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ENVIRONMENTAL ASSESSMENT

JOHN SEVIER FOSSIL PLANT ADDITION OF GAS-FIRED COMBUSTION TURBINE/COMBINED-CYCLE GENERATING CAPACITY AND ASSOCIATED GAS PIPELINE

Hawkins County, Tennessee

PREPARED BY:
TENNESSEE VALLEY AUTHORITY

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

~	Approximately
>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to
$\mu g/m^3$	Micrograms per Cubic Meter
7Q10	The minimum seven-day flow that occurs once in 10 years
APE	Area of Potential Effect
ARAP	Aquatic Resources Alteration Permit
ATWS	Additional Temporary Workspaces
BACT	Best Available Control Technology
BMPs	Best Management Practices
CAA	*Clean Air Act*
CC	Combined Cycle
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CT	Combustion Turbine
dB	Decibels
dBA	Decibels A-Weighted
DER	Draft Environmental Resource (Report[s])
EA	Environmental Assessment
EO	Executive Order
ESA	*Endangered Species Act*
E&SCP	Erosion and Sedimentation Control Plan
ETNG	East Tennessee Natural Gas LLC
FERC	Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
GHGs	Greenhouse Gases
H_2SO_4	Sulfuric Acid
HAP	Hazardous Air Pollutant
HRM	Holston River Mile
HRSG(s)	Heat Recovery Steam Generator(s)
I-	Interstate Highway
IPCC	Intergovernmental Panel on Climate Change
IPPP	Integrated Pollution Prevention Plan
JSF	John Sevier Fossil Plant
kV	Kilovolt
lbs/hr	Pounds per Hour
Ldn	Day-Night Noise Level
Leq	Equivalent Sound Level
MACT	Maximum Achievable Control Technology
MSDS	Material Safety Data Sheets
MGD	Millions of Gallons per Day
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
MW	Megawatts
MWh	Megawatt Hour
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*

NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	Ozone
P	Phosphorus
Pb	Lead
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter Whose Particles are Less Than or Equal to 10 Micrometers
PM_{10}	Particulate Matter Whose Particles are Less Than or Equal to 2.5 Micrometers
PO_4	Phosphate
POTW(s)	Publicly Owned Treatment Work(s)
ppb	Parts per Billion
ppm	Parts per Million
PSD	Prevention of Significant Deterioration
ROW(s)	Right(s)-of-Way
SC	Simple Cycle
SCR	Selective Catalytic Reduction
SFI	Sport Fishing Index
SHPO	State Historic Preservation Officer
SNCR	Selective Noncatalyic Reduction
SO_2	Sulfur Dioxide
SO_3	Sulfur Trioxide
SPCC	Spill Prevention Control and Countermeasures
SR	State Route
Std	Standard
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
TVARAM	Tennessee Valley Authority Rapid Assessment Method (for Wetland Delineation)
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
VSMP	Vital Signs Monitoring Program

CHAPTER 1

1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1. Purpose and Need

The Tennessee Valley Authority (TVA) proposes to construct and operate a new gas-fired combustion turbine/combined-cycle (CT/CC) generating plant on the site of its John Sevier Fossil Plant (JSF) adjacent to the Holston River in Hawkins County, Tennessee (see Figure 1-1). The CC plant would be operated to provide TVA with intermittent to base-load generation and help TVA meet obligations to reduce nitrogen oxides (NOx) and sulfur dioxide (SO_2) emissions under the *Clean Air Act* (CAA) and an Order issued by the U.S. District Court for the Western District of North Carolina. Under that Order, TVA is required to install NOx and SO_2 emission controls on its coal units at JSF by January 1, 2012. Construction and operation of the CC plant would provide the needed generation to meet the power needs of the power transmission system and would allow TVA to meet the emission limits and court-ordered timetable for emission reductions for JSF. Compliance with the Order requires installation of selective catalytic reduction (SCR) technology and flue gas desulfurization (FGD) equipment, also known as scrubbers, to reduce NOx and SO_2 emissions.

1.2. Proposed Action

TVA's action is the proposed construction and operation of a new CC facility at JSF. The footprint for the facility would occupy approximately 55 acres on the JSF Reservation (see Figure 1-2), and the estimated construction duration would be about 24 to 26 months. The CC plant would be constructed in two phases. The first phase would include construction of three simple-cycle (SC) CTs; the second phase would modify the SC CTs to CC CTs by incorporating a heat recovery steam generator (HRSG) system. The proposed plant would be capable of operating in either an SC configuration or a CC configuration (see Section 1.3). The SC configuration would have a capacity of 579 megawatts (MW) while the CC configuration would have a capacity of 878 MW. The SC and CC configurations are proposed to be online January 1, 2012, and June 1, 2012, respectively.

A dependable supply of natural gas must be delivered to the CC plant to enable the plant to operate. Natural gas is a clean and inexpensive fuel for the generation of electric power, either peaking or base load. Preliminary estimates indicate that as much as 150 million dekatherms per day of natural gas would be needed for the CC plant. This demand would require a pipeline equivalent to 24 inches in diameter at 500 to 1,000 pounds per square inch of pressure. TVA proposes to contract with East Tennessee Natural Gas LLC (ETNG) to deliver gas to the plant. This would require ETNG to construct and upgrade approximately 28 miles of pipeline to deliver gas to the site. The proposed pipeline route would be located in Washington County, Virginia, and Greene, Hawkins, Sullivan, and Washington counties, Tennessee.

This environmental assessment (EA) is being prepared to inform TVA decision makers and help the public understand about the environmental consequences of adding a gas-fired CC electric generation plant at the JSF site. The EA presents the environmental evaluation of CC plant construction and operation and of the construction and upgrades of a natural gas pipeline. The decision TVA must make is whether to construct and operate a gas-fired CC electric generation plant at the JSF site.

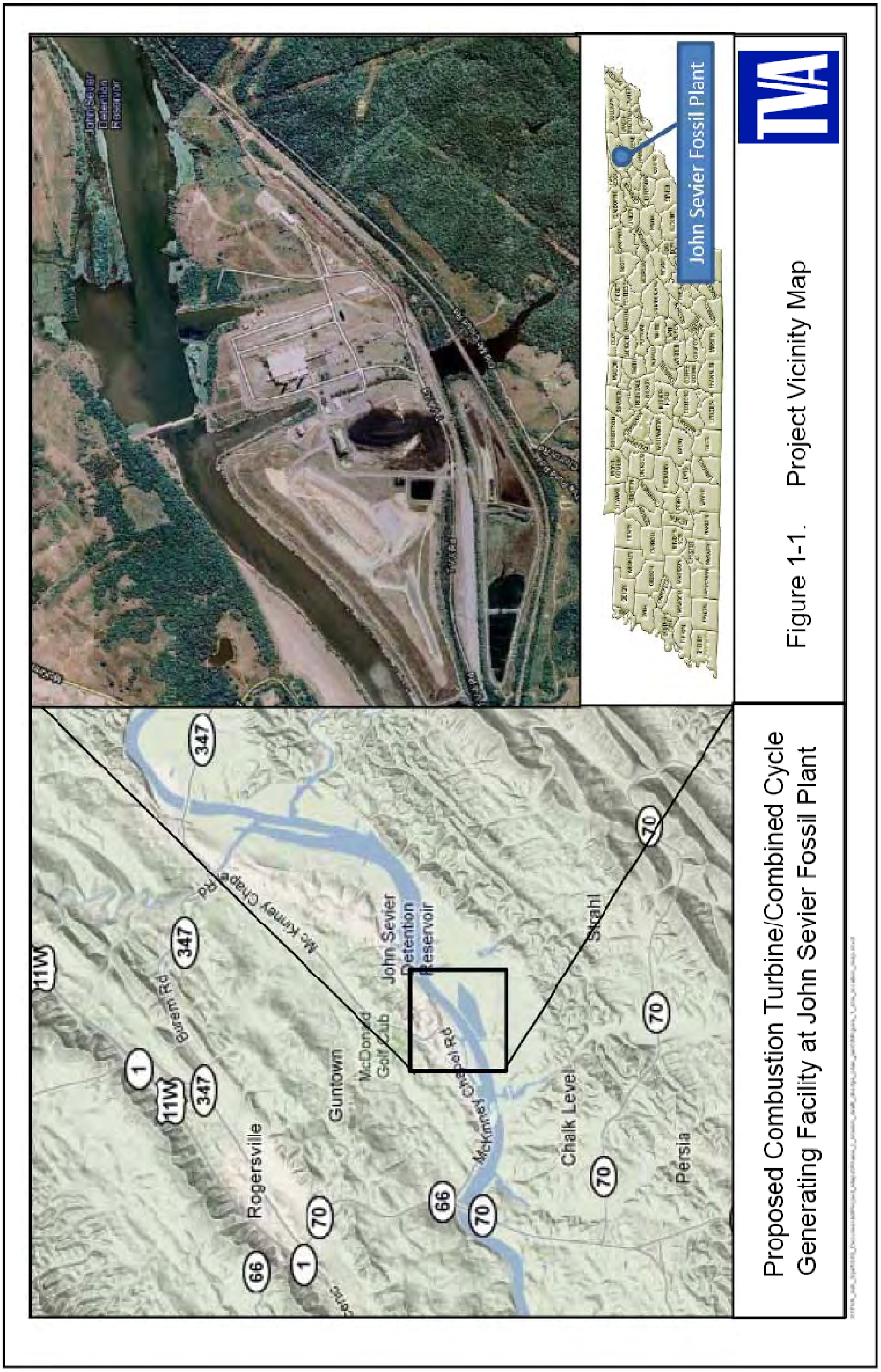

Figure 1-1. **Project Vicinity Map for Proposed Combustion Turbine/Combined-Cycle Facility**

Figure 1-2. Estimated Footprint for the Proposed John Sevier Combustion Turbine/Combined-Cycle Facility

1.3. Background

1.3.1. Nitrogen Oxide and Sulfur Dioxide Emissions

NOx emissions are a precursor to ozone formation. NOx is a generic term for mono-nitrogen oxides (nitric oxide and nitrogen dioxide [NO_2]). These oxides are produced during combustion processes in motor vehicles, power plants, and other facilities, especially at high temperatures. In areas of high motor vehicle traffic, such as in large cities, the amount of NOx emitted into the atmosphere can be considerable. NOx is emitted through exhaust systems and dissolves in the water vapor in the atmosphere, contributing to the formation of acid rain and high ground-level ozone concentrations.

Reduction of NOx can be achieved through boiler optimization, low-NOx burners, selective noncatalytic reduction (SNCR), low-dust SCR, and high-dust SCR. TVA has installed SNCR and SCR technology at several fossil plants, and by 2008, reduced its summer NOx emissions by 81 percent from 1995 levels. NOx emissions at JSF were reduced by about 20 percent when low-NOx burners were installed at all four units in 1995. TVA is planning to install and operate SCR technology to reduce NOx at JSF.

Sulfur is present in coal as an impurity and reacts with oxygen to form SO_2 when the coal is burned. Reduction of SO_2 emissions is typically achieved through use of fuel desulfurization methods, switching to low-sulfur coal, or the use of scrubbers. TVA uses all of these technologies in meeting regulatory requirements at its 11 coal-fired plants; however, there is not a single collective solution. The current strategy for maintaining SO_2 emissions compliance at JSF involves the use of low-sulfur coal with the planned addition of SO_2 scrubbers in the future.

1.3.2. Simple-Cycle Versus Combined-Cycle Electric Generation

SC configuration describes the condition where the only useful energy captured for electricity generation is captured from the expansion of gases, which occurs when natural gas is combusted in the presence of air. The gases of combustion pass through a turbine attached to a generator, which produces electricity as the turbine shaft turns. Figure 1-3 shows a block diagram of turbines operating in both SC and CC modes of operation. In a CC configuration, the products of combustion, after leaving the CT, pass through a heat recovery system, which converts this useful energy to steam. This steam is used in a steam turbine to produce additional electric power.

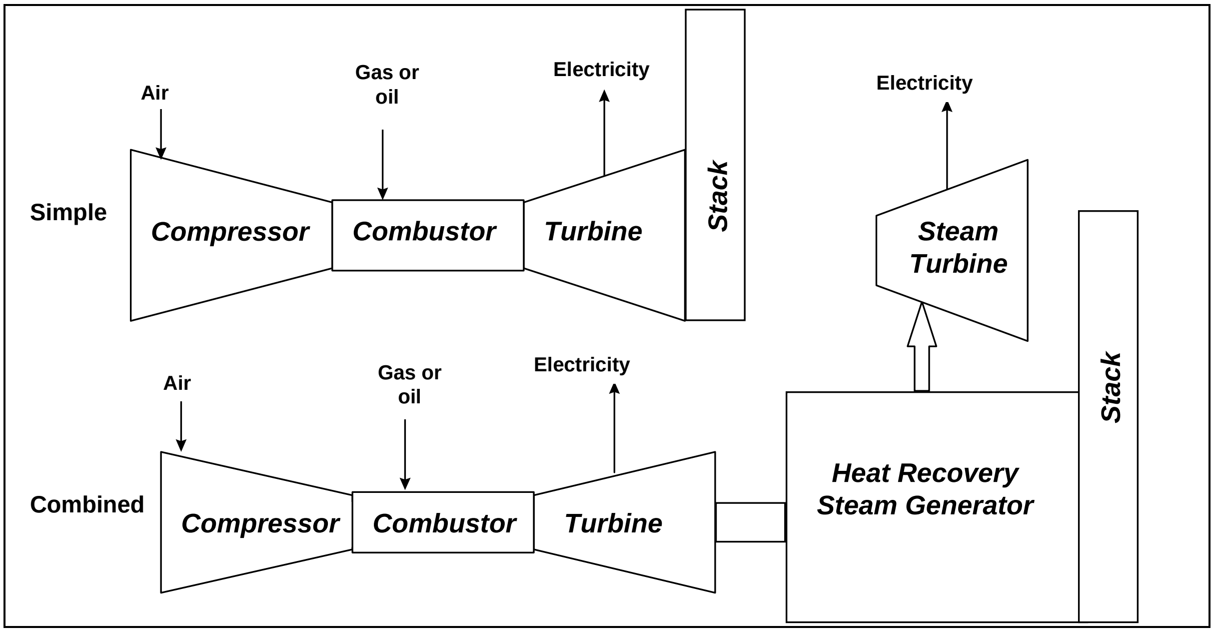

Figure 1-3. Simple-Cycle Versus Combined-Cycle Combustion Turbines

Key characteristics of SC and CC operations are contrasted in Table 1-1. Because of their lower capital cost, SC turbine plants are best suited for supplying peaking power (characterized by relatively infrequent use and low annual capacity factors), while CC systems with their more complex heat exchange and steam turbine components are better suited for continuous base-load operation. Continuous operation is consistent with meeting the intermediate to base-load power requirements of TVA, while intermittent operation is inherent in meeting peaking power requirements, which can change within minutes. The typical startup time for a coal-fired boiler is eight to 12 hours. The typical startup time for a natural gas or fuel oil-fired CT operating in SC mode is 10 to 30 minutes and from CT to CC mode is four to six hours.

Table 1-1. Simple- Versus Combined-Cycle Unit Characteristics

Type of Cycle	Typical Use	Efficiency	Cost to Construct	Operating Cost/kilowatt-hour
Simple	Peaking	~35%	Low	High
Combined	Intermediate to Base Load	~50%	High	Low

1.4. Proposed Construction and Operation

1.4.1. Combustion Turbine/Combined-Cycle Plant Construction and Operation

Construction and operation of the CT/CC plant would include the following:

- Construction and operation of three CT[1]generators with inlet evaporative cooling; HRSGs with duct burners; one reheat condensing steam turbine generator; a natural gas-fired auxiliary boiler; two natural gas-fired dew-point gas heaters; a

[1] Both natural gas and low-sulfur, No. 2, fuel oil are utilized by the CTs. These units will primarily burn natural gas but have the capability of using low-sulfur, No. 2, fuel oil on a secondary basis.

diesel engine-driven emergency firewater pump; a multiple-cell cooling tower; and two distillate-oil storage tanks.

- Transport of major equipment, including generators, to the JSF site.
- Operations within air permit limits as established under a nonattainment New Source Review (NSR) and sitewide cap for NOx, carbon monoxide (CO), volatile organic compounds (VOC), and particulate matter (PM). Once the CC plant is operating, TVA will monitor all air permitted emissions.
- Withdrawal of maximum 7.21 millions of gallons per day (MGD) of CC process water through use of retention dam or TVA operation of upstream dams. Debris may need to be cleared from the existing intake structure prior to operation. If this were the case, then this action would be undertaken as described in TVA's 2005 EA, *John Sevier Fossil Plant Intake Debris Removal Environmental Assessment.*
- Construction and monitoring of a water retention pond to ensure process water discharge meets state requirements. The pond would be cleaned once every five years to remove accumulated solids, which would be analyzed and disposed of in an approved facility.
- Compressor wash water would be collected and disposed off site at an approved wastewater treatment facility.
- Employment of up to 600 workers during peak plant construction of about 16 months, dropping to less than 200 workers once major construction is complete.
- During and after construction, standard storm water best management practices (BMPs) would be implemented so that surface water runoff from parking lot and industrially used areas of the site would be diverted to retention ponds with controlled releases.

1.4.2. Gas Pipeline Construction and Operation

Operation of the proposed JSF CC facility would require the construction and operation of a new 8.4-mile-long JSF mainline extension, 7.9-miles of new pipeline looping segment, and upgrades to approximately 11.7 miles of existing gas pipeline. Additionally, the pipeline project would include constructing a new meter station, a new regulator, and modifications to four existing compressor stations to supply fuel for the proposed CT/CC plant (see Figure 1-4).

Figure 1-5 shows the proposed gas pipeline system overview map. Proposed gas pipeline construction and upgrade activities include the following:

New Gas Pipeline

- Construction of approximately 8.4 miles of new 24-inch-diameter natural gas mainline extension (John Sevier Mainline Extension and installation of a new meter facility at the terminus of the new pipeline). This pipeline would be installed adjacent to TVA's Greeneville 161-kilovolt (kV) transmission line right-of-way (ROW) in Hawkins and Greene counties, Tennessee.

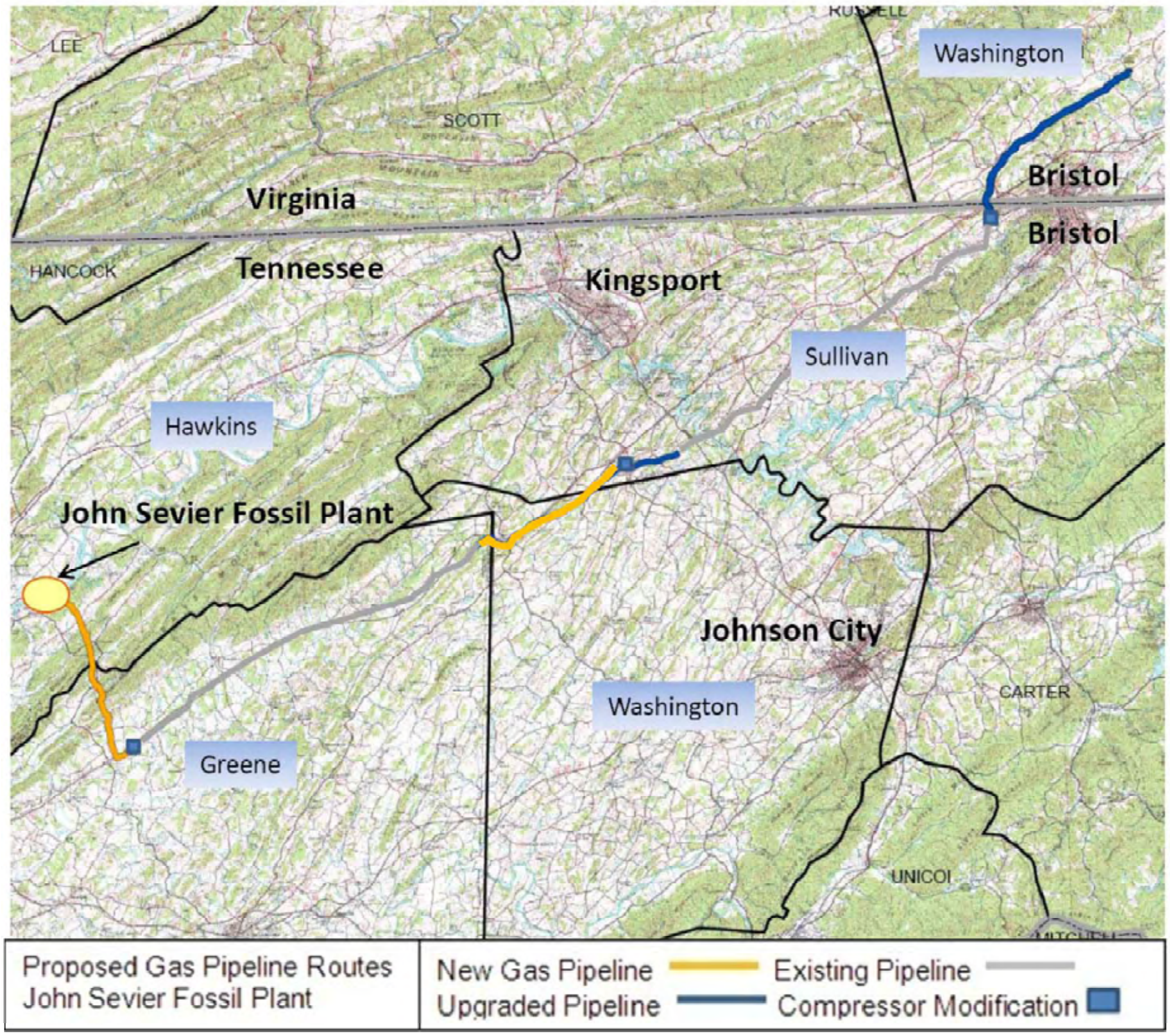

Figure 1-4. Proposed Gas Pipeline System Vicinity Map

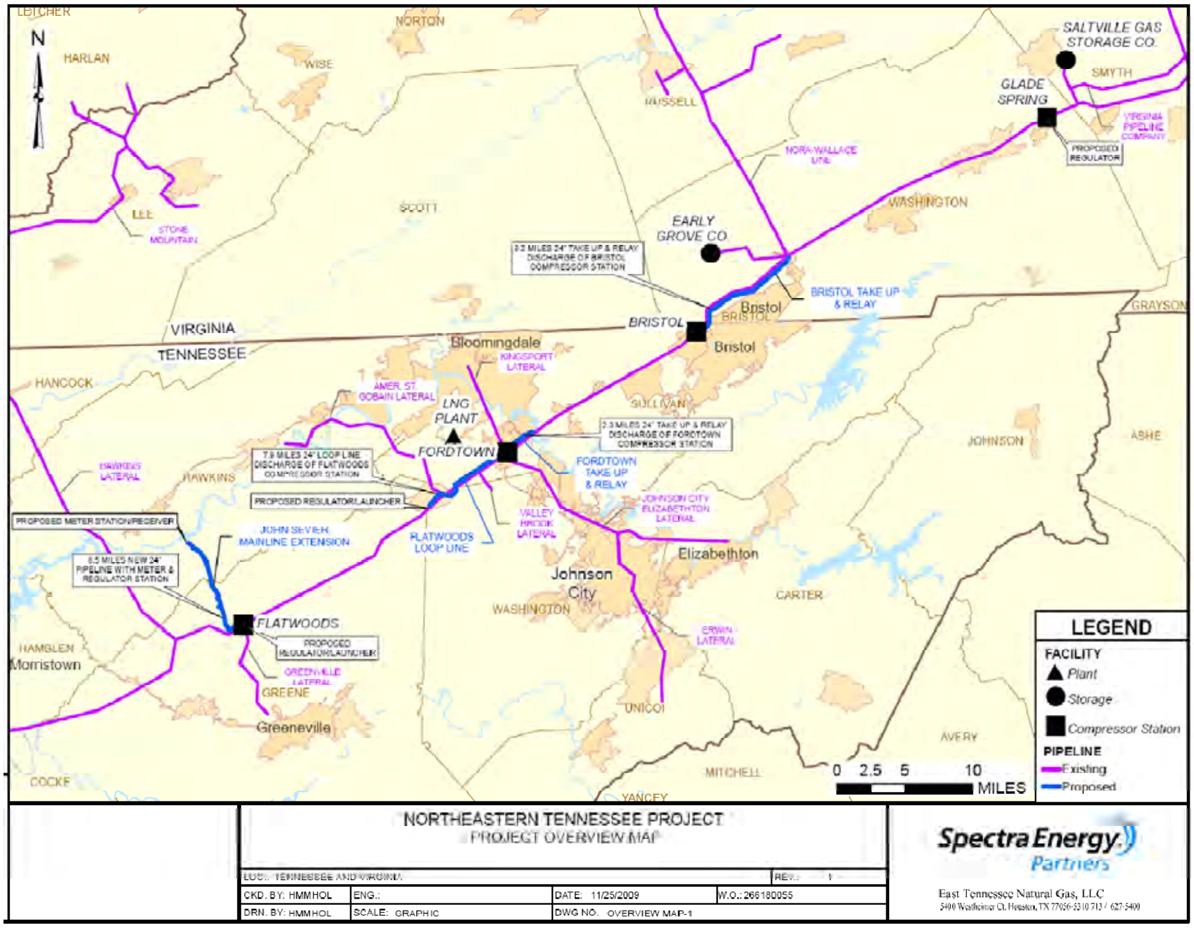

Figure 1-5. Proposed Gas Pipeline System Overview Map

- Addition of approximately 7.9 miles of new 24-inch-diameter natural gas pipeline looping segment (Flatwoods Loop) to the existing Fordtown Compressor Station in Greene, Sullivan, and Washington counties, Tennessee.

- Installation of a new regulator (Flatwoods Regulator Station) at the beginning of the Flatwoods Loop in Greene County, Tennessee.

Gas Pipeline Upgrades

- Removal and replacement of approximately 2.4 miles of existing 12-inch-diameter pipeline with 24-inch-diameter pipeline, including new piping connections at the existing compressor station (Sullivan County, Tennessee).

- Removal and replacement of 9.2 miles of existing 8-inch-diameter pipeline with new 24-inch-diameter pipeline (Sullivan County, Tennessee, and Washington County, Virginia), including new piping connection at the existing compressor station.

- Modification and installation of regulation and piping at the four existing compressor stations in Greene, and Sullivan counties, Tennessee, and Washington County, Virginia.

1.5. Other Pertinent Environmental Reviews or Documentation

Several environmental reviews have been prepared for actions related to the proposed construction and operation of a CT/CC facility and the construction and upgrades of the associated gas pipeline system. The finding in these documents related to this EA are summarized and incorporated by reference as appropriate.

John Sevier Fossil Plant Intake Debris Removal Environmental Assessment (TVA 2005). This EA established protocols for future routine maintenance necessary to maintain the raw water intake structure for the JSF facility.

John Sevier Fossil Plant Units 1 Through 4 Control Systems for Reduction of Nitrogen Oxides Environmental Assessment (TVA 2006a). This EA evaluates six options for the further removal of NOx from coal combustion gases at JSF. This EA discusses TVA's strategy to reduce NOx to benefit regional air quality.

Generic Environmental Assessment for the Purchase of Additional Combustion Turbine Capacity (TVA 2006b). This EA evaluates the impacts of TVA's proposal to purchase and operate existing CT or CT/CC plants located in or near the TVA region.

Installation of Flue Gas Desulfurization System on John Sevier Fossil Plant Draft Environmental Assessment (TVA 2009a). TVA prepared a draft EA for a proposal designed to help reduce SO_2 emissions at JSF by installing dry scrubber technology. However, the EA was not finalized as TVA is still investigating emission-control technologies for JSF.

Northeastern Tennessee Project Draft Environmental Assessment (SpectraEnergy Partners 2010). ETNG prepared a draft EA in cooperation with the U.S. Army Corps of Engineers (USACE) for a proposal to construct and upgrade the 28.0 miles of pipeline to provide natural gas transmission service for the proposed TVA gas-fired facility on the JSF Reservation.

1.6. Public Involvement

Gas Pipeline Route

Public participation in determining the scope of the ETNG gas pipeline portion of this environmental review began in August 2009 when ETNG announced dates for three public meetings to be held on August 25 in Bristol, Virginia, August 26 in Rogersville, Tennessee, and August 27 in Fall Branch, Tennessee. The public meetings were held to seek input from landowners, government agencies, and interested parties to identify potential issues related to the proposed gas pipeline. The meetings were publicized through notices in local media. Sixty-seven individuals attended the three meetings, and most were landowners in the pipeline project area.

On October 22, 2009, the FERC issued a notice of intent (NOI) in the *Federal Register.* The NOI was mailed to 176 interested parties including federal, state, and local officials, agency representatives, conservation organizations, Native American tribes, local libraries and newspapers, and property owners in the vicinity of the proposed gas pipeline route. The NOI announced that ETNG would be preparing an EA for FERC and invited interested parties to comment on the scope of the proposed gas pipeline project.

Four comment letters were received from federal and state agencies, and one comment letter was received from an individual. Issues and concerns raised by commenters were considered in the development of the pipeline project and are addressed in the draft EA that was prepared by ETNG, *Northeastern Tennessee Project Draft Environmental Assessment* (SpectraEnergy Partners 2010)

1.7. Scope of the Analysis

The geographic scope of this analysis includes the proposed 55-acre facility site on the JSF Reservation (Figure 1-2) and the areas that would be impacted by the gas pipeline construction activities (Figure 1-4). TVA's JSF is located in Hawkins County on 750 acres of land south of the Holston River on Cherokee Reservoir near Holston River Mile (HRM) 106. The pipeline construction activities would affect about 415 acres of land in Tennessee and Virginia, 225.4 acres of open land and 115.6 acres of forested land. Approximately 29.9 acres of open land and 30.6 acres of forested land would be permanently impacted. Impacts to the remaining 354 acres would be temporary.

Through internal scoping of the proposed action, TVA has determined that floodplains would not be adversely impacted by the proposed project. The evaluation and resulting findings satisfy the requirements of Executive Order (EO) 11988, Floodplains Management.

There would be no adverse socioeconomic impacts or disproportionate effects to minority or low-income populations, and there would be no effects to prime or unique farmland, parks or, natural areas. Similarly, no modification to recreational opportunities, navigation, or wild and scenic rivers would be involved. This EA further evaluates the following resource areas for potential impacts:

- Air Quality
- Noise
- Surface Water Quality
- Wetlands
- Aquatic Ecology
- Terrestrial Ecology

- Endangered and Threatened Species
- Cultural Resources
- Visual Resources
- Socioeconomics and Environmental Justice
- Transportation

1.8. Environmental Permits and Applicable Regulations

The proposed action is subject to the following environmental permit requirements and regulations. A summary of the environmental permits and applicable regulations is in Appendix A.

- Air Construction Permit and modification of existing Title V Permit
- NSR to determine if the facility meets the requirements of the Prevention of Significant Deterioration (PSD) regulations (40 CFR § 52.21)
- New Source Performance Standards, which impose emission standards on new facilities (40 CFR Part 60)
- Hazardous Air Pollutant (HAP) regulations for specific categories and subcategories of HAPs (40 CFR Part 63)
- Tennessee Air Pollution Control Regulations
- Aquatic Resources Alteration Permit (ARAP)
- *Clean Water Act* Section 404 Permit
- Modification of the existing National Pollutant Discharge Elimination System (NPDES) Permit for JSF
- Coverage under the Construction Storm Water Permit
- Standard BMPs and Integrated Pollution Prevention Plan (IPPP) for the addition of new ponds, switchyards, and fuel tanks

Section 26a of the *TVA Act* requires that TVA approval be obtained before any construction activities can be carried out that would affect shoreline of the TVA reservoirs or in the Tennessee River or its tributaries. Section 26a regulations apply to the proposed gas pipeline. However, permits are not required for certain types of activities that do not constitute the construction of an obstruction according to TVA Guideline 4.3.4 (No Objection Determinations). These conditions are summarized below:

1. Excavation (dredging) of a new channel or enlargement of an existing channel is not construction of an obstruction unless it involves blocking, restricting, or draining the old channel and unless the material removed is piled in or along the stream, river, or reservoir in such a way as to create an obstruction.

2. Excavation of a trench for a submarine sewer, telephone, or other utility line, in which the trench is backfilled to the original contour and is located outside the area

of a marked navigation channel does not create an obstruction (Section 26a approval is required for trenches excavated in the marked navigational channel).

3. Directional borings under streams or rivers (under a marked navigation channel or not) for the installation of utilities or pipelines where no new obstructions are permanently placed within the floodplain and the contour of the stream or riverbed is not altered are not considered obstructions.

4. Construction on, over, or along temporary, intermittent, seasonal, or wet-weather streams or drainages do not constitute obstructions.

5. Discharges into the Tennessee River system are not obstructions unless they are made through or by an obstruction (outfall pipe, etc.) subject to TVA approval.

6. Replacement of bridges or culverts of the same or greater hydraulic capacity, creating no new or additional obstruction, and within the same highway alignment are not new obstructions and are to be considered maintenance activity.

Under TVA Guideline 4.3.4, TVA has made a No Objection determination for the proposed pipeline construction activities covered under Conditions 2, 3, and 4; therefore, 26a approval would not be required.

CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternatives

TVA has determined that there is one Action Alternative to meet the purpose and need defined in Section 1.4. This alternative and a No Action Alternative were evaluated in this EA and described below.

2.1.1. Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not construct a new gas-fired facility, and construction of a natural gas pipeline to serve the proposed CC plant would not be completed. TVA would continue to operate the JSF facility under the current operating plans, which include the planned installation of NOx and SO_2 reduction systems. The construction and operation of these systems are described in detail in two EAs (TVA 2006a; 2009a) listed in Section 1.5.

Under this alternative, TVA would be able to continue to provide reliable, low-cost power and to meet all CAA requirements in the *North Carolina v. TVA* lawsuit, once the plans to install SCRs and scrubbers are implemented. However, as described above, TVA could not meet the court-imposed schedule for SCR and scrubber installation and still maintain system reliability.

2.1.2. Alternative B – Construct and Operate New John Sevier Combined-Cycle Plant and Associated Gas Pipeline System

Under the Action Alternative, TVA would construct and operate a new gas-fired CT/CC facility on the JSF Reservation. This facility would initially have 579 MW of SC capacity available by December 31, 2011, with a total CC capacity of 878 MW available by June 1, 2012. Additionally, construction of approximately 16.3 miles of new gas pipeline to supply fuel for the proposed JSF CT/CT plant and removal and upgrades of approximately 11.7 miles of existing pipeline would be completed. TVA would utilize the existing JSF infrastructure, such as the transmission lines and raw water intake systems, in a manner that allows greater flexibility in generating and transmitting power at the JSF reservation site. Additionally, the intake structure may need to be cleared of debris prior to operation.

The CT/CC plant would consist of three CT generators with inlet evaporative cooling; three HRSGs; one reheat condensing steam turbine generator; one natural gas-fired auxiliary boiler; two natural gas-fired dew-point gas heaters; one diesel engine-driven emergency firewater pump; one multiple-cell cooling tower; and two distillate-oil storage tanks.

In addition to the major equipment systems, the proposed facility includes plant equipment and systems such as natural gas metering and handling systems; instrumentation and control systems; water treatment, storage, and handling; transformers; and administration and warehouse/maintenance buildings. Water treatment equipment would be required to support the steam turbine and HRSG feed water.

Proposed Combustion Turbine/Combined-Cycle Project Footprint

Construction of the proposed CC plant would be a two-phase project with construction starting as early as April 2010, and operation as early as January 1, 2012. Phase 1 would be the construction of the SC/CCs capable of generating 579 MW, and Phase 2 would be the construction of a CC plant capable of generating an additional 300 MW. The new CC plant net output would be approximately 878 MW.

The projected construction period for construction of a CC plant is about 24-26 months. This does not reflect the construction workforces needed for pipeline construction, whose work is not centralized at one location for any significant period of time. The maximum projected CT workforce size is 600 people during peak construction.

Process wastewater and cooling tower blowdown for the plant would discharge to a pond. A wastewater discharge line and suitable discharge/diffuser structure would be constructed for the CC plant.

Plant Operations

Operation of the units would be dispatched by TVA's Power System Control Center in Chattanooga, as needed, based on the cost of operation and the demand for power. The new CC plant net output would be approximately 878 MW. Expected plant operation is based on operating experience at the current TVA CT plants. The units would operate on natural gas or fuel oil, although natural gas is the fuel of choice and would be used except when it could not be economically obtained or if there were a problem with the natural gas supply.

Gas Pipeline Construction

Typical pipeline construction practices and activities are designed to meet standards set by the U.S. Department of Transportation's (USDOT) Office of Pipeline Safety and are contained in Title 49 of the Code of Federal Regulations, Part 192 (49 CFR 190-199). Normal pipe wall thickness and details of pipeline construction would be selected to provide maximum safety and to comply with the USDOT construction requirements. Additional pipeline construction details and information about pipeline testing, reliability, and safety are contained in Appendix B.

The construction and upgrades would be carried out by ETNG, a subsidiary of SpectraEnergy Partners, the owner and operator of the existing pipeline and compressor stations. ETNG would own, operate, and maintain the new pipeline system delivering gas to the CC facility in accordance with the requirements of the USDOT. ETNG has proposed construction to begin in mid-March 2011 with an anticipated in-service date in September 2011. Pipeline construction duration is anticipated to be about 6.5 months.

The pipeline construction and upgrade project occurs within Washington County, Virginia, and Greene, Hawkins, Sullivan, and Washington counties, Tennessee, and would affect about 415 acres of land. Approximately 61 acres would be maintained as permanent pipeline easement, aboveground facilities, and new permanent access roads.

Pipeline construction and operations would require the construction of two new access roads impacting about 0.10 acre. Two new access roads would be constructed from the nearest improved (i.e., state or county) road to permit access for construction and maintenance during pipeline operation. The roads would consist of crushed limestone base and any necessary culverts, gates, etc. Existing access roads may require minor upgrades, such as road surface grading, additional gravel, and tree trimming to support construction activities.

Construction activities would temporarily impact about 354 acres with the creation of construction laydown areas and temporary construction buffers. Furthermore, to allow for the safe operation and staging of equipment and materials for the gas pipeline construction, additional temporary workspaces (ATWS) would be required for crossing roads, water bodies, wetlands, pipe bending, steep slope terrain, and at the beginning and/or end of the pipeline to allow for equipment mobilization. The extent of ATWS is determined on a site-specific basis and would be restricted to the smallest size necessary to construct the pipeline safely. In the case of water bodies, ETNG plans to locate the ATWS in accordance with the setback requirements contained in the FERC (2003a) *Wetland and Water Body Construction and Mitigation Procedures* (FERC Procedures) where feasible.

Gas pipeline construction ROWs would generally be 100 feet wide, with the exception of use of a reduced 75-foot-wide construction ROW in wetland areas. However, a 125-foot-wide ROW would be used as necessary during construction to allow for topsoil segregation in cultivated fields and improved pastures, side slope construction (0 to 48 degrees), and rock storage. Some of the conditions considered in determining ROW size include proximity to existing residences, topography, soils, bedrock, and water bodies.

Following pipeline construction, permanent ROWs would be 50 feet wide. The temporary ROW, laydown areas, and ATWS would be restored and allowed to return to the previous condition. The construction ROW would be designed to affect only necessary acreage to construct the proposed project safely. The permanent ROW would be maintained as low-growing herbaceous vegetation. There would be vegetation clearing within the permanent ROW every three years, with the exception of a 10-foot-wide strip centered on the pipeline route that may be mowed annually.

The gas pipeline facilities would be constructed and maintained in accordance with the FERC (2003b) *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and FERC 2003a Procedures. The construction of a natural gas pipeline to serve the JSF CC plant would require several sequential activities. These activities are generally conducted by separate crews that specialize in particular facets of pipeline construction.

- *Right-of-Way Acquisition* - Typical ROW acquisition width to be acquired from landowners is 100 feet (the typical permanent ROW easement for operation is 50 feet with an additional 50-foot temporary easement for construction). ETNG would negotiate with landowners for both construction and permanent ROW easements.
- *Survey and Staking* - The pipeline alignment would be surveyed. Other pipeline crossings would be marked.
- *Clearing* - In upland areas, trees and brush in the path of the construction ROW would be cleared. The woody debris would be burned or buried.
- *Trench Excavation* - Backhoes or trenching machines would be used to excavate a 7- to 9-foot-deep trench. The trench would be installed to provide for approximately 3 feet of cover over the pipelines as required by 49 CFR Part 192 of the USDOT regulations. To provide working room in the trench, the width of the excavation would be 5 to 7 feet. Soil removed from the ditch would be placed within the construction ROW and used for cover.
- *Blasting* - About 9 miles of the proposed pipeline route segments would cross areas of shallow bedrock. Approximately 5.5 miles of this bedrock is considered

soft and would not likely require blasting. The remaining 3.5 miles of gas pipeline would cross hard bedrock that may require blasting. These activities would adhere to federal and state regulations that apply to controlled blasting and limiting vibration near structures and underground utilities.

- *Water Body Stream Crossing* - Construction at water bodies would be conducted using either a “dry” crossing or “wet” crossing method. The length of the crossing, the sensitivity of the area, existing conditions at the time of crossing, and permit requirements would determine the most appropriate measures to be used. Mobilization of construction equipment, trench excavation, and backfilling would be performed in a manner that would minimize the potential for erosion and sedimentation within the water body channel. Erosion-control measures would be implemented to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas.
- *Stringing* - Once the ditch has been dug, individual segments of pipe would be laid end to end along the ROW using special "stringing" equipment.
- *Bending* - To accommodate moderate changes in vertical or horizontal alignment, a mechanical pipe-bending machine would bend individual segments of pipe to the required angle. If the sharp turns were required, prefabricated fittings would be used to form the turns.
- *Welding and Lowering In* - Crews would weld individual segments together to form longer sections, which would then be lowered into the trench by side-boom tractors. The longer sections would be welded together in the ditch. Welds would be inspected by a qualified third party using radiographic techniques.
- *Coatings* - In addition to factory coatings applied to protect the pipe from corrosion, weld joints would be coated.
- *Backfilling* - The rock and soil removed in the trenching step would then be used to backfill the ditch after the pipeline has been laid. To avoid damage to the line, soil or sand would be placed around the line followed by the rock. The surface would be graded and revegetated to approximate original contour and to meet specific agreements with the landowner.
- *Testing* - Before the pipeline is placed into service, it would be hydrostatically tested. Water from a nearby source would be pumped into the line and pressurized for several hours at pressures that would substantially exceed maximum operating pressures anticipated during service. The test water would contain no chemical additives, and no chemicals would be used to dry the pipeline following the test. At the conclusion of each test, the water would be discharged near the test point at a rate designed to minimize the impacts to the adjoining land and local drainage system. For additional information on the hydrostatic testing of pipelines, see Appendix B.
- *Cleanup* - The final step in the pipeline construction process would be the removal and disposal of any construction debris and the restoration of the surface to its original conditions, including approved revegetation practices and the repair of any fences, gates, or other improvements that may have been affected by the construction.

Modification of compressors and compressor stations would be required to boost gas pressures within the corridor segments. A gas-metering station would be constructed. Metering station facilities would consist of aboveground and underground piping, valves for controlling and activating/stopping flow, and flow-measurement equipment. A small building would be constructed or placed at the station to support and store sensitive equipment and instruments. All aboveground equipment would be enclosed in a chain link fence of suitable height to prohibit access by unauthorized personnel, members of the public, or large farm animals/wildlife. Equipment used would meet USDOT guidelines and design requirements for metering and transporting natural gas.

Pipeline Operations
Following construction of the gas pipeline and its ancillary facilities, the pipeline(s) would be placed into service. Maintenance activities could include periodic mowing of the ROW; performing gas-leak surveys; maintaining fence posts, markers, and decals; performing annual inspection of line ROW (including all water body crossings); performing valve inspections and lubrications; and performing cathodic protection monitoring to prevent corrosion of the steel pipeline.

2.2. Alternatives Considered but Not Selected

2.2.1. Installation of Combined-Cycle Capacity at Greenfield Sites

TVA considered installing new CT/CC capacity at other locations in the northeast region of Tennessee, including TVA's Phipps Bend site. However, acquiring the necessary permits could not be completed in the timeframe needed. Therefore, these alternative locations were eliminated due to the long lead time associated with obtaining environmental permits for greenfield sites.

2.2.2. Install Scrubbers and Selective Catalytic Reduction to Reduce Emissions by December 31, 2011

In order for TVA to reduce NOx and SO_2 emissions by the court-ordered date, TVA would have to install both the scrubbers and SCRs at JSF at the same time. The JSF facility is a major hub in the TVA power system. Installing scrubbers and SCRs at the same time would require TVA to shut down units at JSF for about 20 months, thereby increasing the risk of disruptions to the reliability of the TVA power system. Under this alternative, the power system in the northeast portion of TVA's power service area (Figure 2-1) could become unstable, especially during periods of peak demand, and TVA would not be able to fulfill the mission to provide affordable, reliable power.

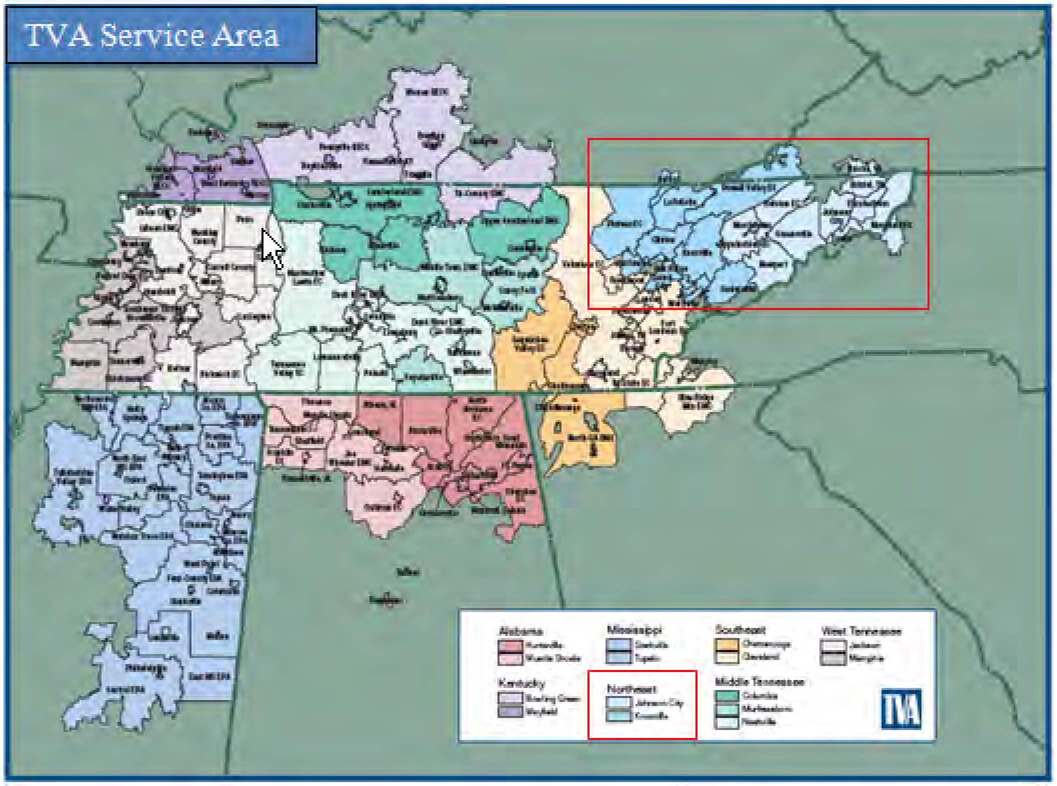

Figure 2-1. TVA Northeast Power Service Area

2.2.3. Comparison of Alternatives

The environmental impacts of the two alternatives are summarized in Table 2-1 below. These summaries are derived from the information and analysis provided in Chapter 3, in the Affected Environment and Environmental Consequences sections of each resource.

2.3. The Preferred Alternative

TVA's preferred alternative is the Action Alternative, under which TVA would construct and operate a new gas-fired CT/CC generating plant on the JSF Reservation. The proposed facility would utilize the existing JSF facility infrastructure such as the transmission lines and raw water intake systems. CT/CC plant operation would require the construction operation, and maintenance of approximately 16.3 miles of new gas pipeline to supply fuel for the new plan and upgrades to approximately 11.7 miles of existing gas pipeline. Under the preferred alternative, TVA would be able to reduce emissions to required levels and provide reliable power to the region served by JSF.

Table 2-1. Comparison of Alternatives Table by Resource Area

Issue Area	No Action Alternative	Proposed Action Alternative
Air Quality	Although local and regional air quality would improve with the installation and operation of scrubbers and SCRs, improvements to air quality from emissions reductions would not be significant.	Impacts to local and regional air quality would be minor with the addition of the CC capacity; overall, the air quality impact of construction- and operation-related activities for the project would not be significant.
Noise	Noise levels at nearby residences would be minor and temporary during the planned construction of scrubbers and SCRs at JSF. Impacts from operation of JSF would not have a measurable noise impact on nearby residences.	Noise levels at nearby residences would be minor compared with background noise without trains or coal unloading, although the community reaction is expected to be “slight.” Noise generated from the CT and pipeline construction and operation are not expected to cause an adverse impact.
Surface Water Quality	Construction impacts to water quality would be minor with the implementation of standard BMPs. Planned operation of the scrubbers and SCRs would have a minor impact on water quality.	Impacts would be minor with discharge from the blowdown pond to the Holston River. Facility and pipeline construction impacts would be minor with the implementation of standard BMPs.
Wetlands	Continued plant operation and planned construction of scrubbers and SCRs would not impact wetlands.	There would be no impacts to wetlands on the JSF Reservation site. Minor temporary impacts to wetlands from new pipeline construction and conversion of 0.02 acre of scrub-shrub to emergent wetlands are anticipated.
Aquatic Ecology	Aquatic ecology impacts would be minor.	Aquatic ecology impacts would be minor.
Terrestrial Ecology - Plants	None with the revegetation with native or nonnative noninvasive species.	None with the revegetation with native or nonnative noninvasive species.
Terrestrial Ecology-Animals	Impacts to terrestrial animals would be minor.	Impacts to terrestrial animals would be minor.
Endangered and Threatened Species	There would be no impacts to endangered or threatened species.	There would be no effect on endangered or threatened species with implementation of mitigation measures to minimize potential impacts to Indiana bats.
Cultural Resources	There would be no impacts to cultural resources.	None with avoidance of identified sites.
Visual	Visual impacts would be minor.	Visual impacts would be minor.

Issue Area	No Action Alternative	Proposed Action Alternative
Socioeconomics	Socioeconomic impacts would be minor.	Socioeconomic impacts would be minor.
Transportation	Transportation impacts would be minor.	Transportation of large and heavy plant equipment would adversely affect some motorists. However, anticipated impacts would be short-term traffic delays and traffic reroutes. Any damage to roadways or bridges resulting from the equipment transport would be repaired. Therefore, anticipated impacts would not be long-term or major.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The existing conditions of environmental resources in the project area and the potential effects of the proposed actions on these resources are described in this section. The affected environment descriptions below are based on field surveys conducted in 2009, on published and unpublished reports, and personal communications with resource experts. As previously described in Section 1.6, the proposed action would not affect navigation, natural areas, recreation, or prime farmland. It would also comply with applicable floodplain regulations. Therefore, these resources are not described further in this document.

3.1. Air Quality

3.1.1. Affected Environment

John Sevier Fossil Plant Site

The proposed JSF CC facility would be subject to both federal and State of Tennessee air permitting regulations. These regulations impose permitting requirements and specific standards for expected air emissions. The standards and regulations that pertain to the proposed facility include:

- NSR to determine if the facility meets the requirements of the PSD regulations (40 CFR Part 52.21)
- New Source Performance Standards, which impose emission standards on new facilities (40 CFR Part 60)
- Hazardous Air Pollutant (HAP) regulations for specific categories and subcategories of HAPs (40 CFR Part 63)
- Tennessee Air Pollution Control Regulations

Through its passage of the CAA, 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:

- nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- carbon monoxide (CO)
- lead (Pb)
- particulate matter whose particles are <10 micrometers (PM_{10})
- particulate matter whose particles are <2.5 micrometers ($PM_{2.5}$)
- ozone (O_3)

The primary and secondary NAAQS are shown in Table 3-1. The primary NAAQS standards are to protect humans, notably children, people with asthma, and the elderly, from health risks. The secondary standards prevent unacceptable effects on the public welfare, such as unacceptable damage to crops and vegetation, buildings and property, and ecosystems. Some pollutants have only a primary standard or a secondary standard, and some have both. All standards, other than annual standards, are not to be exceeded more than once per year (except where noted). Areas in violation of the NAAQS are designated as nonattainment areas, and new emissions sources to be located in or near these areas may be subject to more stringent air permitting requirements.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards[a]	
	Level	Averaging Time	Level	Averaging Time
Nitrogen Dioxide (NO_2)	0.053 ppm (100 $\mu g/m^3$)	Annual (Arithmetic Mean)	Same as Primary	
Sulfur Dioxide (SO_2)	0.03 ppm (80 $\mu g/m^3$)	Annual (Arithmetic Mean)	0.5 ppm (1300 $\mu g/m^3$)	3-hour[b]
	0.14 ppm (365 $\mu g/m^3$)	24-hour[b]		
Carbon Monoxide (CO)	9 ppm (10,000 $\mu g/m^3$)	8-hour[b]	No Secondary Standards	
	35 ppm (40,000 $\mu g/m^3$)	1-hour[b]		
Lead (Pb)	0.15 $\mu g/m^3$	Rolling 3-Month Average	Same as Primary	
	1.5 $\mu g/m^3$	Quarterly Average	Same as Primary	
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour[c]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual[d] (Arithmetic Mean)	Same as Primary	
	35 $\mu g/m^3$	24-hour[e]	Same as Primary	
Ozone (O_3)	0.075 ppm (2008 std)	8-hour[f]	Same as Primary	
	0.08 ppm (1997 std)	8-hour[g]	Same as Primary	
	0.12 ppm	1-hour[h] (Applies only in limited areas)	Same as Primary	

Source: 40 CFR Part 50
Abbreviations: ppm = parts per million, mg/m^3 = milligrams per cubic meter, $\mu g/m^3$ = micrograms per cubic meter, std = standard
[a]The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as U.S. Environmental Protection Agency (USEPA) undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. As of June 15, 2005, USEPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact areas. [b]Not to be exceeded more than once per year. [c]Not to be exceeded more than once per year on average over three years. [d]To attain this standard, the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$. [e]To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$. [f]To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008). [g]To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. [h]The primary standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$1.

The feasibility of constructing a CT facility at the JSF site is affected by several air quality considerations. These include dispersion conditions (nearby high terrain, frequency of air stagnation) and regulatory status (attainment of air quality standards, proximity to PSD Class I area). These regulatory constraints are embodied in the NSR provisions of the CAA and in USEPA PSD regulations (USEPA 1990). Sources locating in attainment areas are subject to the PSD NSR rules; sources locating in or affecting areas not meeting air quality standards must comply with nonattainment NSR. An overriding constraint in either NSR program is that no source may cause or significantly contribute to a violation of an ambient air quality standard. The proposed JSF CC project is subject to nonattainment NSR analysis because the site is located in a nonattainment area (Tri-Cities area) for the 8-hour Ozone Standard.

New sources in nonattainment areas are subject to more stringent control requirements than new sources in attainment areas (lowest achievable emission rate versus best available control technology [BACT]). New sources in nonattainment areas are also subject to emission offset rules. Offset rules require the new source owner to obtain certain reductions in emissions from existing sources within the affected nonattainment area to accommodate the new proposed emissions plus an additional 10 to 20 percent of the proposed increase depending on the severity of nonattainment.

PSD rules restrict the increment by which ambient pollutant levels may increase due to emissions from major new sources, or the modification of existing sources, and require the use of BACT on such sources. A CT/CC facility would be a major source if it emits more than 100 tons per year of any PSD-regulated pollutant. An SC CT facility would be a major source if it emits more than 250 tons per year of any PSD-regulated pollutant. As previously acknowledged, the proposed JSF project would be an SC and CC facility. A memorandum listing pollutants currently subject to PSD review was published in the April 28, 1992, *Federal Register* (USEPA 1992). Generally, dispersion modeling is required to demonstrate that pollution levels do not increase beyond the allowable increments. The pollutants subject to review under the nonattainment NSR regulations are NOx and VOC because these pollutants are precursors to ozone formation. However, the emission increases for this proposed facility indicate that the pollutants would not exceed PSD significance levels; therefore, no further PSD analysis is required. For the site considered in this EA, ambient air quality data necessary for PSD analysis purposes are available.

The air quality near the JSF site is generally good. Table 3-2 shows the results of ambient air quality monitoring of criteria pollutants that are considered representative of the site. Hawkins and nearby Sullivan and Greene counties are currently in attainment for all criteria pollutants.

All areas in Tennessee had attained the old 1-hour ozone standard. However, for some areas, attainment of an 8-hour ozone standard of 80 parts per billion (ppb) has been more difficult to achieve. Subsequently on March 27, 2008, USEPA revised the primary and secondary NAAQS for ozone (40 CFR Part 50). The level of the 8-hour primary standard was revised to 75 ppb, and the secondary standard was also revised, making it identical to the revised primary standard.

Table 3-2. Ambient Concentrations of Criteria Air Pollutants Compared With Air Quality Standards

Pollutant	Level of Standard (ppm)[a]	One-Year Maximum or Mean	
		Concentration (ppm)[a]	Percent of Standard
Nitrogen Dioxide (NO_2)	Annual mean (0.053)	0.0099[b]	19
Sulfur Dioxide (SO_2)	Maximum 3-hour average (0.5) Maximum 24-hour average (0.14) Annual mean (0.030)	0.163[c] 0.038[c] 0.0043[c]	33 27 14
Carbon Monoxide (CO)	Maximum 1-hour average (35) Maximum 8-hour average (9)	1.7 1.0[b]	5 11
Lead (Pb)	(µg/m^3) Quarterly mean (1.5)	(µg/m^3) 0.125[b]	8
PM_{10} (Old Standard)	(µg/m^3) Maximum 24-hour average (150)	(µg/m^3) 42[d]	28
$PM_{2.5}$ (New Standard)	Annual average (15) 24-hour average (35)	11.4[c] 31.1[c]	76 89
Ozone O_3 (New Standard)	4th Highest 8-hour average (0.075)	0.074[b]	98

[a]ppm unless otherwise noted; [b]O_3, NO_2, CO, $PM_{2.5}$, and Pb values for Sullivan County, 2008;,[c]SO_2 values for Hawkins County, 2007; [d]PM_{10} values for Greene County, 2001

Greenhouse Gases

Certain substances present in the atmosphere act like the glass in a greenhouse to retain a portion of the heat that is radiated from the surface of the earth. The common term for this phenomenon is the "greenhouse effect," and it is essential for sustaining life on earth. Water vapor and, to a lesser extent, water droplets in the atmosphere are responsible for 90 to 95 percent of the greenhouse effect. Certain gases, primarily carbon dioxide (CO_2), nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are responsible for the rest. These gases are typically referred to as "greenhouse gases" or GHGs. Both man-made and natural processes produce GHGs. Increases in the earth's average surface temperatures linked in part to increasing concentrations of GHGs, particularly CO_2, in the atmosphere are a cause for concern among scientists and policymakers. On the international level, this phenomenon has been studied since 1992 by the United Nations Framework Convention on Climate Change, Intergovernmental Panel on Climate Change (IPCC).

The primary GHG emitted by electric utilities is CO_2 produced by the combustion of coal and other fossil fuels. Hydrofluorocarbon-containing refrigeration equipment is widely used in industry, and these gases are emitted to the atmosphere in small amounts primarily through equipment leaks. Sulfur hexafluoride, which is used as a gaseous dielectric medium for high-voltage (1 kV and above) circuit breakers, switchgears, and other electrical equipment is also emitted in small amounts to the atmosphere. Methane is emitted during coal mining and from natural gas wells and delivery systems.

The global carbon cycle is made up of large carbon sources and sinks. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural and man-made processes (i.e., sources). When in equilibrium, carbon fluxes among these various reservoirs are roughly balanced. Since the Industrial Revolution (i.e., about 1750), global atmospheric concentrations of CO_2 have risen about 36 percent (IPCC 2007), principally due to the combustion of fossil fuels. Within the U.S., fuel combustion accounted for 94.2 percent of U.S. CO_2 emissions in 2006. Globally, approximately 29 billion tons of CO_2 were emitted through the combustion of fossil fuels in 2005, of which the U.S. accounted for about 20 percent. Changes in land use and forestry practices can also emit CO_2 (e.g., through conversion of forestland to agricultural or urban use) or can act as a sink for CO_2 (e.g., through net additions of carbon stored as forest biomass and in soil) (USEPA 2008).

Worldwide man-made annual CO_2 emissions are estimated at 29 billion tons, with sources within the U.S. responsible for 20 percent of this total. U.S. electric utilities, in turn, emit 2.5 billion tons, roughly 39 percent of the U.S. total. In 2007, fossil-fired generation accounted for 63 percent of TVA's total electric generation, and the nonemitting sources of nuclear, hydro, and other renewables accounted for 37 percent.

From 2005 through 2008, JSF emitted an average of 4,999,078 tons of CO_2 per year (Table 3-3). During 2009, JSF emitted approximately 3,739,144 tons of CO_2 and 4.32 tons of CO_2 per megawatt-hour (MWh).

Table 3-3. John Sevier CO_2 Emissions by Calendar Years 2005-2009 (tons)

Year	2005	2006	2007	2008	2009
Tons of CO_2 Emmitted	5,042,793	5,127,786	4,887,748	4,937,983	3,739,144

JSF Calendar Year 2009 = 864,490 MWh, TVA System Calendar Year 2009 = 36,651,064 MWh, JSF Calendar Year 2009 = 4.32 tons/MWh, JSF as part of TVA system = 0.102 tons/MWh

3.1.2. Environmental Consequences

3.1.2.1. No Action Alternative

Impacts of Construction

Under the No Action Alternative, TVA would continue to follow the JSF Operating Plan, which includes the planned installation of NOx and SO_2 reduction systems. As described in TVA's 2006 EA completed for the planned NOx control systems (TVA 2006a) and the draft EA for SO_2 reduction at JSF (TVA 2009a), air quality impacts from planned construction activities would be temporary, and overall air quality impacts from planned emission-reduction system construction activities would be minor and insignificant.

Impacts of Operation

The installation and operation of NOx reduction systems would benefit regional air quality by reducing the NOx emissions and the associated production of ozone (TVA 2006a). Air quality modeling results also showed that concentrations of SO_2 emissions, following installation of scrubbers, would be reduced, and air quality in the area would improve (TVA 2009a). Under this alternative, after the plans to install SCRs and scrubbers are implemented, TVA would meet all CAA requirements at JSF.

3.1.2.2. Action Alternative

Impacts of Construction

John Sevier Fossil Plant Site

The proposed construction activities would have associated transient air pollutant emissions, primarily from land clearing, site preparation, and the operation of internal combustion engines.

Site preparation, paved road vehicular traffic, and facility construction result in the emission of fugitive dust PM during active construction periods. The proposed location is a developed industrial site (JSF) with a high proportion of disturbed acreage relative to a greenfield or even some brownfield sites. Most (greater than 95 percent by weight) fugitive dust emissions would be deposited within the construction site boundaries. The remaining dust would be subject to transport beyond the property boundary. If necessary, emissions from open construction areas and roadways would be mitigated by spraying water on the roadways as needed to reduce fugitive dust emissions by as much as 95 percent.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of PM, NOx, CO, VOC, 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.

Potential air quality impacts from construction activities would be temporary and would depend upon both man-made factors (e.g., intensity of activity, control measures) and natural factors (e.g., wind speed, wind direction, soil moisture). 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 standards. Overall, the air quality impact of construction-related activities for the project would be minor.

Gas Pipeline Route

Potential air quality impacts would likely occur from fugitive dust generated as a direct result of the movement of construction equipment across the project area and burning of trees and brush from clearing pipeline ROW. Potential air quality impacts from construction of the proposed pipeline would be temporary and minimal, and no air permitting actions are required.

Impacts of Operation

John Sevier Fossil Plant Site

The proposed CC facility and associated gas pipeline would provide TVA with intermediate-load to base-load generation with a nominal generation capacity of 880 MW. The proposed operations would not exceed federal and state PSD thresholds. Emissions from estimates contained in this section should be considered approximate since the precise manner of operation of all of the units on the JSF site is not yet known. In order to accommodate the additional emissions from the CC plant, the operation of JSF's coal-fired units would change from the current plan to ensure that JSF operates within proposed sitewide emission caps.

Gas Pipeline Route

Operation of the proposed pipeline and compressor stations would not affect air quality and would therefore have no impact on operational emissions from each compressor station facility.

Proposed Operation Scenarios

John Sevier Fossil Plant Site

At completion of the proposed project, TVA would have the option to operate generating assets (both the CT and HRSG units[2] along with the four existing coal-fired units) at JSF to meet load demand while operating within the proposed emission caps. Because load

[2] There would be no more than 50 hours of annual operation during which each CT operated at less than nominal loads (i.e., low-load operation). These operating hours at low load would be accounted for in the emissions inventory to ensure that JSF remains below the annual allowable limits.

demand will vary, the CC plant would operate under a combination of three modes: SC (configuration) only; base-load; and cycling modes[3]. Under SC mode, the CTs would be operated for relatively short periods of time to meet peaking demands. Base-load mode is defined as continuous operations used to meet system demands; whereas, cycling mode is defined as peaking (i.e., cycling on and off when needed) operations used to meet high, or peak, electrical system demands. Potential JSF CC operating scenarios (i.e., annual hours) are provided in Tables 3-4 and 3-5. These scenarios are presented as examples of ways that JSF CC can be operated while remaining below the sitewide emissions cap, but are not intended to limit operations.

Table 3-4. Potential John Sevier Combined-Cycle Operating Scenarios[1] (Estimated Annual Hours)

Scenario	Simple-Cycle Only	Base-Load Mode	Cycling Mode
Simple-Cycle Natural Gas	2700	200	200
Simple-Cycle Fuel Oil	500	500	500
Combined-Cycle Natural Gas	-	8000	4200
Combined-Cycle Fuel Oil	-	200	200

[1]TVA would vary the number of CT operational hours, as needed, to meet system power demand while remaining below the requested sitewide emissions cap, including those emissions from the coal-fired units, for each pollutant.

Depending on demand, a combination of these modes would occur. JSF CC may be operated to keep one or two CTs and the steam turbine online through off-peak hours. As peak demands approach, JSF CC would bring the remaining capacity online.

Table 3-5. John Sevier Combined-Cycle Auxiliary Equipment Expected Operating Scenarios[1] (Estimated Annual Hours)

Scenario	Gas Heaters[2]	Auxiliary Boiler	Fire Pump	Cooling Towers
Simple-Cycle/Combined-Cycle Natural Gas/Fuel Oil	8760	2500	50	8760

[1]TVA would vary the number of the auxiliary equipment operational hours, as needed, to meet system power demand while remaining below the requested sitewide emissions cap, including those emissions from the coal-fired units, for each pollutant; expected operational hours for either SC or CC operations.

[2]There are two gas heaters used to remove moisture to increase the heat content of the gas. Each dew point gas heater can provide 100 percent of the natural gas required for the CC plant. Each gas heater is considered to have a 50 percent capacity factor for purposes of estimating annual emissions.

Sources

All sources of air emissions for the proposed CC facility are listed in Table 3-6.

[3] Base-load and cycling modes include SC and CC configurations.

Table 3-6. Emission Sources

Stack Name
CT/HRSG exhaust stack (Unit 1)
CT/HRSG exhaust stack (Unit 2)
CT/HRSG exhaust stack (Unit 3)
Steam Turbine
Auxiliary Boiler
Diesel Fire Pump
Fuel Gas Heater Stack #1
Fuel Gas Heater Stack #2
Cooling Tower (12 cells)

Project Emission Scenarios

Emissions ratings vary with ambient temperature and operating configuration. All annual emission estimates are conservatively based on maximum emission rates occurring at intermediate temperatures (59 or 60 degrees Fahrenheit [°F]). Short-term emission estimates (pounds/CT-hour) conservatively reflect the ambient temperatures that produce maximum values.

The estimated annual emissions from operating the CT units and other associated sources in the three different operating modes are provided in Tables 3-7, 3-9, and 3-11. The current emissions of the JSF coal-fired units are compared with potential future emissions of the JSF CC units in Tables 3-8, 3-10, and 3-12. The operation of the CC units in any of the three operating modes would result in a potential net reduction in emissions from those of the coal units. However, a net increase in CO and VOC emissions may result in some modifications to operational modes. Although an annual net increase may occur, the potential net increase would not exceed NSR significant levels.

- To ensure continuous compliance with the proposed emissions limits (and subsequent sitewide emission caps), TVA will maintain and keep an emissions (e.g., CT operational hours, coal combustion emissions, fugitive sources) and will adjust facility operations to maintain compliance.

Table 3-7. Potential John Sevier Combined-Cycle/Simple-Cycle Only Annual Emissions[1,2]

Pollutant	CTs	Gas Heaters	Auxiliary Boiler	Fire Pump	Cooling Towers	Total
Nitrogen Oxides (NOx)	591	3.20	2.19	0.103	0	596
Sulfur Dioxide (SO_2)	74.9	0.0294	0.0340	<0.01	0	75.0
Carbon Monoxide (CO)	587	3.90	2.19	0.0121	0	593
Lead (Pb)	0.0228	<0.01	<0.01	<0.01	0	0.0228
Particulate Matter (PM)	41.7	0.0979	0.608	<0.01	12.5	54.9
PM ≤10 microns (PM_{10})	41.7	0.0979	0.608	<0.01	12.5	54.9
PM ≤2.5 microns ($PM_{2.5}$)	41.7	0.0979	0.608	<0.01	12.5	54.9
Volatile Organic Compounds (VOC)	72.9	0.779	0.365	<0.01	0	74.0
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	6.54	<0.01	<0.01	<0.01	0	6.54

[1]Tons per year. [2]SC CTs emissions include SC operational hours and start-up and shut-down emissions.

Table 3-8. Potential Difference of Past Annual Actual Emissions From Future Potential John Sevier Combined-Cycle/Simple-Cycle Only Emissions[1]

Pollutant	JSF Coal Operations[2,3]	JSF CC/SC Only[4]	Potential Difference
Nitrogen Oxides (NOx)	8,609	596	8,013
Sulfur Dioxide (SO_2)	27,730	75.0	27,655
Carbon Monoxide (CO)	497	593	-96.0[5]
Lead (Pb)	0.0780	0.0228	0.0552
Filterable Particulate Matter (PM)	474	54.9	419
Filterable PM ≤ 10 microns (PM_{10})	303	54.9	248
Filterable PM ≤ 2.5 microns ($PM_{2.5}$)	136	54.9[6]	81.1
Volatile Organic Compounds (VOC)	59.6	74.0	-14.4[5]
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	73.2	6.54	66.7

[1]Tons per year, [2]Coal operations include, but are not exclusive to, JSF coal-fired boiler operations, JSF coal handling, and JSF ash handling. [3]Average of the highest two-year emissions (2007 and 2008) of the past five years (2004 through 2008). [4]JSF CC/SC (configuration) only includes the CTs, auxiliary boiler, dew-point gas heaters, emergency diesel firewater pump, and cooling tower. [5]Although a net reduction is not projected, the potential net increase does not exceed NSR significant levels. [6]Full load PM emissions ($PM_{2.5}$) from natural gas-fired SC operation are based on manufacturer's data and stack testing data from similarly equipped units.

Table 3-9. Potential John Sevier Combined-Cycle Base-Load Annual Emissions[1,2]

Pollutant	CTs	Gas Heaters	Auxiliary Boiler	Fire Pump	Cooling Towers	Total
Nitrogen Oxides (NOx)	559	3.20	2.19	0.103	0	564
Sulfur Dioxide (SO_2)	104	0.0294	0.0340	<0.01	0	104
Carbon Monoxide (CO)	282	3.90	2.19	0.0121	0	288
Lead (Pb)	0.0373	<0.01	<0.01	<0.01	0	0.0373
Particulate Matter (PM)	124	0.0979	0.608	<0.01	12.5	137
PM ≤ 10 microns (PM_{10})	124	0.0979	0.608	<0.01	12.5	137
PM ≤ 2.5 microns ($PM_{2.5}$)	124	0.0979	0.608	<0.01	12.5	137
Volatile Organic Compounds (VOC)	90.5	0.779	0.365	<0.01	0	91.6
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	5.65	<0.01	<0.01	<0.01	0	5.65

[1]Tons per year. [2]Base-load annual CTs emissions include SC operational hours, CC operational hours, and start-up and shut-down emissions.

Table 3-10. Potential Difference of Past Annual Actual Emissions From Future Potential John Sevier Combined-Cycle Base-Load Emissions[1]

Pollutant	JSF Coal Operations[2,3]	JSF CC Base-Load Mode[4]	Potential Difference
Nitrogen Oxides (NOx)	8,609	564	8,045
Sulfur Dioxide (SO_2)	27,730	104	27,626
Carbon Monoxide (CO)	497	288	209
Lead (Pb)	0.0780	0.0373	0.0407
Filterable Particulate Matter (PM)	474	137	337
Filterable PM ≤ 10 microns (PM_{10})	303	137	166
Filterable PM ≤ 2.5 microns ($PM_{2.5}$)	136	137[6]	-1[5]
Volatile Organic Compounds (VOC)	59.6	91.6	-32.0[5]
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	73.2	5.65	67.6

[1]Tons per year. [2]Coal operations include, but are not exclusive to, JSF coal-fired boiler operations, JSF coal handling, and JSF ash handling. [3]Average of the highest two-year emissions (2007 and 2008) of the past five years (2004 through 2008). [4]CC base-load mode includes the CTs, duct burners, auxiliary boiler, dew-point gas heaters, emergency diesel firewater pump, and cooling tower. [5]Although a net reduction is not projected, the potential net increase does not exceed NSR significant levels. [6]Full load PM emissions ($PM_{2.5}$) from natural gas-fired CC operation are based on AP-42 emissions factors and stack testing at similarly equipped TVA CC sites.

Table 3-11. Potential John Sevier Combined-Cycle Cycling Mode Annual Emissions[1,2]

Pollutant	CTs	Gas Heaters	Auxiliary Boiler	Fire Pump	Cooling Towers	Total
Nitrogen Oxides (NOx)	469	3.20	2.19	0.103	0	474
Sulfur Dioxide (SO_2)	99.1	0.0294	0.0340	<0.01	0	99.2
Carbon Monoxide (CO)	463	3.90	2.19	0.0121	0	469
Lead (Pb)	0.0330	<0.01	<0.01	<0.01	0	0.0330
Particulate Matter (PM)	81.0	0.0979	0.608	<0.01	12.5	94.2
PM ≤ 10 microns (PM_{10})	81.0	0.0979	0.608	<0.01	12.5	94.2
PM ≤ 2.5 microns ($PM_{2.5}$)	81.0	0.0979	0.608	<0.01	12.5	94.2
Volatile Organic Compounds (VOC)	97.8	0.779	0.365	<0.01	0	98.9
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	5.65	<0.01	<0.01	<0.01	0	5.65

[1]Tons per year. [2]Cycling mode annual CTs emissions include SC operational hours, CC operational hours, and start-up and shut-down emissions.

Table 3-12. Potential Difference of Past Annual Actual Emissions From Future Potential John Sevier Combined-Cycle Cycling Mode Emissions[1]

Pollutant	JSF Coal Operations[2,3]	JSF CC Cycling Mode[4]	Net Reduction
Nitrogen Oxides (NOx)	8,609	474	8,135
Sulfur Dioxide (SO_2)	27,730	99.2	27,631
Carbon Monoxide (CO)	497	469	28.0
Lead (Pb)	0.0780	0.0330	0.0450
Filterable Particulate Matter (PM)	474	94.2	380
Filterable PM ≤ 10 microns (PM_{10})	303	94.2	209
Filterable PM ≤ 2.5 microns ($PM_{2.5}$)	136	94.2	41.8
Volatile Organic Compounds (VOC)	59.6	98.9	-39.3[5]
Sulfur Trioxide (SO_3) as Sulfuric Acid Mist (H_2SO_4)	73.2	5.65	67.6

[1]Tons per year. [2]Coal operations include, but are not exclusive to, JSF coal-fired boiler operations, JSF coal handling, and JSF ash handling. [3]Average of the highest two-year emissions (2007 and 2008) of the past five years (2004 through 2008). [4]CC cycling mode includes the CTs, duct burners, auxiliary boiler, dew-point gas heaters, emergency diesel firewater pump, and cooling tower. [5]Although a net reduction is not projected, the potential net increase does not exceed NSR significant levels. [6]Full load PM emissions ($PM_{2.5}$) from natural gas-fired CC operation are based on AP-42 emissions factors and stack testing at similarly equipped TVA CC sites.

Table 3-13. John Sevier Combined-Cycle Simple-Cycle Only Mode, Base-Load Mode, and Cycling Mode Net Emissions and Prevention of Significant Deterioration Significant Emission Rates[1]

Pollutant	Net Emissions			PSD Significant Emission Rates		
	SC Only Mode	CC Base Mode	CC Cycling Mode	SC Only Mode	CC Base Mode	CC Cycling Mode
Nitrogen Oxides	-8,013	-8,045	-28.0	40	40	100
Sulfur Dioxide	-27,655	-27,626	-8,135	40	40	40
Carbon Monoxide	96.0	-209	-27,631	100	100	40
Lead	-0.0552	-0.0407	-380	0.6	0.6	25
PM	-419	-337	-209	25	25	15
PM_{10}	-248	-166	-41.8	15	15	10
$PM_{2.5}$	-81.1	1.00	39.3	10	10	40
Volatile Organic Compounds	14.4	32.0	-0.0450	40	40	0.6
Sulfuric Acid Mist	-66.7	-67.6	-67.6	7	7	7

[1]Tons per year. Source: 40 CFR 52.21

Table 3-13 compares the calculated facility emissions and the applicable PSD thresholds. The emission increases for this proposed project, in conjunction with sitewide emissions caps requested by TVA, would not exceed PSD significance levels under any of the three operating modes; therefore, no further PSD analysis is required.

The proposed facility's impacts are below the applicable *de minimis* monitoring levels for all pollutants. Thus, a preconstruction ambient monitoring analysis is not required.

The operating modes evaluated are conservative for the facility under consideration. Additionally, any specific strategies necessary for limiting emissions to meet PSD requirements for ambient air quality impacts will be defined through the PSD permitting process.

Hazardous Air Pollutants

The 1990 amendments to the CAA mandated a new approach to regulation of HAPs. The former CAA requirement that National Emission Standards for Hazardous Air Pollutants (NESHAP) protect health with an ample margin of safety was replaced by a control-technology approach, with an evaluation of residual health risks to be performed later. The USEPA must set NESHAP to reflect the maximum achievable control technology (MACT) for categories of major HAP emission sources (new sources that emit more than 10 tons per year of a single HAP or 25 tons per year of total HAPs). For a new source, MACT emission standards require the maximum degree of emission reduction that is achieved in practice by the best-controlled similar source.

The CC facility, in conjunction with JSF, would have HAP emission rates above the major threshold designation. Accordingly, the 40 CFR Part 63 NESHAPs are applicable to the JSF CC facility. Table 3-14 provides the applicable NESHAP subcategories associated with the CC facility.

Table 3-14. John Sevier Fossil Combined-Cycle Facility National Emission Standards for Hazardous Air Pollutant Subcategories

Equipment	Citation	Title
Combustion Turbines	40 CFR 63 Subpart YYYY	NESHAPs for Stationary CTs
Auxiliary Boilers	40 CFR 63 Subpart DDDDD	NESHAPs for Industrial, Commercial, and Institutional Boilers and Process Heaters
Duct Burners and HRSGs		
Emergency Diesel Fire Pump	40 CFR 63 Subpart ZZZZ	NESHAPs for Stationary Reciprocating Internal Combustion Engines

Note: The dew point heaters would not be subject to 40 CFR 63 Subpart DDDDD because they are categorized as small gaseous units and exempt via 63.7506(c). The emergency diesel fire pump meets 40 CFR 63 Subpart ZZZZ requirements by meeting 40 CFR 60 Subpart IIII requirements (40 CFR 63.6590(c)). Subpart YYYY of 40 CFR part 63 requires that the CTs meet a formaldehyde limit of 91 parts per billion corrected to 15 percent oxygen. In order to meet this, Subpart YYYY mandates that the oxidation catalyst's inlet temperature must be measured to ensure that it is within the manufacturer's suggested temperature range and that the time diesel is fired in the CTs must be recorded using an hour meter.

Carbon Dioxide

Worldwide man-made annual CO_2 emissions are estimated at 29 billion tons, with sources within the U.S. responsible for 20 percent of these tons. U.S. electric utilities, in turn, emit 2.5 billion tons, roughly 39 percent of the U.S. total. In 2007, fossil-fired generation accounted for 63 percent of TVA's total electric generation and nonemitting sources such as nuclear; hydro and renewables accounted for 37 percent.

The JSF CC gas-fired plant, if operated in lieu of the four coal-burning units, would result in a reduction in CO_2 emissions. As a rule of thumb, a coal-fired plant produces about 2,000 pounds of CO_2 per MWh of generation, and natural gas CC generation produces about 1,000 pounds of CO_2 per MWh. When diesel fuel is used for CC generation, CO_2 emissions are around 1,150 pounds per MWh. These CO_2 emissions rates are 50 and 43 percent, respectively, less than the per MWh emissions of the JSF coal-fired units.

Conclusions

The proposed construction activities would have associated transient air pollutant emissions, primarily from land clearing, site preparation, and the operation of internal combustion engines. However, even under unusually adverse conditions, these emissions would be temporary and would have, at most, a minor, transient impact on off-site air quality and be well below the applicable ambient air quality standards. Overall, the air quality impact of construction-related activities for the project would be minor.

The operation of the CC units in any of the three operating modes would result in a potential net reduction in emissions from those of the coal units. However, a net increase in CO and VOC emissions may result in some modifications to operational modes. Although an annual net increase may occur, the potential net increase would not exceed New Source Review significant levels. Furthermore, information in Table 3-13 shows comparisons between the calculated facility emissions and the applicable federal and state Prevention of Significant Deterioration thresholds. The emission increases for the proposed action in conjunction with site-wide emissions caps requested by TVA would not exceed PSD significance levels.

3.2. Noise

3.2.1. Affected Environment

John Sevier Fossil Plant Site

The area surrounding JSF consists of open farmland, residential properties, the upper end of Cherokee Reservoir, and a golf course. The closest homes are located approximately 0.5 mile southwest of the proposed JSF CC site. Trees growing between the proposed site and nearby residences block the line of site and help to attenuate noise from JSF.

Noise is measured in logarithmic units called decibels, which are abbreviated as dB. Given that the human ear cannot perceive all pitches or frequencies in the sound range, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel, or the dBA. A-scale weighting reflects the fact that a human ear hears poorly in the lower octave-bands. It emphasizes the noise levels in the higher frequency bands heard more efficiently by the ear and discounts the lower frequency bands.

The equivalent sound level, or Leq, is the constant sound level that conveys the same sound energy as the actual varying instantaneous sounds over a given period. It averages the fluctuating noise heard over a specific time period as if it had been a steady sound.

The day-night sound level or Ldn is the 24-hour average noise level with a 10-dBA penalty between 10 p.m. and 7 a.m. to account for the fact that most people are more sensitive to noise while they are sleeping.

There are no federal, state, or local regulations for community noise in Hawkins County; however, USEPA (1973) guidelines recommend that Ldn not exceed 55 dBA.

There are numerous existing noise sources at JSF. The coal plant itself does not generate much noise outdoors, although noise from coal delivery and unloading and ash-handling activities can be heard from nearby residences. Coal generally arrives daily by trains, which arrive any time of the day or night, and can be heard from nearby residences. Coal is unloaded from railcars with an unenclosed bottom dumper, which generates considerable noise, and when temperatures are particularly cold, a shaker is necessary to unload the coal. This shaker is very loud and can be clearly heard from nearby residences. While the shaker is not needed very often, it is needed for all of the railcars unloaded on any particular day. It typically takes five to seven hours to unload the coal. In addition, dozers, compactors, and other heavy equipment at the plant can also be heard from nearby residences. The main railroad tracks are also quite close to these homes that experience noise from trains delivering coal to JSF as well as more frequent train traffic unrelated to JSF.

On November 6 and December 4, 2009, background noise was measured to record the existing noise levels in the vicinity of JSF. Noise measurements at residences on McCloud Church Circle averaged 46 dBA during periods without trains or coal unloading. This is typical of a rural setting. During these measurements, the loudest noises were from cars driving on the gravel road, although traffic was very light. Noise from ash handling at the power plant and barking dogs were the most frequent sources. Horses, birds, and leaves in the wind were also heard during these measurements. While coal was being unloaded and the shaker was in use, noise levels averaged 51 dBA near these residences. Periodically while trains are passing on the main railroad tracks, noise levels are approximately 73 dBA near these residences. Overall, these homes experience relatively low noise levels much of the time; however, there are intermittent periods of high noise levels caused by passing trains and coal delivery trains.

Gas Pipeline Route

Construction of the proposed pipeline has the potential to create temporary noise pollution in the local construction area. There are no statewide noise regulations for the states of Tennessee and Virginia; however, USEPA (1973) guidelines recommend that Ldn not exceed 55 dBA. Kingsport, Tennessee and Washington County and the city of Bristol, Virginia have code ordinances pertaining to roadway traffic and construction related noise. The city of Kingsport’s noise ordinance limits vehicular noise to the standards established by the Federal Highway Administration (FHWA) within the city limits.

Blasting activities and horizontal directional drilling under SR 11 in Sullivan County, Tennessee has the potential to produce noise impacts above 55 dBa. Blasting would occur only during daylight hours, however, the horizontal directional drilling under SR 11 may require 24-hour continuous drilling. If 24-hour drilling occurs, ETNG would monitor the noise generated at the nearest residences and calculate the Ldn to determine noise impacts. If Ldn exceeds 55dBa, ETNG would mitigate for noise levels to minimize noise impacts to nearby residences.

3.2.2. Environmental Consequences

3.2.2.1. No Action Alternative

Under the No Action Alternative, TVA would continue to follow the operating plan, which includes the planned installation of NOx and SO_2 reduction systems. Although there would be a short-term increase in noise during construction, the operation of the emissions reduction system would not noticeably increase noise levels.

3.2.2.2. Action Alternative

Impacts of Construction

John Sevier Fossil Plant Site

Under the Action Alternative, construction activities would last about 24 to 26 months. Most of the work would occur during the day on weekdays. However, construction activities could occur at night or on weekends, if necessary. Construction activities would increase traffic on roads near the plant, which would also increase intermittent noise at some nearby residences. During the first site preparation phase of construction, noise would be generated by compactors, front loaders, backhoes, graders, and trucks. The second phase would involve concrete mixers, cranes, pumps, generators, and compressors. Due to the temporary and intermittent nature of construction and the site's rural location, noise from construction activities are not expected to cause adverse impacts.

Gas Pipeline Route

Construction of the pipeline is anticipated to last for about 6.5 months. Construction noises would be variable because the types of equipment would change throughout different phases of construction. Construction vehicles would comply with the City of Kingsport's noise ordinance. Washington County and the city of Bristol, Virginia limit construction activities to Monday through Saturday from 7:00 a.m. to 7:00 p.m. and Monday through Friday from 7:00 a.m. to 6:00 p.m., respectively. ETNG would obtain permission from Washington County or the City of Bristol, Virginia if construction activities would take place outside of the times established under the respective ordinances. Construction activities involving blasting and directional drilling could potentially have temporary noise impacts on nearby residences.

Noise from construction activities could potentially affect some nearby residences. However, due to the temporary nature of noise impacts anticipated from gas pipeline construction, noise impacts would be minor.

Impacts of Operation

John Sevier Fossil Plant Site

Predicted noise emissions from the operation of the proposed CT facility were evaluated for both SC and CC modes. Noise emissions were estimated during 100 percent, full load capacity, under normal operating conditions. The following assumptions were used to estimate noise emissions:

- Noise emissions from each of the three gas turbine assemblies, including air inlets and gas turbines, were limited to 60 dBA at 400 feet.
- Noise emissions from each of the three HRSGs, including the exhaust stacks, were limited to 62 dBA at 400 feet.
- Noise emissions from one 12-cell mechanical draft cooling tower were limited to 56 dBA at 400 feet.
- The steam turbine would be located inside an enclosure that limits noise emissions to 50 dBA at 400 feet.
- The steam turbine condenser and ancillary equipment would be located inside an enclosure that limits noise emissions to 50 dBA at 400 feet.
- Noise emissions from three boiler feed pumps were limited to 85 dBA at 3 feet.
- Noise emissions from the main transformer were limited to 85 dBA at 3 feet, and emissions from the auxiliary transformer were limited to 75 dBA at 3 feet.
- Noise emissions from the auxiliary boiler were limited to 85 dBA at 3 feet.

Based on this information, noise levels (Leq) at the nearby residences are estimated to be 50 dBA when operating in SC mode and 53 dBA when operating in CC mode. This is an increase of 4 and 7 dBA over measured daytime background noise levels during periods without trains or coal unloading. When operating in CC mode, there would be an increase of approximately 2 dBA over noise levels during coal unloading, and when operating in SC mode, there would be no increase in noise over levels now experienced during coal unloading. Noise from the CTs would not be audible over the noise of passing trains.

People's ability to perceive changes in noise levels varies considerably from one person to another, and the response to perceived noise changes also varies considerably. However, changes in noise levels less than 3 dBA are generally barely perceptible to most listeners, while a 5-dBA change is generally considered noticeable by most people. Noise from the CTs is likely to be noticeable at the nearby residences when operating in CC mode during the day and when operating in either mode at night.

The day-night noise levels (Ldn) would depend on the hours of operation. If the CTs were operated continuously for 24-hours, the Ldn at the nearby residences is expected to be 57 dBA for SC mode and 59 dBA for CC mode. If the CTs were only operated for 8 hours during the day, the Ldn at the nearby residences would be approximately 50 dBA for SC mode and 51 dBA for CC mode.

If CTs were operated for eight hours during the day, the day-night noise level would not exceed USEPA's recommended guideline of 55 dBA at the nearby residences. If combustions turbines were operated 24 hours a day, the Ldn is expected to exceed USEPA's recommended guideline. However, the exceedences would not result in significant noise impacts.

Annoyance from noise is highly subjective. The Federal Interagency Committee on Noise used population surveys to correlate annoyance and noise exposure (U.S. Air Force 1992). Information in Table 3-15 shows estimates of the percentage of residential population that would be highly annoyed from a range of background noise and the average community reaction description that would be expected. This information indicates that noise from the CTs operating 24 hours a day in CC mode would be expected to cause no more than a "moderate" community reaction. Since residents in this area have already been exposed to noise from frequent passing trains, they would be expected to be less sensitive to noise than people in quieter communities are; thus, a "slight" community reaction is anticipated.

Table 3-15. Estimated Annoyance From Background Noise

Ldn (dBA)	Percent Highly Annoyed	Average Community Reaction
75 & above	37	Very severe
70	25	Severe
65	15	Significant
60	9	Moderate
55 & below	4	Slight

Source: U.S. Air Force 1992

Conclusions

The proposed CTs at JSF would increase noise levels at nearby residences compared with background noise without trains or coal unloading. The increase would likely be noticeable when CTs are operated in CC mode during the day and in either mode at night. Depending on the hours of operation, the day-night noise level at nearby residences may exceed USEPA's recommended guideline of 55 dBA. However, community reaction is expected to be "slight," and noise from the CTs is not expected to cause any significant impact.

3.3. Surface Water Quality

3.3.1. Affected Environment

John Sevier Fossil Plant Site

Surface Water - Holston River

Potential adverse impacts to surface water quality are normally related to those resulting from construction activities and the maintenance of the new facilities. Potential construction-related impacts in waterways include increased turbidity and sedimentation. Proper standard erosion-control measures would be followed to minimize the potential for adverse impacts on water quality and aquatic organisms and habitats.

Stream-Designated Uses

The proposed JSF CC facility would be located on the JSF Reservation, which is at HRM 106.2. The Holston River is impounded at HRM 52.3 by Cherokee Dam, and the impoundment extends upstream approximately 54 miles to the John Sevier Detention Dam and Pool at HRM 106.3. Cherokee Reservoir is the farthest downstream and largest impoundment of the Holston River. The average flow of the Holston River at Cherokee Dam is 4,500 cubic feet per second (cfs). JSF uses water withdrawn from the John Sevier Detention Pool for plant service water and for cooling water for its condensers. The proposed CC facility would also use the JSF intake structures for its plant service water.

Water quality on the Holston River was assessed by the Tennessee Department of Environment and Conservation (TDEC) in reporting year 2007. TDEC classified the Holston River for use as a domestic water supply, as an industrial water supply, for fish and aquatic life, for recreation, for livestock watering and wildlife, and for irrigation. The Holston River from HRM 89.0 upstream to HRM 142.3 is listed as not supporting one or more of its uses due to mercury contamination from sources outside Tennessee (TDEC 2008). As of March 28, 2009, Polly Branch had not been assessed by TDEC as either supporting or not supporting its uses. Dodson Creek was assessed in 2008 as fully supporting its uses of fish and aquatic life, livestock watering and wildlife, and recreation, from Cherokee Reservoir to the confluence of Louderback Creek, at approximately Dodson Creek Mile 2.

Drainage from the JSF site enters the Holston River, either directly or via Polly Branch, a zero- (low-) flow stream. Polly Branch is classified for uses for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2007). NPDES Permit number TN0005436 and NPDES Industrial Storm Water General Permit number TNR053187 cover water discharges at JSF.

Domestic Water Supply

Morristown Utility Systems operate a domestic water supply intake 31 miles downstream of JSM at HRM 75. Water from this intake serves approximately 60,000 people in Morristown, Bean Station, Rutledge, Russellville, Whitesburg, Bulls Gap, White Pine, and Mooresburg. The plant design capacity is 24 MGD with 9 MGD being the average daily demand. The intake design has two separate systems. The primary system is a variable stage intake that allows water to be drawn from lake stages between 1,020 and 1,070 feet. The secondary system is a standby intake that projects into the original riverbed and can be activated during outages of the primary system. The plant is equipped with conventional equipment for potable water treatment including equipment for chlorinating water. Morristown Utility Systems does not have a secondary source of water should an environmental event occur that would force the intake to discontinue operation for more than 24 hours (Mike Howard, Morristown Utility Systems, personal communications, November 2, 2004).

The Persia Water Utility serves most residents within the site locality. This utility has applied for a water-supply intake on the left bank of the Holston River between HRMs 102 and 103. This would be the only public water supply in the site locality and would be located slightly less than 2 miles downstream of the proposed JSF CC site.

Reservoir Water Quality
The reach of the Holston River adjacent to JSF has been substantially altered from its former free-flowing character by: (1) control of river flow by upstream dams, primarily Fort Patrick Henry Dam and (2) the presence of the John Sevier Detention Dam and the downstream Cherokee Dam. The area affected by Cherokee Reservoir extends to the tailwaters of the John Sevier Detention Dam and Pool. Cherokee Reservoir is a relatively deep storage impoundment with a long retention time and plenty of nutrients, resulting in low dissolved oxygen levels and high chlorophyll levels (Dycus and Baker 2001). Like most TVA reservoirs, stratification during summer months occurs for Cherokee Reservoir. Recent concerns have included occasional low dissolved oxygen in the reservoir forebay and in releases from Cherokee Dam.

Approximately 27 miles of river downstream of Cherokee Dam are reported as impaired due to low dissolved oxygen and flow alterations (TDEC 2008). TVA currently mitigates (increases) dissolved oxygen and maintains a minimum release flow from Cherokee Reservoir. In 1995, as part of the Reservoir Releases Improvements Program, TVA installed an oxygen addition system on the upstream side of Cherokee Dam. TVA typically injects 2,100 tons per year of pure oxygen into the water impounded behind Cherokee Dam. This system, in addition to surface water pumps and turbine venting, maintains the dissolved oxygen concentrations of Cherokee Dam releases at 4 milligrams per liter (mg/L) or more. These systems have improved the aquatic habitat downstream for the last 10 years.

Another water quality issue in the watershed is mercury, historically released from the Saltville, Virginia, chlor-alkali plant into the North Fork of the Holston River for an extended period until the plant was closed in 1972. It was located more than 100 miles upstream of the JSF site. Mercury released from this industrial source has contaminated surface water and sediments of both the North Fork Holston and Holston Rivers. Since the 1970s, TVA has measured elevated levels of mercury in Cherokee Reservoir. In 1983, the Saltville site was added to the Superfund National Priorities List. A 2001-2002 USEPA investigation of the North Fork Holston and Holston Rivers and an associated ecological risk assessment reported results indicating elevated mercury levels in sediment cores collected in front of the JSF Detention Dam, downstream from the JSF intake channel. TVA's Reservoir Vital Signs Monitoring Program (VSMP) continues to monitor mercury levels in water, sediment, and fish tissues (TVA 2009b). Olin Corporation and USEPA may also sample Holston River sediments in conjunction with assessments of the Saltville Waste Disposal Ponds Superfund Site.

No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are near the proposed action.

All wastewaters from the proposed CC facility at JSF are proposed to be directed to a process pond prior to release to the Holston River. The proposed process pond would be 0.75 acre in size (approximately 32,625 square feet) and 7 feet deep with no baffles.

Gas Pipeline Route

In conjunction with the proposed JSF CC facility, ETNG is proposing to expand its existing natural gas pipeline facilities in Sullivan, Washington, Hawkins and Greene counties, Tennessee, and Washington County, Virginia. The proposed pipeline route is shown in Figure 1-4 and would be in Ridge and Valley terrain. The gas pipeline project would require the crossing of 17 perennial streams, 19 intermittent streams, and 13 wet-weather conveyances in Hawkins, Greene, Washington, and Sullivan counties, Tennessee, and Washington County, Virginia (Appendix C). All of these streams lie within the Holston River watershed.

Water Body Crossing

Construction at water bodies would be conducted using either a “dry” crossing or “wet” crossing method (Appendix B). The length of the crossing, the sensitivity of the area, existing conditions at the time of crossing, and permit requirements will determine the most appropriate measures to be used. Mobilization of construction equipment, trench excavation, and backfilling would be performed in a manner that would minimize the potential for erosion and sedimentation within the water body channel. Erosion control measures would be implemented to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas.

Sanitary Wastewater

During the construction phase, sanitary sewage would be collected in temporary toilet facilities, trucked to a suitable and permitted sewage disposal facility, and/or sent to the existing plant sanitary sewer for disposal.

3.3.2. Environmental Consequences

Surface Water - Holston River

3.3.2.1. No Action Alternative

Under the No Action Alternative, TVA would continue to follow the operating plan, which includes the planned installation of NOx and SO_2 reduction systems. Surface water impacts resulting from disturbance during construction would be mitigated by use of storm water pollution prevention BMPs to minimize the extent of disturbance and erosion. Silt fences and/or other sediment and erosion control measures would be installed, inspected, and maintained for the duration of construction. TVA would obtain a Construction Storm Water Permit from TDEC prior to beginning construction.

To conduct this work, the appropriate CWA, U.S. Army Corps of Engineers (USACE), and TDEC permits would be obtained. Per permit requirements, any mitigation would be identified through the ARAP and Section 404 permitting process, providing for compensation for the loss of stream reaches. Potential surface water impacts during construction would be mitigated, and the impacts would be minor with the implementation of BMPs as well as compliance with the requirements of the ARAP and Section 404 permitting process.

3.3.2.2. Action Alternative

Impacts of Construction

John Sevier Fossil Plant Site

Storm Water
TVA would obtain a Construction Storm Water Permit from TDEC prior to beginning construction. Surface water impacts due to land disturbance during construction would be mitigated by use of storm water pollution prevention BMPs, which would limit the extent of disturbance and erosion. Erosion control measures such as silt fences and/or other controls would be installed, inspected, and maintained for the duration of construction. The JSF IPPP would be updated, and TVA would comply with all requirements. The plan provides descriptions and procedures for engineering controls and management measures (or BMPs) both to prevent spills and to minimize the impacts from potential spills of fuels and other hazardous chemicals. Updating the JSF IPPP to cover the additional CC facilities and operations would expand those proactive measures to the JSF CC facility.

Per permit requirements, any mitigation would be identified through the ARAP and 404 permitting process providing for the loss of stream reaches. Potential surface water impacts during construction would be mitigated, and potential impacts would be minor through the use of BMPs as well as compliance with the requirements of the ARAP and 404 permitting process. Impacts to surface water would be minor with the implementation of standard controls and BMPs.

Gas Pipeline Route

Storm Water
To minimize potential water quality impacts, the BMPs in the *Erosion and Sedimentation Control Plan* (E&SCP), as outlined in the Draft Environmental Resource (DER) Report (SpectraEnergy Partners 2009), would be implemented throughout construction activities. The measures in the E&SCP were developed based on guidelines from FERC, USACE, U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA), and the Natural Resource Conservation Service.

Prior to earth disturbance, a crew would install erosion control devices, such as silt fences and temporary slope breakers, to reduce potential impacts to streams. A combination of stream crossing methods would be used to construct the gas pipeline (Appendix B). ETNG anticipates primarily using open-cut crossing methods for water body crossings along the proposed pipeline route. Stream crossing would be as close to perpendicular to the center line of the stream as possible. Removal of riparian vegetation would be kept to the minimum necessary. If there were water in the stream at the time of the crossing, standard BMPs for crossing wet streams such as clean rock fill and culverts, equipment pads, wooden mats, and culverts or portable bridges would be employed. Water body crossing construction methods are discussed in further detail in Appendix B.

ETNG would also obtain and comply with all conditions in TDEC's Aquatic Resources Alteration Permit (ARAP) and Construction Storm Water General Permit as they relate to this project. Construction Storm Water General Permit conditions may include: storm water detention structures (including wet ponds); storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems which combine several practices. ETNG's existing methods and BMPs are compatible with the conditions in the ARAP and Construction Storm Water General Permit. Potential surface water impacts during construction of the proposed gas pipeline would be minimized by the use of sedimentation and erosion control BMPs. Impacts to surface water would be minor with the implementation of standard controls and BMPs.

Hydrostatic Testing
Hydrostatic testing is the last step in pipeline construction. This consists of running water, at pressures higher than will be needed for natural gas transportation, through the entire length of the pipe to ensure that the pipeline is strong enough, and absent of any leaks of fissures. The pipeline would be pressure tested in accordance with ETNG requirements to ensure its integrity for the intended service and operating pressures. The water would normally be obtained from water sources crossed by the pipeline, including streams and available municipal supply lines.

In order to ensure the efficient and safe operation of the gas pipelines, ENTG would inspect the pipelines for corrosion and defects. This is done through the use of sophisticated pieces of equipment known as pigs. Pigs are robotic devices that are propelled down pipelines to evaluate the interior of the pipe. Pigs are used to test pipe thickness, and roundness, check for signs of corrosion, detect minute leaks, and any other defect along the interior of the pipeline that may either impede the flow of gas, or pose a potential safety risk for the operation of the pipeline. Additional "drying" pig runs would be made, if necessary, to remove any residual water from the pipeline. Discharge of hydrostatic test water following hydrostatic testing would be conducted in compliance with the ENTG's E&SCP (SpectraEnergy Partners 2009) and all applicable state and federal regulations.

Temporary Water Intake and Discharge
ETNG's temporary water intake and discharge procedures include the following:

- Pumps used for hydrostatic testing within 100 feet of any water body or wetland shall be operated and refueled in accordance with ETNG's Spill Prevention Control and Countermeasure (SPCC) Plan (SpectraEnergy Partners 2009).
- The intake hose will be screened to prevent entrainment of fish and other aquatic life.
- Ambient, downstream flow rates will be maintained to protect aquatic life, provide for all water body uses, and provide for downstream withdrawals of water by existing users.
- Hydrostatic test manifolds will be located outside wetlands and riparian areas to the greatest extent practical.
- Overland discharges of test water will be dewatered into an energy dissipation device constructed of straw bales.
- Dewatering structures will be located in well-vegetated and stabilized areas, if practical, and an attempt will be made to maintain at least a 50-foot vegetated buffer from adjacent water body/wetland areas. If an adequate buffer is not available, sediment barriers or a similar erosion control measure will be installed.
- Discharge rate will be regulated, energy dissipation device(s) will be used, and sediment barriers will be installed, as necessary, to prevent erosion, streambed scour to aquatic resources, suspension of sediments, and flooding or excessive stream flow.

- Temporary water intake or discharge will not occur into state-designated exceptional value and impaired waters, water bodies that provide habitat for federally listed as threatened or endangered species, or water bodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

The temporary water intake and discharge hoses/piping would be laid on the ground and not buried. Further, it is not anticipated that vegetation off the pipeline ROW would be cleared to obtain or discharge water.

TDEC staff did not identify any special requirements for water withdrawal and hydrostatic test water discharge authorizations. The hydrostatic test water discharge NPDES Permit would follow the standard notice of intent submittal process. Once TDEC grants coverage for the hydrostatic test discharges, SpectraEnergy Partners would provide a copy to TVA for issuance of a letter of “no objection” narrative for hydrostatic testing.

Conclusion

To minimize impacts on water quality within the pipeline project area, construction activities would adhere to the guidelines outlined in ETNG's E&SCP and SPCC Plan (SpectraEnergy Partners 2009). These documents are designed so that implementation of the BMPs contained herein would minimize construction impacts on environmental resources, including water quality. With the implementation of these plans, the proposed gas pipeline is expected to result minor, short-term impacts on water quality.

Impacts of Operation

John Sevier Fossil Plant Site

Storm Water

After construction, storm water BMPs would continue to be implemented so that surface water runoff from parking lot and industrially used areas of the site would be diverted to a retention pond(s) with a controlled rate(s) of release. Runoff from areas with potential oil leaks, such as the two distillate-oil storage tanks, would be directed to an oil/water separator with subsequent discharge to the proposed process pond. The proposed process pond would be 0.75 acre (approximately 32,625 square feet) in surface area and 7 feet in depth with no baffles. The initial volume of the process pond would be approximately 193,000 cubic feet. Oil collected in the oil/water separator would be periodically removed and trucked off site to an approved, waste oil recycling facility.

Sanitary Wastewater

During plant operations, there would be a small workforce at the site. Sanitary sewage would be collected in a septic tank and discharged to a leach field.

Process Wastewater

As stated earlier at the beginning of the Air Quality section, two phases of CC construction are proposed. SC CTs are proposed to be constructed in the first phase. The second phase is a modification of the SC CTs to CC CTs while incorporating an HRSG bypass. Therefore, the proposed JSF CC facility would be able to operate in either an SC configuration or a CC configuration.

During the first phase when the proposed facility would be operating in the SC configuration, the proposed facility would not require a cooling tower, and there would be no associated wastewater discharge.

During the second phase, the proposed facility would include an HRSG. To prevent concentration of minerals in the HRSG, it would require a demineralized water feed and boiler blowdown to remove accumulating minerals. HRSG operation would also require boiler feedwater treatment chemicals, such as Optisperse™. The Material Safety Data Sheets (MSDS) for the Optisperse™ HRSG feedwater chemical is in Appendix D. Optisperse™ contains phosphates (PO_4) and sodium hydroxide. The sodium hydroxide would be neutralized in the proposed JSF CC water system, cooling tower, and process pond. The estimated maximum phosphorus (P) concentration in the cooling tower blowdown to the process pond would be 16 mg/L as PO_4 (5.22 mg/L as P). After mixing with the water treatment plant waste in the process pond, the mixed concentration is calculated to be 10.2 mg/L as PO_4 (3.34 mg/L as P). There may be some removal of phosphate in the process pond, but the potential percent removal is unknown at this time. Even if no phosphate removal occurs in the process pond, at a maximum flow of 1.13 MGD, the process pond would discharge approximately 31.5 pounds per day of phosphorus to the Holston River. The 7Q10 (the minimum seven-day flow that occurs once in 10 years) at Surgoinsville is 762 cfs (~492 MGD). Therefore, if the discharge were completely mixed with the river, it would increase the phosphorus concentration in the Holston River only by a maximum of 0.008 mg/L.

In addition, cooling towers would be used to cool the steam cycle's condenser water. Cooling towers produce continuous blowdown to remove minerals concentrated in the cooling tower by evaporation of the JSF CC service water. When in operation, the proposed cooling towers would operate at nine cycles of concentration, which means the minerals in the treated service water would be concentrated nine times. Use of cooling towers would allow the proposed CC facility to utilize approximately one-ninth of the water of a comparable facility that used once-through condenser cooling. However, use of cooling towers also means that those minerals in the cooling water that are concentrated by evaporation must be removed by discharging a small stream of water called cooling tower blowdown. This blowdown stream would have minerals concentrated to approximately nine times the concentrations in the CC service water.

To prevent those concentrated minerals from precipitating in the JSF CC systems, cooling water treatment chemicals would be added to the proposed cooling tower system. These chemicals include Flogard MS6206 at 7 mg/L, Gengard™ GN8005 at 10 mg/L, Sodium hypochlorite at 1 mg/L, and sulphates at 790 mg/L from sulphuric acid (H_2SO_4). FoamTrol® AF1440 and Spectrus DT1404 may be used intermittently in cooling tower, if necessary. For example, FoamTrol® is used to reduce or eliminate excessive foaming in the cooling tower system so it would only be used if that condition appeared to be an operational issue. The applicable conditions would be those determined by either JSF CC operating staff or by the cooling tower specialists. Spectrus™ DT1404 is a formulation containing sodium bisulfite to remove any residual chlorine from the cooling tower blowdown. The MSDSs for these cooling tower additives are also in Appendix D.

A biocide (Spectrus™) may be dosed to the cooling towers intermittently to control biological slimes in the cooling towers. If a biocide is added to the cooling towers, cooling tower blowdown would be halted for approximately four hours both to provide maximum effectiveness for the biocide and to prevent discharge of any significant amount of biocide. This interruption of blowdown combined with the retention time in the process wastewater pond would result in no major impact from the biocides utilized in the cooling tower system.

The second-phase operation using cooling towers would utilize the most service water, which would result in the most water treatment plant wastes. It would also discharge the most cooling tower blowdown so that would be the most conservative case from a water and wastewater perspective. That is the case discussed in detail in the following sections.

Several ambient temperature cases ranging from -5 °F to 102 °F were evaluated to estimate the probable range of water requirements for the CC plant. Operation of one to three turbines was also evaluated. In terms of water consumption and wastewater generation, the most conservative case would be three-turbine operation, 100 percent power, with supplemental duct firing at an ambient temperature of 102 °F. Lower ambient temperatures, fewer units in service, and lower power generation all would normally result in lower volumes of water use, water treatment wastes, and cooling tower blowdown. Higher ambient temperatures, more units in service, and higher power generation would normally result in higher volumes of water use, water treatment wastes, and blowdown. For all scenarios evaluated, the estimated raw water intake flows ranged from 0.730 MGD to 7.21 MGD. At plant capacity factors of 40 or 60 percent, the raw water intake flows would still be high for short periods, but would drop considerably on a monthly and annual basis.

TVA’s NPDES Permit (TN0005436) requires minimum bypassed flows over the JSF retention dam whenever TVA is operating any coal-fired units at JSF. TVA releases from the upstream dams when needed to support JSF operation. This permit requires that to the maximum extent practicable, not less than 350 cfs or one-third of the plant cooling water flow, whichever is greater, would be passed over the JSF retention dam during the period from June 1 to September 30 at any time the plant is in operation. During the period of October 1 to May 31, the minimum bypass flow would be 100 cfs.

The maximum JSF withdrawal with four units operating is estimated to be 1,013 cfs (655 MGD). The estimated maximum withdrawal for the proposed JSF CC units is about 11.16 cfs (7.21 MGD). Therefore, the withdrawal for the proposed JSF CC units, together with the existing JSF coal-fired units, would result in an additional 1.1 percent increase in the withdrawal rate. However, operation of all four coal-fired units and the CT/CC unit simultaneously would not be feasible because of power transmission limitations. In any case, the effect of such an increase would be mitigated by the retention dam and operation of the upstream dams. If needed, TVA would conduct an entrainment and impingement study once the system becomes operational and further ensure that entrainment and impingement mortality to fish and shellfish are minimized through use of the best technology available in accordance with Section 316 (b) of the CWA.

As an example of the most conservative probable operation, the water balance schematic for Case NE4A (three turbines, 100 percent power, duct fired, at 102 °F) is shown in Figure 3-1 and the respective flows are listed in Table 3-16. The cooling tower blowdown would be the primary flow through the proposed JSF CC process pond in all Phase 2 cases. The 102 °F case is the most conservative example because it is based on the highest ambient temperature and results in the highest cooling water flows and blowdown (0.724 MGD) to the CC process pond. The second-largest flow to the proposed process pond would be 0.408 MGD of sludge from the clarifier or solids separation component in the JSF CC water treatment system.

This extreme case would be rare and would likely only occur for a few days per year. Operational plans include duct firing 50 percent or less of the time. The 90 °F ambient cases would occur periodically during the four warmest months of the year. As an example for the same Case NE4A (three turbines, 100 percent power, duct fired), but at 90°F, the cooling tower blowdown flow and the wastewater treatment sludge flow would decrease approximately 10 percent. The process pond discharge would drop from 1.14 MGD to 1.03 MGD.

Table 3-16. Respective Water Flows for Three Turbines, 100 Percent Power Duct Fired at 102 Degrees Fahrenheit Ambient Air Temperature

Description	River Water	Pretreat Effluent	Service & Fire Water	Feed to Makeup	Makeup to Demin Tk	Aux Cooling Makeup	GT Water Wash	Chem Feed Dilution
STREAM	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Flow lbs/hr[1]	2.51E+06	2.36E+06	2.36E+06	1.06E+05	1.06E+05	5.00E+02	00.00E+00	5.00E+02
Flow GPM	5,010.09	4,726.50	4,726.50	212.00	212.00	1.00	0.00	1.00
Flow GPD	7.21E+06	6.81E+06	6.81E+06	3.05E+05	3.05E+05	1.44E+03	0.00E+00	1.44E+03

Description	Cycle Makeup	Aux Boiler Makeup	SerW to 3GT Evap Coolers	3 HRSG Quench	3 HRSG to Cooling Tower	Service Water to CT	Lamella Sludge	CT Makeup
STREAM	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Flow lbs/hr[1]	6.54E+04	0.00E+00	1.58E+05	4.60E+04	2.09E+05	2.01E+06	1.42E+05	2.26E+06
Flow GPM	130.80	0.00	316.80	92.02	417.82	4,014.16	283.59	4,522.50
Flow GPD	1.88E+05	0.00E+00	4.56E+05	1.33E+05	6.02E+05	5.78E+06	4.08E+05	6.51E+06

Description	CT Eval/ & Drift	CT Blowdown	Main Cycle Sample Panel Dr.	Secondary Cont. Drains	Oil Water Sep Clear Water	Misc. Service Water	RO/UF Reject	Process Pond Evaporation
STREAM	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Flow lbs/hr[1]	2.01E+06	2.51E+05	1.50E+03	0.00E+00	0.00E+00	0.00E+00	4.53E+04	5.00E+02
Flow GPM	4,020.00	502.50	3.00	0.00	0.00	0.00	90.52	1.00
Flow GPD	5.79E+06	7.24E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	1.44E+03

Description	Waste To Outfall	Storm Water Pond Evap	Storm Water Outfall	Offsite Disposal	Blowdown 3 GT Evap Coolers	3 GT Evap Cooler Evap	MUD & Tk Drain	CT Basin Drain
STREAM	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Flow lbs/hr[1]	3.96E+05	0.00E+00	0.00E+00	0.00E+00	9.90E+04	9.90E+04	0.00E+00	0.00E+00
Flow GPM	791.09	0.00	0.00	0.00	198.00	198.00	0.00	0.00
Flow GPD	1.14E+06	0.00E+00	0.00E+00	0.00E+00	2.85E+05	2.85E+05	0.00E+00	0.00E+00

Description	Misc. Drains	3 HRSG Blowdown	Demin Water to 3 GT Evap. Coolers	Demin Water to Gas Turbine
STREAM	**33**	**34**	**35**	**36**
Flow lbs/hr[1]	1.00E+03	6.39E+04	3.96E+04	0.00E+00
Flow GPM	2.00	127.80	79.20	0.00
Flow GPD	2.88E+03	1.84E+05	1.14E+05	0.00E+00

[1]Pounds per hour

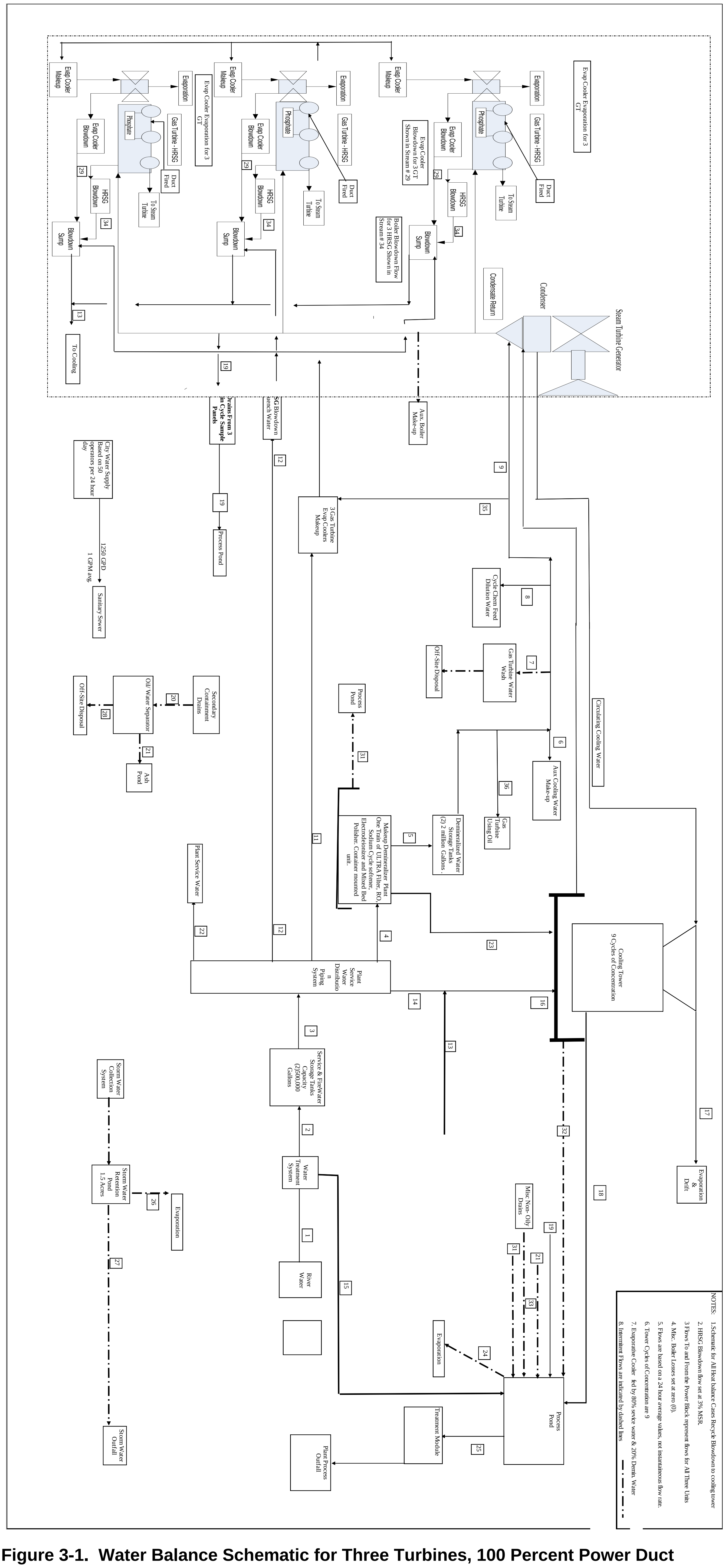

Figure 3-1. Water Balance Schematic for Three Turbines, 100 Percent Power Duct Fired at 102 Degrees Fahrenheit Ambient Air Temperature

The primary wastewaters generated by the proposed JSF CC facility during the second phase are cooling tower blowdown, clarifier sludge from the raw water treatment system, reverse osmosis (RO) reject from the makeup demineralizer plant, and a combination of HRSG blowdown and evaporative cooler blowdown to the blowdown sump. Compressor wash water would be collected and disposed off site at an approved wastewater treatment facility.

The cooling tower blowdown and the clarifier sludge from the water treatment system would be sent to the proposed CC process pond for treatment prior to discharge to the Holston River. There are no publicly owned treatment works (POTWs) near JSF that are on the same side of the river as JSF. The nearest city with a POTW is Rogersville. The Rogersville POTW is operating at full capacity and does not have any available capacity to treat sanitary or process wastewaters from the proposed CC facility.

The RO reject stream would be sent to the cooling tower basin. The HRSG blowdown and evaporative cooler blowdown would be combined in a blowdown sump. The discharge from the blowdown sump would be sent to the cooling tower system. Therefore, the RO reject stream and the HRSG/evaporative cooler blowdown streams would be contained in the cooling tower blowdown prior to discharge to the process pond. Thus, the cooling tower blowdown and the water treatment clarifier sludge are the only significant process wastewaters that would be directed to the process pond.

The water treatment clarifier sludge would be high in suspended solids (approximately 5,000 mg/L), but these solids are estimated to settle very quickly. The proposed process pond would need to be cleaned approximately once every five years to remove accumulated solids. These solids would be analyzed and disposed of off site in an approved facility. All other flows to the process pond would be negligible in comparison to these flows.

At maximum cooling tower blowdown flows (0.724 MGD) plus maximum water treatment plant clarifier sludge flows (0.408 MGD), the combined flows entering the proposed process pond would be 1.14 MGD (152,418 cubic feet/day). With a proposed process pond volume of 193,000 cubic feet, this would result in an initial theoretical retention time of approximately 1.3 days. During many of the other operational scenarios, the flows entering the process pond would be 10 to 25 percent less, and therefore, the retention times would be longer (1.4 to 1.7 days).

The various operational scenarios with different numbers of units operating and different temperatures would result in different flows to the process pond, but the concentrations of total dissolved solids, sulfates, and metals entering the process pond would stay approximately the same. The reason for this is the two primary streams entering the process pond would be the cooling tower blowdown, which would always be at nine cycles of concentration, and the clarifier sludge, which should have fairly consistent solids concentrations.

The primary constituents of the cooling tower blowdown would be those minerals, metals, or other parameters present in the Holston River water, treated in the water treatment system to make service water, then concentrated nine times in the cooling tower system. The estimated concentrations discharged to the proposed JSF CC process pond are listed in Table 3-17 below. This table is based on the conservative assumption that if a

Table 3-17. Estimated Concentrations Discharged to the Proposed John Sevier Combined-Cycle Plant Process Pond

Constituent	Unit of Measure	River Water	Clarifier Effluent	Clarifier Under Flow	RO Reject	Service Water	Cooling Tower Blowdown	HRSG Blowdown	Evap Cooler Blowdown	HRSG Blowdown with Quench	To Process Pond	TDEC WQ
Flows To Process Pond	GPM	0	0	284		0	503				787	Standard
Flows to Cooling Tower Basin	GPM				91	4014			198	220		
Species												
Calcium	mg/L	40	40	40	132	40	379	0	64	23	256.41	
Magnesium	mg/L	10	10	10	36	10	95	0	16	6	64.46	
Sodium	mg/L	14	14	14	96	14	142	13	22	8	95.49	
Potassium	mg/L	2	2	2	6	2	19	0	3	1	12.71	
Barium	mg/L	0.04	0.04	0.00	0.00	0.00	0	0.00	0.07	0.04	0.03	
Bicarbonate	mg/L	140	129	129	433	129	1223	0	207	75	827.91	
Carbonate	mg/L	0	0	0	13	0	2	0	0	0	1.52	
Chlorides	mg/L	27	27	27	102	27	256	3	43	11	173.26	
Fluoride	mg/L	0	0	0	0	0	0	0	0	0	0.00	
NO3/NO2	mg/L	0	0	0	0	0	3	0	1	0	2.11	
Sulfates	mg/L	23	43	43	168	43	409	3	69	18	276.66	250
Sulfite	mg/L	0	0	0	0	0	0	0	0	0	0.00	
Sulfide	mg/L	0	0	0	0	0	0	0	0	0	0.00	
Phosphorous	mg/L	0	0	0	0	0	0	3	0	0	0.00	
Silica	mg/L	3	3	3	9	3	26	10	4	1	17.81	
Chlorine	mg/L	0	1	1		1	9	0	2	0.58	6.03	
Color	mg/L	20	3	3		3	27	0	5	2	18.09	
Total Dissolved Solids	mg/L	170	170	170	995	170	1686	40	272	94	1138.31	
Total Suspended Solids	mg/L	12	1	5000		1	9	0	2	1	1811.14	

Constituent	Unit of Measure	River Water	Clarifier Effluent	Clarifier Under Flow	RO Reject	Service Water	Cooling Tower Blowdown	HRSG Blowdown	Evap Cooler Blowdown	HRSG Blowdown with Quench	To Process Pond	TDEC WQ
Total Hardness	mg/L as CaCO3	141	141	141		141	1251	0	226	82	850.31	
Total Alkalinity	mg/L as CaCO3	115	106	106		106	941	10	170	62	639.24	
TKN[1]	mg/L	0.55	0.550	0.550		0.550	5	0.000	1	0.321	3.32	
N-Ammonia	mg/L	0	0.000	0.000		0.000	0	0.000	0	0.000	0.00	
Coliform Count	col/100mL	20	0.000	0.000		0.000	0	0.000	0	0.000	0.00	
Total Organic Carbon	mg/L	2	0.500	0.500		0.500	4	0.000	1	0.291	3.02	
Total Inorganic Carbon	mg/L	24	24.000	24.000		24.000	213	0.000	38	13.991	144.73	
Chemical Oxygen Demand	mg/L	21	0.000	0.000		0.000	0	0.000	0	0.000	0.00	
Oil & Grease		0	0.000	0.000		0.000	0	0.000	0	0.000	0.00	
Antimony		0.000	0.0005	0.000	0.002	0.001	0.005	0.000	0.001	0.000	0.0030	
Arsenic	mg/L	0.001	0.0011	0.001	0.004	0.001	0.010	0.000	0.002	0.001	0.0071	0.010
Aluminum	mg/L	0.250	0.1250	0.125	0.419	0.125	1.185	0.000	0.200	0.073	0.8020	0.200
Beryllium	mg/L	0.000	0.0010	0.000	0.003	0.001	0.009	0.000	0.002	0.001	0.0061	0.004
Boron	mg/L	0.000	0.1000	0.100	0.335	0.100	0.948	0.000	0.160	0.058	0.6416	
Cadmium	mg/L	0.000	0.0003	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.0016	0.00025
Chromium (Dissolved)	mg/L	0.000	0.0005	0.001	0.002	0.001	0.005	0.000	0.001	0.000	0.0032	
Chromium (Total)	mg/L	0.000	0.0050	0.005	0.017	0.005	0.047	0.000	0.008	0.003	0.0321	
Copper	mg/L	0.003	0.0028	0.003	0.009	0.003	0.027	0.000	0.004	0.002	0.0180	0.006
Cobalt	mg/L	0.001	0.0013	0.001	0.004	0.001	0.012	0.000	0.002	0.001	0.0083	
Iron (Dissolved)	mg/L	0.000	0.1000	0.100	0.335	0.100	0.948	0.000	0.160	0.058	0.6416	
Iron	mg/L	0.380	0.1000	0.100	0.000	0.100	0.887	0.000	0.160	0.058	0.6031	1.000
Lead (Dissolved)	mg/L	0.000	0.0005	0.001	0.002	0.001	0.005	0.000	0.001	0.000	0.0032	0.0025
Lithium	mg/L	0.000	0.0150	0.015	0.050	0.015	0.142	0.000	0.024	0.009	0.0962	

Constituent	Unit of Measure	River Water	Clarifier Effluent	Clarifier Under Flow	RO Reject	Service Water	Cooling Tower Blowdown	HRSG Blowdown	Evap Cooler Blowdown	HRSG Blowdown with Quench	To Process Pond	TDEC WQ
Manganese	mg/L	0.065	0.0100	0.010	0.000	0.010	0.089	0.000	0.016	0.006	0.0603	
Manganese (Dissolved)	mg/L	0.016	0.0160	0.016	0.054	0.016	0.152	0.000	0.026	0.009	0.1027	
Mercury	mg/L	0.000	0.0002	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.0013	0.000051
Molybdenum	mg/L	0.000	0.0050	0.005	0.017	0.005	0.047	0.000	0.008	0.003	0.0321	
Nickel (Dissolved)	mg/L	0.001	0.0012	0.001	0.004	0.001	0.011	0.000	0.002	0.001	0.0077	0.052
Selenium (Dissolved)	mg/L	0.000	0.0005	0.001	0.002	0.001	0.005	0.000	0.001	0.000	0.0032	0.005
Silver (Dissolved)	mg/L	0.000	0.0003	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.0016	
Thallium (Dissolved)	mg/L	0.000	0.0005	0.001	0.002	0.001	0.005	0.000	0.001	0.000	0.0032	0.002
Tin	mg/L	0.000	0.0005	0.001	0.002	0.001	0.005	0.000	0.001	0.000	0.0032	
Titanium	mg/L	0.000	0.0050	0.005	0.017	0.005	0.047	0.000	0.008	0.003	0.0321	
Zinc	mg/L	0.000	0.0050	0.005	0.017	0.005	0.047	0.000	0.008	0.003	0.0321	0.120
Zinc (Dissolved)	mg/L	0.000	0.0050	0.005	0.017	0.005	0.047	0.000	0.008	0.003	0.0321	0.120
Phenol	mg/L	0.000	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	
Flowgard MS6206	mg/L	0.000	0.000	0.000	0.000	0.000	**7**	0.000	0.000	0.000	4.4723	
Gengard™ GN8005	mg/L	0.000	0.000	0.000	0.000	0.000	**10**	0.000	0.000	0.000	6.3891	
Sodium Hypochlorite	mg/L	0.000	0.000	0.000	0.000	0.000	**1**	0.000	0.000	0.000	0.3195	
Sulphates (H_2SO_4 added)	mg/L	0.000	0.000	0.000	0.000	0.000	**790**	0.000	0.000	0.000	504.7362	

[1] Total Kjeldahl Nitrogen or TKN is the sum of organic nitrogen; ammonia (NH3) and ammonium (NH4+)

parameter were below detection limits in the raw water, then the concentration in the treated service water would be one-half the detection limit.

As listed in the Table 3-17 above, most of the parameters proposed to be discharged to the process pond from the proposed facility are estimated to meet TDEC's stream standards. The parameters of potential concern, which are highlighted in red in Table 3-17, are common minerals and solids that are concentrated in the water treatment systems, such as the RO reject, the clarifier sludge, and the cooling tower blowdown. The potential parameters of concern include sulfates, total dissolved solids, total suspended solids, hardness, and alkalinity. However, because these wastewaters would receive additional settling and neutralization in the proposed JSF CC process pond before they are discharged to the Holston River, they are expected to have minor impacts on the river.

Total copper has been found in the JSF raw water intake at 0.0028 mg/L. If the concentration is unchanged by the water treatment system and then concentrated in the CC cooling tower system, the estimated copper concentration entering the process pond would be 0.018 mg/L, which is greater than the TDEC fish and aquatic life Criterion Continuous Concentration (CCC) standard of 0.006 mg/L. However, because of the alkalinity and hardness in the cooling tower blowdown and the water treatment clarifier sludge, it is likely that substantial copper removals would occur in these systems or in the process pond. Therefore, the copper present from the raw water intake is expected to have minor impacts on the Holston River.

The concentrations of several metals in the intake raw water were below analytical detection limits. In the analysis, the conservative assumption was made that if the concentration of a parameter is below detection limits (BDL) in the raw water, then one-half the detection limit would be used to calculate potential discharge concentrations. Because of the use of this reporting convention, some metals are shown as discharging from the JCC process pond at concentrations above the TDEC stream standards at the outfall before stream dilution. These metals include aluminum, beryllium, cadmium, mercury, and thallium. If originally present, these metals could be concentrated in the cooling tower system. These metals are not added during the process and are likely present in the source river water. Therefore, their presence and concentration in the discharge to the process pond is speculative. Even if these metals are present in the raw water intake, the neutralization and settling provided in the process pond would likely remove some of these metals. Thus, the concentrations of metals in the process pond discharge would not have a major impact on the Holston River.

Whole Effluent Toxicity

The NPDES Permit for the proposed JSF CC would likely contain requirements for whole effluent toxicity testing for the NPDES Permit, which would probably involve exposing a seven-day or three-brood cycle of fathead minnows and daphnids to effluent samples. If the whole effluent toxicity testing reveals any potential impacts, TVA would use an adaptive management approach to determine the source of the toxicity and address the source with appropriate process modifications or wastewater treatment alternatives. In the case that operation of the proposed CC facility does result in concentrations of minerals, dissolved solids, or metals that could cause impacts to the Holston River, appropriate additional treatment processes would be added to ensure that no significant impact occurred. Additional treatment options could include adding baffles or other treatment processes to the process pond. The proposed process pond would be monitored to determine that proper management and controls were in place to ensure the effluent had only minor impacts to the receiving stream. If the additional alkalinity increases the process pond pH beyond 6.0-9.0, pH control measures, such as a CO_2 system, might have to be used at the pond to control pH. Therefore, the expected process wastewaters would result in no major impacts.

3.4. Wetlands

3.4.1. Affected Environment

Activities in wetlands are regulated under Section 404 of the *Clean Water Act* and are covered under EO 11990, Protection of Wetlands. Under Section 404, the USACE established a permit system to regulate activities that result in the discharge of “dredge or fill material” into the “waters of the United States.” This requires that authorization under either a Nationwide General Permit or an Individual Permit be obtained to conduct specific activities in wetlands. Additionally, Section 401 requires water quality certification by the state for projects permitted by the federal government (Strand 1997). EO 11990 requires agencies to minimize wetland destruction, loss, or degradation, and preserve and enhance natural and beneficial wetland values, while carrying out agency responsibilities. The use of the Tennessee Valley Authority Rapid Assessment Method (TVARAM) for wetland delineation guides TVA’s wetland mitigation decisions consistent with TVA’s independent responsibilities under the *National Environmental Policy Act* (NEPA) and EO 11990. TVARAM is a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region.

Field surveys were conducted to determine types and locations of wetlands present within the boundaries of JSF and along the pipeline corridors. Wetland determinations were performed according to USACE standards, which require documentation of hydrophytic (i.e., wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Reed 1997; U.S. Department of Defense and USEPA 2003). Broader definitions of wetlands, such as that used by the USFWS (Cowardin et al. 1979), and the TVA Environmental Review Procedures definition (TVA 1983) were also considered in this review. In addition, wetlands were categorized according to their ecological condition. Using TVARAM, selected wetlands were categorized by their functions, sensitivity to disturbance, rarity, and irreplaceability.

According to TVARAM methodology, wetlands may be classified into three categories. Category 1 wetlands are considered “limited quality waters” and represent degraded aquatic resources. Category 2 includes wetlands of moderate quality and wetlands that are degraded but have reasonable potential for restoration. 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. The wetlands on the proposed JSF site are Category 2 wetlands.

John Sevier Fossil Plant Site

JSF is located in the Holston River watershed, and within the Southern Shale Valleys ecoregion IV, a subdivision of the Ridge and Valley ecoregion III, which occurs between the Blue Ridge Mountains on the east to the Cumberland Plateau on the west (Griffith et al. 2001). The relatively steep and rolling topography of the region affects the type, location, and extent of wetlands. In general, low-lying, poorly drained areas are confined to floodplains and large (greater than 10 acres) wetlands are uncommon. Land use/land cover data generated by USEPA in 1999 indicated wetlands comprise less than 0.3 percent of overall land use types in the Holston River watershed (TDEC 2006a; TDEC 2006b).

Two wetlands totaling about 1.0 acre were found within the JSF site footprint (see Table 3-18). Both wetlands are located within the TL ROW from the JSF fossil plant. Both are associated with drainage channels and conveyances that run within the TL ROW. Wetlands 1 and 2 are a mix of scrub-shrub and emergent habitats located adjacent to each other near the eastern portion of the TL ROW and JSF plant site. Vegetation found in these sites includes black willow, cattail, smartweed, jewelweed, soft rush, American water plantain, and woolgrass. These two wetlands scored as Category 2 wetlands using TVARAM.

Table 3-18. Wetlands in the Proposed John Sevier Fossil Plant Site

Wetland Identification	Wetland Type	TVA RAM Category (Score)	Size (acres)
W 001	Emergent/scrub-shrub	2 (41)	0.62
W 002	Emergent/scrub-shrub	2 (41)	0.37
		Total	**.99**

The emergent and scrub shrub wetlands perform valuable functions including flood control, sediment retention, wildlife habitat, and ecosystem support functions such as filtration of sediment and other contaminants and habitat required by species dependent on water and woody plants for all or part of their life cycle.

In order to avoid the two wetlands in the proposed site boundary, the CC plant plans were adjusted so that the wetlands would be entirely outside of the proposed project footprint.

Gas Pipeline Route

Field surveys conducted by ETNG and reported in the DER Report (SpectraEnergy Partners 2009) indicated 11 wetlands occur within the proposed pipeline corridors. Table 3-19 presents the type, location, classification, and area affected for each wetland that would be crossed. Three broad classes of freshwater wetland systems (Cowardin et al. 1979) are present in the gas pipeline project area including forested, scrub-shrub, and emergent wetlands and descriptions of these classes are described below. Some wetlands are also a combination of two or more habitat types. All of the wetlands present within the proposed gas pipeline footprint are Category 2 wetlands, indicating moderate provision of wetland functions.

<u>*Wetland Classes*</u>

Forested wetlands are dominated by woody vegetation that is at least 6 meters tall (Cowardin et al. 1979). Forested wetlands within the project area were dominated by the following canopy species: red maple, sycamore, and green ash. The understory included species found in the canopy as well as black willow, spicebush, false nettle, clearweed, moneywort, jewelweed, and arrow arum.

Scrub-Shrub wetlands include areas dominated by woody vegetation less than 6 meters (20 feet) tall. Scrub-shrub components of emergent and forested wetlands within the project area included black willow, spicebush, and multiflora rose. The gas pipeline project would affect two wetland components that are strictly scrub-shrub areas.

The proposed pipeline would cross five wetland components that are strictly emergent wetlands with no shrub component present. Emergent wetlands within the project area were dominated by the following species: jewelweed, pale touch-me-not, small flowered agrimony, spearmint, moneywort, water pepper, wingstem, reed canary grass, Joe pye weed, boneset, spotted ladysthumb, common rush, common cattail, clearweed, dark green bulrush, swamp milkweed, fox sedge, narrowleaf cattail, American water horehound, sedges, spike rush, and American water plantain.

Six wetland components are characterized either as forested mixed with scrub-shrub and emergent vegetation or scrub-shrub mixed with emergent vegetation. The dominant vegetation in these wetlands is similar to that listed above.

Table 3-19. Wetlands Within the Proposed Gas Pipeline Route

Wetland Identification	Wetland Type	TVARAM Category (Score)	Location - Mile Post	Temporary Impact (acres)	Permanent Impact (acres)[a]
John Sevier Mainline Extension					
3-JS-WL-002[b]	Emergent	2 (34)	6.63	0.06	0.00
3-JS-WL-002	Scrub-shrub	2 (34)	6.63	0.01	0.01
Flatwoods Loop					
2-FW-WL-002[b]	Forested	2 (53)	7.42	0.01	0.00
2-FW-WL-002	Scrub-shrub	2 (53)	7.42	0.02	0.01
2-FW-WL-002	Emergent	2 (53)	7.42	0.01	0.00
Bristol Relay					
1-BR-WL-001	Emergent/scrub-shrub	2 (41)	0.97	0.08	0.00
1-BR-WL-003	Emergent	2 (37)	2.70	0.01	0.00
1-BR-WL-004	Forested/emergent	2 (45)	3.67	0.05	0.00
1-BR-WL-005	Scrub-shrub/emergent	2 (38)	3.51	0.20	0.00
1-BR-WL-007	Emergent	2 (25)	5.66	0.12	0.00
1-BR-WL-008	Emergent	2 (32)	5.72	0.10	0.00
1-BR-WL-010	Forested/scrub-shrub/emergent	2 (49)	8.56	0.01	0.00
1-BR-WL-011	Forested/scrub-shrub/emergent	2 (42)	8.58	0.01	0.00
1-BR-WL-012	Scrub-shrub/emergent	2 (36)	9.12	0.25	0.00
			Total	**0.94**	**0.02**

[a] Permanent forested wetland impacts calculated based on a 30-foot maintained ROW in a scrub-shrub or emergent state. Permanent scrub-shrub impacts calculated based on a 10-foot maintained ROW in an emergent state. There would be no permanent impacts to emergent wetlands.

[b] Some wetlands are listed more than once to break them into different classifications, as appropriate.

3.4.2. Environmental Consequences

3.4.2.1. No Action Alternative

Under the No Action Alternative, TVA would not construct a new gas-fired facility and would continue to operate the JSF facility under the current operating plans, which includes the planned installation of NOx and SO_2 reduction systems. The installation and operation of these systems are described in detail in two EAs (TVA 2006a; 2009a) listed in Section 1.4. Based on wetland analyses in both of these EAs, under the No Action Alternative, the proposed construction and operation of the emission-reduction systems would not impact wetlands.

3.4.2.2. Action Alternative

Construction Impacts

John Sevier Fossil Plant Site

There are two wetlands in the JSF site footprint; however, in order to avoid potential wetland impacts, the boundary of the JSF site was adjusted and construction activities would avoid wetland areas. The wetlands would not be directly affected. However, potential indirect wetland impacts resulting from construction activities could include erosion and sedimentation from storm water runoff during the construction period. In order to minimize potential impacts to wetlands, TVA would follow standard construction BMPs to reduce the potential for construction related sedimentation. Therefore, under the Action Alternative, potential impacts to wetlands would be minor.

Pipeline Route

Overall pipeline construction impacts to wetlands associated with the Action Alternative are minor. Approximately 0.02 acre of scrub-shrub wetlands would be permanently converted to emergent wetlands, and another 0.92 acre of wetland would be temporarily impacted by construction. While there would be a slight reduction in wetland function and wildlife habitat value associated with habitat conversion, this change would affect less than 0.0001 percent of wetland acreage present in the project area.

The primary permanent impact to wetlands would result from the conversion of scrub-shrub wetland areas to emergent wetland types. As shown in Table 3-19, the proposed gas pipeline project would affect a total of approximately 0.94 acre of wetlands. Of the 0.94 acre, approximately 0.08 acre is forested, a mix of forested and emergent habitat, or a mix of forested/scrub-shrub/emergent wetland. Approximately 0.86 acre is emergent wetland and or scrub-shrub/emergent habitat.

Following construction, approximately 0.02 acre of scrub-shrub wetland would be cleared and permanently converted to emergent wetland habitat. Regeneration of trees would be prevented within the permanent ROW by mechanical means for the operational lifetime of the pipeline.

Temporary effects on wetlands would be greatest during and immediately following construction. In emergent wetlands, the impact of construction on vegetation would be relatively short-term since herbaceous vegetation would regenerate quickly. In forested and scrub-shrub wetlands, the impact on vegetation would be extended due to the longer regeneration period of the vegetative types and the periodic maintenance or clearing allowed by the E&SCP (SpectraEnergy Partners 2009).

The E&SCP wetland crossing procedures were developed with collaboration of several agencies, including USACE, and comply with Section 404 Nationwide permit program terms and conditions (33 CFR Part 330). E&SCP wetland crossing procedures, erosion and sediment control, and restoration are described in Appendix B. With the implementation of these wetland crossing procedures, impacts to wetlands are expected to be minor and insignificant.

Operational Impacts

John Sevier Fossil Plant Site

Operations of the proposed JSF CC plant are not anticipated to impact wetlands.

Gas Pipeline Route

Pipeline operations include maintenance of the pipeline ROW consisting of periodic mowing and, in some cases, hand clearing of larger vegetation. Although there may be a short-term loss of wetland habitat, in some cases, mowing promotes diversity in plant communities, which may lead to an overall beneficial effect for habitat value. This depends on the composition of the specific wetland community.

ETNG would develop wetland mitigation measures in coordination with the USACE during the permitting phase of the proposed gas pipeline project and provide these mitigation plans to the FERC prior to construction. To minimize the potential for spills, and any impacts from such spills, ETNG would implement its SPCC Plan and E&SCP during construction.

- Vegetation clearing of the pipeline ROW in wetland areas would be restricted to a 10-foot-wide cleared strip centered over the pipeline for maintenance purposes. Additionally, trees within 15 feet of the pipeline greater than 15 feet in height would be selectively cut and removed from the permanent ROW. The remaining 0.92 acre of wetland disturbed during construction would be allowed to return to preconstruction conditions.

With the implementation of these measures during pipeline ROW maintenance, overall operational impacts to wetlands would be minor.

3.5. Aquatic Ecology

3.5.1. Affected Environment

A November 2009 field review of the JSF site documented one intermittent stream and one perennial stream in areas within the project boundary. Both streams are unnamed tributaries to the Holston River. No important aquatic resources are present in either of these streams.

The reach of the Holston River adjacent to JSF and the gas pipeline expansion has been substantially altered from its former free-flowing character by the presence of the John Sevier Detention Dam (located adjacent to JSF), and Cherokee Dam (35.5 miles downstream). The area affected by Cherokee Reservoir extends to the tailwaters of the John Sevier Detention Dam. TVA began a program to monitor the ecological conditions of its reservoirs systematically in 1990. Reservoir (and stream) monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated VSMP. 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 (Dycus and Baker 2001).

<u>Benthic Community</u> - Compared to the stations of other TVA run-of-the-river reservoirs, the monitoring sites on Cherokee Reservoir have consistently rated as "poor" to "fair." Cherokee Reservoir rated "fair" at the forebay and "fair" at the midreservoir in 2008 (Table 3-20) monitoring; ecological conditions were similar to those found in previous years.

Cherokee is a relatively deep storage impoundment with a long retention time and abundant nutrients, resulting in low dissolved oxygen levels and high chlorophyll levels.

Table 3-20. Recent (1996-2008) Benthic Community Scores Collected as Part of the Vital Signs Monitoring Program in Cherokee Reservoir

	Sample Year							
Station	**Mile**	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**
Forebay	HRM 55	Fair	Fair	Poor	Poor	Fair	Fair	Fair
Midreservoir	HRM 76	Poor	Fair	Fair	Poor	Fair	Fair	Fair

Rating codes: Poor (7-16); Fair (17-26); Good (27-35)

Fish Community - The VSMP fish community monitoring results are shown in Table 3-21. . Overall results indicate that the Cherokee fish assemblage has been consistently in the "fair" range at the forebay station and in the "fair" to "good" range at the midreservoir transition station since 1998.

Table 3-21. Cherokee Reservoir Fisheries Assemblage Index Scores, Based on Vital Signs Monitoring Data

	Sample Year					
Station	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**
Forebay	Fair	Fair	Fair	Fair	Fair	Good
Midreservoir	Fair	Fair	Fair	Good	Good	Fair

Rating codes: Poor (12-28); Fair (29-44); Good (45-60)

Cherokee 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 resource agencies and, when available, results of angler success as measured by state resource agencies (i.e., bass tournament results and creel surveys). The SFI score ranges from a high of 60 (excellent) to a low of 20 (very poor). .In 2007, Cherokee rated better than average for black crappie and striped bass; the SFI rating was below average for black basses, smallmouth bass, spotted bass, and largemouth bass (Table 3-22). There are no fish consumption advisories in effect for Cherokee Reservoir.

Table 3-22. Sport Fishing Index Scores for Selected Sport Fish Species in Cherokee Reservoir 2007

Fish Species	2007 Score	2007 Valleywide Average	Range of Values
Black Basses	32	36	Below Average
Black Crappie	50	34	Better than Average
Largemouth Bass	30	33	Below Average
Smallmouth Bass	24	30	Below Average
Spotted Bass	28	33	Below Average
Striped Bass	46	37	Better than Average

Gas Pipeline Route

The gas pipeline project would require the crossing of 49 water bodies, including 17 perennial, 19 intermittent, and 13 wet-weather conveyances in Hawkins, Greene, Washington, and Sullivan counties, Tennessee, and Washington County, Virginia. All of these streams lie within the Holston River watershed. Table 2.1.1-1 of the DER Report, (Appendix C) lists surface water bodies crossed by the pipeline and includes approximate milepost, water body name, approximate water body width, flow regime (perennial or intermittent), and state-designated use.

Perennial streams in this area support diverse communities of fish and benthic macroinvertebrates (including insects, crayfish, and mollusks). No unique or important aquatic habitats (including trout fisheries or habitat for federally listed species) were identified within the gas pipeline project area.

3.5.2. Environmental Consequences

3.5.2.1. No Action Alternative

Under the No Action Alternative, TVA would continue to follow the operating plan, which includes the planned installation of NOx and SO_2 reduction systems. Construction of the emission-reduction systems would occur on previously disturbed areas on the JSF site, and all work would be conducted using standard BMPs to minimize potential impacts to surface waters in the Holston River. The existing conditions and trends described for aquatic life in this segment of the Holston River are expected to continue. No incremental effects to aquatic animals would occur as a result of the planned construction activities.

3.5.2.2. Action Alternative

John Sevier Fossil Plant Site

Construction Impacts

TVA proposes to construct the CC plant on the JSF Reservation utilizing the existing facility infrastructure. The proposed project would occur on previously disturbed areas on the JSF plant site, and all work would be conducted using BMPs to minimize potential impacts to surface waters in the Holston River. No effects to aquatic life would occur as a result of these construction activities.

An ARAP would be obtained for any stream alterations to the two identified water courses located within the project area, and the terms and conditions of this permit would require mitigation from these proposed activities. No measurable impacts to aquatic life in the Holston River would occur under this alternative.

Operational Impacts

As previously mentioned, the withdrawal for the proposed JSF CC units, together with the existing JSF coal-fired units, would result in an additional 1.1 percent increase in the withdrawal rate on the Holston River. However, operation of all four coal-fired units and the CT/CC unit simultaneously would not be feasible because of power transmission limitations. In any case, the effect of such an increase would be mitigated by the retention dam and operation of the upstream dams. If needed, TVA would conduct an entrainment and impingement study once the system becomes operational and further ensure that entrainment and impingement mortality to fish and shellfish are minimized through use of the best technology available in accordance with Section 316 (b) of the CWA.

Gas Pipeline Route

ETNG anticipates using open-cut crossing methods for all water body crossings along the proposed gas pipeline route. Short-term impacts on fisheries associated with pipeline construction activities may be caused by increased sedimentation and turbidity, temperature changes due to removal of vegetation cover over streams, introduction of water pollutants, or entrainment of fish. However, no long-term effects on water temperature, dissolved oxygen, pH, benthic invertebrates, or fish communities are expected to occur due to the construction or operation of the pipeline or aboveground facilities. An ARAP would be obtained for any stream alterations necessary for this work.

To minimize impacts on aquatic resources within the project area, construction activities for the project would adhere to the guidelines outlined in ETNG's E&SCP and SPCC Plan (SpectraEnergy Partners 2009). These documents are designed so that implementation of the BMPs contained herein would minimize construction impacts on environmental resources, including aquatic resources. With the implementation of these plans, the proposed gas pipeline is expected to result in minor impacts on aquatic resources.

3.6. Terrestrial Ecology – Plants

3.6.1. Affected Environment

As previously stated, JSF is located in the Southern Shale Valleys ecoregion, a subdivision of the Ridge and Valley ecoregion, which occurs between the Blue Ridge Mountains on the east to the Cumberland Plateau on the west. This is a relatively low-lying region made up of roughly parallel ridges and valleys that were formed through extreme folding and faulting events in past geologic time (Griffith et al. 2001). The Southern Shale Valleys ecoregion consists of lowlands, rolling valleys and slopes, and hilly areas dominated by shale materials. Small farms and rural residences occur throughout where land is used for grazing or farming tobacco, corn, or hay (Griffith et al. 2001).

John Sevier Fossil Plant Site

The vegetative (physiognomic) classes observed within the project footprint and surrounding areas of the JSF were herbaceous vegetation and evergreen-deciduous forest and scrub-shrub wetland communities. Much of the forested areas observed were scattered along fencerows and stream corridors. Details of the dominant species occurring in these areas are included in Appendix E.

Approximately 95 percent of the area inspected by TVA biologists was herbaceous vegetation contained within transmission line or railroad ROWs. Evergreen-deciduous forests make up approximately 4 percent of the total acreage and are scattered along fencerows and a small area of palustrine forest. The remaining 3 percent of the JSF project area occurs as scrub-shrub wetlands.

There are no uncommon terrestrial plant communities or otherwise noteworthy botanical areas occurring on or adjacent to the project area.

Gas Pipeline Route

Construction of 16.3 miles of new pipeline and upgrades to 11.7 miles of gas pipeline near Bristol, Virginia, to JSF would cross portions of Washington County, Virginia, and Greene, Hawkins, Sullivan, and Washington counties, Tennessee. All 28 miles of the gas pipeline occurs within the Ridge and Valley ecoregion, described above. However, the pipeline crosses several subdivisions of the Ridge and Valley, and they include the following: Southern Shale Valley, Southern Sandstone Ridges, Southern Dissected Ridges and Knobs, and Southern Limestone Dolomite Valleys and Low Rolling Hills.

SpectraEnergy Partners, who reported crossing three major vegetative cover types that included upland forest, open areas of herbaceous vegetation, and wetlands, conducted fieldwork for the gas pipeline portion of the project. Further details of the associated ecosystems, vegetative classes, and dominant plant species occurring in these areas are included in Appendix E.

Upland forests occurring along the proposed pipeline routes are generally composed of three forest cover types: early successional forest, mixed early successional/second-growth forest, and second-growth forest. In total, approximately 115 acres of upland forest would be affected by construction of the project. Of this, approximately 31 acres would be permanently affected by pipeline operations (SpectraEnergy Partners 2009).

Open land cover type in the pipeline project area is made up of several kinds of land including maintained lawns (nonresidential), agriculture, pasture/hayfield, old fields and scrub-shrub. Approximately 225 acres of open land cover type would be affected by construction of the gas pipeline. Approximately 30 acres of existing open land would be maintained as new permanent ROWs. Periodic maintenance activities along the ROW such as mowing would not result in a change in this cover type during pipeline operations.

Only two new access roads would be constructed, one of which would be used only temporarily during construction. It is estimated that construction activities associated with new access roads would disturb about 0.57 acre of open, undeveloped land. Following construction, approximately 0.07 acre would be maintained as new permanent access roads.

3.6.2. Environmental Consequences

3.6.2.1. No Action Alternative

Under the No Action Alternative, TVA would not construct a new gas-fired facility and ETNG would not construct the associated pipelines. However, TVA would continue to follow the JSF operating plan, which includes the planned installation of NOx and SO_2 reduction systems. The terrestrial vegetation communities occurring on the sites planned for the emission-reduction systems are common and representative of the region; as a result, the impacts of the No Action Alternative are expected to be minor.

3.6.2.2. Action Alternative

John Sevier Fossil Plant Site

Because the vegetation communities present within and around JSF are common and representative of the region; implementation of the proposal to build a new CT/CC facility and the associated gas pipeline is expected to result in minor impacts to these botanical resources.

Gas Pipeline Route

Following construction, approximately 30.63 acres of forested land would be retained as new permanent ROW, and the remaining disturbed forests would be allowed to return to preconstruction use (SpectraEnergy Partners 2009). Additionally, 29.91 acres of open land would be retained as permanent ROW, and the remainder would be returned to preconstruction conditions. Most access roads would be on existing roads, and two new roads would be constructed, impacting 0.10 acre. No major impacts are anticipated on the open land vegetation cover type because this type of vegetation would be allowed to become reestablished following construction. In order to minimize impacts to vegetation, the DER Report describes ETNG's proposed measures, such as segregating topsoil in agricultural and residential areas, installation of permanent erosion control measures, and conducting revegetation efforts and monitoring post-construction vegetation to reduce impacts to vegetation. Because the vegetation communities along the pipeline route and access roads are common and representative of the region, and based on standard BMPs and the mitigation activities planned by ETNG, long-term impacts to the terrestrial ecology of the region are expected to be minor.

3.7. Invasive Terrestrial Species – Plants

EO 13112 for invasive species serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species potentially cause.

3.7.1. Affected Environment

EO 13112 defines an invasive nonnative species as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem, and whose introduction does or is likely to cause economic or environmental harm or harm to human health (U.S. Department of Agriculture 2007). All of the species mentioned below have the potential to adversely affect the native plant communities because of their potential to spread rapidly and displace native vegetation. All of these invasive species are Rank 1 (severe threat) and are of high priority to TVA (James 2002).

John Sevier Fossil Plant Site

Much of the native vegetation within and surrounding JSF has been altered by previous land use history. Invasive exotic plant species occurring within the project area include autumn olive, Chinese privet, crown vetch, Japanese honeysuckle, Japanese stilt grass, Johnson grass, mimosa, multiflora rose, sericea lespedeza, and small carp grass.

Gas Pipeline Route

Along the 28 miles of proposed gas pipeline, much of the area has been altered by previous land use history. Based on the DER Report (SpectraEnergy Partners 2009), several common exotic invasive species were observed during field reviews and included species such as autumn olive, bush honeysuckle, Japanese honeysuckle, Japanese stilt grass, multiflora rose, princess tree, tree-of-heaven, and winter creeper.

3.7.2. Environmental Consequences

3.7.2.1. No Action Alternative

Under the No Action Alternative impacts to terrestrial ecology would be minor. The entire JSF project site occurs on land with previous and current levels of disturbance to native plant communities, such as farming, pastures, and plant operations. Most of the vegetation is dominated by exotic invasive species. Adoption of the No Action Alternative would not result in measureable impacts to terrestrial ecology due to the introduction or spread of invasive exotic terrestrial plant species.

3.7.2.2. Action Alternative

John Sevier Fossil Plant Site

Proposed construction activities could result in the introduction and spread of invasive exotic weed species, which are known to be present in and around JSF. However, with the implementation of standard BMPs designed to prevent the introduction and spread of exotic weed species and standard BMPs for revegetating disturbed lands (Muncy 1999 and James 2002), impacts from the introduction and spread of invasive nonnative plant species would be minimal.

Gas Pipeline Route

Under the Action Alternative, construction activities could potentially be the source for the introduction and spread of invasive exotic weed species, which are known to be present in and around the proposed gas pipeline project area. To lessen impacts to terrestrial ecology, ETNG would implement mitigation measures described in its E&SCP and SPCC Plan (SpectraEnergy Partners 2009) such as “conducting revegetation efforts in accordance with the recommendations of the local soil conservation authority, other land management agencies, or the affected land owner; and monitor post construction vegetation.” With the implementation of standard BMPs and mitigation measures planned by ETNG, impacts to terrestrial ecology from the introduction and spread of invasive nonnative species would be minimal. Further controls to minimize the introduction and spread of exotic weed species are detailed in the DER Report (SpectraEnergy Partners 2009).

3.8. Terrestrial Ecology – Animals

3.8.1. Affected Environment

John Sevier Fossil Plant Site

The habitats in the JSF project area are currently disturbed and are similar to the surrounding landscape. Most of the JSF project area consists of early successional habitats dominated by herbaceous vegetation. The remaining habitat areas are young woodland fragments occurring along roadways, fencerows, and stream corridors.

Early successional habitats consist of pastures, hayfields, and transmission line ROWs. These areas support many common species including common yellowthroat, field sparrow, song sparrow, indigo bunting, eastern meadowlark, wild turkey, red-winged blackbird, Carolina wren, mourning dove, white-tailed deer, eastern cottontail, and striped skunk. Reptiles found in this habitat include black racer and black rat snake.

Stands of mixed woodlands are scattered along fencerows and along the slopes adjacent to a few creek bottoms. Remaining wooded fragments are young in age. Both woodland types are highly fragmented, show disturbances from both cattle and previous agricultural practices, and provide poor quality overall habitat for terrestrial animals. As previously stated in Wetlands Section 3.4 of the draft EA, two wetlands are known to occur on the JSF Reservation.

Several common birds were observed in both forest types including tufted titmouse, eastern towhee, northern cardinal, yellow-billed cuckoo, blue jay, American crow, American goldfinch, eastern phoebe, downy woodpecker, blue-gray gnatcatcher, and Carolina chickadee. Eastern chipmunk and gray squirrel are also observed in the forested areas. Common amphibians and reptiles in this habitat include slimy salamanders, eastern box turtle, copperhead, and eastern garter snake. Low-gradient streams and wetlands in this forested habitat provide habitat for American woodcock, northern cricket frog, upland chorus frog, dusky salamander, and southern two-lined salamander.

A cave is recorded approximately 1 mile from the JSF reservation. No heron colonies or other unique or sensitive resources occur within 3 miles of the JSF site and the project area does not contain any designated critical habitat for federally listed species.

Gas Pipeline Route

Agricultural practices have heavily impacted habitats within the proposed gas pipeline route project area. Three habitat types are crossed by the proposed gas pipeline route: upland forest, open lands, and wetlands. Upland habitats include young and second-growth hardwoods and mixed evergreen-deciduous forest. Open lands, the most prevalent habitat type in the project area, include old-field, scrub-shrub dominated habitats and agricultural and maintained fields. Occasional wetlands occur along the proposed corridor.

Forests in the pipeline project area are highly fragmented, and many show disturbance from both cattle and previous agricultural practices. Several species of birds are found in these habitats, including tufted titmouse, eastern towhee, northern cardinal, yellow-billed cuckoo, blue jay, American crow, American goldfinch, eastern phoebe, downy woodpecker, blue-gray gnatcatcher, and Carolina chickadee. Eastern chipmunk and gray squirrel also occur in these habitats.

Open lands support many common species, including common yellowthroat, field sparrow, song sparrow, indigo bunting, eastern meadowlark, wild turkey, red-winged blackbird, Carolina wren, mourning dove, white-tailed deer, eastern cottontail, and striped skunk. Reptiles found in this habitat include black racer and black rat snake.

Low-gradient streams and wetlands exist within the proposed pipeline route. These areas provide habitat for the muskrat, eastern box turtle, northern cricket frog, upland chorus frog, dusky salamander, and southern two-lined salamander.

Caves are uncommon in the vicinity. No heron colonies or other unique or sensitive resources occur within the proposed pipeline route. The pipeline project area does not contain any designated critical habitat for federally listed species.

3.8.2. Environmental Consequences

3.8.2.1. No Action Alternative

Under the No Action Alternative, the planned emissions reduction project area would be converted from a landscape of primarily early successional habitat with small fragments of forest to an industrial area, providing sparse habitat for terrestrial wildlife. The habitats in the planned project area are currently disturbed by agricultural practices and are similar to the surrounding landscape. Wildlife in the project area would likely be displaced but impacts to wildlife would be minor as individuals would be able to move to other nearby habitats in the surrounding landscape.

3.8.2.2. Action Alternative

John Sevier Fossil Plant Site

Under the Action Alternative, construction and operation of the proposed facility would have minor impacts on terrestrial wildlife and their habitat. The habitats in the JSF project area are currently disturbed and are similar to the surrounding landscape. Wildlife in the project area would be displaced but would not be significantly impacted, as individuals would be able to move to other nearby habitats in the surrounding landscape.

Gas Pipeline Route

Under the Action Alternative, vegetation clearing and the general disturbance caused by construction equipment to install the pipeline would result in change or loss of habitat, habitat fragmentation and animal displacement. While much of the proposed route is open lands along existing ROW corridors, portions of the pipeline construction would result in the conversion of some forested habitats to open lands. However, the impacts of this conversion are considered minor, as forests in the area are already heavily fragmented. Wildlife in the pipeline project area would be displaced by the initial construction of the gas pipeline but would not be substantially impacted, as individuals would be able to move to other nearby habitats in the surrounding landscape. Because much of the gas pipeline would be along open lands, immediate effects from construction would be limited in duration, since these habitats would revert quickly to their preconstruction state. However, gas pipeline ROW maintenance activities would potentially affect ground nesting birds and other wildlife. To minimize potential impacts on wildlife, ETNG would implement standard BMPs and mitigation measures described in its E&SCP (SpectraEnergy Partners 2009), including ROW maintenance clearing scheduling requirements to reduce potential impacts to ground nesting birds, and allowing temporary workspace areas to revegetate. Adoption of this alternative is not expected to result in major impacts to terrestrial wildlife or their habitats.

3.9. Endangered and Threatened Species

Species listed at the federal level as threatened or endangered are protected under the *Endangered Species Act*, which is administered by the USFWS. Section 7 of this act requires federal agencies to consult with USFWS in situations where a federal action may adversely affect federally listed species or their habitats. Tennessee and Virginia also have laws protecting state-listed endangered and threatened species.

3.9.1. *Affected Environment – Aquatic Animals*

John Sevier Fossil Plant Site

Review of the TVA Natural Heritage database indicated that several state-listed and federally listed aquatic animal species are reported from Hawkins County, the Holston River, and its tributaries upstream of JSF and the John Sevier Detention Dam (Appendix F). The records for the federally listed purple bean mussel are from Beech Creek, a tributary to the Holston River that flows into the John Sevier Detention Reservoir at approximately HRM 108.7. No federally designated critical habitat segments are present within the site project area. However, Beech Creek Unit Seven Designated Critical Habitat for five federally listed mussels occurs within 4 river miles upstream from JSF.

Due to changes caused by impoundment of the river, suitable habitat is no longer present for the purple bean or any of the other state-listed or federally listed species in the main stem of the Holston River from Cherokee Dam (HRM 52.3) upstream to the upper end of the John Sevier Detention Reservoir (at HRM 118). None of these species are likely to occur in the vicinity of JSF (HRMs 106-107). Several additional federally listed species were once present in the Holston River adjacent to and downstream of JSF but have been eliminated from this portion of their former range. These species include the green blossom pearly mussel, fine-rayed pigtoe, spiny river snail, turgid blossom pearly mussel, birdwing pearly mussel, and Cumberland monkeyface.

Gas Pipeline Route

Several federally and state-listed aquatic animal species are known to occur in streams in Hawkins, Greene, Sullivan, and Washington, counties, Tennessee, and Washington County, Virginia. Listed aquatic species known from these counties are summarized in Appendix F.

A field survey conducted in September 2009 identified only the likely occurrence of two listed aquatic species in streams affected by the project: Cherokee Clubtail, listed as a species of concern in Virginia, and Tennessee dace, listed as endangered in Virginia and deemed in need of management in Tennessee (SpectraEnergy Partners 2009). No other federally or state-listed aquatic species or suitable habitats were identified during the field surveys.

3.9.2. *Environmental Consequences – Aquatic Animals*

3.9.2.1. No Action Alternative

Planned construction of the emission-reduction systems would occur on previously disturbed areas on the JSF Reservation. All work would be conducted using standard BMPs to minimize potential impacts to surface waters of the Holston River. Because this alternative would not result major impacts to surface waters and no protected aquatic animals are present in the vicinity, no effects to listed aquatic animals are anticipated as a result of adoption of the No Action Alternative.

3.9.2.2. Action Alternative

John Sevier Fossil Plant Site

Because implementation of this alternative would not result in major impacts to surface waters of the Holston River and no protected aquatic animals are present in the vicinity of the JSF site, no impacts to protected aquatic species or their habitat (including federally designated critical habitat for the purple bean in Beech Creek) would occur under the Action Alternative.

Gas Pipeline Route

Limited, short-term impacts on aquatic resources and habitats would result from pipeline construction activities. Because implementation of this alternative would not result in major impacts to surface water quality or aquatic habitat, only minor direct, indirect, or cumulative impacts to protected aquatic species or their habitat would occur. Populations of the Cherokee clubtail and Tennessee dace would not be measurably affected by pipeline construction activities.

Because no other federally or state-listed aquatic species reported from Hawkins, Greene, Washington, and Sullivan counties, Tennessee, and Washington County, Virginia, occur in streams affected by this project, no impacts to these species are anticipated from the gas pipeline construction. Because no pipeline construction activities would take place in the Beech Creek watershed, no impacts to federally designated critical habitat for the purple bean would occur.

3.9.3. Affected Environment – Plants

John Sevier Fossil Plant Site

No federally listed and one state-listed plant species, American barberry,are known from within 5 miles of JSF. In addition, no federally listed plants are known to occur in Hawkins County, Tennessee. Two records of American barberry have been reported within 5 miles of JSF, but they are considered historical (meaning the species has not been seen in over 25 years).

American barberry is a low, clonal, spreading shrub with pale yellow flowers, elliptical red berries, and a spiny stem that is yellow beneath portions of the brown bark. It is restricted to the hilly portions of 13 eastern and southeastern states. It grows mainly on open, exposed hillside slopes that are seasonally wet and seeping.

TVA biologists conducted a field survey in September 2009, and no federally or state-listed plant species or habitats to support listed plants were observed.

Gas Pipeline Route

No federally listed and 13 state-listed plant species have been reported to occur within 5 miles of the proposed gas pipeline in Greene, Hawkins, Sullivan, and Washington counties, Tennessee (Appendix F). Several state-listed plant species from Sullivan County have historic status including American barberry, butternut, northern white cedar, sand grape, and Virginia heartleaf. In addition, purple milkweed has historically occurred in Greene County.

No federally listed and two state-listed plant species are known from within 5 miles of the proposed gas pipeline in Washington County, Virginia (see Appendix F). Two federally listed plant species, small whorled pogonia and Virginia spiraea, are known from Washington County, Virginia. The woody shrub, sapsuck is state-listed as threatened and it has historical status in Washington County.

Small-whorled pogonia is a perennial herb that grows up to 9.5 to 25 centimeters (cm) in height. Whorls of five or six leaves are produced near the top of the stem and are usually 4 to 8 cm in length. It occurs in habitat where there is relatively high shrub coverage or high sapling density. However, it is known from several different forest types from dry open woods, to moist forests with white pines, to wooded slopes along streams. Its range is a widespread, (but species are not abundant) in northeastern North America from southern Maine and Michigan, south to central and western West Virginia, western Virginia, western North Carolina, eastern Tennessee, and into northern Georgia.

Virginia spiraea is a perennial shrub of the rose family with creamy white flowers in tightly packed bunches. Mature plants reach a height of 3 to 10 feet. Most existing populations consist of only a few clumps. They prefer periodically flood-scoured rocky banks of high quality streams and riverbanks and on gravel bars. It is found in the Appalachian Plateaus or the Southern Blue Ridge Mountains in Alabama, Georgia, North Carolina, Kentucky, Ohio, Tennessee, Virginia, and West Virginia.

Sapsuck is a large shrub species with long narrow leaves and small, greenish, four-parted flowers. It inhabits rocky, mountainous, dry slopes, and requires direct sunlight. It has a nearly horizontal growth habit and is parasitic on the roots of hemlock as well as other species. It is found only in Virginia, Tennessee, and North Carolina.

The DER Report (SpectraEnergy Partners 2009) indicates that no federally listed or state-listed plant species were observed within the proposed gas pipeline route. An additional rare plant survey was conducted at Steele Creek, Stoffel Creek, and Clear Creek crossings within the proposed pipeline route in Washington County, to determine whether the small whorled pogonia and Virginia spiraea, or their appropriate habitat were in the vicinity. Neither the plants nor their habitats were found within the pipeline project area.

3.9.4. Environmental Consequences – Plants

3.9.4.1. No Action Alternative

Because no known populations of extant endangered and threatened plant species or habitat to support them occur within the immediate vicinity of JSF, adoption of the No Action Alternative would not result in any project-related impacts to these botanical resources.

In addition, under the No Action Alternative, there would be no need to construct the associated gas pipeline or access roads from Washington County, Virginia, to the Hawkins County, Tennessee, facility; therefore, there would be no impacts to federally listed and state-listed plant species under this alternative.

3.9.4.2. Action Alternative

John Sevier Fossil Plant Site

No federally or state-listed plant species or habitat to support those species were observed within the footprint of JSF. Therefore, no impacts to federally or state-listed plant species are anticipated.

Gas Pipeline Route

Although appropriate habitat for several state-listed plant species occurs within the vicinity of the proposed gas pipeline and access roads, no federally or state-listed plant species were observed during plant surveys within the gas pipeline project area. No state-listed plants would be affected by the proposed pipeline construction and operation.

TVA provided additional data from the surveys to the USFWS Virginia Field Office to address concerns about potential adverse effects to Virginia spiraea. Based upon the results of the survey, TVA has determined that construction of the anticipated pipeline would not result in impacts to this species or its habitat. In a letter dated March 8, 2010 (see Appendix G), the USFWS concurred with TVA's determination. Implementation of the Action Alternative would have no effect on the federally listed small whorled pogonia.

3.9.5. Affected Environment – Terrestrial Animals

John Sevier Fossil Plant Site

Two federally listed terrestrial animal species, the Indiana and gray bats, and the federally protected bald eagle occur in Hawkins County, Tennessee. One state-listed species and one tracked species are also reported in the vicinity (Appendix F).

The bald eagle is protected under the *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act.* Both acts prohibit harm to eagles or their nests. Eagles typically nest in forested habitats near large bodies of waters, such as reservoirs and rivers, where they forage. Populations of bald eagles have gradually increased in northeast Tennessee. Bald eagles have been reported from localities approximately 1.8, 11, and 20 miles from the JSF project site. The species routinely forages along the Holston River near JSF.

Gray bats roost in caves year-round and typically forage over open water habitats, including streams, rivers, and reservoirs. Three populations of gray bats occur in caves approximately 7, 12, and 21 miles from the JSF reservation. No caves exist in the vicinity of the JSF site, but this species likely forages nearby on the Holston River.

Indiana bats roost in caves during the winter and typically form summer roosts under the bark of trees with exfoliating bark (Menzel et al. 2001). Summer roosts are found in mature forests with an open understory, usually near water (Romme, et al., 1995). The species has been reported from a cave approximately 12 miles from the project area. However, there is no suitable roosting habitat for Indiana bats within the JSF reservation.

Southern bog lemmings are found in wet meadows and forested habitats. However, preferred habitat usually includes areas having a thick herbaceous or humus layer. On-site habitat for the southern bog lemming occurs in the early successional vegetation found in the wetlands within the JSF reservation. The species has been reported from a wetland just south of JSF.

Although Virginia rails nest in Tennessee, few nesting localities have been reported within the state. A dead Virginia rail was found during the 2009 fall bird migration period just south of JSF, so the species may breed in marsh habitat near the JSF facility.

Gas Pipeline Route

Three federally listed terrestrial animal species, Carolina northern flying squirrel, Indiana bat, gray bat,,and the federally protected bald eagle have been reported from localities within 3 miles of the proposed gas pipeline in Greene, Hawkins, Sullivan, and Washington counties, Tennessee, and Washington County, Virginia (study area) (Appendix F). Two state-listed species and one tracked species are also reported in the pipeline study area (Appendix F).

Carolina northern flying squirrels are primarily found in high elevations within spruce-fir forests and in mixed conifer-northern hardwood forests. Carolina northern flying squirrels can occur in forests of varying age and understory density, though most records show a preference for old growth forest with widely spaced, mature trees. The project area does not have the appropriate habitat for this species, the gas pipeline route is located a much lower elevation.

Field surveyors examined the full length of the existing pipeline corridor and the proposed new pipeline extension to JSF for caves and mines. In addition, state agencies were contacted to determine if geologic features that may support bats were known to be present within or near these areas. A sinkhole depression occurs along a portion of the gas pipeline corridor, but the depression did not contain habitat for listed species. No caves or mines were observed in the project area and none were documented through consultation with agencies.

Suitable summer roosting habitat for Indiana bats was identified along portions of the existing gas pipeline ROW. Of the 65 areas surveyed, nine forested tracts have suitable roosting habitat for summer colonies of Indiana bats.

No suitable roosting habitat for common barn owls was found along the gas pipeline corridor. Suitable habitat for three state-listed species, i.e., the hairy-tailed mole, southern bog lemming, and Virginia rail, exists in both the pipeline project area and the nearby landscape.

3.9.6. Environmental Consequences – Terrestrial Animals

3.9.6.1. No Action Alternative

Adoption of the No Action Alternative is not expected to adversely impact listed or protected animal species. Although bald eagles recently began nesting and foraging near JSF, The project site is well beyond the 660-foot buffer zone for nests recommended by the *National Bald Eagle Management Guidelines* developed by the USFWS (2007a). The planned construction of emission-reduction systems is not expected to result in adverse impacts to bald eagles. Furthermore, no suitable roosting habitat for gray bats or Indiana bats exists within the JSF site. The proposed actions are not expected to impact to gray bat or Indiana bat or their roosting or foraging areas.

Although suitable habitat for the state-listed southern bog lemming exists in the planned JSF project area and the nearby landscape, the species was not observed during field surveys. A dead Virginia rail was observed in a marsh near the fossil plant. However, it was discovered during the species' migratory period. If these species occur in the project area, adoption of the No Action Alternative would have minor affects on populations of Action Alternative

John Sevier Fossil Plant Site

Adoption of the Action Alternative is not expected to result in impacts to listed or protected species in the vicinity of JSF. Bald eagles recently began nesting and foraging near JSF as the species continues to spread through this region of Tennessee and Virginia. The proposed actions are not expected to result in impacts to bald eagles. The project site is well beyond the 660-foot buffer zone recommended by the *National Bald Eagle Management Guidelines* developed by the USFWS. Construction and operation of the planned emission-reduction systems is not expected to result in impacts to eagles that nest and forage near the project site. Furthermore, no suitable roosting habitat for gray bats or Indiana bats occurs within the JSF site. The proposed actions are not expected to result in impacts to gray bat or Indiana bat roosting or foraging areas.

As previously mentioned, habitat for state-listed southern bog lemming and Virginia rail exists at JSF and the nearby landscape. If the species do occur within the project area, the planned construction activities may displace some individuals into nearby areas. The potential displacement of the species would not be expected to measurably affect either species because of their mobility, wide range of habitat preferences, and presence of suitable habitat in the area. Adoption of the Action Alternative is not likely to adversely affect federally listed or state-listed terrestrial animal species or their habitats.

Gas Pipeline Route

There is no suitable roosting habitat for gray bats and common barn owls within the gas pipeline project route. Suitable habitat for hairy-tailed mole, southern bog lemming, and Virginia rail exists in both the pipeline project area and the nearby landscape. The proposed actions in the proposed gas pipeline route may displace some individuals into nearby areas but are not expected to measurably affect populations of these species. Although gray bats could forage over larger streams and rivers in the vicinity, TVA has determined that installing the proposed gas pipeline would not result in adverse impacts to this species or its habitat.

Potential roost trees for Indiana bats occur along several forested portions of the proposed gas pipeline. All potential roost trees were identified and demarcated along the proposed corridor. Because large blocks of forest would remain once the existing corridor is modified, and most of the habitat along the corridor ranked low, the loss of the potential roost trees is not expected to result in major impacts to Indiana bats.

In order to minimize potential impacts to Indiana bats along the gas pipeline corridor, TVA and ETNG identified specific protocol to avoid and minimize any impacts from the pipeline on the Indiana bat. Mitigation measures proposed by TVA would reduce any potential impacts to Indiana bats to insignificant levels. In a letter dated February 24, 2010 (see Appendix G), TVA requested concurrence from the USFWS regarding this determination and TVA has worked with the USFWS to ensure that proposed modifications along the gas pipeline would not result in adverse impacts to Indiana bats. In a letter dated March 9, 2010, the USFWS responded to TVA supporting these findings (see Appendix G).

Because more data is needed to fully address issues with the Indiana bat, TVA agreed to implement additional measures to avoid potential adverse impacts to Indiana bat and their habitat. Furthermore, ETNG has committed to comply with all reasonable and prudent measures, and terms and conditions identified during further consultation. The USFWS agreed to the mitigation measures described below, and agreed to further evaluate potential impacts to Indiana bat during the FERC consultation process associated with the pipeline modifications.

Therefore, with the implementation of the proposed mitigation measures described below, the proposed action is not likely to adversely affect Indiana bats.

- A USFWS approved contractor will survey for Indiana bats along the proposed route using guidelines specified in the USFWS Indiana Bat Draft Recovery Plan (USFWS 2007b). The consultant will work closely with the respective USFWS offices to determine appropriate survey efforts.

- If Indiana bats are captured in the study area and if Indiana bat habitat is impacted along the project corridor, TVA would work with the USFWS to identify habitat on nearby TVA lands that could be improved to provide suitable roost habitat for Indiana bats. Proposed improvement activities could include modifying forest characteristics in a manner to benefit foraging bats (i.e., remove vegetation within the midstory) and create suitable roosting sites (i.e., create snags).

- If Indiana bats are captured, individual bats would be equipped with radio transmitters, released and followed to roost trees. If active roosts are found in a tree within the project workspace, ETNG would avoid impacts to confirmed roosting trees to the maximum extent practicable. If no Indiana bats are captured, trees would be removed along the proposed ROW as needed.

- If avoidance of a roosting tree is not practicable, and formal consultation with the USFWS becomes necessary, ETNG will comply with all reasonable and prudent measures, terms, and conditions resulting from the formal consultations.

3.10. Cultural Resources

Historic and cultural resources, including archaeological resources, are protected under the following federal laws: the *Archaeological Resources Protection Act*, the *Native American Graves Protection and Repatriation Act*, and the *National Historic Preservation Act* (NHPA). Section 106 of NHPA requires federal agencies to consult with the State Historic Preservation Officer (SHPO) when proposed federal actions could affect these resources.

3.10.1. Affected Environment

Background
East Tennessee has been an area of human occupation for the last 12,000 years. This includes five broad cultural periods: Paleo-Indian (11,000-8000 B.C.), Archaic (8000-1600 BC), Woodland (1600 B.C.-A.D. 1000), Mississippian (A.D. 1000-1700), and Historic (A.D. 1700 to present). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. In East Tennessee, during the 17th and 18th centuries,

Europeans and Native Americans began interacting through the fur trading industry. European-American settlement increased in the early 19th century as the Cherokee were forced to give up their land.

Washington County, Tennessee, was established by North Carolina in 1777. For a brief time, the county became part of the State of Franklin. During the Civil War, a number of skirmishes were fought in the county. In the 1880s, industrialists from the north began investing in the area. The Quillen College of Medicine was established in 1974 at what is now East Tennessee State University (Kozsuch and Broyles 1998).

Sullivan County was established in 1780. The area was considered part of Virginia until a boundary survey proved it to be a part of North Carolina in 1779. The county voted in favor of secession while most of East Tennessee remained loyal to the Union during the Civil War. The Carolina, Clinchfield, and Ohio Railroad was constructed through the Holston Valley in 1909 and brought tremendous industrial growth for the area. The Tennessee Eastman Corporation, which began as a methanol distillery in the 1920s, is the largest employer in the county today (Semmer 1998a).

Greene County was established in 1783 as part of North Carolina. The county held the state's largest and most important pro-Union meeting prior to the Civil War. The meeting was called the Greenville Convention of 1861. During the late 19th century, the county developed into the region's most important tobacco market. Today the county's economic focus has changed to include large industrial employers (Semmer 1998b).

Hawkins County was originally established as a North Carolina county on January 6, 1787. At this time, the county consisted of what are now Hancock, Grainger, Jefferson, Knox, Roane, Meigs, and Hamilton counties. During the Civil War, the existing railroad tracks made Bulls Gap the frequent scene of fighting between Union and Confederate forces. After the war, the railroad dominated the economic life of Bulls Gap. From the 1840s through the 1870s, the marble industry was developed in Hawkins County, and the area became famous for its pink and red variegated marble. Marble from Hawkins County was used in the Washington Monument in Washington, D.C., as well as the balustrades and stairways of the Capitol in Washington, D.C. Today the principal sources of farm income are beef cattle and burley tobacco. In 1791, the town of Rogersville printed Tennessee's first newspaper, *The Knoxville Gazette* (Price 1998).

The prehistory of southwestern Virginia begins sometime before 11,000 B.P. (before present) and traditionally ends at A.D. 1600 (350 B.P.), just prior to the first permanent European settlement. This section summarizes the technological, economic, social, and political changes that occurred during that time span. In 1776, Washington County was formed from the now extinct Fincastle County. By the 1830s, the business of stock raising was the chief mode of farming in the counties of Southwest Virginia. Agriculture remained of high importance to the county following the Civil War and does to this day (Hockersmith and Karpynec 2007).

Area of Potential Effect

Tennessee

The archaeological area of potential effect (APE) for the proposed action was determined to be approximately 92 acres on the JSF reservation, the new gas pipeline installation and upgrade areas in Greene, Hawkins, Sullivan, and Washington counties, modification of piping at three compressor stations in Greene and Sullivan counties, and all of the pipeline's associated access roads in Tennessee.

The APE for architectural resources includes a 0.805-kilometer (0.5-mile) area surrounding the proposed CT/CC plant as well as any areas where the project would alter existing topography or vegetation in view of a historic resource.

Virginia

The APE in Virginia includes new pipeline installation and existing pipeline upgrades in Washington County, Virginia. The APE also includes modification of piping at a compressor station in Washington County, Virginia and the gas pipeline's associated access roads in Virginia.

John Sevier Fossil Plant Site

One previously recorded architectural resource, the JSF facility, is eligible for listing on the NRHP for its significance in electrical development following World War II, and as a representative example of International Style architecture. Additionally, 17 previously unrecorded architectural resources were identified within the APE during the survey. (Jones and Karpynec 2009).

Gas Pipeline Route

In Tennessee, prior to the archaeological survey, an archival investigation identified two previously recorded archaeological resources (40GN232 and 40WG123). The archaeological survey identified four previously unrecorded archaeological resources (40GN282, 40WG133, 40WG134, and 40WG135).

Sites 40GN232 and 40WG123 are prehistoric archaeological resources that were recommended potentially eligible for listing in the (National Register Historic Places) NRHP. The pipeline corridor was moved to avoid both sites. Sites 40GN282 and 40WG134 were considered ineligible for listing in the NRHP due to the lack of intact deposits. Sites 40WG133 and 40WG135 were recommended potentially eligible for listing in the NRHP. The pipeline corridor was moved to avoid both of these potentially eligible sites.

In Virginia, prior to the survey, an archival survey identified four previously recorded archaeological sites within the APE (44WG247, 44WG248, 44WG249, and 44WG250). Three of the sites (44WG247, 44WG249, and 44WG250) were determined ineligible for the NRHP. Site 44WG248 was previously determined eligible for the NRHP.

3.10.2. Environmental Consequences

3.10.2.1. No Action Alternative

Under the No Action Alternative, TVA would not construct a new gas-fired facility but would continue to operate the JSF facility under the current operating plans, which include the planned installation of NOx and SO_2 reduction systems. The installation and operation of these systems are described in detail in two EAs (TVA 2006a; 2009a) listed in Section 1.4. In these two EAs, TVA, in consultation with the Tennessee SHPO, determined that the proposed undertakings of constructing and operating emission-reduction systems would not adversely affect any archaeological sites, historic sites, or historic structures that are listed in or are eligible for listing in the NRHP. TVA's previous consultations are documented in letters dated November 2, 2004, and December 4, 2008 (Appendix G).

3.10.2.2. Action Alternative

John Sevier Fossil Plant Site

The cultural resources investigations of the APE identified the JSF facility as an architectural resource. To comply with Section 106 of the NHPA, TVA submitted a November 6, 2009, letter (Appendix G) and the draft Cultural Resources Survey Report (Jones and Karpynec 2009) to the Tennessee SHPO describing the proposed actions and reporting the findings of the survey. In the letter, TVA determined that the proposed actions would not adversely affect properties eligible for listing in the NRHP and requested concurrence from the Tennessee SHPO.

In a letter dated November 12, 2009 (Appendix G), the Tennessee SHPO did not concur with TVA's determination and responded that construction of the proposed CT/CC plant would adversely affect properties eligible for listing in the NRHP (the historic JSF facility). However, in response to additional information submitted by TVA in a letter dated December 21, 2009 (Appendix G), the Tennessee SHPO determined that with implementation of a mitigation measure (shown below) identified in its December 29, 2009, response, the proposal as described would not adversely affect the historic JSF facility (Appendix G). With the implementation of the mitigation measure identified by the Tennessee SHPO, impacts to the historic property would be insignificant.

- As recommended by the Tennessee SHPO, in order to minimize visual impacts to the JSF facility, TVA would place sufficient vegetative screening between the historic property and the proposed project to screen it from the historic property. A vegetation plan for JSF is under development by TVA, and will be coordinated with the Tennessee SHPO.

Gas Pipeline Route

In Tennessee, Sites 40GN232 and 40WG123, 40WG133, and 40WG135 were recommended potentially eligible for listing in the NRHP. In order to avoid the sites eligible for listing in the NRHP, the gas pipeline has been rerouted.

In Virginia, Site 44WG248 is eligible for listing in the NRHP and moving the pipeline route in the vicinity of this site is not practicable. Mitigation measures have been developed in order to minimize potential impacts to this site. Pursuant to 36 CFR Part 800 of Section 106 of the NHPA, TVA proposed the mitigation measures below, in a letter dated January 26, 2010, to the Virginia SHPO to minimize potential impacts to eligible Site 44WG248.

- The pipeline installation would be confined to the boundaries of the existing trench within the boundaries of Site 44WG248. Timber mats would be employed for access to the site and a straw barrier would be used to separate the spoil piles from the site surface and prevent ground impacts when the spoil is returned to the trench. The proposed work would not disturb any intact archaeological deposits and would be confined to the previously disturbed portions of the site. An archaeological monitor would be present during construction to ensure that no intact archaeological deposits are disturbed.

- The Virginia SHPO reviewed the archaeological survey results and mitigation measures proposed by TVA. With the implementation of the proposed mitigation measures, TVA has determined that no cultural resources eligible for the NRHP would be adversely affected by the proposed pipeline construction. In a letter dated March 5, 2010, the Virginia SHPO concurred with TVA's findings with the caveat that the mitigation measures must be implemented to result in no adverse effects to historic and archaeological resources.

3.11. Visual Resources

3.11.1. Affected Environment

Visual resources were 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).

John Sevier Fossil Plant Site

The JSF is located in a rural portion of Hawkins County, Tennessee, near the small settlement of McCloud. The surrounding topography ranges from gently sloping near the banks of the Holston River to moderately and steeply sloping ranges at Piney Mountain to the south and Town Knobs to the north. Dense forest is visible along the slopes leading up from the valley floor to the hilltops above. Agricultural operations, as well as scattered private residences and rural farmsteads are visible toward the banks of the Holston to the south. To the north, and slightly obscured from view, residential development increases in density along the banks and farther northward to the nearby town of Rogersville.

The existing JSF stacks, as well as the 500-kV transmission lines leaving the plant site to the east, are dominant elements in the landscape for recreational river users, shoreline and near shore residents, and motorists traveling on nearby roadways within the foreground (i.e., within 0.5 mile from the observer) and middleground (0.5 mile to 4 miles from the observer) viewing distances. Within the immediate vicinity of the plant site, the landscape character is distinctly industrial. Plant employees, visitors, and visitors to the recreation area, located just off the plant access road and to the west of a large ash disposal area, currently have views of taller elements within the plant site. Views along portions of the access roadway to the south are blocked due to changes in elevation and existing vegetation.

The scenic attractiveness of the proposed project area is common to minimal, and the scenic integrity is low.

Gas Pipeline Route

The proposed 28-mile pipeline route would be mostly located within or adjacent to existing ETNG pipelines and TVA transmission line ROWs. Approximately 7 miles would not be located within existing pipeline or transmission line ROW. The pipeline outside of existing ROWs would occur along the new loop pipeline (2.4 miles) and the new mainline extension (4.8 miles) to JSF (Figure 1-5).

Although the pipeline would be installed beneath the surface, the pipeline installation would require vegetation clearing within the proposed construction work areas. Most visual impacts would be temporary and limited to the duration of the construction, with the exception of forested areas, where permanent ROW would be constructed and maintained. Temporary work areas would return to their original condition.

3.11.2. Environmental Consequences

3.11.2.1. No Action Alternative

The adoption of the No Action Alternative would result in the planned addition of several large structures within the plant site, parking for employees and contractors, and use of equipment and staging areas. These planned project elements would remain in context with the existing industrial landscape character surrounding the JSF Reservation. The planned construction and operation of emission-reduction systems would not result in significant impacts to existing visual resources.

3.11.2.2. Action Alternative

John Sevier Fossil Plant Site

The new plant would be constructed within the existing plant site and would add to the number of discordantly contrasting elements seen in the landscape by employees, contractors, and visitors. These elements would be visually similar to other industrial structures seen in the landscape now. Construction of a CT/CC plant at the JSF Reservation would be visually minor.

Views would change little for employees and visitors to the plant site. The most discernable alterations would include grading of the site, which would be viewed in the foreground of plant operations and would become visually subordinate to the overall landscape character associated with the plant site.

Area residents and motorists would likely notice an increase in equipment and personnel in the proposed project area. These impacts would be temporary and would be confined to the life of the project. Generally, activities occurring within the reservation boundary would not be perceivable off site, as the vegetative buffer and changes in elevation would continue to screen views of internal operations. Impacts most noticeable to those in the project vicinity would include an increase in the number and frequency of trucks entering and leaving the plant site. Views of these proposed alterations in landscape character would not be exceedingly visible, and upon completion, the proposed alterations would not be readily discernable from the viewing points and distances described above. Therefore, impacts to visual resources resulting from the proposed project under the Action Alternative would be minor.

Gas Pipeline Route

Modifying existing gas lines within existing gas line ROW and constructing a new gas line within existing transmission line ROW would be visually minor. The new gas pipelines would be buried underground and would not be seen by area residents and motorists within the project area. Construction-related impacts would include views of temporary laydown areas and an increase in personnel and equipment along each of the gas line routes. These minor visual intrusions would be temporary until all activities were complete, and disturbed areas were restored by the implementation of standard TVA BMPs (Muncy 1999). There would be no visual effects from aboveground facility modifications because the proposed changes would be to existing facilities where visual impacts already exist.

3.12. Socioeconomics and Environmental Justice

3.12.1. Affected Environment

JSF is located in Hawkins County, Tennessee, about 5 miles east-southeast of the city of Rogersville. Hawkins County is part of the Kingsport-Bristol-Bristol Metropolitan Statistical Area, which includes Sullivan, Scott, Washington, and Greene counties in Tennessee and Washington County in Virginia.

According to 2008 population estimates by the U.S. Census Bureau, (http://www.census.gov/popest/estimates.html), the population of Hawkins County is estimated to be 57,477. Of the other counties in the project area, the largest adjacent county is Sullivan, with an estimated 2008 population of 153,900. The next largest county is Washington, Tennessee, with a population of 118,639; Washington County, Virginia, has a population of 52,620. Greene County's population is 65,789. The population of the independent city of Bristol, Virginia, is 17,424, which is slightly smaller than Scott County, with 22,850.

Average income levels in Hawkins County are lower than the state and national levels. According to estimates for 2007 (http://www.bea.gov/regional/reis/), per capita personal income was $25,023 in Hawkins County, almost 65 percent of the national average of $38,615 and 74.9 percent of the state average of $33,395. The economy of Hawkins County is more dependent on farming and on manufacturing than either the state or the nation. Farm employment accounts for 10.8 percent of total employment in the county, while manufacturing accounts for 20.2 percent. In contrast, farm employment accounts for 2.5 percent of the Tennessee total and 1.6 percent of the national total. Manufacturing accounts for 10.5 percent of Tennessee employment and 8.0 percent nationwide.

The minority population in Hawkins County is 3.7 percent of the total, according to U.S. Census Bureau 2007 estimates (http://www.census.gov/popest/estbygeo.html). This is well below the state and national levels of 22.8 and 34.0 percent, respectively. JSF is located in Census Tract 508, Block Group 1. The minority population of this block group is 31, about 2.1 percent of the total population of the block group (http://factfinder.census.gov/home/saff/main.html?_lang=en).

The poverty level in Hawkins County in 2007 was 16.4 percent, which is slightly higher than the state average of 15.8 percent and higher than the national average of 13.0 percent (http://www.census.gov/did/www/saipe/county.html). Poverty levels in the vicinity of JSF are similar to those in the county. Census Tract 508, Block Group 1, had a poverty level of 17.6 percent as of the 2000 Census of Population, slightly higher than the county level of 15.8 and the state level of 13.5 (http://factfinder.census.gov/home/saff/main.html?_lang=en). Workers commuting from the east would mostly impact Census Tract 508, Block Group 1. Those commuting from the west would impact parts of Census Tract 503, which has a poverty level of 18.0 percent. In comparison, the comparable county poverty level is 15.8 percent, while the state and national levels are 13.5 and 12.4 percent, respectively.

3.12.2. Environmental Consequences

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Under EO 12898, Environmental Justice, federal agencies are to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

3.12.2.1. No Action Alternative

Under the No Action Alternative, TVA would not construct a new gas-fired facility and would continue to operate the JSF facility under the current operating plans, which include the planned installation of NOx and SO_2 reduction systems. The installation and operation of these systems would increase employment in the area by 600 workers at peak construction for about 24 to 26 months, this level would decline after about 16 months until most of the construction is completed.

Overall, poverty levels in the vicinity of JSF are slightly higher than in the larger surrounding areas, but the minority population is small. Minority population levels are low compared to state and national levels. No concentrations of minority or low-income populations have been identified, and population in the area is generally dispersed. Any impacts to persons living in the area would be minor. Therefore, no disproportionate impacts to disadvantaged populations are expected to occur as a result of implementation of the No Action Alternative, and obligations under EO 12898 have been satisfied.

3.12.2.2. Action Alternative

Under the Action Alternative, at peak construction, the new gas-fired plant at JSF would be expected to employ up to 600 workers for about 16 months. After about 14 months, it is expected to gradually decline to less than 200 workers until most of the construction is completed. Construction should be completed in about 24 to 26 months. Based on prior TVA projects in the area, it is anticipated that about 22 percent of the workers would move into the area, with the rest commuting from their current residences, including the Knoxville area.

Hawkins County would likely be the location where many of the workers would reside. It is anticipated that over 55 percent of people planning to relocate would move to Hawkins County, with Sullivan County being the next likely location. The construction workforce would be about 590 for a short time; of these, about 130 workers would move into the area. About 72 workers are likely to locate in Hawkins County and about 28 in Sullivan County, with the remaining 30 or so residing at various areas in other nearby counties.

As many as about 73 percent of the workers are likely to bring families with them. This would result in an estimated temporary population increase of about 338 in the area. Hawkins County and perhaps Sullivan County would likely see a noticeable increase in school-age children. An estimated additional 44 school-age children would reside in Hawkins County, with only about 17 in Sullivan County. Impacts to schools in other nearby counties would likely be minor.

Overall, poverty levels in the impact area are slightly higher than countywide and statewide levels, but the minority population is small. Minority population levels are low compared to state and national levels. No concentrations of minority or low-income populations have been identified, and population in the area is generally dispersed. Any impacts to persons living in the area would be minor. Therefore, no disproportionate impacts to disadvantaged populations are expected to occur as a result of implementation of the Action Alternative, and obligations under EO 12898 have been satisfied.

3.13. Transportation

The existing conditions of resources along the proposed transport route and the potential effects of the proposed actions on these resources are described in this section.

3.13.1. Affected Environment

John Sevier Fossil Plant Site

Local Roadway Traffic
JSF is served by highway and railway modes of transportation. Tennessee SR 66 and SR 70 provide truck and automobile access to JSF. These state highways are high quality, rural roadways with a shoulder. Access from Interstate 81 from the west is via SR 66 northeast to SR 70 east to JSF. Access from Interstate 81 from the east is via SR 70 north to JSF. Direct access to JSF is via Old Highway 70 and a JSF access road east into the JSF Reservation. Table 3-23 shows the 2008 Average Annual Daily Traffic counts (Tennessee Department of Transportation 2008).

Table 3-23. Primary Routes Studied With 2009 Average Annual Daily Traffic Counts

Roadway	Average Daily Use
SR 66 (South of SR 70)	3653
SR 66 (North of SR 70)	11,122
SR 70	1074
Old Highway 70	991

Highway Capacity Manual methodology (Transportation Research Board 2000) was followed to identify potential traffic flow problem areas in the vicinity of JSF. The manual provides a qualitative method to measure traffic flow and motorists perceptions of traffic flow. Six levels of service (LOS) are defined and given letter designations from A to F with LOS A representing the best conditions, and LOS F representing the poorest conditions. The upper limit of LOS E is considered to be the capacity for roadways in the vicinity of JSF. The LOS for existing traffic was compared to the total of the existing traffic and the predicted traffic and there was no change in the anticipated LOS (See Table 3-24).

Table 3-24. Current and Anticipated Levels of Service for Roadway Segments in the Vicinity of John Sevier Fossil Plant

Roadway Segment	Existing Level of Service	Anticipated Level of Service
SR 66 (South of SR 70)	D	D
SR 66 (North of SR 70)	E	E
SR 70	C	C
Old Highway 70	D	D

Equipment Transport from Memphis to John Sevier Fossil Plant
The new equipment for the JSF CC facility is oversized. It would be transported from west Tennessee to the JSF Reservation by roadway and by barge. Small, truckable freight would be transported from Memphis by roadway (about 465 miles). JSF would receive and off-load eight trucks a day from Memphis over a two-week period. Two loads of oversized power equipment would be hauled by barge (about 917 miles) from the Mississippi River in Memphis, to the Holston River near Knoxville. The oversized equipment would continue by roadway from Knoxville to JSF in Rogersville, Tennessee.

Description of Transport Equipment
The oversized steam generator (stator) and turbine (high-pressure/intermediate-pressure (HP/IP) turbine) equipment would continue by roadway to JSF for about 65 miles on a "Dolly Specialized Transporter" (DST). The largest single equipment item is the generator stator, the stationary part of the rotor system in the generator. The stator is 18 feet and 3 inches tall, 38.6 feet wide, and weighs 749,000 pounds (see Figure 3-2).

Figure 3-2. Stator Steam Generator

Waterway Transport
TVA would contact with a specialized transportation company with expertise in hauling oversized and overweight equipment to oversee the safe transport of the equipment from Memphis to JSF. The stator and HPIP would initially be transported by barge from its Memphis warehouse to the Burkhart Enterprises Dock on the Holston River in Knoxville, Tennessee via the Mississippi, Ohio, Tennessee, and French Broad Rivers (Figure 3-3). The barge would pass through 11 navigation locks or dams on the river system route, two on the lower Ohio River System and nine on the Tennessee River System (Table 3-25).

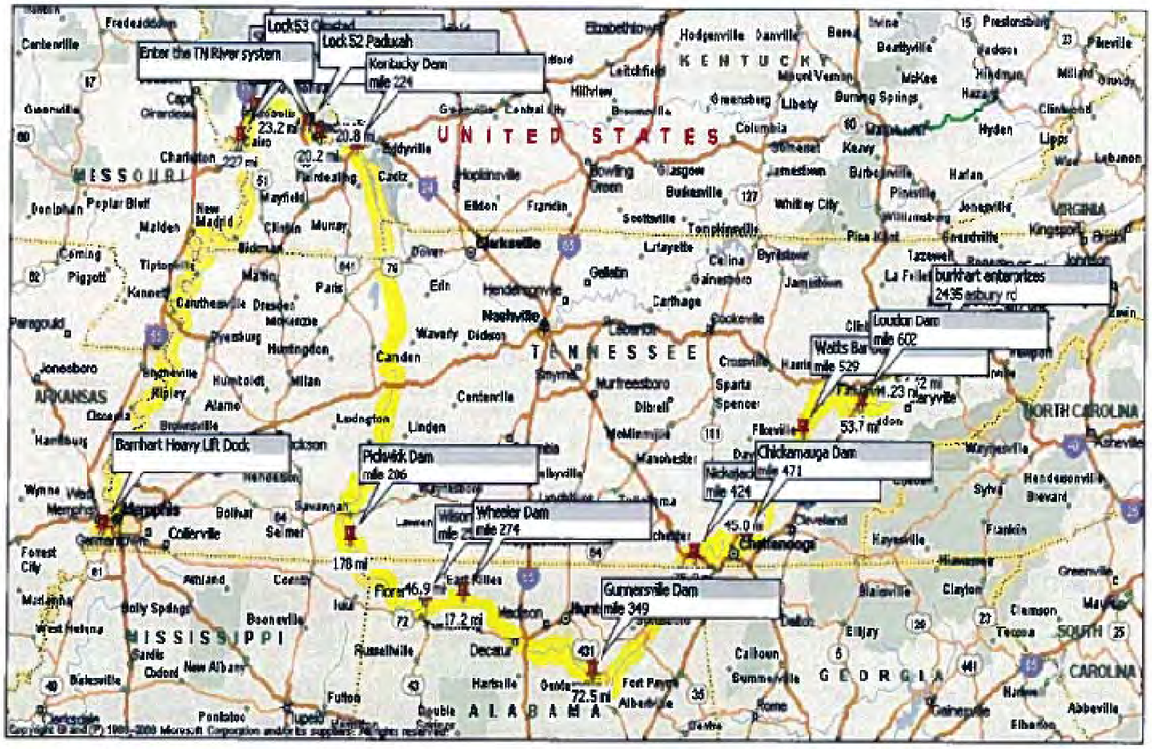

Figure 3-3. Barge Route from Memphis to Knoxville, Tennessee

The river route to Knoxville from Memphis would be 917 miles and would last about 8 days with a dedicated towboat. Currently, there are three navigation lock closures schedule on the Tennessee River System during 2010. The Watts Bar Lock is scheduled to be closed to river traffic from April 13 to May 11, 2010, Chickamauga Lock is scheduled for closure July 20 to August 10, 2010, and Watts Bar Lock is schedule to be closed from October 12 to November 2, 2010.

The USACE navigation charts indicate that the lowest vertical clearance bridge on the main channel of the Tennessee River occurs at the Southern Railway Bridge, which is located at TRM 470, immediately downstream of the Chickamauga Lock and Dam. The vertical bridge clearance at TRM 470 is about 57 feet at normal pool elevation. However, at high water conditions, i. e., during a 100-year flood, the vertical clearance is about 26 feet.

Summer pool levels at the low water dock at Burkhart Enterprises would provide an adequate depth to accommodate the barge with the stator and HPIP. However, at winter pool (elevation 807 above msl), the low water dock at Burkhart Enterprises has a shallow depth for barge traffic. Depending on the draft of the barge, winter pool levels at Burkhart Enterprises may need to be adjusted to accommodate the barge transport of the stator and HPIP. After the barge is delivered to the Burkhart Enterprises dock, the barge would be ballasted to dock height and ramps would be set from dock to barge. A specialized platform trailer would move the equipment off the barge. The trailer would roll under the equipment and hydraulically lift the stator and HPIP from the barge deck. Then the trailer would roll off the barge deck to a staging area to prepare for roadway transport. The barge discharge duration is expected to be 2 days.

Table 3-25. Barge Route from Memphis to Knoxville – Navigation Locks and Dams

Dam or Navigation Lock	River Mile Location	County and State
Ohio River System		
Olmstead Lock # 53	Ohio River Mile 962.0	Pulaski County, Illinois
Paducah Lock #52	Ohio River Mile 938.9	Massac County, Illinois
Tennessee River System		
Kentucky Dam	Tennessee River Mile 22.4	Marshall County, Kentucky
Pickwick Landing Dam	Tennessee River Mile 206.7	Hardin County, Tennessee
Wilson Dam	Tennessee River Mile 259.4	Lauderdale and Colbert counties, Alabama
Wheeler Dam	Tennessee River Mile 274.9	Lauderdale and Lawrence counties, Alabama
Guntersville Dam	Tennessee River Mile 349.0	Marshall County, Alabama
Nickajack Dam	Tennessee River Mile 424.7	Marion County, Tennessee
Chickamauga Dam	Tennessee River Mile 471.0	Hamilton County, Tennessee
Watts Bar Dam	Tennessee River Mile 529.9	Meigs and Rhea counties, Tennessee
Fort Loudoun Dam	Tennessee River Mile 602.0	Loudon County, Tennessee

Roadway Transport

The Tennessee Department of Transportation (TDOT) Structure Inventory and Appraisal (SI&A) Office works with the vehicle permit office to route overweight and oversize commercial vehicles, such as very large trucks, through the state. Using vehicle inspection information, the SI&A Office can route these vehicles safely. TDOT uses a software system to issue these permits in a manner that is fast and efficient but which still works to protect the bridge infrastructure of Tennessee from damage. In order to meet the axle loading and special hauling permit requirements from TDOT (TDOT 2010), a special transport vehicle would be used so that the weight of the load is better distributed over the entire road/bridge width. Other permits that may be required include a TDOT ROW permit (for work in the ROW), a local/city/county grading permit, and traffic control permits.

Barnhart would construct two “Dolly Super Transporters” (DST) to haul the stator and HPIP over the road to JSF at the dock staging area. The larger DST for the stator would have 24 dollies and the smaller DST for the HPIP would be approximately half that size. A drawing and an image of a DST are shown in Figures 3-4 and 3-5. A front 600 horsepower (HP) Pacific truck (Figure 3-6) and a rear 700 HP Pacific truck combinations would propel both of the DST beds. The longer of the two units that would haul the stator is expected to be approximately 260 to 280 feet long including both trucks and the DST The overall width is about 22 feet, 2 inches. Both the stator and HPIP vehicle systems would travel in tandem at speeds of about 7 to 22 miles per hour (mph).

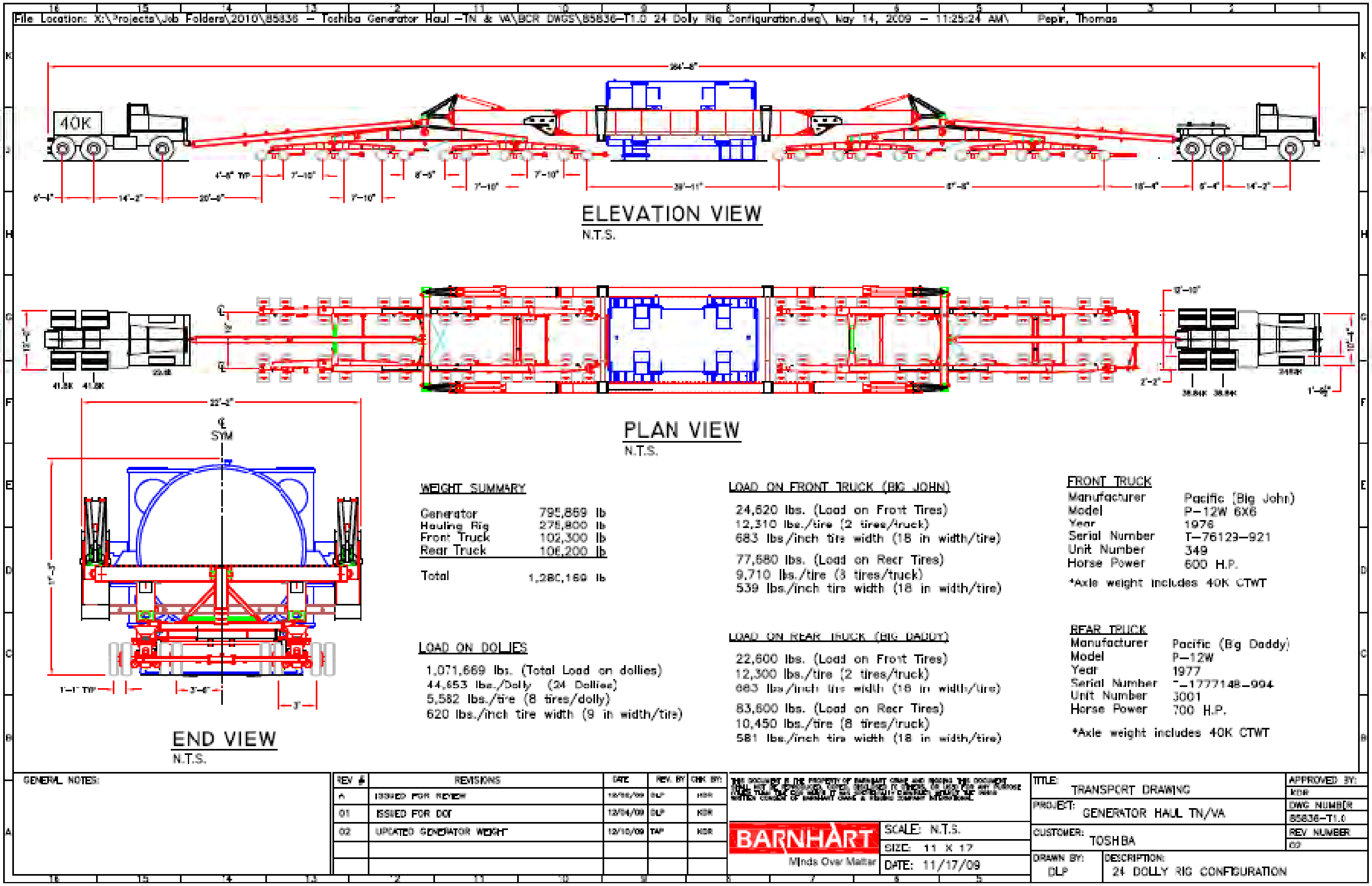

Figure 3-4. Dolly Super Transporter Drawing

Figure 3-5. Dolly Super Transporter Photograph

Figure 3-6. Pacific 600 Horsepower Truck

Roadway Route Selection Process

The contracted transport company would prepare a detailed transportation plan to facilitate the shipment of the power equipment. The contracted specialized transport company has performed a significant amount of preliminary work to plan the route, such as completing several route surveys, working collaboratively with TDOT, and securing an engineering firm that specializes in bridge stability to perform bridge analyses on all bridge structures along the proposed haul path. Additionally, the transport company has contacted the USACE to confirm the proposed haul route is feasible.

Given the specialized transport company's experience in moving large pieces of equipment, TVA considers the scoping work to be valid information relative to this EA. If potential issues are identified with the proposed route, the route would be modified accordingly. In summary, the following information has been considered in the development of the proposed route:

- The proposed route was traveled with this proposed haul in mind
- An engineering firm has been retained to take field measurements of overhead obstructions
- All bridge structures that would be crossed by the DST have been identified
- TDOT and the USACE have been notified regarding the proposed transport project
- TDOT bridge reports of all structures the DST would cross have been identified
- Civil improvements that may be required have been identified

Because slow speeds (7 to 22 mph) are required to safely transport the oversized and overweight equipment, state and U.S. highway routes were selected. Center city roadways and roadways with tight turns and numerous overhead height restrictions would be avoided when possible. In some cases, overhanging tree limbs would need to be trimmed before transporting the equipment.

Roadway Route from Knoxville to John Sevier Fossil Plant

The proposed roadway transport route would be along paved roadways through portions of Knox, Jefferson, Hamblen, and Hawkins counties. The affected environment descriptions are based on field surveys conducted in February 2010 while traveling the proposed roadway transport route. The proposed transport route of the stator and HPIP is subject to change based on permitting, bridge structure reports, and other factors. Figure 3-7 depicts the route relative to the regional setting. Detailed maps of the proposed transport route are included in Appendix H.

The transport vehicles would utilize a combination of 4-lane and 5-lane divided roadways from Knoxville to Morristown, and 2-lane and 3-lane segments of roadway near JSF. Most of US 11E between Knoxville and Morristown is 4-lane divided roadway with adequate outside shoulders. Inside the Morristown city limits, the proposed route is primarily 5-lanes and the proposed alternate route is primarily 4-lane divided roadway. East of Morristown the proposed route follows US 11 E to Bulls Gap and is only two lanes wide with one lane in each direction. Likewise, from Bulls Gap to Rogersville, SR 66 has only one lane in each direction.

On the five-lane and four-lane divided segments of roadway; the transport vehicle would likely use two travel lanes so that vehicles traveling in the same direction would be able to pass on the outside shoulder (when one exists). Traffic traveling in the opposite direction would be unobstructed.

On the two-lane segments of roadway, the opposing traffic flow would be rerouted and both lanes would be used for the equipment transporters. These roadway segments would be divided into short lengths so that excessive delays would be avoided for traffic traveling in the opposite direction. Traffic travelling in the same direction as the equipment transporters would likely follow behind the transport vehicle and travel at slow rates of speed. Temporary pull over sites may be used occasionally to allow following traffic to pass.

Low hanging overhead utility lines would be adjusted or relocated either by simply using the slack to temporarily increase their height, temporarily removing them, or permanently increasing their height. .Utility trucks would travel ahead of the convoy and adjust the wires while another set of utility trucks would travel behind the convoy to restore the wires to their original location.

Roadway Transport Civil Improvements
During the development of the proposed route, three locations have been identified that would likely require civil improvements.

In Knoxville, Tennessee, a left turn from Pickle Lane onto National Drive (see Figure 3-8) would require a proposed temporary installation of well-graded crusher-run limestone and compacted level with the road edge of pavement. After the TVA equipment transport is complete, the material would be removed and the ground restored to its original condition.

East of Knoxville, the route would require Interstate Highway (I-) 40 median crossing at the Strawberry Plains Pike interchange (see Figure 3-9). The transport vehicles are too large and cannot pass under the I-40 bridges on Strawberry Plains Pike. Therefore, they would travel up the eastbound on-ramp to I-40, cross the I-40 median, and travel down the westbound I-40 off-ramp back onto Strawberry Plains Pike. A well-graded crusher-run limestone compacted to a grade level with road edge elevation is proposed for the median and areas adjacent to the ramps. After the TVA equipment transport, the material would be removed and the ground restored to its original condition.

In Hawkins County at Bulls Gap, a left turn from US 11 E to SR 66 would likely impact an abandoned self-service car wash (see Figure 3-10 and Figure 3-11). In addition to the car wash, the roadway transport would require temporary removal of the traffic signal at this intersection.

State permits that the contract transport company may be required to obtain include:

- TDOT Overweight/Overdimensional Single Trip Permit
- TDOT Vertical Clearances Permit
- TDOT Right-of-Way Access Permit
- TDEC Special Waste Approval
- Tennessee Storm Water Multi-sector General Permit for Industrial Activities
- Blanket Section 401 Water Quality Certification Permit

Figure 3-7. Proposed Haul Route From Knoxville, Tennessee, to John Sevier Fossil Plant

Figure 3-8. Civil Improvements Proposed at Intersection of Pickle Lane and National Drive in Knoxville, Tennessee

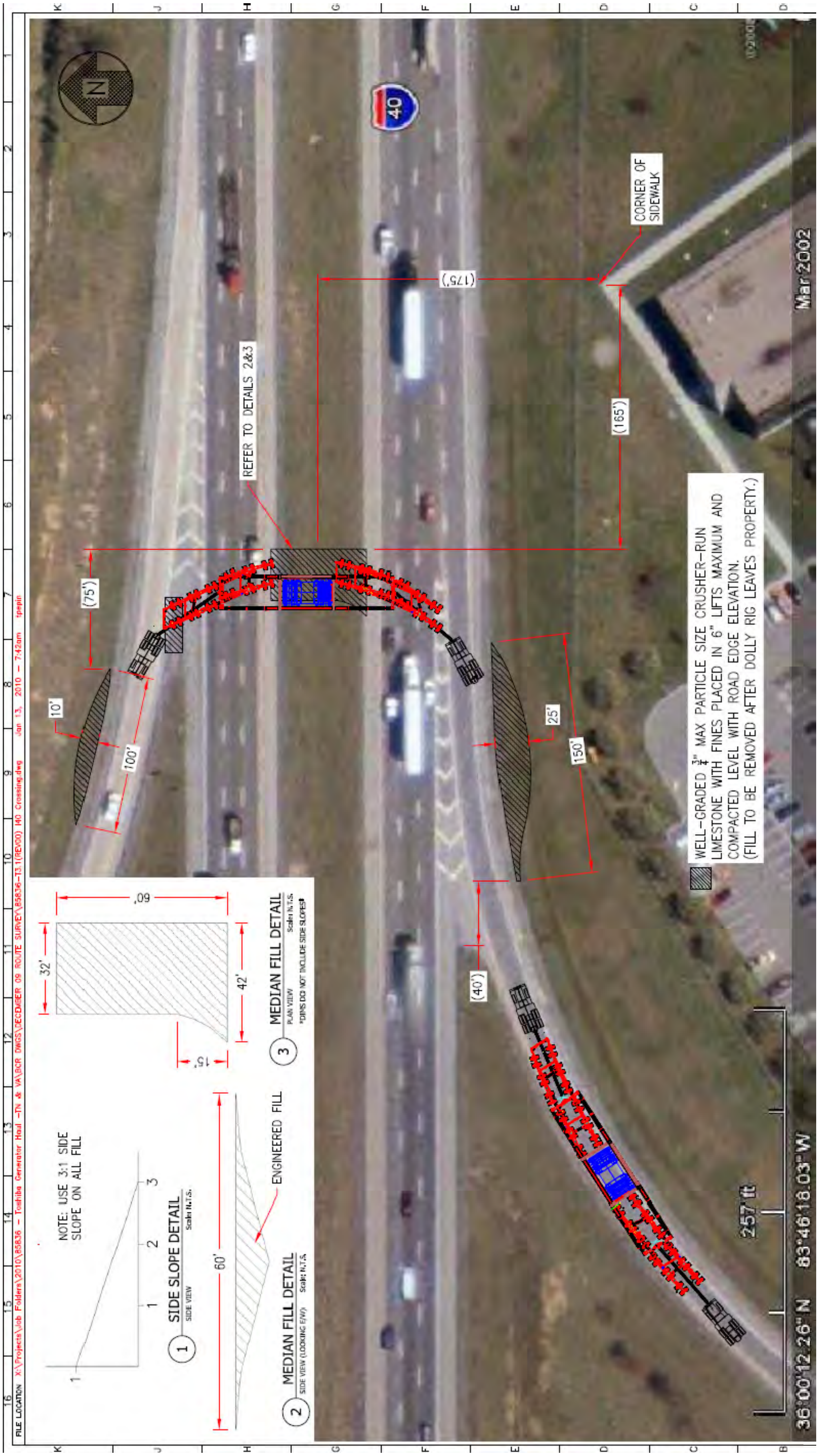

Figure 3-9. Civil Improvements Proposed on I-40 at Strawberry Plains Pike in Knoxville, Tennessee

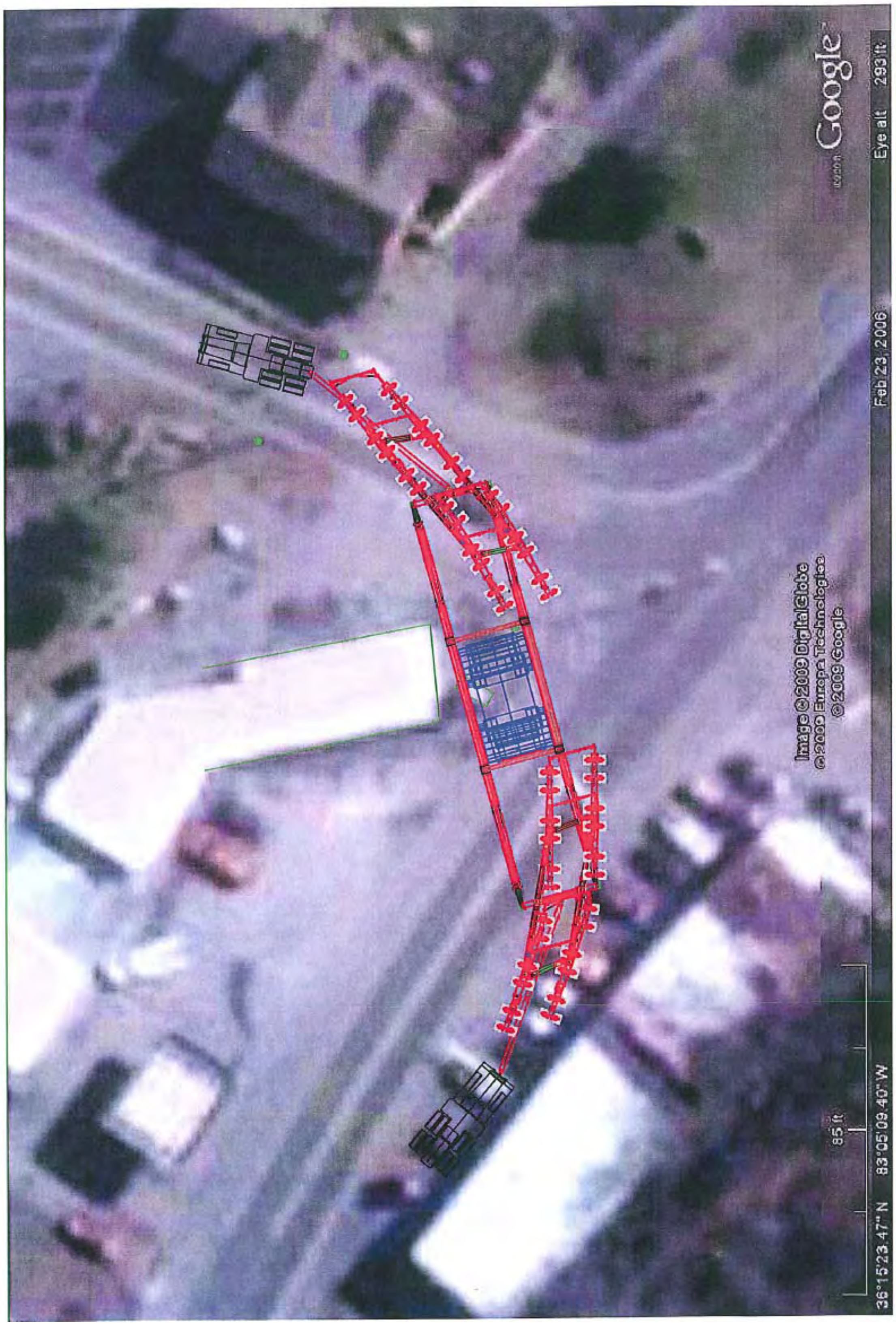

Figure 3-10. Aerial Photograph of Proposed Route at Car Wash in Bulls Gap, Tennessee

Layover Stops
As previously indicated, the 65-mile trip from Forks of the River Industrial Park to JSF would likely take about 4 days to complete, which is an average of approximately 17.1 miles per day. At night, suitable layover locations would be identified for the two transport vehicles. Paved areas suitable for parking the transport vehicles overnight are preferred for layover stops. If suitable paved or on-street parking areas are not available, matting would be spread in a grid system to create a surface on which the transporter vehicles can park (see Figure 3-11).

Figure 3-11. Matting Used Over Unpaved Areas for Overnight Parking

3.13.2. Environmental Consequences

3.13.2.1. No Action Alternative

John Sevier Plant Commuter Traffic
Under the No Action Alternative, TVA would continue to follow the operating plan, which includes the planned installation of NO_x and SO_2 reduction systems. The installation and operation of these systems would require increased staffing for about 20 months, reaching a short duration peak (about 2 months) of approximately 500 workers, and would decline after about 10 months until most of the construction is completed. Construction and operation of the proposed emission reduction systems at JSF under the No Action Alternative are expected to cause minor impacts to roadways and traffic flows.

Construction material deliveries to JSF would involve an estimated 100 deliveries per day. These deliveries would be by roadway or railway. Commuting workers would add about 750 vehicle trips in and out of the JSF Reservation. Minor traffic delays would be experienced at the nearby intersections, primarily at SR 66 and SR 70, during shift changes. Such delays would be for the short-term duration of the construction period. The employment levels would rise to peak levels for short durations, rising and falling over the duration of the construction. A smaller number of commuters would be on site prior to peak construction periods and following the completion of the project.

The roadways in the vicinity of JSF are capable of supporting increases in traffic anticipated under the No Action Alternative with no drop in current LOS provided to commuters. Furthermore, the operation of the emissions reduction systems would not create measureable traffic increase for the roadways near JSF. Therefore, traffic impacts to motorists resulting from both the construction and operation of the planned emission reduction systems would be minor.

Equipment Transport
Under the No Action Alternative, the oversized equipment would not be transported from Memphis to JSF. River navigation and roadways would not experience additional traffic and there would be no project related traffic delays. Furthermore, roadways and overhanging trees and utilities between Knoxville and JSF would not require any modifications. Adoption of the No Action Alternative would not affect waterway or roadway traffic.

3.13.2.2. Action Alternative

John Sevier Plant Commuter Traffic
Under the Action Alternative, at peak construction, the new gas-fired plant at JSF is expected to employ up to 600 workers and construction should be completed in about 24 to 26 months. Most construction work would occur during the day on weekdays. However, construction activities could occur at night or on weekends, if necessary.

During the larger employment stages of construction, there would be measurable increases in roadway traffic in the vicinity of the JSF Reservation. Assuming an average of 1.6 workers per vehicle, commuting workers would add about 850 vehicle trips in and out of the JSF Reservation during the peak construction period. Impacts would likely be more noticeable on the local roads between I-81 and the JSF site, including SR 70 and SR 66. SR 66 between US 11W and SR 70 could also be impacted by additional traffic.

TVA would work with local and state officials, as appropriate, to manage and alleviate such impacts, including the possible use of staggered work shifts and encouragement of carpooling to help minimize traffic impacts to area roadways. Due to the temporary and intermittent nature of construction and the site's rural location, the impacts on traffic from construction activities are expected to be minor.

Equipment Transport - Waterways
Potential impacts to river navigation barge traffic are associated mainly with inadequate vertical clearance and reservoir winter pool depths. In order for vertical clearance to be at a risk threshold, the river would have to reach the 100-year flood elevation at the lowest vertical clearance (i.e., the Southern Railway Bridge at TRM 470). However, the river would be closed to navigation traffic during a 100-year flood event according to the Tennessee River Waterway Management Plan (TVA 2010). Thus, navigation would not be affected by a low vertical clearance risk.

TVA estimates that the low water dock at Burkhart Enterprises has a shallow depth at winter pool elevation 807 above msl. If the stator and HPIP equipment were transported during winter pool, safeguards would be implemented to ensure adequate pool depths are available for barge transport and delivery. Necessary adjustments to winter pool levels at Burkhart Enterprises Dock would be coordinated with the TVA River Forecast Center to ensure adequate depths are maintained.

Equipment Transport – Roadways

Potential transportation impacts during the roadway transport of the equipment are due to the fleet of slow moving vehicles (transporters, traffic control vehicles, police escort vehicles, support personnel, service vehicles, etc.) and convoy trips on the proposed route. Motorists along the route would experience delays if they encounter the transport convoy, but the delays would be limited to relatively short periods in localized areas. One of the major causes of delays to motorists would be during the adjustment of low hanging over-head utility lines. The delays imposed to motorists would not be reoccurring, but instead would be incident related. Highway crossings permits would be obtained from the TDOT for crossings of both state and federal highways. Several route surveys have been conducted to determine the safest route to JSF, including bridge analyses along the haul path. All equipment transport would comply with TDOT regulations and necessary permits would be acquired, and permit conditions would be adhered to (TDOT 2010). As part of the TDOT permitting process, the transportation company would involve the development and approval of a Route Control Plan. The plan would include emergency response plans, road closures and reroutes of traffic around the closed portion of the highway during transport, emergency pull off points, and overnight pull off points with security planning. Impacts to traffic are anticipated to be minor and temporary with safeguards involving the implementation of a traffic control plan and the dispersion of traffic information to affected municipalities.

Emissions from combustion of fuels and fugitive dust from the transport activities would have minor and temporary affects to local air quality. The transport of the stator and HPIP would involve short-term use of heavy equipment that requires use of fuels, petroleum, oil, and lubricants for routine operation. In the event of a fuel, oil, or hydraulic leak or rupture, spilled fluids would be collected using absorbent materials to prevent or stop the spill from spreading into the environment. A copy of the Spill Contingency Plan would remain with the transport contractor at all times. Spill response procedures, proper handling of hazardous waste, and proper maintenance of heavy-duty transporters would ensure that potential impacts would be minor. Hydrology and water quality impacts are expected to be minor and the effects would be similar to those occurring with the current uses of the waterways and roadways. No adverse water resources impacts are expected along the proposed haul route.

To minimize impacts to motorists, traffic control plans and traffic information would be dispersed to each municipality to inform motorists of the potential traffic impacts during the transport. Additionally, the transport company would coordinate with law enforcement agencies along the haul route and would contract with a traffic control firm to ensure that appropriate signs and markings are installed as temporary traffic control devices.

3.14. Cumulative Environmental Effects

Cumulative effects (or impacts) are defined in the *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (Council on Environmental Quality 1987) as follows:

> "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

This section discusses those resources and receptors that could result in perceivable, but insignificant, cumulative effects from TVA's alternative actions. For construction and operation of the CT's and pipeline, no substantive cumulative impacts are expected for cultural resources, visual resources, socioeconomics, transportation or federally listed plants for either the No Action or Action Alternatives. At most only minor cumulative effects would be expected to surface water quality, wetlands, the introduction and spread of invasive and exotic plant species, terrestrial ecology (plants and animals) and federally listed aquatic or terrestrial species. The potential for cumulative effects to air quality, water quality, and noise levels are discussed further below.

<u>Air Quality</u>
Under the No Action Alternative, installation and operation of the planned NOx and SO_2 reduction systems for coal-fired generation at JSF would improve local air quality, and would result in long-term, cumulative benefits to regional air quality. However, compared to coal-based generation, use of CT units, as proposed under the Action Alternative, would result in large cumulative reductions in emissions of NOx and SO_2 (see Tables 3-8, 3-10, and 3-12 in Section 3.1.2.2), producing even greater cumulative benefits to local and regional air quality. The degree of improvement would depend on the operating schedule and methods (e.g., SC vs. CC operation) for the CT units.

<u>Noise</u>
As discussed in the Noise section 3.2 of this EA, there are numerous existing noise sources at JSF. Under either the No Action Alternative or Action Alternative, construction activities for the NOx and SO_2 reduction systems (No Action, or for the CT units, the Action Alternative) would cause a short-term increase in noise that would be in addition to operational noise produced by JSF coal-fired units. However, this increase would be temporary and not likely to result in increased cumulatively greater noise levels to nearby residents.

Mode of operation of the CT units would affect the degree of long-term cumulative noise impacts. Operation of the CT generating facilities in CC mode would result in a cumulative increase in noise levels over that currently experienced at nearby residences during coal unloading operations (one of the louder plant activities at JSF). However, operation of the CT units in SC mode would not increase noise over levels currently experienced during coal unloading. Potential cumulative noise impacts also vary depending upon total hours and time of day the CT units are operated. If operated at nighttime, cumulative noise levels could exceed USEPA recommended levels (55 dbA) at nearby residences. However, annoyance from noise is highly subjective. Results of population surveys conducted by the Federal Interagency Committee on Noise that correlated annoyance and noise exposure indicate that the cumulative levels of noise for nighttime CT operation at JSF would be expected to produce no more than a moderate community reaction. Neither construction nor operation of the proposed pipeline is expected to result in increased cumulative noise impacts.

Surface Water Quality
From an operational perspective, the pipeline would not have a continuous wastewater discharge; however, the operation of CT plant in CC mode would have a continuous wastewater discharge from the operation of the cooling towers, clarifiers, and RO system. The primary constituents of the cooling tower blowdown would be those minerals, metals, or other parameters present in the Holston River water, treated in the water treatment system to make service water, and then concentrated nine times in the cooling tower system. The clarifiers remove sediment from the raw water intake and RO rejects are not discharged to the wastewater pond they are disposed of separately.

The concentrations of several metals in the intake raw water were below analytical detection limits. These metals include aluminum, beryllium, cadmium, mercury, and thallium. These metals are not added during the process and are likely present in the source river water. If these metals were present in the raw water intake, the neutralization and settling provided in the process pond would likely remove some of these metals. The concentrations of metals in the process pond discharge would not result in cumulative impacts on the Holston River.

3.15. Summary of TVA Commitments and Proposed Mitigation Measures

Specific nonroutine environmental commitments or mitigation measures have been identified to reduce potential environmental effects.

- TVA will maintain an emissions ledger on file based on operational inputs (e.g., CT operational hours, coal combustion emissions, fugitive sources) and will adjust facility operations to maintain compliance.

- Vegetation clearing of the pipeline ROW in wetland areas will be restricted to a 10-foot-wide cleared strip centered over the pipeline for maintenance purposes. Additionally, trees within 15 feet of the pipeline greater than 15 feet in height will be selectively cut and removed from the permanent ROW. The remaining 0.92 acre of wetland disturbed during construction will be allowed to return to preconstruction conditions.

Pursuant to Section 7 of the ESA, TVA consulted with the USFWS and received concurrence that with the proposed mitigation measures below, the proposed action, as described, is not likely to adversely affect Indiana bats.

- To avoid potential impacts to Indiana bats, a USFWS approved contractor will survey for Indiana bats along the proposed route using guidelines specified in the USFWS Indiana Bat Draft Recovery Plan (April 2007). The consultant will work closely with the respective USFWS offices to determine appropriate survey efforts.

- If Indiana bats are captured, individual bats will be equipped with radio transmitters, released, and followed to roost trees. If active roosts were found in a tree within the project workspace, ETNG will avoid impacts to confirmed roosting trees to the maximum extent practicable. If Indiana bats are not captured, trees will be removed along the proposed ROW as needed.

- If avoidance of a roosting tree is not practicable, and formal consultation with the USFWS becomes necessary, ETNG will comply with all reasonable and prudent measures, terms, and conditions resulting from the formal consultations.

- If impacts to Indiana bat habitat are not avoidable along the project corridor, TVA will work with the USFWS to identify habitat on nearby TVA lands that could be improved to provide suitable roost habitat for Indiana bats. Proposed improvement activities could include modifying forest characteristics in a manner to benefit foraging bats (i.e., remove vegetation within the midstory) and create suitable roosting sites (i.e., create snags).

Pursuant to 36 CFR Part 800 of Section 106 of the NHPA, TVA has consulted with the Tennessee SHPO and the Virginia SHPO and received concurrence with the determination that, with the mitigation measures proposed below, historical and archaeological resources will not be adversely impacted.

- TVA has committed to place sufficient vegetation between the JSF historic property and the proposed JSF CC facility to screen it from the historic property.

- Pipeline upgrades will be confined to the boundaries of the existing trench within the boundaries of Site 44WG248. Timber mats will be employed for access to the site, and a straw barrier will be used to separate the spoil piles from the site surface and prevent ground impacts when the spoil is returned to the trench. The proposed work will not disturb any intact archaeological deposits and will be confined to the previously disturbed portions of the site. An archaeological monitor will be present during construction to ensure that no intact archaeological deposits are disturbed

Additionally, as a standard practice, specific mitigation measures, and BMPs identified in the EA will be implemented to minimize potential environmental effects associated with the construction and operation of the proposed JSF CC plant.

Mitigation measures pertaining to the construction and operation of the gas pipeline have been identified by ETNG. ETNG will the responsible party implementing and tracking completion of mitigation measures identified for the gas pipeline project. ETNG will inform TVA as to the progress of pipeline construction and suitability of the identified mitigation measures.

CHAPTER 4

4.0 LIST OF PREPARERS

4.1. NEPA Project Management

Kelly R. Baxter

Position:	NEPA Specialist
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Position:	Senior NEPA Specialist
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4.2. Technical Contributors

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Experience:	19 years in Protected Aquatic Species Monitoring, Habitat Assessment, and Recovery; 11 years in Environmental Review
Involvement:	Aquatic Ecology/Threatened and Endangered Species

Patricia B. Cox

Position:	Botanist, Specialist
Education:	Ph.D., M.S. and B.S., Biology
Experience:	31 years in Plant Taxonomy at the Academic Level; 6 years in Environmental Assessment and NEPA Compliance
Involvement:	Threatened and Endangered Species Compliance, Invasive Plant Species, and Terrestrial Ecology

James H. Eblen

Position:	Contract Economist
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Involvement:	Socioeconomics and Environmental Justice

Dawn M. Foster, CEP

Position:	Contract Senior Transportation Planner
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Kelie H. Hammond, P.E.
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Involvement: Transportation and Navigation

Travis Hill Henry
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Involvement: Air Resources

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Charles L. McEntyre, P.E.; CHMM
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Experience: 32 years in Wastewater and Water Treatment
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W. Chett Peebles, RLA; ASLA
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Involvement: Visual Resources

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Involvement: Wetlands

Cassandra L. Wylie
Position: Atmospheric Analyst
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Involvement: Noise Impacts

W. Richard Yarnell
Position: Archaeologist
Education: B.S., Environmental Health
Experience: 38 years, Cultural Resource Management
Involvement: Cultural Resources

CHAPTER 5

5.0 LIST OF AGENCIES, ORGANIZATIONS, AND STAKEHOLDERS TO WHOM COPIES ARE SENT

Federal Agencies

National Park Service
U.S. Army Corps of Engineers, Nashville District Office
U.S. Army Corps of Engineers, Norfolk District Office
U.S. Department of Energy
U.S. Fish and Wildlife Service, Tennessee Field Office
U.S. Fish and Wildlife Service, Virginia Field Office

County and State Agencies

Hawkins County Mayor's Office
Tennessee Department of Environment and Conservation
Tennessee Historical Commission
Tennessee Wildlife Resources Agency
Virginia Department of Environmental Quality
Virginia Historical Commission

CHAPTER 6

6.0 LITERATURE CITED

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