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## FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

# **SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2 LICENSE RENEWAL Hamilton County, Tennessee**

**PREPARED BY:  
TENNESSEE VALLEY AUTHORITY**

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## **Final Supplemental Environmental Impact Statement**

**June 2011**

**Proposed project:** Sequoyah Nuclear Plant Units 1 and 2 License Renewal  
Hamilton County, Tennessee

**Lead agency:** Tennessee Valley Authority

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**Abstract:** TVA proposes to submit an application to renew the operating licenses for Sequoyah Nuclear Plant (SQN), Units 1 and 2, in Hamilton County, Tennessee. License renewal would permit operation for an additional 20 years past the current operating license terms that expire in 2020 for Unit 1 and in 2021 for Unit 2. License renewal would involve continuation of normal operations, maintenance, and refueling. The license renewal program would not require major new construction, alterations, or refurbishment to SQN to maintain consistency with the current licensing basis. The purposes of the proposed action are to (1) obtain extended licenses to operate SQN Units 1 and 2 to help meet the identified need for power between 2020 and 2031; (2) maximize use of existing assets; and (3) support TVA's efforts to reduce the carbon emissions of its generating system.

In addition to continuing to operate SQN, TVA evaluated alternative methods for supplying electrical power. Relative to SQN, the No Action Alternative would involve ceasing operation of SQN when the current operating licenses expire, and using other methods to provide necessary capacity and energy. TVA examined various supply-side and demand-side options, including some that require construction of new generation facilities. Feasible alternatives evaluated in more detail are construction of a new nuclear plant or a new natural gas-fired plant.

TVA has prepared this supplemental environmental impact statement to inform decision makers and the public about the potential environmental impacts that would result from renewing SQN operating licenses. This document supplements the original 1974 *Final Environmental Statement Sequoyah Nuclear Plant Units 1 and 2* (TVA 1974a). TVA will use this information in addition to input provided by reviewing agencies, tribes, and the public to make an informed decision about renewing SQN operating licenses.

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## SUMMARY

### S.1. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The current operating licenses for Sequoyah Nuclear Plant (SQN) expire at midnight on September 17, 2020, and September 15, 2021, for Units 1 and 2 respectively. The Tennessee Valley Authority (TVA) must decide whether to submit a license renewal application (LRA) to the U.S. Nuclear Regulatory Commission (NRC) to extend the operating licenses of the two units for an additional 20 years beyond their current license terms.

As an integral part of TVA's current generation portfolio, SQN provides substantive base load generation to the TVA power system. Renewal of the current operating licenses would allow SQN to continue supplying approximately 2,400 megawatts electric (MWe) installed capacity of safe, clean, reliable, and cost-effective base load power in the period between 2020 and 2041. The license renewal program would not require major new construction, alterations, or refurbishment to SQN to maintain consistency with the current licensing basis. Furthermore, because nuclear processes produce substantially less air pollutants compared to fossil-fueled generation sources, continued operation of SQN would support TVA's efforts to reduce the carbon emissions of its generating system.

Demand for electricity in the TVA power service area has grown at the average rate of 2.3 percent per year from 1990 to 2008. Although the 2008 – 2009 economic recession has slowed load growth in the short term and added uncertainty to the forecast of power needs, economic recovery is expected, and future power needs are projected to grow at a rate that requires additional generating capacity.

The purposes of the proposed action are to (1) obtain extended licenses to operate SQN Units 1 and 2 to help meet the identified need for power between 2020 and 2031; (2) maximize use of existing assets; and (3) support TVA's efforts to reduce the carbon emissions of its generating system.

SQN Units 1 and 2 are pressurized light water reactors with a capacity of approximately 1,200 MWe each. SQN began commercial operation with Unit 1 in July 1981 and Unit 2 in June 1982. The SQN site is composed of approximately 630 acres that includes approximately 525 acres of land known as the industrial site and approximately 105 acres known as the training area peninsula. SQN is located near the geographical center of Hamilton County, Tennessee, on a peninsula on the western shore of Chickamauga Reservoir at Tennessee River mile (TRM) 484.5. SQN is close to the city of Soddy-Daisy, Tennessee, and is approximately 18 miles northeast of the Chattanooga, Tennessee, city center.

The purpose of this supplemental environmental impact statement (SEIS) is to inform decision makers, agencies, and the public about the potential environmental impacts that would result from the proposed action and alternatives.

This SEIS supplements the original *Final Environmental Statement, Sequoyah Nuclear Plant Units 1 and 2* that TVA prepared in 1974 to evaluate the impacts of constructing and operating SQN. Information from the 1974 final environmental statement (FES) was

analyzed and updated where needed to develop this SEIS. Additionally, information from other related environmental reviews was used to develop this SEIS.

This SEIS also updates the need for power analysis based upon the current TVA power system, TVA policies, forecasted economic conditions, costs of fuel and technology, and other contributing factors. In its Integrated Resource Plan (IRP), released in March 2011 (TVA 2011a), TVA assumed for analysis purposes that existing nuclear plants such as SQN would continue to be the backbone of TVA's power supply in the future. This SEIS uses information and analyses from the IRP EIS process, particularly for load forecasting and evaluation of energy generation portfolios designed to meet forecast needs.

This SEIS also incorporates information from the NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NRC 1996) in which the NRC considered the environmental effects of 20-year renewals of nuclear power plant operating licenses (results are codified in 10 CFR Part 51).

## S.2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives were analyzed in addition to the continuing operation of SQN by license renewal. TVA considered alternatives for the generating capacity and energy needed to provide approximately 2,400 MWe of base load power between 2020 and 2041. Potential options for meeting TVA's purpose and need include the range of supply-side and demand-side actions identified in TVA's IRP process. TVA reviewed options that would require new generating capacity, options that would not require new generating capacity, and a combination of those alternatives.

The Action Alternative, relative to SQN, is to take the action necessary to continue operation of SQN and would result in pursuing renewal of the operating licenses. Taking no action to renew the SQN operating licenses would result in ceasing operation of SQN Unit 1 in 2020 and Unit 2 in 2021. Subsequently, TVA would need to rely on alternate means to meet the demand for power that SQN provides. Therefore, in this SEIS, implementing an alternate way to provide the capacity and energy otherwise generated by SQN is described as part of the No Action Alternative.

Eventual decommissioning of SQN would be necessary regardless of TVA's decision to pursue license renewal. SQN would undergo decommissioning at the end of the current licenses, or at the end of the license renewal period. SQN would be placed in a safe condition and all fuel removed from the reactor. Decommissioning activities would begin after the permanent and safe shutdown of the units is achieved and after the formal decommissioning plans are approved by the NRC.

Safe storage of spent fuel would also be necessary whether SQN operating licenses are renewed or not. SQN has an independent spent fuel storage installation (ISFSI) used to safely store spent fuel in licensed and approved dry cask storage containers on site. This ISFSI is licensed separately from the SQN operating units and would remain in place until the U.S. Department of Energy (DOE) takes possession of the spent fuel and removes it from the site for permanent disposal or processing.

Transmission lines connecting SQN to the electric power grid would be operated whether SQN is operated or shut down. Operation and maintenance of transmission lines does not depend upon the decision to renew SQN operating licenses; proposed maintenance would

be identical regardless of the decision to pursue license renewal. Therefore, operation of transmission lines and maintenance of rights-of-way (ROWs) are not addressed in this SEIS.

### **Alternative 1 – SQN Units 1 and 2 License Renewal – Action Alternative**

The proposed action is for TVA to submit an LRA to the NRC to extend the expiration dates for SQN's operating licenses. Renewal of the current operating licenses would permit operation for an additional 20 years past the current operating license terms that expire at midnight on September 17, 2020, and September 15, 2021, for Units 1 and 2, respectively. The NRC would evaluate TVA's LRA and the potential environmental impacts of granting renewed licenses. If this alternative is granted, SQN would be available as a base load generation plant until 2040 for Unit 1 and 2041 for Unit 2.

The license renewal program would not require major new construction, alterations, or refurbishment to SQN to maintain consistency with the current licensing basis. Nor would it require changes to the programs, processes, or procedures currently in use. No changes to operational limits or permit requirements would be necessary to comply with current regulations. Other than the continued normal operations, refueling, and maintenance for an additional 20 years, no significant changes would be needed to continue current operation of SQN Units 1 and 2. If the DOE does not take responsibility for the permanent storage and disposal of spent fuel before 2026, expansion of the on-site ISFSI may be required to support SQN operations during the period of license renewal.

### **Alternative 2 – SQN Units 1 and 2 Shutdown – No Action Alternative**

If no action were taken by TVA, the operating licenses for SQN would expire in September 2020 and 2021 for Units 1 and 2 respectively. If the operating licenses expire, SQN would shut down and enter decommissioning. The TVA power service area would be shorted approximately 2,400 MWe of reliable base load generation and electric service could be disrupted during periods of peak demand on the TVA system.

If SQN were shut down, TVA would need to build new capacity to meet demand, in addition to operating existing resources, implementing approved new projects (e.g., Watts Bar Nuclear Plant Unit 2 projected to begin operating in 2013), and pursuing other planned expansion. Two power generation options were evaluated based upon cost optimization planning strategies: Alternative 2a, which includes construction and operation of a new advanced nuclear facility, and Alternative 2b, which includes construction and operation of multiple new natural gas-fired combined-cycle units.

#### **Alternative 2a – New Nuclear Generation**

Under Alternative 2a, TVA would identify a suitable site and decide the type of approved reactor technology. TVA would evaluate the various available approved reactor technologies and decide which would best meet the TVA mission and goals. TVA is exploring potential use of the Advanced Passive 1000 (AP1000) reactor technology at the Bellefonte nuclear site. Technology-related specifics used in this SEIS are examples only, and most are examples of the AP1000 technology design.

Based on the currently approved advanced reactor design technologies, TVA assumes it would require at least two new units to replace the existing SQN units. Under Alternative

2a, TVA would construct a new nuclear power plant at an alternate site. Construction locations may include a greenfield (i.e., undisturbed) site or a brownfield site. It is estimated that the new plant site would require 1,000 acres; additional land for transmission lines and other facilities could be necessary, depending upon existing infrastructure.

It is assumed that the new nuclear power plant would have an initial 40-year license term with the opportunity to renew for an additional 20-year license term. The AP1000 plant design is for 60 years. Operation of a new nuclear plant would support the TVA goal of reducing carbon emissions from electrical power generation.

#### **Alternative 2b – New Natural Gas Generation**

Under Alternative 2b, TVA would identify a suitable site and design a new natural gas-fired facility. TVA would most likely use combined-cycle type generation units, because they are more efficient than simple cycle units.

TVA recently evaluated construction and operation of a combustion turbine/combined-cycle plant at the John Sevier Fossil Plant (JSF) in Hawkins County, Tennessee. It would be feasible to complete the permitting process for a similar new natural gas-fired generation if Alternative 2b were adopted. For this SEIS, the JSF project is used as an example of facility design, construction, and potential environmental impacts.

### **S.3. SUMMARY OF ENVIRONMENTAL CONSEQUENCES**

Potential environmental impacts of the proposed project and the power generation alternatives are briefly summarized in Table S-1.

### **S.4. PREFERRED ALTERNATIVE**

Based upon the evaluations presented in this SEIS, and considering environmental impacts, costs, electrical generation needs of the TVA system, and TVA goals and policies, TVA has identified Alternative 1 – SQN Units 1 and 2 License Renewal as the preferred alternative. Implementing the preferred alternative would provide the Tennessee Valley with an additional 20 years of reliable base load power while promoting TVA's efforts to reduce carbon emissions, make beneficial use of existing assets, and deliver power at the lowest feasible cost.

### **S.5. PUBLIC REVIEW OF THE DRAFT SEIS**

A notice of intent (NOI) to prepare the SEIS was published in the *Federal Register* on Monday, April 12, 2010 (see Appendix A). The NOI described the SQN plant and its location, summarized the proposed action and alternatives, enumerated the environmental issues to be addressed in the SEIS, and detailed the scoping process. The deadline for comments was May 11, 2010.

The draft SEIS was available for public comment for 45 days following publication of the notice of availability (NOA) in the *Federal Register* in November 2010 (see Appendix A). At the close of the public comment period, TVA responded to the substantive comments received as provided in Appendix D of this document and incorporated any necessary changes into the final SEIS (FSEIS). The completed FSEIS will be transmitted to the U.S.

Environmental Protection Agency (EPA), which will publish another NOA in the *Federal Register*. TVA will make a decision on the proposed action no sooner than 30 days after the EPA's NOA of this FSEIS is published in the *Federal Register*. This decision will be based on the project purpose and need, anticipated environmental impacts as documented in the FSEIS, and cost, schedule, technological, and other considerations. To document the decision, TVA will issue a formal record of decision (ROD).

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**Table S-1. Summary of the Environmental Impacts of the Action and No Action Alternatives**

Resource	Attribute/Potential Effects	Alternative	
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation
Surface Water	Chemical or thermal degradation of surface water quality.	<p>There would be no major construction activities.</p> <p>All releases to surface water would be controlled as per NPDES permits and remain minor.</p> <p>SQN complies with current NRC and TDEC regulations.</p> <p>No change is anticipated regarding potential impacts from the current level of minor impacts anticipated.</p> <p>Direct, indirect, and cumulative effects of chemical and thermal discharges would be minor.</p> <p>Changes to hydrology and consumptive use of surface water.</p>	<p>Temporary and minor impacts from sedimentation and erosion during construction. No cumulative construction impacts are anticipated.</p> <p>Compliance with NPDES permit would limit potential impacts.</p> <p>Cooler discharge due to closed- cycle cooling.</p> <p>Thermal impacts would be minor and would be mitigated by derating if necessary.</p> <p>Direct, indirect, and cumulative effects of chemical discharges would be minor.</p> <p>No change in current level of minor impacts to water supply. No cumulative effects to water supply are expected.</p> <p>Effects on water supply would be similar to Alternative 2a, but on a smaller scale.</p> <p>Impacts would be minor.</p>

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Groundwater	Chemical and radiological impacts to groundwater quality.  Groundwater use.	Minor impacts.  No groundwater use. No impact anticipated.	Minor radiological impacts on groundwater quality.  If used for sanitary and potable water, there could be a minor impact. If used for makeup water and/or cooling water, then impacts could be moderate to substantial.	No radiological impact on groundwater.  Alternative 2b would be similar to Alternative 2a and would have similar impacts on the groundwater resource.
Floodplain and Flood Risk	Construction or modification of the floodplain.	No increase in flood risk in the Chickamauga Reservoir watershed.	All proposed construction would be evaluated to ensure consistency with Executive Order 11988.  Dredging would be a repetitive action with minor impacts.	Alternative 2b would be similar to Alternative 2a and would have similar impacts on the floodplain.  Flooding of the plant site from the river, lake, or probable maximum precipitation.  No cumulative effects to flood risk.

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Wetlands	Destruction of wetlands or degradation of wetland functions.	No impact.	<p>Impacts due to construction, including transmission lines, would range from minor to substantial.</p> <p>Consistent with Executive Order 11990, a new plant would not be constructed in wetlands unless there were no practicable alternative.</p>	<p>Alternative 2b would be similar to Alternative 2a and would have similar impacts on any wetlands.</p>
Aquatic Ecology	Destruction of aquatic organisms; degradation or destruction of aquatic habitat.	<p>No new impact.</p> <p>No change from current minor impacts on fish populations from impingement and entrainment.</p> <p>Thermal impacts to aquatic species in Chickamauga Reservoir would continue to be minor.</p>	<p>Impacts could range from minor to substantial depending on plant design, organisms present, source water, and receiving water.</p> <p>Dredging would have minor direct and indirect effects.</p> <p>An NPDES permit regulating discharge and temperature of toxic substances would be required.</p>	<p>Alternative 2b would be similar to Alternative 2a and would have similar impacts on the aquatic ecology.</p>

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Terrestrial Ecology	Removal or degradation of terrestrial vegetation, wildlife habitat, and/or wildlife.	No substantial change from current SQN operations. No indirect effects.	Substantial direct impacts could occur from clearing and construction operations if a greenfield site is selected.  Minor indirect impacts may occur.  Likely to result in minor cumulative impacts due to potential collective habitat loss, habitat fragmentation, and decreased biological diversity.	Alternative 2b would result in impacts similar to those associated with Alternative 2a, but would be smaller in scale due to smaller size.  Construction of associated transmission lines could result in minor cumulative impacts. Impacts less likely if construction occurs on a brownfield site.

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Endangered and Threatened Species	Mortality, harm, or harassment of federally listed or state-listed species including impacts to their critical habitat.	No new direct impacts. No indirect or cumulative impacts.	Clearing and construction could result in substantial direct impacts, depending upon the location chosen.  Minor to substantial indirect impacts associated with potential habitat loss and fragmentation, and decreased biological diversity could occur.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Natural Areas	Degradation of the value or quality of natural areas.	No new direct impacts. No indirect or cumulative impacts.	Direct impacts are unlikely. New plant would be constructed at a distance from most natural areas.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Recreation	Degradation or elimination of recreational facilities or opportunities.	No impacts.	Impacts could range from minor to moderate, depending upon site location. Potential adverse impacts resulting from construction and operation would be evaluated.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Archaeology and Historic Structures	Damage to archaeological sites or historic structures.	No direct, indirect, or cumulative effects within SQN site or vicinity are expected.	Depending on the site, the effects could range from minor to substantial. Direct, indirect, and cumulative impacts would be evaluated, with historic properties identified and managed per the National Historic Preservation Act Section 106 process.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Visual	Effects on scenic quality, degradation of visual resources.	No new impacts.	Potential removal of SQN structures would make the SQN site less visible. The level of impact anticipated during construction and operation would range from minor to moderate.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.

<b>Resource</b>	<b>Attribute/Potential Effects</b>	<b>Alternative</b>		
		<b>1 – SQN License Renewal</b>	<b>2a – SQN Shutdown and New Nuclear Generation</b>	<b>2b – SQN Shutdown and New Natural Gas-Fired Generation</b>
Noise	Generation of noise at levels causing a nuisance to the community.	Impacts would be minor; no change from the current condition.	Noise associated with construction would be minor for the surrounding communities, and minor to moderate for the nearest residents. Noise associated with operation of a new plant is expected to be minor.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Socioeconomics and Environmental Justice	Changes in local population, employment, and incomes.	No changes in operating employment levels. No new impacts to population, local employment, or income.	Construction noise associated with new transmission systems is expected to be minor.	Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
	Disproportionate effects on low-income and/or minority populations.	No disproportionate effects on low-income or minority populations.	Potential effects might disproportionately impact minority or low-income communities depending on location.  Negligible socioeconomic impacts expected with the closure of SQN; therefore, no disproportionate impacts to minority and low-income populations.	Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.  Impacts on local and regional housing markets would be location dependent and range from minor to substantial.  Potential short-term, minor negative effects on the housing market, specifically in Hamilton County.
	Changes in availability of housing.	No changes or new impacts.		

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Effects on water supply and wastewater.	No changes or new impacts.	<p>Interconnecting to existing systems could require the development of additional capacity.</p> <p>Increased population could require the development of additional capacity.</p> <p>Demand on the Hamilton County water and wastewater systems would lessen, but impact would be negligible.</p>	<p>Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.</p>	
Police, fire, and medical services.	No changes or new impacts.	<p>Support from local emergency service providers would be necessary during construction and operation.</p> <p>Demand for emergency services near SQN may lessen, but impact would be minor and temporary due to growth trend in the county.</p>	<p>Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.</p>	

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Schools and education.	No changes or new impacts.	The costs of providing education for additional students should be offset by the increase in tax revenues and plant-equivalent payments.  Demand for school services near SQN may lessen, but impact would be minor and temporary due to growth trend in the county.	No change in land use at SQN is anticipated.  Depending on the location of the new plant site, ROWs, the transmission inter-tie connection, and rail spur could result in potentially substantial land-use impacts.	Alternative 2b would result in impacts similar to those associated with Alternative 2a, but would be on a smaller scale.  There could be a resulting decrease in off-site land-use impacts due to decreased demand for uranium supplies.
Changes in land use, land acquisition, land conversion, or road locations.	No changes in on-site land use and no new off-site impacts.			In-lieu-of tax payments would have a positive and beneficial impact on local government revenues.
Local government revenues.	No impact on local government revenues.			Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.  The amount of in-lieu-of tax payments Hamilton County receives likely would not be impacted if SQN were shut down.

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Elevated levels of traffic from construction work force and deliveries.	No changes or new impacts expected.	Mitigation of potential transportation impacts due to the location of a facility may be necessary due to expected increases in construction and operation traffic.  Traffic would decline on SQN access roads.	Alternative 2b would result in impacts similar to those associated with Alternative 2a, but on a smaller scale.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Solid and Hazardous Waste	Generation and disposal of solid and hazardous waste.	No impacts from construction. Minor indirect impact of off-site disposal in permitted landfills.	Minor indirect impact during construction and operation from off-site disposal in permitted landfills are likely.  Minor cumulative impacts expected.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.
Seismology	Seismic adequacy.	No changes or new impacts are expected.	No adverse seismic effects anticipated. Extensive seismic analysis required prior to choosing a location.  Impacts related to seismic activity would be minor.	Alternative 2b would result in impacts similar to those associated with Alternative 2a.  Seismic evaluations would not be as rigorous as required for a new nuclear plant.

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Air Quality	Emissions resulting in increases of air pollutants.	SQN is not a significant source of pollutants, and the impact of operation for an additional 20-year period would be minor.	<p>Construction impacts are short term and can be mitigated in many cases. The overall impacts to air quality would be minor if there were no existing air quality issues; however, the impacts could be potentially large if the site were in a nonattainment area.</p> <p>Small indirect impacts off site and no cumulative impacts due to construction.</p> <p>Impact of a nuclear plant on air quality would be minor. TVA would obtain appropriate permits and maintain air emissions in compliance with regulatory limits.</p>	<p>Construction impacts of a new natural gas-fired plant would be expected to be similar to Alternative 2a.</p> <p>Depending on the chosen location, operation of typical combined-cycle combustion turbine gas-fired generation plants have minor to moderate impacts on air quality. Air emissions would meet all required regulations.</p> <p>A new nuclear plant is not expected to adversely affect local meteorological conditions.</p> <p>A new natural gas-fired plant is not expected to adversely affect local meteorological conditions.</p>

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
	Climatology and effects due to climate change.	The impacts from global climate change and greenhouse gas emissions upon SQN would be expected to be minor.  Cumulative impacts over an additional 20 years of operation would offset millions of tons of greenhouse gases that otherwise would be produced by fossil fuel-fired generation. License renewal would provide TVA flexibility in reducing greenhouse gas emissions from its portfolio of generating assets.  Radiological gaseous emissions.	Impacts from global climate change and greenhouse gas emissions would be expected to be minor.  Cumulative impacts over an additional 20 years of operation would offset millions of tons of greenhouse gases that otherwise would be produced by fossil fuel-fired generation. License renewal would provide TVA flexibility in reducing greenhouse gas emissions from its portfolio of generating assets.  All radioactive effluents would be released in accordance with applicable regulations, and the impact from those effluent releases would be minor.  Indirect and cumulative impacts would be minor.	A natural gas-fired plant would contribute a considerable amount of greenhouse gas emissions for the life of the plant. The impacts are direct and indirect, as well as potentially cumulative.  There would be no radioactive impacts during the construction of a new nuclear plant.  There would be no expected observable direct or indirect impacts from radioactive gaseous releases from a new nuclear facility during normal operations.

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
Radiological Effects	Effects to humans and nonhuman biota from normal radiological releases.	Annual doses to the public are well within regulatory limits; no observable health impacts are expected.  No changes or new impacts are expected.  Doses to nonhuman biota would be well below regulatory limits; no noticeable effects are expected.	Radiological effects to humans and biota would be similar to SQN and within all applicable release limits.	Radiological effects not applicable to natural gas-fired turbines.
Uranium Fuel Effects	Radioactive waste volumes and disposal.	Low-level radioactive waste would remain a minor impact on the available landfill capacity. The indirect and cumulative impacts on licensed landfills would be minor.  Radioactive gaseous and liquid releases.	Operating nuclear power plant would produce low-level radioactive waste similar to SQN and would be a minor impact.	No radioactive waste generated.  Releases of radioactive liquid and gaseous effluents would be in accordance with applicable federal regulations, resulting in minor impact.

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
	Radioactive waste transportation.	The impact to members of the public resulting from processing, storage, and transportation of solid low-level radioactive waste is minor..	Impacts from transportation of low-level radioactive waste would be minor, similar to SQN.	No radioactive waste would be transported.
	Spent fuel.	Minor impacts from the operation of the ISFSI, as it is operated in accordance with all applicable regulations.	Minor impacts from spent fuel storage.	No spent fuel generated.
Plant Safety	Postulated design-basis accidents.	In all cases, the doses to an assumed individual at the exclusion area boundary and low population zone are a fraction of the regulatory dose limits. Environmental risks due to postulated radiological accidents are minor.	The new nuclear plant would be designed specifically for the selected technology, which would be approved by the NRC and would meet all design-basis accident criteria.	This section is not applicable to Alternative 2b.

Sequoyah Nuclear Plant Units 1 and 2 License Renewal

Resource	Attribute/Potential Effects	Alternative		
		1 – SQN License Renewal	2a – SQN Shutdown and New Nuclear Generation	2b – SQN Shutdown and New Natural Gas-Fired Generation
	<p>Severe accidents.</p> <p>Plant security.</p>	<p>Severe accident analysis indicates that the risk is minor and meets all safety goals.</p> <p>Notwithstanding the very remote risk of a terrorist attack affecting operations, TVA increased the level of security readiness, improved physical security measures, and increased its security arrangements with local and federal law enforcement agencies at all of its nuclear generating facilities, and TVA is in compliance with all regulations on plant security.</p>	<p>The new nuclear plant would be designed specifically for the selected technology, which would be approved by the NRC and would meet all severe accident criteria.</p>	<p>This section is not applicable to Alternative 2b.</p> <p>TVA would maintain appropriate security at a natural gas-fired plant. However, the requirements and standards for plant security at such a facility would be less than required for a nuclear-powered facility.</p>

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