

TENNESSEE VALLEY AUTHORITY

Final Supplemental Environmental Impact Statement, Single Nuclear Unit at the Bellefonte Plant Site, Jackson County, Alabama

AGENCY: Tennessee Valley Authority (TVA)

ACTION: Issuance of Record of Decision (ROD)

SUMMARY: This notice is provided in accordance with the Council on Environmental Quality's regulations (40 CFR 1500 to 1508) and TVA's procedures for implementing the National Environmental Policy Act (NEPA). A notice of availability (NOA) of the Final Supplemental Environmental Impact Statement for a Single Nuclear Unit at the Bellefonte Plant Site (final SEIS) was published in the Federal Register on May 21, 2010. TVA prepared the final SEIS to update the extensive environmental information and analyses that exist respecting the Bellefonte site and the construction and operation of a nuclear power plant on that site. On August 20, 2010, the TVA Board of Directors (TVA Board) approved the expenditure of \$248 million for additional engineering, design, and licensing activities, as well as the procurement of long lead-time components for the partially complete Bellefonte Unit 1. This decision will help maintain Unit 1 as a viable alternative to meet the projected need for base load generation on the TVA system in 2018-2020. Bellefonte Unit 1 is a 1,260-megawatt (MW) Babcock and Wilcox (B&W) -designed pressurized light water

reactor. It is anticipated that the TVA Board will be asked to approve completion and operation of Unit 1 next year, depending on the results of a new TVA Integrated Resource Plan (IRP), which is scheduled for completion in spring 2011.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION: With almost 37,000 MW of net dependable summer generating capacity, TVA operates the nation's largest public power system, producing 4 percent of all the electricity in the nation. TVA provides electricity to most of Tennessee and parts of Virginia, North Carolina, Georgia, Alabama, Mississippi, and Kentucky. It serves about 9 million people in this seven-state region through 155 power distributors and 56 directly served large industries and federal facilities. The TVA Act requires the TVA power system to be self-supporting and operated on a nonprofit basis and directs TVA to sell power at rates as low as are feasible. TVA power is supplied by three nuclear plants, 11 coal-fired plants, 12 gas-fired plants, 29 hydroelectric dams, a

pumped-storage facility, a wind farm, a methane-gas cofiring facility, and several small solar photovoltaic facilities and through several power purchase agreements. TVA transmits electricity from these facilities over almost 16,000 miles of transmission lines.

This final SEIS supplements and updates the original TVA Final Environmental Statement for Bellefonte Nuclear Plant Units 1 and 2 (May 1974), hereafter referred to as the 1974 FES; the TVA Final Environmental Impact Statement for the Bellefonte Conversion Project (October 1997); the U.S. Department of Energy's Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor (March 1999), which TVA adopted; and the TVA Bellefonte Nuclear Plant Units 3 and 4, Combined License Application Part 3, Environmental Report, Revision 1 (October 2008), hereafter referred to as the COLA ER. Where pertinent, the final SEIS incorporates by reference, utilizes, tiers from, and updates information from this substantial environmental record.

The final SEIS also tiers from and incorporates by reference two TVA programmatic reviews, Energy Vision 2020 Integrated Resource Plan Final Programmatic Environmental Impact Statement (December 1995) and Reservoir Operations Study Final Programmatic Environmental Impact Statement (May 2004). In June 2009, TVA began work on a new IRP for meeting future demand on the TVA power system over the next 20 years. The new IRP is scheduled to be completed in spring 2011.

Background

The Bellefonte site is located on a 1,600-acre peninsula on the western shore of Guntersville Reservoir at Tennessee River Mile 392, near the town of Hollywood, Alabama. After completing an environmental statement for the project and receiving approval to begin construction from the Atomic Energy Commission, now the Nuclear Regulatory Commission (NRC), TVA commenced construction of two B&W pressurized-water reactors at the Bellefonte site in 1974. TVA halted construction in 1988 when forecasted load growth began to decrease. Currently, Units 1 and 2 are in “deferred” plant status, a designation by the NRC that construction permits for the facility exist, but construction is not currently active.

In 2006, TVA joined NuStart Energy Development LLC to participate in a demonstration of NRC’s new combined licensing process. Using the Bellefonte site, TVA submitted a Combined License Application (COLA) to the NRC for two AP1000 units (designated as Bellefonte Units 3 and 4) in October 2007. This application is pending. TVA has not proposed to construct these advanced reactors at the Bellefonte site or elsewhere.

Public Involvement

TVA published a notice of intent to prepare an SEIS in the Federal Register on August 10, 2009. The NOA of the draft SEIS was published in the Federal Register by the U.S. Environmental Protection Agency (USEPA) on

November 13, 2009. TVA accepted comments on the draft SEIS until December 28, 2009. Approximately 50 people attended a public meeting on December 7, 2009, in Scottsboro, Alabama. Comments were received from 35 individuals and four federal and state agencies. Some commenters supported the development of nuclear power generation, while others stated opposition. Many comments were focused on the age of existing structures, water quality, reactor design, the safety of nuclear power, air quality and climate change, spent fuel, radwaste, the need for power and alternative sources of energy, and socioeconomic impacts.

After considering and responding to all substantive comments, TVA completed and issued the final SEIS, which identifies Alternative B, Completion and Operation of Bellefonte Unit 1, as TVA's preferred alternative. The NOA of the final SEIS was published in the Federal Register on May 21, 2010.

Although not required, TVA invited comments on the Final SEIS during a 30-day period from May 21, 2010, through June 21, 2010. Comments were received from nine individuals, one state agency, and one federal agency. These comments have been considered. Compared to the information and analysis in the final SEIS, none raised significant new issues or provided significant new information.

Alternatives Considered

TVA considered numerous alternatives to constructing and operating Bellefonte Units 1 and 2 in its 1974 FES, including various sources of base load

generation and eight alternative plant locations. As part of the COLA process for Units 3 and 4 (see background, above), TVA evaluated the construction and operation of two Westinghouse AP1000 units at the Bellefonte site, including alternative sites and energy resource options.

In the present final SEIS, TVA evaluates three generation alternatives and two transmission alternatives. The power generation alternatives include Alternative A – No Action, Alternative B – Completion and Operation of a B&W Pressurized Light Water Reactor, and Alternative C – Construction and Operation of an AP1000 Advanced Passive Pressurized Light Water Reactor. The transmission alternatives were No Action and Action.

Under Alternative A, No Action, TVA would continue to maintain the construction permits for Units 1 and 2 in deferred status, which would involve routine maintenance of select plant systems and other regulatory compliance activities. Major buildings and plant components would remain intact, but some investment recovery activities would continue.

Under Alternative B, TVA would complete construction of either the B&W designed Unit 1 or Unit 2. Units 1 and 2 are approximately 55 percent and 35 percent complete, respectively. However, all major plant structures, including the plant cooling towers and the reactor, auxiliary, control, turbine, office, and service buildings have been completed and remain intact for both units. New construction would consist of support buildings, laydown areas and parking, minor offices, warehouses, security upgrades, and auxiliary buildings within the

previously disturbed plant footprint. The majority of completion activities would take place inside existing buildings. Existing plant systems, facilities, and operational components continue to be evaluated to better determine their need for replacement or refurbishment under NRC guidelines. Major construction activities would not be required to complete either unit.

In addition to this final SEIS, TVA has completed a detailed scoping, estimating, and planning (DSEP) study for Units 1 and 2 to develop a licensing strategy, determine the material condition of Units 1 and 2, define the schedule and cost for completion and startup, and assess project risk. The DSEP determined that seismic Category 1 structures (e.g., safety-related structures designed and built to withstand the maximum potential regional earthquake stresses) for Units 1 and 2 are intact and require only minor maintenance to meet current requirements.

Under Alternative C, TVA would construct and operate a single 1,100-MW AP1000 advanced passive pressurized light water reactor at the Bellefonte site, designated Unit 3. New construction would consist of the power block composed of five principal structures: nuclear island (containments, shield and auxiliary buildings), diesel generator, turbine, annex buildings, and radwaste buildings. The AP1000 would use the existing natural draft cooling towers, water intake channel and pumping station, blowdown discharge structure, transmission lines and switchyards, and several other supporting facilities. Construction of the new power block would entail blasting, excavation, and grading of previously

disturbed ground and the clearing of 50 acres of forest within the original site footprint. As a modular design, half of the major components would be constructed elsewhere, then transported and assembled at the Bellefonte site. Natural features of the site would be preserved as much as possible, and landscaping would be designed to help visually blend the buildings with the surroundings. The existing turbine and office and service buildings would be removed.

The transmission system for Units 1 and 2 was completed in the 1980s. Much of this system, except two pairs of 500-kilovolt (kV) lines connecting the plant site to the TVA system and the associated switchyard, has been in use since that time. Based on an interconnection system impact study conducted in 2009, TVA determined that no new transmission lines would be needed for either Action Alternative. However, due to routine system growth, some transmission upgrades would be needed to accommodate the delivery of power produced by a single nuclear unit on the Bellefonte site.

Two transmission alternatives were considered, Action and No Action. Under the No Action transmission alternative, current line operation and maintenance activity would be continued, but the existing transmission system could not support operation of a nuclear unit at the Bellefonte site. Under the Action Alternative, TVA would refurbish and reenergize the 500-kV switchyard and the two pairs of connecting 500-kV transmission lines. Additionally, approximately 100 miles of existing transmission lines would be updated (i.e.,

retensioned), and 121 miles of line would be reconducted (i.e., lines would be upgraded to a higher carrying capacity). The affected lines include nine transmission lines in Alabama, Tennessee, and Georgia. All work would occur in existing rights-of-way.

Other energy alternatives and sites were also considered in the final SEIS. TVA considered whether power needs could be met using power purchases, repowering of electrical generation plants, energy conservation, fossil fuel energy sources, and renewable energy resources including wind, solar, biomass, and hydropower. All of these energy resources have a place in TVA's plans for providing affordable, reliable power in the future. However, TVA's need for power analysis indicates that even with substantial energy replacement through conservation measures, TVA must still add new base load generation to balance resources with the projected load requirements. Neither coal-fired nor natural gas-fired power was found to be environmentally preferable to nuclear power, and renewable energy sources were not found sufficient to meet power needs in the required time frame.

The 2008 COLA ER updated information about potential alternative sites. No obviously superior alternatives to the Bellefonte site were found among five candidate sites.

Need for Power

To provide the most up-to-date information, TVA adjusted the need for power analysis between the draft SEIS and final SEIS. Adjustments include

updates to reserve requirements, forecasted hydropower production, fuel and emissions' allowance prices, and the load forecast. New power purchase agreements for wind energy were taken into account, as were anticipated layups of some amount of coal-fired generation by 2015. Plans for TVA's Energy Efficiency and Demand Response (EEDR) program were also updated.

Since 1990, TVA's net system requirements have grown at an average rate of 2.3 percent. The current medium-load (or expected) forecast shows a 1.3 percent average annual growth from 2010 through 2030. The high forecast projects load growth of only 2.0 percent, and the low forecast projects 0.3 percent. The final SEIS analysis shows overall needs increase approximately 7,500 MW in capacity by 2019 in the medium-load case, based in part on the projected decrease in generation from existing coal-fired units. TVA anticipates using a mix of resources, including EEDR programs, renewable resources, natural gas-fired generation, and nuclear generation to provide the additional future needs. In TVA's base-case analysis, the EEDR portion of total energy capacity increases from 1 percent in 2010 to 6 percent in 2019. Renewable resources decrease slightly, from 15 percent in 2010 to 14 percent in 2019, because the forecasted peak load also grows.

Environmental Consequences

The environmental consequences of constructing and operating Bellefonte Units 1 and 2 were addressed comprehensively in the 1974 FES. Subsequent environmental reviews by TVA and NRC have updated that analysis. By 1988,

when construction of Units 1 and 2 was halted, most of the construction effects had already occurred. Completing either of these units would use structures that already exist, and most of the work required for completion would occur inside of those buildings. Land disturbances proposed for the construction of new support facilities would be within the current plant footprint.

The environmental effects of constructing and operating two AP1000 units were addressed in the 2008 COLA ER. This final SEIS updates and supplements information provided in that COLA ER. Although more site preparation and construction would be necessary under Alternative C, this would be offset by the somewhat simpler design and modern modular construction techniques used to construct the AP1000 unit. As a result, the construction duration and site construction labor force for an AP1000 unit is comparable to the estimated duration and labor requirements for Alternative B.

This final SEIS updates analyses of the following resources that could be effected construction and operation of a nuclear unit: surface water and groundwater, floodplain/flood risk, wetlands, aquatic ecology, terrestrial ecology, endangered and threatened species, natural areas, recreation, archaeological resources and historic structures, visual, noise, socioeconomics and environmental justice, solid and hazardous waste, seismology, climatology, meteorology, air quality, global climate change, radiological effects of normal operations, uranium fuel use effects, nuclear plant safety, and security and plant decommissioning.

Ignoring the impacts from constructing alternative base load generation, virtually no impacts would result at the Bellefonte site from implementation of the No Action Alternative. Most of the impacts that would occur under the two Action Alternatives would be minor to moderate. Thermal water effects from plant operations would be similar, although impacts from operation of an AP1000 unit would be slightly less than impacts from a B&W unit due to the smaller amount of water withdrawal and blowdown discharge. However, a B&W unit would consume a smaller amount of the water withdrawn than an AP1000 unit. Under either Action Alternative, derates are possible during periods of excessive heat and drought. Alternative B would require the removal of about 10 percent more material from the intake channel than Alternative C, and dredging from the main river channel is not required for Alternative C. Impacts from the intake dredges would be minor. Dredging of the barge unloading area for an AP1000 unit and towing of barges during construction for either alternative could impact the endangered pink mucket pearlymussel (hereafter referred to as pink mucket). Plant operations under Alternative B or C could also impact the pink mucket.

Under Alternative C, 50 acres of forest and native grassland, including 12 acres of wetlands, would be lost. For both Action Alternatives, one archaeological site outside the site footprint would be marked to ensure avoidance. There could be temporary periods of moderate noise impacts during construction for both Action Alternatives. Some minor to moderate socioeconomic impacts are expected, primarily during construction, for either Action Alternative including housing availability, demand for schools, and

increased traffic. No disproportionate impacts to low-income or minority populations are expected.

The final SEIS also considered the environmental consequences of the proposed transmission system improvements on surface water and groundwater, aquatic and terrestrial ecology, threatened and endangered species, wetlands, floodplains, natural and recreation areas, land use, visual and archaeological resources and historic structures, socioeconomics and environmental justice, as well as operational impacts such as electric and magnetic fields and lightning strike hazard. Direct, indirect, and cumulative impacts on these resources from the transmission Action Alternative would be none to minor with the use of standard TVA right-of-way vegetation management guidelines and environmental quality protection specifications for transmission line construction.

During the course of the SEIS preparation, TVA consulted with the U.S. Fish and Wildlife Service (USFWS) and the State Historic Preservation Officers (SHPOs) in Alabama, Tennessee, and Georgia, as well as interested tribes. On January 21, 2010, USFWS concluded that only the pink mucket could be affected by the proposed nuclear plant construction and operation. In a biological opinion issued April 15, 2010, USFWS issued an incidental take permit for the pink mucket under either Action Alternative. TVA committed to providing \$30,000 to be used for research and recovery of the pink mucket should either of the Action Alternatives be selected.

In a September 9, 2009, letter, the Alabama SHPO concurred with TVA's finding of no effects on historic properties associated with construction and operation of a nuclear unit on the Bellefonte site. TVA completed a memorandum of agreement (MOA) with the Georgia SHPO on April 28, 2010, and with the Alabama SHPO on June 1, 2010, for the treatment of potential impacts to historic properties from transmission system improvements on existing rights-of-way. Instead of entering into an MOA, in a May 20, 2010, letter, the Tennessee SHPO requested TVA follow procedures to conduct a phased identification and evaluation of historic properties pursuant to 36 CFR Part 900.4(b)(2).

Comments on the Final SEIS

TVA received comments on the final SEIS from 11 persons or entities, including letters from four individuals, five citizen groups, the Tennessee Department of Environment and Conservation Water Supply (TDEC Water Supply), and the USEPA.

Three of the four individuals expressed support for the project and interest in jobs at the plant site. One agreed that a plant was needed but expressed concern that spent fuel and radwaste storage issues should be addressed. The citizen groups included Southern Alliance for Clean Energy, Blue Ridge Environmental Defense League and its local affiliate Mothers Against Tennessee River Radiation/Bellefonte Efficiency and Sustainability Team, Citizen's Task Force, and Citizens to End Nuclear Dumping in Tennessee. These groups

preferred the No Action Alternative due to their perception of the high cost and safety risks associated with nuclear power, along with perceived uncertainties about fuel availability and spent fuel storage. They preferred that TVA implement an aggressive program to reduce demand for electricity by promoting EEDR programs as well as increasing renewable energy capacity. These organizations also commented on TVA's power forecast, completing the IRP before making this decision, the viability of both technologies under consideration, flooding, earthquakes, and climate change. No new issues were raised in these comments, and similar comments were addressed in the final SEIS.

TDEC Water Supply's comments focused on source water protection, including water wells and underground injection control, during the proposed transmission improvements. Currently, no new right-of-way is planned, and TVA has no plans to fill sinkholes or disturb wells. However, TVA will consider TDEC's guidance in planning these improvements.

USEPA reiterated its preference for Alternative C, commenting that an AP1000 unit would operate more efficiently and be safer due to the use of passive safety features. USEPA expressed concern about the age of the partially completed B&W plant and the cost effectiveness of completing one of the B&W units versus new construction over the life of the plant. However, USEPA also gave deference to the NRC licensing process regarding the identification of the appropriate reactor technology for the site. TVA was

commended for pursuing energy technology options that would reduce air emissions.

In response to USEPA's comment on environmental justice, TVA has examined U.S. Census data for neighboring block groups. TVA found that seven block groups surround the Bellefonte site block group. Of these, five block groups had minority populations greater than the county average, but well below the state and national averages. These groups are not expected to be disproportionately affected by construction and operation of a nuclear plant. The in-depth analysis of the impacts on low-income or minority populations conducted in 2008, referenced in the final SEIS, includes information regarding specific outreach strategies used for data collection in the COLA ER. The final SEIS acknowledges the need to provide ongoing outreach to all affected populations. The final SEIS also acknowledges the potential for housing issues related to the construction workforce and the need for mitigation. TVA has undertaken an in-depth housing study to better identify the extent and location of housing impacts and to develop a strategy for addressing those concerns. This study, to be completed in fall 2010, will be available for consideration when TVA makes its final decision about plant construction. Any additional mitigation that might be identified because of the housing study will be incorporated into a second ROD described below. Material was added to the final SEIS stating what actions TVA would take under both Alternatives B and C to prevent and monitor tritium leaks to groundwater, based on industry and NRC guidance. USEPA also asked whether TVA planned to fill wetlands on the rights-of-way for the transmission

system serving the site. TVA has no plans to fill wetlands in existing rights-of-way. Final SEIS Table E-3 includes information requested by USEPA regarding a comparison of effluent temperatures for the B&W and AP1000 units. The effluent temperature from a B&W unit would be the same as for an AP1000 unit, and no adverse thermal effects are expected beyond the mixing zone.

Decision

TVA has chosen a phased decision-making approach for the Bellefonte project. As stated in the final SEIS, TVA's preferred alternative is completion and operation of Bellefonte Unit 1. On August 20, 2010, the TVA Board approved a budget allocation of \$248 million in support of continued engineering, design, and regulatory-basis development, as well as the procurement of long-lead components such as steam generators for Unit 1 in order to preserve the completion option on a timely basis. This will help ensure that Unit 1 continues to be a viable alternative for meeting base load power needs in the 2018-2020 time frame. Based on the results of TVA's new IRP, scheduled to be completed in spring 2011, the TVA Board will be asked to approve the completion and operation of Unit 1. TVA will issue a second ROD to document that decision.

Environmentally Preferred Alternative

Under the No Action Alternative, TVA would continue to maintain the construction permits for Bellefonte Units 1 and 2 in deferred status. There would be little change to the Bellefonte site and minimal direct environmental impacts.

Under this alternative, TVA would have to pursue other means of meeting the need for power. Although energy conservation is expected to substantially reduce future demand growth on the TVA system, TVA's analyses indicate that it would still need more base load generation. Because Bellefonte Unit 1 has been partially constructed and any major disturbance of the Bellefonte site has already occurred, constructing a new base load plant would likely result in greater environmental impacts than completing and operating Unit 1.

The environmental impacts of the two Action Alternatives are very similar. The B&W unit (Alternative B) would withdraw more water from the reservoir than would the AP1000 plant (Alternative C), but due to increased evaporative losses, the AP1000 would consume more water. Under both Action Alternatives, the proportion of average river flow withdrawn and discharged is very small, and impacts from thermal discharges and on water supply are similar and minor. Slightly more dredging of the reservoir would be required for the B&W unit, but dredging for the AP1000 unit at the barge unloading dock could impact the pink mucket mussel. Operation of either facility could impact the pink mucket in the mixing zone.

Overall, potential impacts to water quality and aquatic ecology of Alternative B are slightly higher than Alternative C, but both would be insignificant. Because part of the Alternative C facility would be constructed on a mostly forested site, it would result in greater impacts to wildlife, vegetation, and wetlands. Neither Action Alternative would clearly result in lower socioeconomic

impacts. While both alternatives would employ the same number of construction workers, the construction period for the AP1000 unit would be about 30 percent longer. The AP1000, however, would require about 20 percent fewer employees to operate the plant. More solid waste would be produced during AP1000 construction, while the B&W construction would produce more hazardous waste. The B&W unit would generate about 5 percent more spent fuel during its operating lifetime. However, when standardized by the amount of energy generated, spent fuel generation is similar. The amount of radioactive waste produced by each reactor type would also be similar when standardized by the amount of energy generated. The safety effects of the two reactor types are not materially different.

Based on this comparison, TVA has determined that neither Action Alternative would be environmentally preferable to the other. However, either Action Alternative likely would be environmentally preferable to the No Action Alternative, assuming TVA has to build new base load generation.

Mitigation Measures

Resumption of construction activities on the Bellefonte site would not occur until the TVA Board authorizes construction and TVA formally notifies NRC of its intent to reactivate construction. The preliminary activities authorized by the TVA Board on August 20 do not have the potential environmental impacts from constructing and operating a nuclear unit at the Bellefonte site that were

identified in the final SEIS. Accordingly, no actions are necessary at this time to mitigate potential environmental impacts.

Dated: August 26, 2010



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