TENNESSEE VALLEY AUTHORITY

Clinch River Nuclear Site Advanced Nuclear Reactor Technology Park Final Programmatic Environmental Impact Statement

AGENCY: Tennessee Valley Authority.

ACTION: Record of Decision.

SUMMARY: This notice is provided in accordance with the Council on Environmental Quality's regulations and Tennessee Valley Authority's (TVA's) procedures for implementing the National Environmental Policy Act (NEPA). TVA has selected the Preferred Alternative identified in the Clinch River Nuclear (CRN) Site Advanced Nuclear Reactor Technology Park Final Programmatic Environmental Impact Statement (PEIS). The Notice of Availability of the Final PEIS for the Clinch River Nuclear Site Advanced Nuclear Reactor Technology Park was published in the Federal Register on July 29, 2022. The Preferred Alternative, Alternative D – Nuclear Technology Park at Area 1 and Area 2 with Small Modular Reactors (SMRs) and/or Advanced Non-Light Water Reactors (Non-LWRs), provides the necessary flexibility in achieving the purpose and need of the project to support TVA's goal of demonstrating the feasibility of deploying advanced nuclear reactor technologies at the CRN Site capable of incrementally supplying clean, secure, and reliable power that is less vulnerable to disruption. As defined in the PEIS, advanced reactors can include non-LWRs and LWRs. SMRs are a type of advanced LWR reactor with an electrical output of generally no more than 300 megawatts electric (MWe).

FOR FURTHER INFORMATION CONTACT: J. Taylor Johnson, NEPA Compliance Specialist, Tennessee Valley Authority, 1101 Market Street, BR 2C-C, Chattanooga, Tennessee 37402; by telephone (423) 751-2732, or email at jtcates@tva.gov. The Final PEIS, this Record of Decision (ROD) and other project documents are available on TVA's website https://www.tva.gov/nepa.

SUPPLEMENTARY INFORMATION:

TVA is a corporate agency of the United States that provides electricity for business customers and local power distributors serving 10 million people in the Tennessee Valley—an 80,000-square-mile region comprised of Tennessee and parts of Virginia, North Carolina, Georgia, Alabama, Mississippi, and Kentucky. TVA receives no taxpayer funding and derives virtually all revenues from the sale of electricity. In addition to operating and investing revenues in its power system, TVA provides flood control, navigation, and land management for the Tennessee Valley watershed and provides economic development and job creation assistance within the Service area. In May 2016, TVA submitted an application to the Nuclear Regulatory Commission (NRC) for an Early Site Permit (ESP) at the CRN Site for two or more new nuclear power units demonstrating small modular reactor (SMR) technology, with a total combined nuclear generating capacity not to exceed 800 MWe. The NRC prepared and released a Final Environmental Impact Statement (NRC ESP FEIS) to assess the environmental impacts of the action proposed in the TVA ESP application (ESPA). The NRC ESP FEIS identified issuance of an ESP for the CRN Site as the preferred alternative.

Following the NRC ESP FEIS publication in April 2019, the NRC issued an ESP to TVA on December 19, 2019, which is valid for up to 20 years. The ESP represents NRC's approval of the CRN Site as suitable for the future demonstration of the construction and operation of two or more SMRs with characteristics presented in the ESPA, but it does not authorize TVA to construct or operate a nuclear facility. Prior to construction or operation of advanced nuclear reactors at the CRN Site, TVA must apply for and receive additional permits and licenses from the NRC.

In June 2019, TVA released the agency's Integrated Resource Plan (IRP) Final Environmental Impact Statement (EIS) and the Final 2019 IRP. The IRP identified the

various generating resources that TVA intends to pursue to meet the energy needs of the Tennessee River Valley over a 20-year planning period. The 2019 IRP recommended that TVA continue to evaluate emerging nuclear technologies, including SMRs, as part of technology innovation efforts aimed at developing future electricity generation capabilities. In December 2021, the TVA Board of Directors authorized the implementation of a New Nuclear Program to advance SMR planning efforts at the CRN Site, and to explore plans for potential additional reactors at other locations on the TVA system to support TVA's 2050 decarbonization aspiration. The Final PEIS for the Clinch River Nuclear Site Advanced Nuclear Reactor Technology Park is TVA's next step in exploring the potential for new nuclear generation on the TVA system, to pursue the recommendations of the IRP.

Nuclear Reactor Designs Considered

Nuclear technology alternatives considered by TVA for the CRN Site include both SMRs and advanced non-LWRs, both further defined in the PEIS. Potential SMR reactor designs analyzed in the PEIS include low- or high-power pressurized water reactors and boiling water reactors. Potential advanced non-LWR reactor designs analyzed in the PEIS include thermal, molten salt graphite-moderated; thermal, fluoride salt coolant, graphite-moderated; high temperature gas, graphite-moderated, helium-cooled; molten chloride fast reactors; and micro reactors.

Alternatives Considered

TVA considered four alternatives in the Draft PEIS and Final PEIS located in two different areas (Area 1 and Area 2) on the site identified as suitable for Nuclear Technology Park development. Area 1 includes lands previously disturbed by the Clinch River Breeder Reactor Project that were evaluated in the ESPA Environmental Report

(ER). A portion of Area 2 was also evaluated in the ESPA ER for a proposed temporary laydown area.

The four alternatives considered by TVA in the PEIS are:

Alternative A – No Action. Under this alternative, TVA would not seek additional approvals from the NRC for the CRN Site, and a Nuclear Technology Park and advanced nuclear reactors would not be further explored, constructed, operated, and therefore not decommissioned at the CRN Site. The CRN Site would continue to be managed in accordance with the Watts Bar Reservoir Land Management Plan, and TVA would continue routine maintenance and clearing associated with the transmission lines that currently traverse the CRN Site. As this alternative would not support TVA's nuclear technology innovation efforts aimed at developing future generation capabilities, the No Action Alternative would not meet the purpose and need for the proposed action. It does, however, represent current conditions and provides a benchmark for comparing the environmental impacts of implementation of Alternatives B, C, and D.

Alternative B – Nuclear Technology Park at Area 1 with SMRs and/or Advanced Non-LWRs. Under Alternative B, potential project activities would include site preparation, construction, operation, and decommissioning of one or more advanced nuclear reactor(s) at Area 1 of the CRN Site. This alternative consists of two options for development of Area 1: Alternative B1 – Construction of one or more SMRs or Alternative B2 – Construction of one or more SMRs and/or advanced non-LWRs.

Alternative C – Nuclear Technology Park at Area 2 with Advanced Non-LWRs. Under this alternative, potential project activities would include site preparation, construction, operation, and potential decommissioning of one or more advanced non-LWRs at Area 2 on the CRN Site.

Alternative D – Nuclear Technology Park at Area 1 and Area 2 with SMRs and/or Advanced Non-LWRs, potential activities would include site preparation, construction,

operation, and decommissioning of one or more advanced nuclear reactor(s) at Area 1 and Area 2 on the CRN Site. One or more SMRs and/or advanced non-LWRs could be constructed at Area 1 and one or more advanced non-LWRs could be constructed at Area 2.

Environmentally Preferred Alternative

The PEIS includes baseline information for understanding the potential environmental and socioeconomic impacts associated with the alternatives considered by TVA. TVA considered 20 resource areas related to the human and natural environments and the impacts on these resources associated with each Nuclear Technology Park alternative. Alternative A – No Action would result in the lowest level of environmental impacts as the construction- and operation-related impacts resulting from Alternatives B through D on Areas 1 and 2 would be avoided. However, Alternative A – No Action does not meet the purpose and need for the project.

Implementation of Alternative D, TVA's preferred alternative, would result in minor to moderate unmitigated impacts to the environment. These impacts would be related to stormwater discharge into local surface waters and groundwater; alteration of stream habitat; loss of vegetated land cover; impacts to wetlands; and increased noise, dust, traffic, and air emissions. Minor to moderate adverse impacts during construction would result from soil disturbance and erosion; impacts to onsite streams; and shoreline alteration. Moderate impacts would include loss of upland plant and animal communities; loss of habitat for listed bat species; disruption of views from adjacent properties; removal of low-quality forest and herbaceous habitat; impacts to three small areas of native cedar glades; and traffic increases at selected intersections within the local transportation network.

Potential impacts to two state-listed plant species–rigid sedge and pale green orchid–could occur from the proposed development of the 161-kV offsite transmission line. These impacts would be mitigated to the extent possible through minimization measures and TVA's planned efforts to expand the Grassy Creek Habitat Protection Area (HPA) by about 14 acres in the area where these plants are located.

Moderate impacts to six archaeological sites determined to be eligible for listing on the National Register of Historic Places (NRHP) would occur due to construction disturbance from the project but would be mitigated through a Programmatic Agreement (PA) between TVA and the Tennessee State Historic Preservation Officer (SHPO). The proposed action would also result in minor to moderate beneficial impacts associated with increased employment, payroll, and tax revenues.

Minor impacts during operation of the Nuclear Technology Park would include localized alteration of hydrologic patterns, limited scour diversion from the use and discharge of cooling water from and into the Clinch River arm of the Watts Bar Reservoir, noise, increased traffic, and impacts associated with design basis accidents, severe accidents, and plant security. The combined environmental impacts from the uranium fuel cycle, the storage of spent fuel onsite, radioactive waste management, and the transportation of unirradiated fuel and radioactive waste would be minor.

The environmentally preferred action alternative that meets the project purpose and need is Alternative B – Nuclear Technology Park at Area 1 with SMRs and/or advanced non-LWRs. Alternative B would meet the purpose and need of the project and would have less impacts than Alternative D as Area 2 would not be disturbed. However, as the project would be limited to only the use of Area 1, there would be less flexibility for project activities and less opportunity for exploring technologies that could assist in meeting the project goals.

Impacts associated with Alternative C would be somewhat reduced relative to Alternative D, as the majority of Area 1 would not be disturbed. However, as the project would be limited to only the use of Area 2, and the advanced non-LWR technologies are less mature and further from commercialization than SMRs, there is limited flexibility to meet the purpose and need of the project.

Decision

Informed by the summary of the submitted alternatives, information, and analyses in the Final PEIS, TVA certifies it has considered all of the alternatives, information, analyses, and objections submitted by State, Tribal, and local governments and public commenters for consideration in developing the PEIS. TVA has selected the preferred alternative identified in the Final PEIS, Alternative D – Nuclear Technology Park at Area 1 and Area 2 with SMRs and/or advanced Non-LWRs. This alternative was selected over Alternative B – Nuclear Technology Park at Area 1 with SMRs and/or advanced non-LWRs and Alternative C – Nuclear Technology Park at Area 2 with advanced Non-LWRs, as it would best achieve the purpose and need of the project by providing the greatest flexibility to support TVA's goal of demonstrating the feasibility of deploying advanced nuclear reactor technologies at the CRN Site.

Public Involvement

On February 2, 2021, TVA published a Notice of Intent (NOI) in the Federal Register announcing that it planned to prepare a PEIS to address future actions at the CRN Site relating to construction and operation of a Nuclear Technology Park. The NOI initiated a public scoping period, which concluded on March 19, 2021. In addition to the NOI in the Federal Register, TVA contacted local, state, and federal agencies, local power companies, and directly served customers, and sent a media advisory to news outlets

across the TVA service area. A public notice advertisement was also placed in the Roane County News, Knoxville News Sentinel, News-Herald, Oak Ridger, Courier News, and on the TVA website. As part of Scoping, TVA hosted a live virtual scoping webinar on March 1, 2021, to gather input from the public and stakeholders. A total of 98 individuals, including members of the general public and representatives of a variety of organizations as well as TVA, registered for the meeting, and 58 attended the question-and-answer session following the presentation. During the scoping period, TVA received 45 comment submissions from members of the pubic, local government, and state and federal agencies. Comment submissions were carefully reviewed and summarized in a Scoping Report included in Appendix C of the PEIS.

The Draft PEIS was released to the public on February 18, 2022, and a Notice of Availability including a request for comments on the Draft PEIS was published in the Federal Register on February 18, 2022. The Draft PEIS was posted on TVA's website and hard copies were available by request. Additionally, TVA held a virtual public open house on March 10, 2022. Approximately 160 individuals registered for the event which was attended by 75 individuals at the event's peak attendance. Attendees included individuals from the general public, NRC, EPA, TVA, and local media. TVA accepted and answered questions from the attendees following the presentation. TVA's public and agency involvement for the Draft PEIS included a 45-day public comment period, which closed on April 4, 2022.

TVA received 18 comment submissions, which included emails and submissions through the project website and virtual meeting room. Comment submissions were carefully reviewed and consisted of 72 individual comment statements. The most frequently mentioned topics from the public comments were related to support for the project, the impact from site development on threatened and endangered species, concern for habitat loss, impacts to water quality of the Clinch River arm of the Watts Bar

Reservoir from general site development and runoff, as well as concern about fuel leaks and spent fuel storage. TVA provided responses to these comments, made appropriate minor revisions to the Draft PEIS, and issued the Final PEIS.

The Notice of Availability for the Final PEIS was published in the Federal Register on July 29, 2022.

Mitigation Measures

TVA will use the following means to avoid or minimize environmental harm:

Appropriate best management practices during any site preparation, construction, operation, and decommissioning of advanced nuclear reactors, including those described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority, the Tennessee Erosion and Sediment Control Handbook, the project-specific stormwater pollution prevention plan, and those associated with a site-specific Integrated Pollution Prevention Plan.

In addition, TVA will:

- Conduct additional site-specific investigations to evaluate the presence of karst features in areas proposed for structure development.
- Ensure that any disturbance of contaminated sediments within the Clinch River arm of the Watts Bar Reservoir would be subject to the terms of the Watts Bar Interagency Agreement that includes the USACE, U.S. Department of Energy, TDEC, and the U.S. Environmental Protection Agency, to coordinate review of permitting and authorization.
- Minimize the noise effects of blasting by requiring the construction contractor to develop a blasting plan to include notifications to local officials, emergency departments, and neighboring businesses and residents.

- Minimize noise impacts based on further analysis and/or modeling to determine offsite operational noise impacts when designs for specific reactor and cooling technologies are developed.
- Minimize the effect of construction dewatering on groundwater levels in the areas surrounding any potential excavation and reduce the need for dewatering by appropriately blocking or grouting fractures and cavities transmitting large amounts of water. As appropriate, TVA will assess the effects of dewatering by monitoring groundwater levels surrounding the excavation and water levels in potentially affected surface waterbodies.
- Limit any new rail line construction to the north side of the rail spur, thereby avoiding 100- and 500-year floodplains.
- Minimize permanent and temporary impacts to wetlands and other sensitive resources during the design phase of any reactor to be constructed on site. If impacts to wetlands are not avoidable, CWA permitting with the USACE and TDEC will be conducted as appropriate.
- Establish a buffer around forested wetland W019, which is rated as having exceptional value, such that it would not be impacted by project activities.
- Design the diffuser ports that are part of the discharge system to direct effluent upwards into the water column so that limited physical alteration or scouring occurs, thereby minimizing impacts to benthic habitats.
- Work to minimize and avoid impacts in native cedar glade areas during design, construction, and operation.
- Time any proposed actions within 660 feet of active osprey nests to avoid nesting seasons, or coordinate with the U.S. Department of Agriculture Wildlife Services for guidance to ensure compliance under Executive Order 13186.

- When feasible, remove trees within the Project Area in winter (October 15 - March 31) when most species of migratory birds would not be nesting and/or would be away from the region.
- Review any proposed tree removal plans once site-specific designs are completed to determine if impacts to potentially suitable Indiana bat and northern long-eared bat habitat may occur. Consultation under Section 7 of the Endangered Species Act will occur, as appropriate, when specific designs have been selected, the scope of each project has been refined, and impacts to federally listed bats can be properly assessed.
- Ensure that state-listed plant species including the rigid sedge and pale green orchid are not significantly impacted by designing the proposed offsite transmission line to avoid the species and their habitat to the greatest extent possible. TVA transmission engineers will consult with the TVA botanist during design to ensure the location of the habitat is considered early in the process.
- Pursue expansion of the Grassy Creek HPA by about 14 acres to provide additional protection to the state-listed rigid sedge and pale green orchid.
- Use site design to minimize and avoid impacts to streams and wetlands where feasible to lessen potential impacts to suitable habitat for the southeastern shrew and other riparian dependent rare species.
- Take steps to address localized traffic congestion by staggering work shifts to avoid localized delays at key intersections, installing traffic lights and stop signs, and adding turning lanes as appropriate to the level of traffic present.
- Equip mechanical draft cooling towers with efficient drift eliminators and/or other design attributes to reduce particulate matter emissions.
- Maintain the grounds of the Hensley Cemetery and avoid the cemetery during construction, operation and maintenance activities. The cemetery would remain

accessible to those individuals with familial connection to individuals buried at Hensley Cemetery.

- Per the stipulations of the Programmatic Agreement (PA) executed between TVA, and the Tennessee State Historic Preservation Officer with concurring parties of the Eastern Band of Cherokee Indians and the United Keetoowah Band of Cherokee Indians in Oklahoma, TVA will seek ways to avoid or minimize adverse project impacts on NRHP-eligible archaeological sites, and if avoidance or sufficient minimization are not possible, TVA will mitigate the adverse effects in accordance with the stipulations of the PA. TVA will consult with the Tennessee SHPO and federally recognized tribes throughout the process.

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