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FINAL ENVIRONMENTAL ASSESSMENT

WATTS BAR NUCLEAR PLANT UNIT 1
REPLACEMENT OF STEAM GENERATORS
Rhea County, Tennessee

TENNESSEE VALLEY AUTHORITY

APRIL 2005

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Environmental Assessment **April 2005**

Proposed project: Watts Bar Nuclear Plant Unit 1
Replacement of Steam Generators
Rhea County, Tennessee

Lead agency: Tennessee Valley Authority

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Abstract: The Tennessee Valley Authority (TVA) has prepared an Environmental Assessment of a proposal to replace the Unit 1 steam generators at Watts Bar Nuclear Plant (WBN). Steam generators, like any other heat exchanger or large piece of equipment, wear or degrade with usage. The United States Nuclear Regulatory Commission requires that extensive eddy current testing be done periodically during each refueling outage to ensure the integrity of the steam generator tubes that form a critical part of the reactor coolant system pressure boundary. Tubes found degraded must be plugged or otherwise repaired. These repairs reduce the heat transfer surface area and ultimately reduce the steam pressure to the turbine generator, restricting the generator's ability to produce power. The refueling outage testing indicates there is a high probability the unit would have to derate starting at the time of Unit 1 Cycle 7 refueling outage, scheduled for September 2006. This degradation and resultant repair would increase with time, leading to larger losses of generation and lost revenue to TVA. Ultimately, this could lead to the shutdown of the unit. Replacement of the steam generators would maintain the generation capability of WBN Unit 1.

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CHAPTER 1

1. Purpose of and Need for Action

1.1. The Decision

Tennessee Valley Authority (TVA) must decide whether (1) to continue to operate Unit 1 at Watts Bar Nuclear Plant (WBN) without replacing the four steam generators or (2) to replace the four Unit 1 steam generators. This replacement would include purchasing, transporting to the site, and installing the new generators. Interim on-site storage of the removed steam generators is also required.

Steam generators, like any other heat exchanger or large piece of equipment, wear or degrade (reducing power) with usage. The United States Nuclear Regulatory Commission (NRC) requires that extensive eddy current testing be done periodically during each refueling outage to ensure the integrity of the steam generator tubes, which form a critical part of the reactor coolant system pressure boundary. Tubes found degraded must be plugged or otherwise repaired. These repairs reduce the heat transfer surface area and ultimately restrict the steam pressure to the turbine generator, thus reducing the generator's ability to produce power. The refueling outage testing indicates there is a high probability the unit would have to derate starting at the time of Unit 1 Cycle 7 refueling outage scheduled for September 2006. This degradation and resultant repair would increase with time, leading to larger losses of generation and lost revenue to TVA. Ultimately, this could lead to the shut down of the unit. Replacement of the steam generators would maintain the generation capability of WBN Unit 1.

1.2. Location of Watts Bar Nuclear Plant

WBN is located on a tract of approximately 1,770 acres in Rhea County in East Tennessee. It is on the west bank of the Tennessee River (Chickamauga Reservoir) between Tennessee River Miles (TRM) 528 and 528.6. The site is approximately 1.25 miles south of the Watts Bar Dam and approximately 31 miles north-northeast of TVA's Sequoyah Nuclear Plant. The 1,770-acre reservation is managed by TVA. In addition to WBN, the reservation includes the Watts Bar Dam and Hydroelectric Plant, the Watts Bar Fossil Plant (currently shut down), the TVA Central Maintenance Facility, and the Watts Bar Resort Area. The resort area buildings and improvements have been sold to private individuals and the associated land leased to the Watts Bar Village Corporation, Inc. Due to this sale and leasing arrangement, no services are provided to the resort area from WBN.

1.3. Other Pertinent Environmental Reviews or Documentation

National Environmental Policy Act (NEPA) documents related to WBN steam generator replacement (SGR) are listed below:

- Abbreviated Environmental Assessment for the Replacement of Steam Generators - Sequoyah Nuclear Plant Unit 1 (TVA, 2000)
- Energy Vision 2020, Integrated Resource Plan Environmental Impact Statement, Volumes 1 and 2 (TVA, 1995a)
- Final Environmental Impact Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2 (NRC, 1995)

- Final Supplemental Environmental Review Relating to the Operation of Watts Bar Nuclear Plant (TVA, 1995b)
- Final Environmental Impact Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2 (TVA, 1978)
- Environmental Impact Statement for Watts Bar Nuclear Plant Units 1 and 2 (TVA, 1972)

1.4. The Scoping Process

A TVA interdisciplinary team reviewed the potential direct, indirect, and cumulative effects of Alternative A (the No Action Alternative), operating WBN without replacing the Unit 1 steam generators, and Alternative B (the Action Alternative), purchasing, transporting, and installing the new generators at WBN and on-site interim storage of the removed steam generators. Copies of the draft document were provided to the Tennessee Department of Environment and Conservation (TDEC), Tennessee Wildlife Resources Agency, and United States Fish and Wildlife Service (USFWS) in January 2005 for intergovernmental review. A 30-day public comment period occurred January-February 2005. Figure 1-1 shows the affected areas for this project.

1.5. Necessary Federal and State Permits/Licenses

Action Alternative B would require the following:

- If 1 acre or more of land were disturbed, a Construction Storm Water Permit from TDEC would be required.
- The proposed footbridge construction would involve modification of the stream bank, and an Aquatic Resource Alteration Permit (ARAP) from TDEC would be needed for this action.
- The Tennessee Storm Water Multi-Sector General Permit for Industrial Activities would be modified to include the new steam generator laydown and other areas affected by the project.

Figure 1-1. Steam Generator Replacement Project Affected Areas

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CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the No Action and Action Alternatives and discusses the environmental consequences of each.

2.1. Alternatives

There are two alternatives discussed and evaluated in this Environmental Assessment (EA): (1) the No Action Alternative (Alternative A) and (2) the Action Alternative, to purchase, transport, and install four replacement Unit 1 steam generators at WBN; and provide on-site interim storage for the removed steam generators (Alternative B).

2.1.1. Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would continue to operate Unit 1 at WBN. This would result in gradual derating (reducing power) of WBN Unit 1 starting with the Unit 1 Cycle 7 refueling outage followed by subsequent shutdown of the unit or large expenditures of resources for repair of the degraded steam generator tubes.

If the steam generators were not replaced, additional radiation exposures of 31.1 Roentgen equivalent to man (rem) per outage would continue to be amassed by workers who perform the required testing, maintenance, and repair to keep the unit operating at its expected power level. The radiation exposure level would increase with time, as the work frequency increased to repair tubes. By comparison, the dose to workers during the replacement of the steam generators is estimated to be 204 rem based upon the following parameters: (1) year 2006 replacement, (2) a refueling cycle of 18 months, and (3) the 40-year NRC operating license expiring in 2035. Nineteen refueling outages would occur prior to WBN Unit 1 license expiration. A Cycle 7 replacement would result in a reduction of radiation exposure of 386 (590-204) rem, without consideration of the additional exposure that would result from additional tube repair operations as the steam generators continue to degrade. When the power level could no longer be maintained, additional power would need to be made up to support the Valley's power needs. At some point, the economic viability of the unit would be threatened.

2.1.2. Alternative B – Purchase, Transport, and Install Four Replacement Unit 1 Steam Generators at WBN; Remove and On-Site Temporarily Store the Old Steam Generators

Under Alternative B, TVA proposes to purchase replacement steam generators (RSGs), to accept delivery to WBN in fall 2005, and to install these steam generators during the Unit 1 Cycle 7 refueling outage in fall 2006. Replacement of the four steam generators would be considered a large maintenance project.

Steam Generator Replacement Construction Activities

The general construction activities involved would include the following:

- Clearing, grading ,excavation, and stabilization work
- Delivery of permanent plant equipment (e.g., RSGs) and temporary storage on concrete saddles
- Delivery of construction equipment and materials (e.g., trucks, compressors, cranes, pipe, steel plating, concrete)

- Reclamation of three former parking lots and one former laydown area
- Construction of a new building (i.e., old steam generator storage facility [OSGSF]) on site for storage of the old steam generators (OSGs)
- Construction of a new decontamination building
- Excavation and foundation work for the outside lift system (OLS) crane and erection of the crane adjacent to the Unit 1 containment building
- Excavation and foundation work for the off-load crane at the barge off-load area
- Excavation work for construction of the pedestrian footbridge in a wooded area near the parking lot immediately west of the heavy equipment building
- Demolition activities on the Unit 1 containment dome for access and removal of the existing steam generators
- Removal of waste concrete and steel
- Removal of OSGs and associated piping
- Installation of RSGs and associated piping in Unit 1
- Replacement of steel and concrete shielding on the Unit 1 containment dome

Clearing, Grading, and Excavations

Clearing and grading activities would be required to support the SGR work. The primary areas requiring clearing and grading would be:

- Minor clearing of low-lying vegetation and grass and minor grading (approximately 0.3 acre) at the new steam generator off-load area just north of the old steam plant coal-unloading conveyor along the Tennessee River.
- Minor grading for roadway improvement along unpaved portions of the proposed RSG haul route from the off-load area to the WBN main access road.
- Grading of graveled parking area (approximately 2.0 acres) and foundation excavation for the new OSGSF.
- Clearing of grass and area grading (approximately 10 acres) for temporary construction parking lots and a laydown/storage area north of the protected area (PA).
- Clearing and grading (approximately 3.6 acres) for temporary construction parking immediately west of the existing heavy equipment building.
- Clearing and minor pier foundation work (approximately 0.6 acre) for a temporary pedestrian walkway between the temporary construction parking lot and the northeast access point to the PA.
- Minor clearing and grading (0.3 acre) for a new decontamination building east of the existing diesel generator building within the PA.
- Grading and foundation excavation work in the PA for the OLS crane in the immediate area of the Unit 1 containment.

Replacement Steam Generator Off-Loading, Delivery, and Interim Storage

Four RSGs and the primary mock-up would be delivered to WBN by barge via the Tennessee River. Under proposed Alternative B, barge deliveries would be expected to occur in fall 2005. Each barge would be expected to have a dedicated tow. The barges would depart from the Port of New Orleans and travel up the Tennessee-Tombigbee Waterway to the Tennessee River and onto the WBN site off-loading area in the Chickamauga Reservoir. Off-loading would occur at an existing docking area immediately north of the old steam plant coal-unloading conveyor.

The installation of the barge off-load crane for the RSGs would require excavation and foundation work to be performed on land within the existing sheet pile perimeter. Other preliminary work in this area was covered under a TVA Categorical Exclusion Checklist (TVA, 2004a). Adjacent to the existing sheet piling along the river's edge, deep foundations (e.g., drilled pilings) would be required to avoid placing additional lateral loading on the sheet piling. Landward, away from the sheet piling, only spread-footing foundations would be required. These engineered concrete piles would be installed within steel sleeves to prevent concrete from entering the waters of the U.S. during the concrete pour. The aboveground portion of these engineered features would be removed once the unloading of the river barges was completed.

Each RSG would be removed from the barge via the off-load crane and placed directly onto a flatbed heavy-haul truck. Trucks would travel north along an existing unpaved road, turn northwest onto the existing paved road, and continue on this road as it heads west-northwest following the road to where it intersects with the paved main access road to the WBN site. The trucks would then follow the paved road south into the site, turning southeast past warehouses E and F. The RSGs would be unloaded and placed on concrete support saddles for temporary storage in anticipation of their installation in Unit 1.

Temporary Storage of Equipment and Supplies

Equipment and supplies for the SGR work would be delivered to the WBN site via trucks. Temporary storage for much of this material would be provided in the SGR temporary laydown/storage area just north of the PA and northwest of the north portal. Portions of this area, previously used for parking, contain some remaining gravel surface, although currently overgrown with grass. Overall, the area would undergo minor clearing and grading and be prepared with a new gravel surface for improvement as a suitable laydown/storage space.

Old Steam Generator Storage Facility Construction

The new building, designated as the OSGSF, would be constructed immediately east of warehouses E and F for the interim storage of the four OSGs removed from Unit 1. The area for the building was originally a parking area during WBN construction and now contains the remnants of a graveled surface. The area would be surveyed and graded, and excavations would be made for the building foundation. In addition, this same general area would serve as the temporary storage area for the RSGs prior to installation in Unit 1.

Foundation Work and Erection of Outside Lift System Crane

Prior to erection of the OLS crane adjacent to the Unit 1 containment building, a suitable foundation would be required to support the crane. This work includes excavation of existing soil and gravel and installation of a concrete pad. The anticipated foundation area contains both paved and unpaved developed areas adjacent to Unit 1. Some minor clearing of grass and grading would be required to prepare the ground surface either for

leveling or excavation. Existing above- and underground utilities and possibly a groundwater monitoring well in this area would need either to be protected or relocated.

Decontamination Building Construction

A decontamination building would be constructed to support the SGR work, primarily in the handling, packaging, and temporary storage of contaminated clothing and equipment from the radiologically controlled areas. The building would be constructed in an unimproved area to the east of the existing diesel generator building, occupying an area of approximately 50 feet by 85 feet. Some minor clearing and grading for the removal of topsoil and leveling would be made to prepare the site for a concrete slab foundation.

Demolition Activities at Unit 1 Containment Dome and Generation of Solid Wastes

Demolition activities for the Unit 1 containment dome's two openings would consist of the installation of a debris barrier system inside the annulus area underneath the concrete dome. The concrete would be removed from the containment dome by a hydrodemolition process, which uses a high-pressure water jet to remove concrete while leaving the steel reinforcement bar intact. The hydrodemolition process would create a path through the 2-foot-thick concrete approximately 30 inches wide around the perimeter of the opening. Each containment dome opening would be approximately 45 feet by 22 feet. There would be approximately 480 cubic feet of removed concrete for the opening, utilizing approximately 900,000 gallons of water. The water and concrete slurry from hydrodemolition would be removed through a high-suction vacuum system. The vacuum system would have a piping connection tied into a vacuum truck located on the ground. The source water for hydrodemolition would be the existing fire protection system for WBN. Water not captured in the vacuum process would be allowed to drain off the concrete debris within the immediate work area. This water from the hydrodemolition process would be sampled, treated, and released through an approved National Pollutant Discharge Elimination System (NPDES) discharge point. The concrete rubble would be screened for radiation, would be temporarily stored on site in TVA-provided containers, and would be periodically transported off site for disposal in a local landfill. The concrete section lifted from the dome using the heavy lift crane would be stored at a TVA-specified location.

Each of the steam generators would be cut free from existing piping and then lifted by a large crane out the top of the concrete shield building, through the steel containment and internal structural concrete enclosures that house the steam generators through temporary openings. They would subsequently be transported to the steam generator storage area. Afterward, the RSGs would be lowered into the building and reconnected to the existing piping, and the temporary openings would be closed. Creating the temporary openings in the shield building would result in generation of concrete rubble for disposal. The steel from the containment vessel would be reused. Prior to welding the RSGs to the existing piping, the piping to be welded would be decontaminated to reduce worker radioactive exposure and dose. This decontamination effort would generate radioactive waste for disposal. Replacement of the reflective metal insulation on the steam generators would not create additional waste, as the OSGs would be temporarily stored in an engineered on-site facility with the reflective metal insulation attached to the OSG vessel. The support activities for this work would create some amount of both radioactive and nonradioactive solid waste.

Excavation Work for Construction of the Pedestrian Footbridge

The footbridge construction would require minor stream bank modifications including the installation of two steel beams approximately 4 feet apart decked with scaffold planks. The footer area for these beams would consist of excavating an area approximately 2 feet wide by 2 feet long by 2 feet deep about 4 feet back from the edge of the slope on each side.

These excavated depressions would be filled with a structural fill material and compacted prior to the beams being placed. In addition, a dead tree would be removed due to safety concerns.

2.2. Comparison of Alternatives

Table 2-1 breaks down potential environmental impacts by alternative.

Table 2-1. Comparison of Potential Environmental Impacts

Resource Area or Environmental Issue	Alternative A (No Action)	Alternative B (Replacement of Steam Generators)
Air Quality	None	• Fugitive dust • Exhaust emissions from construction equipment • Beneficial air emissions as compared to replacement energy
Solid and Hazardous Waste	None	• Solid wastes from clearing and grading activities • Other nonhazardous construction wastes • Concrete rubble and asphalt from construction/replacement activities • Hazardous waste from construction/replacement activities
Occupational Radiation Doses and Radioactive/Mixed Waste	• 590 rem dose to workers occurring over the remaining 19 refueling outages WBN has remaining in the 40-year NRC license	• Less than 1 millirem per hour (mrem/h) dose rate outside the OSGSF • Less than 0.00001 mrem/h additional dose rate (added to current dose rate) at the site boundary • Radioactive waste from construction/replacement activities • Approximately 204 rem dose to workers during the SGR • Net reduction of 386 rem dose (590-204)
Terrestrial Ecology	None	• Disturbances to a section of forest to construct a footpath and walk bridge, refurbish old lighting, and remove a dead tree that poses a safety hazard • Cutting the dome for SGR could produce noise levels up to 110 decibels for 24-hours over a 12-day period, which could impact heronries, ospreys, bald eagles, gray bats, and southern bog lemmings

Resource Area or Environmental Issue	Alternative A (No Action)	Alternative B (Replacement of Steam Generators)
		• Southern bog lemmings would be temporarily disturbed during the time periods when improvements would be made to the footpath
Aquatic Ecology	None	• The proposed footbridge construction would involve minor modification of the stream bank
Wetlands	None	• Existing vehicle barriers minimize the impacts to wetlands • BMPs would be utilized during footbridge construction to minimize impacts to the ephemeral stream
Floodplains and Flood Risk	None	• The OSG storage platform would not be located above the Tennessee River probable maximum flood elevation
Surface Water	None	• Approximate water usage for the hydrodemolition and hydroexcavation activities would be 900,000 gallons and approximately 10,000 gallons for the OLS crane foundation, respectively • Soil erosion and sedimentation from construction/replacement activities
Land Use and Visual Resources	None	• Alteration of the existing landscape character of locations within the plant site due to construction of buildings and parking lots • Recreational river users would have prominent views of operations occurring at the shoreline area • A 1,600-ton capacity lift crane with a boom capable of reaching over 400 feet would be erected to remove and replace the steam generators
Noise	None	• Off-site noise impacts from hydrodemolition work would be mitigated by appropriate scheduling of construction activities • Noise from other general construction activities would not result in unacceptable off-site impacts
Archaeological and Cultural Resources	None	None

Resource Area or Environmental Issue	Alternative A (No Action)	Alternative B (Replacement of Steam Generators)
Navigation/Transportation	None	• Transportation by water of the four RSGs from the Republic of South Korea through the Panama Canal to the U.S. Port of New Orleans to the Watts Bar site via the Tennessee-Tombigbee Waterway to the Tennessee River • Additional nonmanual and craft construction personnel and delivery roadway traffic
Socioeconomics and Environmental Justice	None	• Additional workforce over a 30-month period to peak at 710 workers
Cumulative Impacts	None	None

2.3. The Preferred Alternative

TVA's preferred alternative is Alternative B: purchase, transport, and install four replacement Unit 1 steam generators at WBN and provide interim on-site storage for the OSGs.

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CHAPTER 3

3. AFFECTED ENVIRONMENT

Based upon the initial scoping by TVA staff, the potential initiator of impacts or resource areas to which impacts could potentially occur were identified as air quality; solid and hazardous waste; occupational radiation doses and radioactive/mixed waste; terrestrial ecology; aquatic ecology; wetlands; floodplains and flood risk; surface water; land use and visual resources; noise; archaeological and cultural resources; navigation/transportation; and socioeconomics and environmental justice. Due to the location and nature of the proposed activities, there would be no impact to groundwater, recreation, managed areas, prime farmland, or unique natural features.

3.1. Air Quality

Air quality is an environmental resource value that is considered important to most people. Through the passage of the Clean Air Act in 1970, Congress has mandated the protection and enhancement of our nation's air quality resources. Air emissions from WBN are covered under the Conditionally Exempt Major Source Permit Number 448529.

3.2. Solid and Hazardous Waste

Currently, solid and hazardous waste generated at WBN is from plant operation and maintenance activities. WBN is a small quantity generator of hazardous waste. The United States Environmental Protection Agency (USEPA) Generator Identification Number for WBN is TN 2640030035. All waste generated at WBN is managed in accordance with applicable state and Federal regulations.

3.3. Occupational Radiation Doses and Radioactive/Mixed Wastes

Radioactive wastes are generated as part of normal plant operations at WBN. These wastes are managed in accordance with Tennessee License for Delivery T-TN014-L04. The volume of radwaste shipped to licensed disposal sites is approximately 151.9 cubic meters annually under South Carolina Permit Number 2765-41-04-X. Actual annual volumes shipped for disposal to Barnwell, South Carolina, equal 360.9 cubic feet of Class A and Class B waste. Class A waste shipped annually to a processor totals 7,280 cubic feet. There are varieties of compaction and incineration methods used to reduce the volumes of low-level radwaste for disposal. These methods result in an average reduction of dry solid waste greater than a 10 to 1 ratio. Processing of wet waste is accomplished through mobile demineralizers located in the radwaste packaging area. Occupational radiation doses during storage, monitoring, and retrieval of radioactive wastes are a small percentage of the total dose to workers who handle and/or work around radioactive materials each day. Through procedural controls, WBN has measures in place to minimize the likelihood of mixing radioactive and hazardous wastes. There is currently no mixed waste stored at WBN.

3.4. Terrestrial Ecology

3.4.1. Terrestrial Ecology (Animals)

Habitats at the Watts Bar nuclear project area have been largely modified by the presence of WBN. The majority of the SGR project area is nonvegetated, consisting of buildings, roads, fences, and areas of asphalt or gravel. Small areas of weedy herbaceous plants are interspersed within these structures. In the center of the project area, a small section of

hardwood forest surrounds a footpath connecting a parking area to the project site. A small intermittent stream runs through this wooded area.

Together, the nonvegetated land interspersed with small areas of weedy herbaceous plants make up the majority of the project area. Neither provide significant habitat for native terrestrial animals.

The small section of hardwood forest surrounding the proposed footpath can potentially provide habitat for numerous terrestrial animals. White-tailed deer, eastern cottontail, red bat, skunk species, and American toad are terrestrial animal species often associated with this habitat type. Possible bird species include American crow, blue jay, northern cardinal, and Carolina wren.

Unique terrestrial features within Rhea County and nearby Meigs County include 22 heronries and nine caves. The only features within a 3-mile radius of the project area are three heronries, at 0.8, 1.0, and 1.9 miles from the project area.

3.4.2. Terrestrial Threatened and Endangered Species (Animals)

The TVA Natural Heritage database indicated that two federally listed and ten Tennessee state-protected animal species have been reported from Rhea and nearby Meigs Counties (Table 3-1).

Table 3-1. Protected Species of Terrestrial Animals Reported From Rhea and Meigs Counties, Tennessee

Common name	Scientific name	Federal status*	State status*
Amphibian			
Eastern Hellbender	*Cryptobranchus alleganiensis*	-	NMGT
Tennessee Cave Salamander	*Gyrinophilus palleucus*	-	THR
Bird			
Bachman's Sparrow	*Aimophila aestivalis*	-	END
Bald Eagle	*Haliaeetus leucocephalus*	THR	THR
Least Bittern	*Ixobrychus exilis*	-	NMGT
Barn Owl	*Tyto alba*	-	NMGT
Mammal			
Gray Bat	*Myotis grisescens*	END	END
Eastern Small-footed Bat	*Myotis leibii*	-	NMGT
Southern Bog Lemming	*Synaptomys cooperi*	-	NMGT
Osprey	*Pandion haliaetus*		NOST
Reptile			
Northern Pine Snake	*Pithophis melanoleucus*	-	THR

*NMGT = Deemed in Need of Management; THR = Threatened; END = Endangered; NOST = No Status

The eastern hellbender is a large, aquatic salamander that inhabits large streams or rivers with a rocky bottom providing sheltered areas and some turbulence allowing well-oxygenated water. One record of this species occurs within a 3-mile radius of the proposed project area. Although nearby stream systems have appropriate habitat for the eastern hellbender, the section of the Tennessee River adjacent to the project area is too large and deep to contain suitable habitat for this species.

The Tennessee cave salamander is a neotenic salamander restricted to shallow water in caves or sinkholes. No caves or records of this species have been recorded within 3 miles of the project area, and no suitable geologic features exist on site.

The Bachman's sparrow, endemic to the southeastern United States, inhabits savannahs with grassy openings and mature trees, usually pines. Suitable habitat for this species does not exist in the project area.

Bald eagles feed primarily on fish and are often found near large bodies of water. An active nest exists approximately 1.8 miles away from the project area along the Tennessee River. Although the project area is immediately adjacent to the Tennessee River, mature trees and cliffs preferred by this species for perching and nesting are not available in the project area.

The least bittern is a small, migratory heron that nests in marshes with dense emergent vegetation. Suitable habitat for this species is not available in the project area.

The barn owl feeds primarily in open habitats. Suitable habitat for this species exists within the project area. This species nests in hollow trees and abandoned human-made structures. One dead tree with possible cavities currently exists in the wooded area near the footpath. As no evidence of this species was found and the tree is slated for removal, no structures offering large cavities (e.g., cave or hollow tree) would be available within the project area.

Gray bats occupy caves year-round. Large maternity roosts form in caves near large reservoirs and rivers during summer months; the bats roost in other caves during winter. Gray bats have been reported from two Rhea County caves and three Meigs County caves, but all are greater than 3 miles from the project area. No caves exist on site, although gray bats may forage over the adjacent Tennessee River.

Eastern small-footed bats hibernate in caves during the winter and roost in rocky habitats near forested areas and water in summer months. Neither caves nor appropriate rocky habitat exists within the project area.

There are no records of the Indiana bat from either Rhea or Meigs Counties; however, this species occurs in the region. Although ideal habitat for this species does not exist within the project area, a dead tree in the hardwood forest near the proposed footpath offers a potential roost site.

Southern bog lemmings inhabit a wide variety of habitats ranging from grasslands to forests, but usually prefer moist woodland areas near wetlands, bogs, or streams. Although suitable habitat may exist in the tract of hardwood forest containing the small intermittent stream along the footpath, the small size of this habitat and surrounding nonvegetated areas make this species unlikely in the project area.

Osprey are not listed in the state of Tennessee, but are tracked by TVA and Tennessee Natural Heritage. This species feeds exclusively on fish and is found around lakes, reservoirs, and larger rivers. In Tennessee, the osprey is especially common on the Watts Bar Reservoir. Suitable habitat does exist for this species in the project area. An active nest and breeding pair have been sited at the WBN yard-holding pond area.

Northern pine snakes often burrow, preferring the sandy soils in pine barrens or dry mountain ridges that allow this activity. Suitable habitat for this species does not exist in this project area.

3.4.3. Terrestrial Ecology (Plants)

According to Bailey, et al. (1994), the WBN site is within the Central Ridge and Valley section of the Ecological Subregion referred to as the Eastern Broadleaf Forest (Oceanic) Province. Küchler (1964) classifies the vegetation type as Appalachian oak forest. The potential natural vegetation may consist of cold-deciduous broad-leaved forest with evergreen needle-leaved trees (Bailey, 1995). The main forest type is oak-pine, with blackjack oak, chestnut oak, post oak, scarlet oak, and southern red oak dominating drier sites, while the moister sites are dominated by white oak, southern red oak, and black oak. Shortleaf pine can form a major portion of the canopy. Other common trees that constitute a minor portion of the vegetation composition are black gum, several hickory species (bitternut, mockernut, pignut, and shagbark), loblolly pine, and sweetgum (Bailey, 1995).

3.4.3.1. The Proposed Parking Area

The access path from the proposed parking lot 1 (See Figure 1-1) to the project site goes through a wooded area across an ephemeral stream. The canopy layer of the wooded area is composed of several species of oak, (black, chestnut, southern red, and white); the shrub layer consists of dogwood, Carolina buckthorn, high bush huckleberry, and tag alder. Within the herb layer, the most common plant was the highly invasive Japanese stilt grass species. Other herbs include Christmas fern, cinnamon fern, little brown jug, spotted wintergreen, and woodland oat grass. The parking lot and path have been used during previous construction at WBN and would be improved for use again. The path needs to be cleared and a new bridge constructed over the stream channel.

3.4.3.2. The Proposed Barge Off-Load Area

Several weedy species such as golden rod and Johnson grass were common along the edge of the off-load area near the river.

3.4.3.3. The Proposed Route North from Barge Off-Load Area

Golden rod, broom-sedge, ragweed, and Johnson grass were common weedy species that occurred along the roadside of the route from the barge to the storage area.

3.4.3.4. The Proposed Location of Old Steam Generator Storage Area

A few weedy grass species such as crab grass occur in the gravel parking area.

3.4.3.5. The Proposed Location of New Steam Generator Preparation Area

This area is very similar to the steam generator storage area; there are no plant communities present except for some weedy species invading the gravel parking areas.

3.4.4. Terrestrial Threatened or Endangered Species (Plants)

A review of plants in the TVA Natural Heritage database indicated that six Tennessee state-listed plant species are known from within 5 miles of WBN (Table 3-2). No federally listed plant species are known on or immediately adjacent to the area to be disturbed under Alternative B.

Table 3-2. State-Listed Plant Species Reported From Within 5 Miles of Watts Bar Nuclear Plant

Common name	Scientific name	State Status*	Habitat description
Appalachian Bugbane	*Cimicifuga rubrifolia*	THR	Rich woods
Heavy Sedge	*Carex gravida*	SPCO	Rocky river bluffs
Prairie Goldenrod	*Solidago ptarmicoides*	END	Barrens
Northern Bush Honeysuckle	*Diervilla lonicera*	THR	Rocky woodlands and bluffs
Spreading False Foxglove	*Aureolaria patula*	THR	Oak woods and edges
Slender Blazing Star	*Liatris cylindracea*	THR	Barrens

*THR=threatened; SPCO=Special Concern; END=endangered

Field inspection of the project area conducted in September 2004 revealed that no state-listed plants or suitable habitat for these plants was found.

3.5. Aquatic Ecology

3.5.1. Aquatic Life

Two designated wetlands are located near the proposed parking lot 1 (See Figure 1-1). One small, ephemeral stream is located in the proposed project area in a wooded section between two employee parking lots. Ephemeral streams are important because they convey water downstream to wetlands and other stream bodies with aquatic life. This stream channel receives flow from the two designated wetlands as well as other sources, flows to an on-site wetland in the project vicinity, and eventually discharges to the Tennessee River.

As described in Section 2.1.2, the proposed action would include the construction of a temporary footbridge over the ephemeral stream to allow access from parking lots via an old footpath through a wooded area to the north security access portal located at the PA boundary of the plant. The footbridge construction would require minor stream bank modifications. In addition, a dead tree within the streamside management zone would be removed due to safety concerns related to its proximity to the footpath. Based on findings of a field survey, this small, ephemeral stream is not likely to support a diverse aquatic community composed of fish and macroinvertebrates.

3.5.2. Threatened and Endangered Species (Aquatic Life)

Data from the TVA Natural Heritage database indicated that six aquatic animals, which are both state- and federally listed species, have been reported from the Tennessee River at WBN (Table 3-3). Studies conducted from the mid-1980s through 1997 have found 30 species present near WBN (Baxter et al., 1998). The most common species is the elephant-ear (Elliptio crassidens).

Table 3-3. State- and Federally Listed Aquatic Species Reported From the Tennessee River Adjacent to Watts Bar Nuclear Plant

Common name	Scientific name	State status*	Federal status*
Fish			
Snail Darter	*Percina tanasi*	THR	THR
Mussels			
Pink Mucket	*Lampsilis abrupta*	END	END
Rough Pigtoe	*Pleurobema plenum*	END	END
Dromedary Pearlymussel	*Dromus dromas*	END	END
Fanshell	*Cyprogenia stegaria*	END	END
Orange-foot Pimpleback	*Plethobasus cooperianus*	END	END

*THR=threatened; END=endangered

3.6. Wetlands

The wetland survey was performed according to the United States Army Corps of Engineers' standards (Environmental Laboratory, 1987), which require documentation of hydrophytic vegetation (USFWS, 1996), hydric soil, and wetland hydrology for a wetland determination. Broader definitions of wetlands, such as the definition provided in Executive Order (EO) 11990 (Protection of Wetlands), the Tennessee state regulatory definitions (Tennessee Rule: 1200-04-07 and TCA Section 69-3-103[33]), the USFWS definition (Cowardin et al., 1979), and the TVA Environmental Review Procedures definition (TVA, 1983), were also considered in this review.

Two designated wetlands have previously been identified on the WBN site adjacent to the proposed parking lot 1 and in the vicinity of the footpath area. These wetlands are protected by a vehicle barrier system built between them and the proposed parking area. No additional wetlands were identified in the project areas during the field survey. A review of existing data prior to the field survey–including the National Wetland Inventory, the Rhea County Soil Survey (Hasty et al., 1948), United States Geological Survey topographic maps, and a site aerial photograph–indicated a low probability of wetland presence in all project areas except for the footpath area. The National Wetland Inventory did not indicate any wetlands in or immediately adjacent to the project areas. The aerial photograph indicated that all of the project areas except for the footpath were in industrially developed areas or locations that had been filled, graded, and/or graveled, and which had a very low probability of wetland presence. The Rhea County Soil Survey indicated a hydric soil unit (Bloomingdale silty clay loam) in the vicinity of the footpath. However, no hydric soils or wetlands were found in the immediate area of the footpath during the field survey. The only wetlands found in the project vicinity were the two previously identified as stated above and the wetland on-site that receives flow from the ephemeral stream mentioned in Section 3.5.

3.7. Floodplains and Flood Risk

As previously stated, WBN is located on the right bank of Chickamauga Reservoir between TRMs 528.0 and 528.6 in Rhea County, Tennessee. An existing barge loading area is located at about TRM 529.2. The area potentially impacted by this project would extend from about TRMs 528.4 to 529.2. The proposed project area could possibly be flooded from the Tennessee River and local site drainage.

The 100-year floodplain for the Tennessee River would be the area below elevation 697.3 at TRM 528.4 and elevation 697.7 at TRM 529.2. The Tennessee River TVA Flood Risk Profile (FRP) elevation would be 701.1 at TRM 528.4 and 701.5 at TRM 529.2. The FRP is used to control residential and commercial development on TVA land and flood damageable development for TVA projects. At this location, the FRP elevations are equal to the 500-year flood elevations. For the northern area of the plant site, where all construction-related activities would take place, the 100- and 500-year flood elevations have not been determined.

Under current conditions, the estimated Tennessee River Probable Maximum Flood (PMF) level would be elevation 734.9 at WBN. Consequent wave run-up above the flood level would be 2.0 feet, which would produce a maximum flood level of 736.9 (TVA, 2004b). Based on site topography, most of the proposed project area would be inundated at this elevation. Although there would be PMF elevations related to local site drainage, these elevations would be substantively less than the Tennessee River PMF elevation.

3.8. Surface Water

The Watts Bar Reservation is located at the northern end of the Chickamauga Reservoir, which is TVA's sixth-largest reservoir. The reservoir is 59 miles long on the Tennessee River and 32 miles long on the Hiwassee River, covering an area of 35,350 acres with a volume of 628,000 acre-feet.

Watts Bar Unit 1 is a nuclear-powered steam-electric generating facility, rated to produce 1,270 megawatts of electricity at full load and is currently licensed and operating. At the Watts Bar Unit 1 site, the reservoir is about 1,100 feet wide, with cross-sectional depths ranging between 18 feet and 26 feet.

During the steam cycle, heat from the Watts Bar Unit 1 turbine is released when the steam passes through a condenser cooled with recirculated water from the Tennessee River. This water is cooled by passing it through a natural-draft evaporative cooling tower. Although the system is designed as a closed type, make-up water from the Tennessee River is needed to replace water losses from evaporation, drift, and blowdown. All water drawn from and discharged to the Tennessee River for operation of Watts Bar is regulated through the existing NPDES Permit Number TN0020168, and covered in WBN Procedure 0-PI-ENV-3.1: NPDES Plant Effluents.

In 1999, a supplemental condenser cooling water system was added to Watts Bar Unit 1. This system is a once-through cooling water system, which draws water from the existing raw water intake and discharge piping originally operated as a part of the Watts Bar Fossil Plant. After drawing this water, the supplemental condenser cooling water delivers the water to the cooling towers at the WBN site and discharges the water back to the old fossil discharge point, which is now WBN's NPDES Outfall Serial Number 113. This system increases the power production at Watts Bar Unit 1 by drawing cooler water from the Watts Bar Reservoir at the Watts Bar Dam into the plant and reducing the main turbine condenser temperature.

Blowdown from the natural-draft cooling towers is routed to a multiport diffuser system in the main channel of the Tennessee River at TRM 527.9 in accordance with the NPDES permit. Make-up water and other raw water supply requirements are taken from an intake channel and pumping station at TRM 528. When there is no flow from the Watts Bar Dam, cooling tower blowdown is routed to the yard-holding pond. The discharge temperature would vary depending on the cooling tower performance, which is a function of the ambient air temperature, from 41 degrees Fahrenheit (°F) in January to 91°F in July.

Storm water discharges from WBN are regulated through the existing NPDES General Permit for Storm Water Discharges Associated with Industrial Activity, Permit Number TNR051343. In addition, WBN implements the permit and regulatory requirements for industrial storm water discharges through the site's Storm Water Pollution Prevention Plan (SWPPP), which includes environmental compliance manual (ECM) Chapter 4 (TVA, 2004c).

3.9. Land Use and Visual Resources

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

The proposed project site is located in rural Rhea County, Tennessee, just south of State Route (SR) 68 between Spring City and Sweetwater. The topography surrounding the project site is moderately sloping and remains consistent along the valley floor between Walden Ridge and the eastern shore of the Tennessee River. Vegetation is mixed within the valley as the land use transitions from dense forestland along the eastern shore to agricultural lands to sparsely populated residential development to the east and north.

The plant site itself is in the immediate vicinity of TVA's Watts Bar Fossil Plant and TVA's Watts Bar Hydroelectric Plant, where the existing landscape character is industrial. The 500-kilovolt transmission lines streaming from the power production facilities and the natural-draft cooling towers are dominant elements within the foreground (0 to 0.5 mile from the observer) viewing distance. Shoreline and near shore residents to the north are generally not afforded views of plant structures and operations, as most are within the middleground (0.5 mile to 4 miles from the observer) or background (4 miles and beyond) viewing distances. Recreational river users have prominent views of the cooling towers, transmission structures, and a few of the internal plant facilities as they rise from the western shore of the river near TRM 528.

To the interior of the plant site, the landscape character can be separated into two areas, which include the plant operations core area where structures are closely spaced and the landscape is markedly industrial in character, and the plant operations support area where buildings are more loosely set about the low valley terrain and activity is less pronounced. Within this second landscape characterization, support facilities spread outward and into the woodland fringes. Views of this portion of the project site are limited and are restricted primarily to employees and visitors to the plant site.

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

3.10. Noise

WBN is located approximately 7 miles southeast of Spring City, Tennessee. It is situated in a rural area along the Tennessee River. The nearest sensitive receptors are two homes located approximately 0.9 mile west of WBN Unit 1 on Morrison Lane as well as several homes located along River Road, approximately 0.9 mile southeast of WBN Unit 1. There are also homes along the road to the M&M Dock and numerous homes along Crosby Lane and along Old Dixie Highway; these homes range from within 1 to 2 miles of WBN Unit 1.

At high levels, noise can cause hearing loss, and at moderate levels, noise can interfere with communication, disrupt sleep, and cause stress. Even at relatively low levels, noise can cause

annoyance. Noise is measured in decibels (dB), a logarithmic unit, so an increase of 3 dB is just noticeable and an increase of 10 dB is perceived as a doubling of sound level. Since not all noise frequencies are perceptible to the human ear, A-weighted decibels (dBA), which filter out sound in frequencies above and below human hearing, were used for this assessment.

Ambient noise was measured with a Bruel & Kjaer 2237 Integrating Sound Level Meter on October 22, 2004. Measurements were taken in seven locations:

(1) On Morrison Lane adjacent to the nearest residence

(2) At the end of McCustion Cemetery Road where it forks and becomes two private roads

(3) At the cabins at Watts Bar Resort

(4) At the end of the road to the M&M Dock

(5) At the boat ramp at the end of Pinhook Ferry Road

(6) Along River Road

(7) At a boat launch just south of Watts Bar Dam

Measurement locations are shown in Figure 3-1. The measurement location along River Road is the only one that was dominated by traffic. Noise sources at the other locations included mules, horses, dogs, birds, insects, rustling leaves, and boats. Noise from earthmoving equipment at Watts Bar was audible at locations 3, 5, and 7. Noise levels were measured three times at each location, and each measurement lasted for 5 minutes. Leq is the continuous equivalent sound level or the “average” noise level during the measurement period. While Leq is very valuable for describing continuous noises, it is less useful for intermittent noises such as traffic. Leq smoothes out the discrete high-level events, such as vehicles passing, to the point of eliminating the annoyance factor of the events. MaxP is the maximum peak sound level during the measurement, which is an important descriptor for intermittent noises. The Leq and the MaxP measurements are shown in Table 3-4.

Average noise levels in rural areas are typically around 40 dBA during the day, so noise levels at these locations, except along River Road, are fairly typical for rural areas.

Table 3-4. Ambient Noise Levels

Measurement Location	Average Leq (dBA)	Maximum peak sound level (dBA)	Noise Sources
1. Morrison Lane adjacent to the nearest residence	42.9	86.1	Mules, dog, birds, insects, rustling leaves
2. McCustion Cemetery Road at fork where it becomes private	40.5	83.2	Birds, insects, horses, rustling leaves
3. Cabins at Watts Bar Resort	42.5	90.3	Traffic on SR 68 at WBN
4. At end of road to M&M Dock	46.8	81.1	Boats, birds, insects, rustling leaves
5. At boat ramp on Pinhook Ferry Road	47.5	85.7	Boats at WBN, birds, insects
6. Along River Road	59.6	103.8	Traffic, dogs, birds, insects
7. At boat launch south of Watts Bar Dam	44.1	86.9	Boats, road construction at WBN

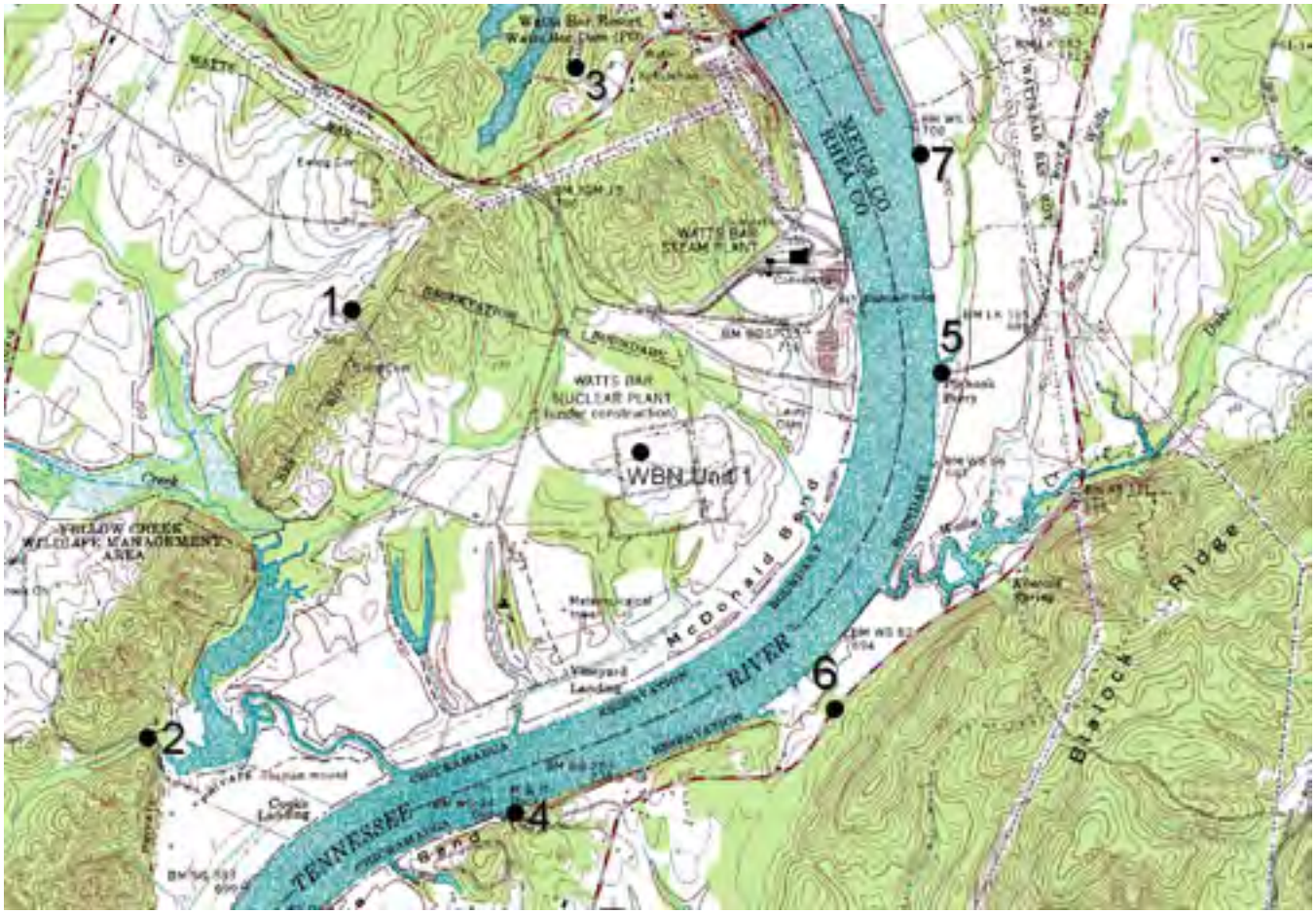

Figure 3-1. Ambient Noise Level Measurement Locations

3.11. Archaeological and Cultural Resources

Documentation indicates that construction activities associated with WBN have significantly altered the terrain within the project area. A field review was conducted by TVA Cultural Resources staff in order to verify the magnitude of disturbance in the proposed parking lot and walkway locations. Findings indicated that these areas have been heavily disturbed, and there was no potential for archaeological resources to be present. The nature of the undertaking is such that it would have no potential to affect historic structures.

3.12. Navigation/Transportation

This site is located less than 1 mile downstream of Watts Bar Lock and Dam at TRM 529.1, on the right descending bank. The off-loading of the barges would take place at the existing Watts Bar fossil site barge off-load area. No new construction would take place in the river to accommodate the delivery of the RSGs.

3.13. Socioeconomics and Environmental Justice

As noted earlier, WBN is located in Rhea County, Tennessee. The population of Rhea County in 2000 was 28,400 (Source: U.S. Bureau of the Census, Census of Population, 2000). The

primary labor market area for the plant consists of eight counties: Bledsoe, Cumberland, Knox, Hamilton, Meigs, McMinn, Rhea, and Roane Counties. The 2000 population of this area was 889,508. Based on 2003 data, the labor force in Rhea County is 12,130; the primary labor market area has a labor force of 461,200 (Source: Tennessee Department of Labor and Workforce Development). The unemployment rate in 2003 was 6.3 percent in Rhea County, while the average in the primary labor market area was 4.1 percent.

The population of Rhea County is 5.4 percent minority, well below both the state of Tennessee, with 20.8 percent, and the nation, with 30.9 percent (Source: U.S. Bureau of Census, Census of Population, 2000). The labor market area has a higher minority population share, 15.0 percent, still well below the state and national levels. The poverty rate in Rhea County is 14.7 percent, slightly higher than the state average of 13.5 percent and the national average of 12.4 percent (Source: U.S. Bureau of the Census, Census of Population, 2000). The poverty rate in the eight-county labor market area is 18.3 percent, higher than Rhea County, the state, and the nation.

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CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

This section evaluates the potential for impacts to the various resources identified by the interdisciplinary technical team establishing scope of the review. The evaluation of impacts herein also constitutes TVA's biological assessment of potential impacts to species listed under the Endangered Species Act.

4.1. AirQuality

4.1.1. Alternative A

Under the No Action Alternative, the steam generators would not be replaced, and the plant would operate exactly as it operates currently, until such time that degradation of the steam generator tubes required derating of the plant and major repairs on the steam generator tubes. No additional impacts to air quality for the No Action Alternative would be anticipated above or beyond those considered among the suite of power generation options available to TVA as evaluated in TVA's Energy Vision 2020 Environmental Impact Statement (TVA, 1995).

4.1.2. Alternative B

During demolition and replacement activities, there would be additional equipment that would likely result in accumulation of additional dust and debris on the roads and grounds in the vicinity of the OSGSF, the decontamination facility, the Unit 1 reactor building, and the various parking and storage areas. Proposed construction equipment and vehicles that would be used for demolition activities and replacement of steam generators at WBN Unit 1 are shown in Table 4-1. The primary fuel for the equipment and vehicles would be low-sulfur diesel fuel.

Appropriate Best Management Practices (BMPs) would be implemented to control and reduce fugitive dust emission from replacement activities to insignificant levels. In addition, replacing the steam generators to retain nuclear generating capacity would have significantly less air quality impact than replacement generation using various hydrocarbon or fossil fuels. Therefore, replacement of the steam generators would be an overall benefit to air quality based upon current and predicted energy demands.

4.2. Solid and Hazardous Waste

4.2.1. Alternative A

Under the No Action Alternative, the steam generators would not be replaced, and the plant would operate exactly as it operates currently. Therefore, there would be no additional solid and/or hazardous waste generated than is currently generated for the No Action Alternative.

4.2.2. Alternative B

Table 4-2 represents estimated waste type and quantities for waste that would be generated due to the proposed construction activities associated with the SGR work.

Solid waste from clearing and grading activities (e.g., vegetation, soil, gravel) would be collected and disposed of at TVA-designated areas within the WBN site boundary. Other nonhazardous construction wastes (e.g., wood waste, scrap metal, plastic, paper, glass) would be placed within TVA-provided containers near the work locations and managed by TVA as part of the existing WBN waste management procedures. Concrete rubble and asphalt would be temporarily stored on site in TVA-provided containers and periodically transported off site for disposal in a local landfill.

Hazardous wastes (e.g., used oils, paint supplies, solvents, and degreasers) generated during construction would be placed within suitable containers in TVA-designated hazardous waste storage areas and managed in accordance with WBN procedures and either transported off site for recycling or disposal in accordance with applicable state and Federal regulations.

Through adherence to existing WBN waste management procedures and general BMPs, the effect of the SGR project on solid and hazardous waste would be insignificant.

Table 4-1. Anticipated Construction Vehicles and Equipment

Equipment/Vehicle Type	Number	Size	Duration of Use (months)
Pick-up Trucks	2	N/A	12
Flat-bed Truck	2	N/A	8-10
Fuel Truck	1	N/A	8
Dump Truck	2	N/A	4
5th-Wheel Tractor	2	N/A	7-9
Lull Forklift	2	5 ton	7-9
Forklift	1	1-1/2 ton	10
Forklift	1	30 ton	10
Crane (rough terrain hydraulic)	1	60 ton	7
Crane	2	20 ton	6
Crane (rough terrain hydraulic)	1	100 ton	10
Crane (Model 3900T)	1	140-foot boom	2
Crane (Model 4100 S-1)	2	160-foot boom	3
Crane (Liebherr)	1	180-foot boom	8
Crane (OLS)	1	340-foot boom	4
Man Lift	2	60 foot	10
Man Lift	1	80 foot	6
Scissor Lift	2	N/A	3
Light Plant	6	N/A	8
Welding Machines	4	N/A	3
Compressor (Model 375)	2	N/A	5
Compressor (Model 1500)	1	N/A	6
Backhoe	1	N/A	10
Hydro-Vac Truck	1	N/A	2
Hydrodemolition Pumps	1	N/A	1
Pier Driller	1	N/A	1

N/A=Not Applicable

Table 4-2. Construction Waste Estimates

Location	Scope	Waste Amount (estimated)	Waste Type
Barge Off-load Area	Clearing and grading Excavations	75 cubic yards 175 cubic yards Total = 250 cubic yards	Vegetation and soil Soil
Old Steam Generator Storage Facility	Grading and excavation	600 cubic yards	Vegetation, gravel, and soils
Decontamination Building	Clearing and grading Excavation	300 cubic yards 400 cubic yards Total = 700 cubic yards	Vegetation and topsoil Gravel and soils
Haul Route and Warehouse F	Miscellaneous excavation and grading of existing road	300 cubic yards	Vegetation, gravel, and soils
Outside Lift System Crane Foundation	Excavation Hydroexcavation water for underground utilities	950 cubic yards 10,000 gallons (90 percent recovery yielding 1,000 gallons of water to ground)	Vegetation, gravel, soil, concrete Water
Trailers, Crane Pad, Laydown Areas, Down-Ending, Dome Debris	Grading and excavation	2,500 cubic yards	Vegetation, soils, gravel, concrete
Dome Cutting	Hydrodemolition water	900,000 gallons	Water

4.3. Occupational Radiation Doses and Radioactive/Mixed Wastes

4.3.1. Alternative A

Under the No Action Alternative, the steam generators would not be replaced, and the plant would operate exactly as it operates currently. Therefore, there would be no additional impacts to radiation doses and radioactive/mixed wastes other than what was previously assessed and bounded in the Final Environmental Impact Statement related to the operation of WBN, Units 1 and 2 (NRC, 1995).

4.3.2. Alternative B

The OSG assemblies would be stored on site in shielded buildings. Potential dose from such storage can be estimated from information gained by previous experience with steam generators (NRC, 1996). Each steam generator would contain approximately 300 curie of fixed gamma emitters at the time it would be removed from the containment. In past SGRs, storage buildings that housed the removed steam generators and associated equipment provided sufficient shielding to limit the dose rate to less that 1 mrem/h outside the building. The OSGSF building would be at least 2,723 feet from the SR 68 site boundary, and the estimated additional

dose rate at the site boundary from the OSGSF building would be less than 0.00001 mrem/h. An individual that lived at this location for 1 year would receive less than 1 mrem from this source, which is within the 40 Code of Federal Regulations (CFR) 190.10 Environmental Radiation Protection Standards for Nuclear Power Operations limits. This dose rate would decrease rapidly during the first 2 years of storage because short-lived radionuclides would decay. Thereafter, the dose would decrease by a factor of two every 5 years as the remaining Cobalt 60 decayed. Therefore, the radiation doses to the public from on-site storage of steam generators and other assemblies removed during replacement would be very small and insignificant.

Estimated waste type and quantities for radioactive waste generated due to the proposed construction/replacement activities are given in Table 4-3. Because WBN has measures in place to minimize the likelihood of mixing radioactive and hazardous wastes, there would be no mixed waste anticipated to be generated by this project.

Table 4-3. Estimated Radioactive Waste Generated

Waste Type	Quantity (ft^3)
Insulation	3,120
Scrap Metal	1,209
Welding Stubs	113
Scrap Wood	651
Concrete Rubble	8,505
Total	13,598

ft^3=cubic feet

These construction wastes would be managed by TVA in accordance with 10 CFR 100 limits and WBN's implementing procedures. Because this waste would be managed in accordance with all applicable Federal and state limits and WBN implementing procedures, the impacts would be insignificant.

4.4. Terrestrial Ecology

4.4.1. Terrestrial Ecology (Animals)

4.4.1.1. Alternative A

Under the No Action Alternative, the steam generators at WBN would not be replaced, and the project area would likely remain in its current state. Therefore, terrestrial animals and their habitats would not be affected.

4.4.1.2. Alternative B

The majority of the proposed project site consists of previously and heavily disturbed areas, resulting in a large proportion of nonvegetated and weedy herbaceous areas that are essentially unsuitable to terrestrial animals. A small section of hardwood forest surrounding the proposed footpath provides suitable habitat for terrestrial animals. The proposed disturbances to this section of forest include the construction of a temporary footbridge, the refurbishment of old lighting along the former footpath, and the removal of a dead tree. The proposed parking lot areas number 2 and number 3 as well as the laydown storage area provide grazing and forage for terrestrial animals. These areas would be graveled and would no longer provide grazing/foraging habitat. However, additional meadow areas located on site provide ample,

alternative grazing/foraging habitat. Therefore, these actions would cause only minimal disturbance to terrestrial animals. Replacement of the OSGs would require cutting the top off the shield building dome and could produce noise levels up to 110 dBA for 24 hours over a 12-day period. This level of noise would probably cause temporary disturbance to terrestrial animals in the nearby hardwood forest surrounding the footpath. The distances of three nearby heronries at 0.8, 1.0, and 1.9 miles from the site are sufficient for these noise levels to decrease to 72, 70, and 64 dB, respectively. These noise levels are typical of a dense urban area with heavy traffic or downtown in a large city and would not cause significant impact to the heronries over the 12-day period. The two heronries that are closer than 1 mile are both currently inactive. Overall, proposed actions for this alternative would not result in adverse impacts to the three heron colonies in the vicinity. Therefore, Alternative B would displace or disrupt minimal wildlife, and impacts to terrestrial animals and their habitats would not be significant.

4.4.2. Terrestrial Threatened and Endangered Species (Animals)

4.4.2.1. Alternative A

Under the No Action Alternative, the steam generators at WBN would not be replaced, and the project area would likely remain in its current state. Therefore, this alternative would not result in adverse impacts to protected terrestrial animal species or their habitats.

4.4.2.2. Alternative B

Suitable habitat for eastern hellbender, Tennessee cave salamander, Bachman's sparrow, least bittern, eastern small-footed bat, and northern pine snake do not exist within the project area. Therefore, these species would not be affected by the proposed project.

Although not part of the proposed project area, the adjacent Tennessee River may provide foraging habitat for ospreys, bald eagles, and gray bats. No other habitat requirements for either species exist within the proposed project area, and any alteration of habitat within the project area would not affect the Tennessee River as potential foraging habitat for these species.

The noise levels produced by cutting the top of the shield building dome during a 12-day period may cause a temporary disturbance for bald eagles and gray bats foraging along the adjacent section of the Tennessee River. However, nearby sections of this river beyond disturbing noise levels would provide ample, alternative foraging habitat during this time period. All gray bat caves in nearby Rhea and Meigs Counties are greater than 3 miles from the source of noise and no significant disturbance is expected for this species. One bald eagle nest exists 1.8 miles from this noise source; the noise level at this distance would decrease to 64 dB and would not adversely affect this nest. In addition, this particular pair of birds is already well acclimated to frequent noise and disturbance from nearby farm and cattle operations, as well as boat traffic from the adjacent Tennessee River. Two records of osprey nests occur at 1.3 and 2.0 miles from the project area; the noise level at these distances should be between 64 and 70 dB and should not affect these nests. The proposed action is, therefore, not likely to adversely impact ospreys, bald eagles, or gray bats.

Habitat for southern bog lemming exists in the hardwood forest surrounding the footpath. There would be temporary disturbance to this species during the time periods when improvements would be made to the footpath and when the top of the shield building dome would be cut. However, adverse impacts are not expected due to their mobility, wide range of habitat preferences, and abundance of suitable habitat in the surrounding area.

Little habitat exists for barn owls within the proposed project area. No Indiana bats have been recorded in either Rhea or Meigs Counties, but this species occurs in the region. One dead tree that could offer potential roost sites for the barn owl or the Indiana bat exists in the hardwood forest. This tree would be slated for removal in the dormant season between October 31 and April 1 in accordance with guidelines specified in the Indiana Bat Recovery Plan (USFWS, 1999). Removal of the dead tree during the dormant season was selected as a precaution to prevent any disturbance to this endangered bat species during the time period it would most likely use this structure for roosting. No negative impacts for Alternative B are significant for protected terrestrial animal species and their habitats within the proposed project area.

4.4.3. Terrestrial Ecology (Plants)

4.4.3.1. Alternative A

The lands within the WBN facility would remain as they are now for the foreseeable future. No impacts to uncommon terrestrial communities or otherwise unusual vegetation would be expected as a result of this alternative.

4.4.3.2. Alternative B

Some disturbance of existing plant communities would occur in preparing the footpath from the parking lot through the woods. Because no uncommon terrestrial communities or otherwise unusual vegetation occurs on the lands to be disturbed under the proposed Action Alternative, impacts to the terrestrial ecology of the region are expected to be insignificant as a result of the proposed action.

4.4.4. Terrestrial Threatened and Endangered Species (Plants)

4.4.4.1. Alternative A

No impacts to threatened and endangered species are expected as a result of the No Action Alternative.

4.4.4.2. Alternative B

No occurrences of federally listed or state-listed plant species are known on or immediately adjacent to the area to be disturbed under the proposed Action Alternative; therefore, no impacts to threatened or endangered plant species are expected.

4.5. Aquatic Ecology

4.5.1. Aquatic Life

4.5.1.1. Alternative A

Under the No Action Alternative, TVA would continue to operate WBN Unit 1 without replacing the steam generators; so there would be no impacts to aquatic life.

4.5.1.2. Alternative B

The proposed action of constructing a temporary footbridge over the ephemeral stream and removing a dead tree from the wooded area would have little, if any, impact on the limited aquatic life in the stream. However, because the proposed footbridge construction involves minor modification of the stream bank, a TDEC ARAP would be needed for this action. Water flow and stream bank disturbance during bridge construction and dead tree removal would utilize specific BMPS to avoid direct impacts to the stream and connected wetlands. Soil disturbance would be minimized and silt fencing would be placed around the excavation area and along the edge of the stream channel to control sediment from entering the drainage area.

Soil removed during construction would be scattered around the immediate footpath area outside of the stream banks and stabilized with gravel.

The Tennessee River at the barge off-load area would not be dredged since the river would have sufficient depth (i.e., estimated to be 16 feet) at the time of delivery. In addition, any disturbed soil during construction of the barge area or widening of the haul route would be minimized or prevented from entering the river through utilization of appropriate BMPs. Silt fencing and hay bales would be placed around the excavation areas. Therefore, no impacts to aquatic life are likely to occur as a result of this action.

4.5.2. Threatened and Endangered Species (Aquatic Life)

4.5.2.1. Alternative A

Under the No Action Alternative, TVA would continue to operate Unit 1 without replacing the steam generators; so no impacts to state- or federally listed aquatic animal populations would result.

4.5.2.2. Alternative B

Construction Impacts

With the use of BMPs to ensure no soil erosion/sediment, concrete, or concrete wash waters enter the river (while excavating adjacent to the barge off-load area to place concrete pilings for the crane), no impacts to protected aquatic animals would result from construction activities under the Action Alternative.

Operational Impacts

State- and federally listed species are located in the Tennessee River at the barge off-load area where the RSG would be delivered; however, there would be no in-water work (i.e., dredging) in this area in support of the SGR work. In addition, as described in Section 4.12.2, TVA would coordinate with River Scheduling to ensure that flows and depths of approximately 16 feet are kept as steady as possible during delivery operations to permit safe unloading of the barges. The two generators placed on each barge would represent less than 50 percent of the capacity of a standard river barge that requires a 9-foot draft. Therefore, no effects to these protected species are expected to occur as a result of barge unloading.

4.6. Wetlands

4.6.1. Alternative A

Under the No Action Alternative, no wetlands would be impacted, and there would be no change in existing conditions.

4.6.2. Alternative B

Under Alternative B, no wetlands would be impacted because there are no wetlands in the specific project areas. The wetlands adjacent to the parking lot 1 are protected through a vehicle barrier system. This system prevents vehicles and pedestrians from disturbing the wetlands, while not impacting the hydrology, soil, or vegetation of the wetlands. The wetlands downstream of the footbridge area would be protected though appropriate BMPs being utilized to avoid direct impacts to the stream channel and connected wetlands. Therefore, no impacts to wetlands are expected to occur as a result of this action.

4.7. Floodplains and Flood Risk

The floodplains and flood risk assessment involves ensuring that facilities would be sited to provide a reasonable level of protection from flooding. Because the proposed project could potentially impact flood elevations at several buildings, it is necessary to evaluate the flood risk associated with the PMF elevations for both alternatives.

4.7.1. Alternative A

Under the No Action Alternative, floodplain areas and local site drainage would not be impacted, and there would be no change in existing conditions.

4.7.2. Alternative B

The following activities are proposed under Alternative B:

(1) The existing barge off-loading area would be improved.

(2) The haul road immediately north of the barge off-loading area would be widened as necessary.

(3) The existing plant roads that would be used to transport the steam generators from the barge off-loading area to the plant would be repaired and paved as needed.

(4) The existing plant road would be temporarily raised approximately 10 inches from the railroad east of Unit 2 to the diesel generator building.

(5) A temporary “sand box” could be constructed between the auxiliary building and the diesel generator building to protect underground facilities.

(6) A 78-foot-diameter by 2-foot-tall concrete crane pad would be constructed near the auxiliary building and would be flush with existing grade.

(7) An earth mound near the crane pad would be excavated and lowered about 4 feet; about 1 foot of sand would be temporarily placed in the area to the west of the crane pad.

(8) Former or reclaimed parking lots 1, 2, and 3 and laydown area would be cleared and graveled as needed.

(9) A temporary bridge would be constructed to span the ephemeral stream southwest of parking lot 1.

(10) An OSGSF and steam generator decontamination facility would be constructed.

(11) The parking area adjacent to the OSGSF would be raised with about 1 foot of gravel.

All existing and proposed facilities are, or would be, located outside the limits of the Tennessee River 100- and 500-year floodplains. None of the proposed activities under Alternative B would result in changes to the Tennessee River PMF elevation. Improving the barge off-loading area and widening the haul road immediately north of the barge off-loading area would involve the placement of fill; however, these areas are a substantial distance from the main plant, so any potential impacts to PMF drainage would not affect critical PMF elevations at the plant. The minor improvements to the existing plant roads, clearing and graveling the existing parking lots, raising the existing parking area adjacent to the OSGSF, lowering the earth mound, and construction of the temporary bridge could result in minor changes to the existing topography, but PMF drainage from these areas does not flow toward the plant. Therefore, no adverse impacts would be expected.

Based on site topography, the proposed OSGSF would be located on ground below the Tennessee River PMF elevation. According to Calculation Number WBNOSG4-262, the high

point of the floor of the building would be at elevation 732.0, and the top of the OSG support pedestals would be elevation 735.5. The building itself would not be located above the Tennessee River PMF elevation, but the top of the OSG pedestals would be. With the top elevation of the OSG pedestals being above the Tennessee River PMF elevation, there is a very small chance that any portion of the OSGs would be inundated during the life of the facility. In addition, the OSGSF would be in an area where the local site PMF drainage would flow away from the building but not flow toward the plant.

A “critical action” (United States Water Resources Council, 1978) is any activity for which even a slight chance of flooding would be too great a risk. Due to the nature of the facility, it would be prudent to protect the OSGs in the OSGSF to the 500-year flood elevation. Although the elevation of the local drainage 500-year flood for this area is not yet known, it is believed that it would be significantly lower than the Tennessee River PMF elevation of 734.9. As stated above, the high point of the floor of the OSGSF would be at elevation 732.0, which may be above the local site drainage 500-year flood elevation. If this were not the case, then the fact that the top elevation of the OSG pedestals (the dimensions of which would be located in WBN Design Change Notice 51684 and shown on associated drawings) would be above the Tennessee River PMF elevation would ensure that the OSGs would not be inundated during a local drainage 500-year flood. The steam generator decontamination facility would be constructed on higher ground across from the auxiliary building above the Tennessee River PMF elevation. Local site PMF drainage from this area would flow away from the plant. The temporary raising of the road from the railroad east of Unit 2 to the diesel generator building would not adversely impact local site drainage PMF elevations because the water could still flow to the east over the portion of the access road that would not be raised. Construction of the temporary “sand box” and concrete crane pad would not restrict the flow of water in the area where they would be located because the water naturally drains away from this area. The sand being placed to the west of the crane pad would not be expected to significantly impact flood elevations. The temporary facilities including the sand to the west of the crane pad would be there for up to 6 months, after which time the area would be returned to preconstruction conditions. Therefore, the project would comply with EO 11988, and there would be no anticipated adverse flood-related impacts.

4.8. Surface Water

4.8.1. Alternative A

No surface water impacts are anticipated at the Watts Bar site beyond the effects of existing and future activities that are independent of the proposed action.

4.8.2. Alternative B

On-site storage of the OSGs in a qualified building would be within the bounds of Watts Bar Unit 1 current NRC license. All excavation would be performed using a digging permit, WBN Technical Instruction-215 (TVA, 2004d). BMPs such as silt fences and hay bales around drain inlet structures would be employed according to TVA, 2004c. The SWPPP would be updated to address the construction of the concrete building and laydown yard. If 1 acre or greater of land in a given drainage area were estimated to be disturbed during construction of the OSGSF, a Construction Storm Water Permit would be obtained from the state.

The RSGs would be off-loaded from the barge, utilizing a gantry crane system. The appropriate BMPs to control runoff would be employed during installation and removal of the gantry crane system to prevent or minimize impact of runoff to the river. The installation of this system would require construction of a pile foundation into bedrock, upon which the gantry crane would be assembled to operate in off-loading the steam generators from the river barges. At the

conclusion of off-loading activities, the embedded foundations would be covered with original roadway gravel surface material, and the barge off-loading area would be returned to its original configuration.

Potential surface water impacts from the SGR work would primarily be from wastewater generated as part of the hydrodemolition and hydroexcavation work at and near the Unit 1 containment building and from storm water discharges associated with the construction activities. The source water for both hydrodemolition and hydroexcavation activities would be the existing fire protection system for WBN. This water would be discharged through Outfall 101. Compliance with the NPDES discharge limitations for this outfall would be maintained.

A series of pumps located adjacent to the Tennessee River at the WBN site provides river water for plant fire protection. The hydro activities would tie into an existing fire hydrant that is adjacent to the SGR work location near Unit 1. The fire hydrant water is chlorinated for biological fouling control. The fire protection water would be pumped through the hydrodemolition equipment and then collected and pumped back through a bag filter to remove suspended solids and other debris. The flow amounts for the blasting are approximately 40 to 50 gallons per minute at 25,000 pounds per square inch. The current estimate for water needs for hydrodemolition is about 75,000 gallons of water per day, for a period of approximately 12 days. This translates to a total of 900,000 gallons of water required for the entire hydrodemolition process. This water would be removed through a high-suction vacuum system as mentioned in Section 2.1.2. WBN environmental personnel would coordinate with TDEC, Water Division, the proper method for sampling, treating, and releasing this process water.

Similar to hydrodemolition work, the proposed source of water for hydroexcavation would be from the existing WBN fire protection system located in the vicinity of the heavy crane foundation near Unit 1. Hydroexcavation activities would consist of excavating an area around the perimeter of the OLS crane. This excavation would be needed to expose buried utilities in the area that cannot safely be excavated around through conventional digging. The hydroexcavation process uses a water jet nozzle that produces high pressure (approximately 2,000 pounds per square inch) to remove gravel and soil. The mixed water and spoils would be vacuumed into a large capacity vacuum truck as the hydroexcavating is taking place. Hydroexcavation activities for the OLS foundation would occur for approximately 10 days using approximately 1,000 gallons of water per day (total yield=10,000 gallons). The assumed recovery rate of the mixed water and spoils slurry to the vacuum truck is 90 percent. Therefore, only approximately 1,000 gallons of water would seep into the ground at the OLS location. The resulting slurry captured in the vacuum truck (i.e., 9,000 gallons of water plus spoils) would be transported and placed at an on-site spoils area. The spoils area would be designed and maintained to retain the slurry within a defined area and to prevent surface migration to a receiving stream. The water in the slurry would be allowed to seep back into the ground.

Construction activities would result in exposed soils that could cause temporary increases in erosion and sediment runoff if not properly managed. Appropriate design in conjunction with the proper use of BMPs would be needed to minimize erosion and sediment runoff and to minimize the magnitude and duration of the impacts. The construction activities for the SGR work would be expected to disturb 1 acre or more of land in a given drainage area and would require TVA to obtain an NPDES Permit for Construction Storm Water Discharges. If necessary, TVA would request coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities through TDEC prior to the start of earth-disturbing activities. TVA would also prepare a Construction SWPPP that addresses the BMPs to be used to prevent or limit the potential for SGR work construction activities to impact storm water quality.

Discharges from WBN include process water and storm water outfalls, covered by the existing TDEC NPDES Permit (TN0020168), and the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities (TMSP TNR051343). Compliance with the applicable NPDES discharge limits would be maintained for all discharge to surface water. Water runoff resulting from the water/soil/gravel slurry would be captured within a defined area through use of geotextile fabric and/or hay bales, silt fences, and straw wattles and allowed to infiltrate into the ground. Extra protection would be afforded through designating a spoils area ensuring no runoff from this area reaches waters of the U.S.

Storm water runoff from all areas disturbed during the SGR work (i.e., RSG off-loading area, OSGSF building areas, decontamination building area, temporary construction laydown and parking, and footbridge) would be protected through the use of erosion and sediment control BMPs as defined in TVA, 2004c. Storm water runoff would continue to be monitored and visually inspected on a routine basis. The Tennessee Storm Water Multi-Sector General Permit for Industrial Activities would be modified to include the new laydown and reclaimed parking lot areas. Storm water runoff would be collected and treated (if necessary) before discharge. Therefore, little or no impact on the surface water would result from soil erosion or the siltation of surface drainage.

A small quantity of sanitary wastewater from the barge off-loading area would be treated by portable toilets. The remaining sanitary wastewater from this project would be processed with the sanitary wastewater on site.

In addition, SGR work would be conducted in accordance with the existing WBN Spill Prevention Control and Countermeasure (SPCC) Plan (TVA, 2004e) and TVAN Standard Programs and Processes (SPP) 3.1 (TVA, 2004f). The plan and procedure describe the BMPs to be used to prevent and/or minimize the release of hazardous substances used on site and the corrective actions to be taken in the event of a release to limit the potential contamination of surface- and groundwaters, respectively.

Development and implementation of BMPs in the SWPPP, ECM-4 (TVA, 2004c), and SPCC Plan (TVA, 2004e) would help prevent and/or minimize the potential for adverse surface water impacts from storm water runoff during execution of the SGR work. There are not expected to be any significant adverse impacts to surface water resources from storm water runoff, hydrodemolition, or hydroexcavation activities associated with the SGR work at the WBN site.

4.9. Land Use and Visual Resources

4.9.1. Alternative A

Under the No Action Alternative, proposed project elements associated with the replacement of steam generators at WBN would not occur. The existing scenic attractiveness and scenic integrity would not change, and the existing visual resources would not be impacted.

4.9.2. Alternative B

Under Alternative B, TVA would replace the steam generators at WBN. This proposed activity would include project elements that would potentially alter the existing landscape character of locations within the plant site. Views of these project elements would be confined, primarily, to the interior of the proposed project site and within the foreground viewing distance. Recreational river users would have prominent views of operations occurring at the shoreline area such as increases in traffic near the off-load area during times of delivery and unloading and the transportation of replacement generators. Increases in equipment and personnel at the

shoreline area would also be discernable to reservoir users but would be brief in duration and would remain in context with the established industrial landscape character.

The replacement activity would require several areas of new construction throughout the plant site in order to facilitate replacement operations. Laydown yards and construction staging/preparation areas would be located where similar activities presently occur. Potential surface preparation and fencing for the security of staging areas would remain in context with the existing landscape character. In addition to construction preparation areas, employee and overflow parking lots would be reclaimed for times of peak activity. New pedestrian walkways would lead employees to access points. Two parking lots would be reclaimed on opposing sides of the proposed RSG haul route, and one construction parking area would be reclaimed to the northeast near TVA's Heavy Equipment Division operations. All of the parking areas proposed would be located on open land and would require only minimal removal of vegetation and stabilization with gravel. The parking lot to the north of the OSGSF, if constructed, would displace an old TVA recreation area that includes developed athletic areas for baseball and basketball, set closely about a large pastoral field.

New structures would be built in the near vicinity of existing plant operations buildings in order to store and decontaminate the OSGs. These structures would be similar in size and design to existing buildings within the foreground viewing distance and would not impact the existing landscape character. Also within the secured plant area, a large heavy-lift crane would be erected to remove and replace the steam generators. The proposed crane would reach as high as 350 feet, with a boom capable of reaching over 400 feet. Once erected, the crane would become a dominant element in the viewshed; however, due to its general features, the crane frame would only be readily discernable from within the foreground viewing distance.

Most elements of the proposed project would be discernable only to plant visitors and employees. These available views would be in keeping with the existing landscape character, resulting in a minimal impact to visual resources. Those proposed project elements that would be visible to recreational lake users and motorists traveling the eastern shore on River Road would be temporary in duration and would change based on seasonal variations in vegetation along the shoreline. These temporary impacts, including the potential for a noticeable increase in traffic along SR 68, would not adversely impact the existing scenic attractiveness or scenic integrity.

Aggregately, the removal and replacement of steam generators at WBN would not result in significant impacts to the existing visual resources.

4.10. Noise

4.10.1. Alternative A

Under the No Action Alternative, the steam generators would not be replaced, and the plant would operate exactly as it operates currently. Therefore, there would be no additional impacts to noise other than what was previously assessed and bounded in the Final Environmental Statement related to the operation of WBN Units 1 and 2 (NRC, 1995).

4.10.2. Alternative B

Construction activities for the SGR work would result in noise impacts greater than those associated with normal WBN operation. Typically, noise from construction activities is intermittent and temporary in nature. During SGR work, clearing and grading activities and other general construction work in areas outside of the PA would typically occur only during normal work hours (e.g., 7:00 a.m.–5:00 p.m.) on a Monday-to-Friday schedule. Grading and

excavation work within the PA for the OLS crane and other support activities would also follow a similar schedule. Table 4-4 demonstrates the noise levels of typical construction activities.

Noise generated by the hydrodemolition activities is expected to be 110 dBA at 50 feet, which would be about 70 dBA at the nearest residence approximately 0.9 mile away. The noise level at the nearest residence would be typical of a sidewalk with passing automobiles. This would be a substantial increase over the current noise levels in the area. Since typical indoor noise levels are 15 to 20 dBA less than outdoor levels when the doors and windows are closed (Cowan, 1994), indoor noise levels at the nearest residence would be approximately 50 to 55 dBA. This indoor noise level is not likely to interfere with normal speech or telephone conversations (Cowan, 1994). While sleep disturbance is more often associated with intermittent or impulsive noises, continuous noise at this level may disrupt sleep for some people. While noise from the hydrodemolition is expected to be quite loud and may cause some temporary impacts at nearby residences, adverse impacts are not expected to be significant because they would last for no more than 12 days.

Table 4-4. Noise Levels From Typical Construction Equipment at Various Distances

Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Expected Sound Pressure* Level at		
		1,000 feet	2,500 feet	5,000 feet
Bulldozer (250 to 700 horsepower)	88	62	54	48
Front-end Loader (6 to 15 cubic yards)	88	62	54	48
Truck (200 to 400 horsepower)	86	60	52	46
Grader (13- to 16-foot blade)	85	59	51	45
Backhoe (2 to 5 cubic yards)	84	58	50	44
Portable Generators (50 to 200 kilowatts)	84	58	50	44
Mobile Crane (11 to 20 tons)	83	57	49	43
Concrete Pumps (30 to 150 cubic yards)	81	55	47	41
Tractor (3/4 to 2 cubic yards)	80	54	46	40

* Estimated levels include attenuation due to distance only (geometric spreading). Atmospheric effects (molecular adsorption and excess attenuation) for standard day conditions (59°F, 70 percent relative humidity) would reduce levels by an additional 3, 7, and 11 dBA at 1,000, 2,500, and 5,000 feet, respectively. Source: Barnes et al., 1977.

Based on the information presented in Table 4-4 for typical construction equipment, including the typical attenuation of noise with distance, there are not expected to be any off-site adverse impacts from noise to the local population from nonoutage construction activities. Hydrodemolition and other activities occurring during the outage could pose unacceptable adverse noise impacts to local residents especially during the nighttime hours and on weekends and holidays. As a mitigation measure, TVA would implement (as necessary) a public noise awareness program prior to the start of the SGR work. The intent of the program would be to raise public awareness and understanding of the nature and duration of the excessive noise-producing activities during the outage and to allow the public to communicate with WBN regarding noise complaints if and when they occur. By implementing a public noise awareness program and because of the temporary nature of the activity, there would not be any long-term adverse impacts from noise associated with the SGR work.

Other phases of construction would require the use of cranes, forklifts, man lifts, compressors, backhoes, dump trucks, pier driller, and portable welding machines. This type of equipment would generate noise levels ranging from 81 to 91 dB at 50 feet (USEPA, 1971). This type of construction equipment would generate noise levels similar to the earthmoving equipment that is already in use at WBN. Construction noise of 91 dBA at 50 feet would be about 51 dBA at the nearest residence approximately 0.9 mile away. This would likely be audible over background noise levels, but it would not cause a significant impact**.**

4.11. Archaeological and Cultural Resources

Because the WBN Reservation has been extensively disturbed previously, no potential exists for historic properties to be affected by implementing either alternative.

4.12. Navigation/Transportation

4.12.1. Alternative A

If the steam generators were not replaced, the barge shipments would not occur, and there would be no impact to commercial navigation. The plant would operate exactly as it operates currently. There would be no additional traffic than is currently at the plant during routine operation and outage activities. Therefore, there would be no impact to transportation for the No Action Alternative.

4.12.2. Alternative B

Under the Action Alternative, four RSGs would be shipped from Doosan Heavy Industries in the Republic of South Korea via a seagoing, dedicated vessel through the Panama Canal to the U.S. Port of New Orleans. The RSGs would be transferred from the seagoing vessel to two river barges in New Orleans and would travel up the Tennessee-Tombigbee Waterway to the Tennessee River to the Watts Bar fossil site. Once at the site, the RSGs would be off-loaded by cranes. Once the RSGs were loaded onto the river barges in New Orleans, they would receive government priority locking at each lock and would not experience any delays throughout the trip. A member of TVA's Navigation staff would assist in communication with the locks and the tows while en route. There are no lock closures scheduled on the Tennessee River that would interfere with the shipment of the RSGs during the delivery time frame.

The headwaters of Chickamauga Reservoir fluctuate approximately 7.5 feet between normal summer pool elevation 682.5 and winter pool elevation 675. Sonar mapping performed by TVA on August 13, 2003, indicated a depth of approximately 16 feet along the sheet piling structures. This would provide sufficient water depths beneath the barges during delivery operations. Navigation staff would coordinate with River Scheduling to ensure that flows would be kept as steady as possible during delivery operations.

The RSG work would require both nonmanual and craft construction personnel at the WBN site in addition to the existing operating plant workforce. The estimated number of additional construction-related personnel for each month of planned RSG work at the site is provided in Table 4-5.

Overland deliveries to the WBN site in support of the SGR work would occur primarily from fall 2005 through early winter 2006. Table 4-6 provides the estimated number of deliveries of equipment and materials necessary to support the SGR work including RSG unloading, rental equipment, OSGSF foundation work and construction, concrete deliveries, structural fill, and waste concrete/asphalt to off-site landfill.

Table 4-5. Estimated Numbers of Nonmanual and Craft Personnel on Watts Bar Nuclear Plant Site Supporting Steam Generator Replacement Work

Month	Estimated Number of Personnel
1	31
2	40
3	60
4	110
5	125
6	250
7	321
8	450
9	430
10	496
11	601
12	648
13	678
14	681
15	710*
16	695
17	697
18	668
19	649
20	594
21	547
22	426
23	253
24	226
25	186
26	121
27	96
28	52
29	14
30	3

*Denotes “peak” construction workforce

Table 4-6. Estimated Types and Number of Deliveries in Support of Steam Generator Replacement Work

Delivery Type	Loads to the Site	Loads off the Site
Equipment and Materials	250	250
Crane	200	200
Concrete	250	0
Structural Fill	200	0
Waste Concrete/Asphalt*	0	50

*Waste concrete/asphalt would be transported off site for disposal in a landfill. Excess soil, gravel, and vegetation waste would be disposed of at TVA-designated areas on the WBN site and are not expected to require transport off site.

Because the additional traffic and deliveries due to the replacement project would be temporary and short term, and the road that would be utilized is currently extensively traveled, impacts due to transportation would be short term and insignificant.

4.13. Socioeconomics and Environmental Justice

4.13.1. Alternative A

4.13.1.1. Socioeconomics

WBN is currently operating Unit 1, and there would be no changes in Unit 1 operations. Therefore, there would be no impacts due to socioeconomics from operation of WBN Unit 1. If at some time in the future WBN proposed to shut down Unit 1 for any reason, an environmental review that included the effects of shutdown would be conducted at that time.

4.13.1.2. Environmental Justice

WBN is currently operating Unit 1, and there would be no changes in Unit 1 operations. Therefore, there would be no impacts due to environmental justice from operation of WBN Unit 1. If at some time in the future WBN proposed to shut down Unit 1 for any reason, an environmental review that included the effects of shutdown would be conducted at that time.

4.13.2. Alternative B

4.13.2.1. Socioeconomics

The proposed action would require both nonmanual and craft construction personnel at the WBN site in addition to the existing operating plant workforce. The estimated number of additional construction-related personnel would increase to a peak of 710 in the 15th month of planned SGR work at the site and then gradually decrease. The maximum employment level would represent about 5.8 percent of the current labor force of Rhea County and about 0.15 percent of the labor force in the eight-county primary labor market.

Previous TVA experience at the WBN site and at other construction sites suggests that it is likely that no more than one-third of all workers hired for construction or similar activities would move into the primary labor market area. The remaining workers generally would already reside within the primary labor market area, including locations such as the Chattanooga and Knoxville metropolitan areas, close enough to commute on a temporary basis. Based on this, it is anticipated that the maximum number of workers moving into the area would be about 180 to 230 workers, not all resulting from this proposed action. Because of the temporary nature of work–30 months–and the short duration of the maximum employment level, very few workers

who do move in are expected to bring families with them. It is not likely that the increased population in the area due to all SGR work activities would exceed about 260 persons. However, it is possible that the demand for the required skills would make recruiting difficult, resulting in a somewhat larger number of workers moving temporarily into the local area.

Due to the short term of the project, the total impact on annual earnings and income in Rhea County and in the labor market would be small and insignificant. The number of personnel brought on site to support this project is within the scope of other TVA nuclear plant refueling outages. Impacts on community services such as medical services, police, and fire protection would also be very small and insignificant because of the small size of the workforce relative to existing population, because the workers who do move would likely be dispersed within the labor market area, and because of the short duration of the maximum population increase.

On-site medical services combined with the medical personnel brought in for construction would accommodate most medical demands.

4.13.2.2. Environmental Justice

The minority population around the plant site is relatively small, and poverty rates are similar to those of the broader state and national population. Almost all of the activity associated with the proposed action would occur inside the WBN site, further removing it from the population in the surrounding area. Therefore, no disproportionate negative impacts to disadvantaged populations would be expected.

4.14. Cumulative Impacts

4.14.1. Alternative A

TVA has determined that incremental cumulative impacts of the No Action Alternative would be insignificant. WBN is currently operating Unit 1, and there would be no changes in Unit 1 operations. If at some time in the future WBN proposed to shut down Unit 1 for any reason, an environmental review that included the effects of shutdown would be conducted at that time.

4.14.2. Alternative B

TVA has determined that incremental cumulative impacts of purchasing, transporting, and installing four RSGs for Unit 1 at WBN and on-site interim storage of the OSGs would be insignificant. The construction activities are short term and temporary in nature. Disturbed soil would be returned to its original state after the SGR activities were completed. All discharges would be short term in nature and would comply with WBN's NPDES discharge permit limitations. All wastes would be managed and disposed of properly. All other impacts would be very minor.

4.15. Summary of TVA Commitments and Proposed Mitigation Measures

4.15.1. Routine and Compliance Measures

4.15.1.1. Alternative A

None

4.15.1.2. Alternative B

(1) The primary fuel for the equipment and vehicles would be low-sulfur diesel fuel.

(2) Appropriate BMPs would be implemented to control and reduce fugitive dust emission from replacement activities and parking lot excavations.

(3) All wastes would be managed in accordance with existing WBN waste management procedures and general BMPs.

(4) Because the proposed footbridge construction involves modification of the stream bank, albeit minor, an ARAP would be needed for this action.

(5) Water flow and stream bank disturbance during footbridge construction and dead tree removal would utilize specific BMPs to avoid direct impacts to the stream channel and connected wetlands.

(6) During footbridge construction, soil disturbance would be minimized and silt fencing would be placed around the excavation area and along the edge of the stream channel to control sediment from entering the drainage area.

(7) Soil removed during construction of the footbridge would be scattered around in the footbridge area outside the stream channel and stabilized with gravel.

(8) Silt fencing and hay bales would be placed around the barge off-load excavation areas to ensure no sediments enter the Tennessee River.

(9) TVA would coordinate with River Scheduling to ensure that flows and depths of approximately 16 feet would be kept as steady as possible during the delivery operations of the RSGs.

(10) The temporary sand box to the west of the crane pad would be in place for up to 6 months. After this time frame, the sand box would be removed, and the area would be returned to preconstruction conditions.

(11) All excavation would be performed using digging permits, WBN TI-215, and appropriate BMPs.

(12) If 1 acre or more of land were to be disturbed in a given drainage area during construction, a Construction Storm Water Permit would be obtained.

(13) Storm water runoff from all areas disturbed during the SGR work (i.e., RSG off-loading area, OSGSF building areas, decontamination building area, temporary construction laydown and parking, and pedestrian site access bridge) would be protected through the use of erosion and sediment control BMPs as defined in TVA, 2004c (the WBN ECM-4, 4.0 Best Management Practices), TVA, 2004e (SPCC Plan ECM-8), and TVA, 2004f (SPP-3.1, Corrective Action Program).

(14) After the SGR work has been completed, the embedded foundations would be covered with original roadway gravel surface material, and the barge off-loading area would be returned to the original configuration.

(15) The source water for both hydrodemolition and hydroexcavation activities would be the existing fire protection system for WBN. This water would be discharged through Outfall 101. Compliance with the NPDES discharge limitations for this outfall would be maintained.

(16) Prior to hydrodemolition, WBN environmental personnel would coordinate with TDEC, Water Division, the proper method for sampling, treating, and releasing this process water.

(17) Hydroexcavation slurry would be transported and placed at an on-site spoils area with geotextile fabric and/or hay bales, silt fences, and straw wattles for filtration.

(18) Extra protection would be afforded through designating a spoils area with appropriate BMPs ensuring no runoff from this area directly reaches waters of the U.S.

(19) The Tennessee Storm Water Multi-Sector General Permit for Industrial Activities would be modified to include the new laydown and reclaimed parking lot areas.

(20) SGR work would be conducted in accordance with the existing WBN SPCC Plan and Corrective Action Program.

(21) A member of TVA's Navigation staff would assist in communication with the locks and the tows while the RSGs were en route to WBN.

4.15.2. Special Mitigation Measures

4.15.2.1. Alternative A

None

4.15.2.2. Alternative B

(1) The dead tree in the proposed footpath area would be removed in the dormant season between October 31 and April 1 in accordance with guidelines specified in the Indiana Bat Recovery Plan (USFWS, 1999).

(2) TVA would implement (as necessary) a public noise awareness program prior to the start of the SGR work.

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CHAPTER 5

5. LIST OF PREPARERS

Preparer	Contribution
Robert Bond	Surface Water
Mark Burzinski	Bechtel Corporation, Environmental Services
Stephanie Chance	Protected Aquatic Animals
Patricia Cox	Terrestrial Ecology (Plants)
Jennifer Fiedler	Terrestrial Ecology (Animals)
Kelie Hammond	Navigation/Transportation
Roger Milstead	Floodplains and Flood Risk
Philip Mummert	Socioeconomics and Environmental Justice
Tom Nahay	WBN Steam Generator Replacement Quality Management
Diedre Nida	NEPA Advisor, EA Project Management
Erin Pritchard	Archaeological and Cultural Resources
Jon Riley	Land Use and Visual Resources
Barbara Rosensteel	Wetlands
Edwin Scott	Aquatic Life
Robert Wilson	Map
Cassandra Wylie	Noise Impacts

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CHAPTER 6

6. LIST OF AGENCIES AND PERSONS CONSULTED

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CHAPTER 7

7. SUPPORTING INFORMATION

7.1. Literature Cited

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7.2. Acronyms, Symbols, and Abbreviations

°F	Degree Fahrenheit
a.m.	Latin term, ante meridiem, meaning “before noon”
ARAP	Aquatic Resource Alteration Permit
BMP(s)	Best Management Practice(s)
CFR	Code of Federal Regulations
dB	Decibel
dBA	Decibel A-weighted sound level; the sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network; the A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise
EA	Environmental Assessment
ECM	Environmental Compliance Manual
e.g.	Latin term, exempli gratia, meaning “for example”
EO	Executive Order
FRP	Flood Risk Profile
et al.	Latin term, et alii (masculine), et aliae (feminine), or et alia (neutral) meaning “and others”
i.e.	Latin term, id est, meaning “that is”
Leq	The continuous equivalent sound level or the “average” noise level during the measurement period
MaxP	Maximum peak sound level during measurement of noise; an important descriptor for intermittent noises
mrem/h	millirem (Roentgen equivalent in man) per hour of exposure
NEPA	National Environmental Policy Act
NRC	United States Nuclear Regulatory Commission
NPDES	National Pollutant Discharge Elimination System
OLS	Outside Lift System; denotes the crane used to support and remove/replace the steam generators from the Unit 1 containment
OSG(s)	Old Steam Generator(s); denotes the four steam generators to be removed from Unit 1
OSGSF	Old Steam Generator Storage Facility; denotes the new building constructed on the WBN site providing interim storage of the four OSGs removed from Unit 1 as part of the SGR work
PA	Protected Area; area at WBN controlled by picture badges and hand geometry systems
p.m.	Latin term, post meridiem, meaning “after noon”

PMF	Probable Maximum Flood
rem	Unit of radiation dosage (such as from x-rays) applied to humans; rem was derived from the phrase ***Roentgen*** *equivalent man;* the rem is now defined as the dosage in rads that will cause the same amount of biological injury as one rad of x-rays or gamma rays
RSG(s)	Replacement Steam Generator(s)
SPCC Plan	Spill Prevention Control and Countermeasure Plan developed in accordance with 40 CFR 112.5
SPP	Standard Programs and Processes
SGR	Steam Generator Replacement
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WBN	Watts Bar Nuclear Plant

APPENDIX A - UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, CONCURRENCE LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

RECEIVED
Environmental Policy and Planning

FEB 28 2005

Doc. Type:
Index Field:
Project Name:
Project No.:

February 25, 2005

Mr. Jon M. Loney
Manager, NEPA Administration
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Re: FWS #05-0641

Dear Mr. Loney:

Thank you for your letter and enclosure of January 27, 2005, transmitting a draft environmental assessment for the proposed replacement of steam generators at Unit 1 of the Watts Bar Nuclear Plant in Rhea County, Tennessee. Fish and Wildlife Service biologists have reviewed the document and we offer the following comments.

The preferred alternative (i.e., Alternative B) would involve replacement of four new steam generators at Unit 1. The project would include improvement of a barge loading facility; construction of new storage and decontamination buildings; demolition of the Unit 1 containment dome; clearing, grading, and excavation for construction of temporary parking lots, access roads, and a pedestrian walkway. The work would be done completely within the boundaries of the Watts Bar Nuclear Plant.

The draft environmental assessment describes the proposed action, the fish and wildlife resources present in the action area, and the potential impacts to those resources resulting from implementation of the preferred alternative. If Best Management Practices are employed during construction activities, there will be no adverse impacts to fish and wildlife resources from the proposed replacement of generators.

Based on review of available information, there are no federally listed or proposed endangered or threatened species in the impact area of the proposed action. In view of this, we believe that the requirements of section 7 of the Endangered Species Act have been fulfilled. Obligations under section 7 must be reconsidered, however, if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for the opportunity to comment. If you have any questions, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor