STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

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July 10, 2018

Via Electronic Mail to ClinchRiverESPEIS@nrc.gov
Attn: May Ma, Chief
Office of Administration,
U.S. Nuclear Regulatory Commission,
TWFN–07–A60
Washington, DC 20555–0001

Dear Chief Ma:

The Tennessee Department of Environment and Conservation (TDEC) appreciates the opportunity to provide comments on the U.S. Nuclear Regulatory Commission (NRC) *Draft Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site* (Draft EIS). On May 12, 2016, the Tennessee Valley Authority (TVA) submitted an application to the NRC for an ESP for the Clinch River Nuclear Site (CRN Site) in Oak Ridge, Roane County, Tennessee, for new nuclear power units demonstrating small modular reactor technology. The Draft EIS summarizes the impacts that could result from building and operating two or more small modular reactors (SMRs) at the CRN Site. It also summarizes the cumulative impacts and alternatives evaluated.

Actions considered in detail within the Draft EIS include:

- **Proposed Action**. The proposed NRC action is the issuance, under the provisions of 10 CFR Part 52 (TN251), of an ESP for approval of the CRN Site as suitable for the future demonstration of the construction and operation of two or more SMRs that fall within the plant parameter envelope (PPE)[1] described in the TVA ESP application. The Draft EIS provides the NRC review team's analyses of the environmental impacts that could result from building and operating two or more SMRs with a maximum total electrical output of 800 MW(e) to demonstrate the capability of SMR technology.

- **No Action Alternative**. The no-action alternative refers to a scenario in which the NRC would deny the ESP request. Upon such a denial by the NRC, the construction and operation of a new nuclear power plant at the proposed location on the CRN Site in accordance with the 10 CFR Part 52 (TN251) process referencing an approved ESP would not occur. There are no environmental impacts associated with not issuing the ESP, and the impacts predicted in this EIS associated with building and operating two or more

[1] A PPE is a set of values of plant design parameters that an ESP applicant expects will bound the design characteristics of the reactor or reactors that might be constructed at a given site. The PPE values are a bounding surrogate for actual reactor design information. Analysis of environmental impacts based on a PPE approach permits an ESP applicant to defer the selection of a reactor design until the construction permit or combined construction permit and operating license or combined license stage.

SMRs at the CRN Site or at any one of the alternative sites would not occur. In this context, the no-action alternative would accomplish none of the benefits intended by the ESP process, which would include (1) early resolution of siting issues prior to large investments of financial capital and human resources in new plant design and construction, and (2) early resolution of issues related to the environmental impacts of construction and operation of new nuclear units that fall within the plant parameters for SMR nuclear.

- **Alternative Sites**. As discussed in Chapter 1.0 of the Draft EIS, the NRC's proposed action related to the TVA application is the issuance of an ESP for the CRN Site approving the site as suitable for the future demonstration of the construction and operation of two or more SMRs. The consideration of alternative sites is one portion of the review of alternatives.[2] Candidate areas for siting two new nuclear reactors were chosen by TVA after considering areas within TVA's Power Service Area using the following criteria:
    - availability of land
    - proximity to a water source
    - proximity to sensitive resources such as wetlands
    - proximity to transmission lines and existing transportation infrastructure
    - obvious topographic concerns
    - flexibility to optimize site layout and design for environmental and cost mitigation purposes.

  Further review of the candidate areas by TVA included locations at which a minimum of 120 contiguous acres were available, preferably in a square configuration. Nearby parcels were evaluated for use as laydown area and parking area that could accommodate the construction of two or more small modular reactors at the alternative site. Because access to a water source is essential, preference was given to sites immediately adjacent to or within 0.5 mile of a primary water source. Easy access to transmission lines (onsite or within 5 miles) and the availability of existing transportation infrastructure were also considered. Ultimately, four candidate sites were chosen for additional site suitability analyses, which resulted in the Clinch River Nuclear Site being chosen as the preferred site.[3]

- **Systems Design Alternatives**. The review team evaluated design alternatives for the heat-dissipation and circulating-water systems (CWS) described in Draft EIS Section 3.2. The CWS for a new nuclear power plant at the CRN Site would be a closed-cycle system composed of mechanical draft cooling towers cycling water through the condenser. Makeup water for the cooling towers would be obtained from the Clinch River using a new intake structure, and blowdown from the cooling towers would be routed to a holding pond before being discharged through a new structure located in the Clinch River downstream from the intake. Although there may be other plant systems that require cooling, such as the service water

[2] The review of alternative sites consists of a two-part sequential test (NRC 2007-TN5141). The first part of the test determines whether any of the alternative sites are environmentally preferable. To determine if a site is environmentally preferable, the NRC staff considers whether the applicant has (1) reasonably identified candidate sites, (2) evaluated the likely environmental impacts of the proposed action at these sites, and (3) used a logical means of comparing sites that led to selection of the proposed site. Based on its independent review, the NRC staff determines whether any of the alternative sites are environmentally preferable to the applicant's proposed site. If the NRC staff determines that one or more alternative sites are environmentally preferable, it then proceeds with the second part of the test. The second part of the test determines if an environmentally preferable alternative site is not simply marginally better, but obviously superior to the proposed site. The NRC staff examines whether (1) one or more important aspects, either singly or in combination, of an acceptable and available alternative site are obviously superior to the corresponding aspects of the applicant's proposed site, and (2) the alternative site does not have offsetting deficiencies in other important areas. Included in this part of the test is the consideration of estimated costs (i.e., environmental, economic, and time of building the proposed plant) at the proposed site and at the environmentally preferable site or sites (NRC 2007-TN5141).

[3] Alternative sites evaluated included Redstone Arsenal Site 12 in Madison County, Alabama, Oak Ridge Reservation Site 8 in Roane County, Tennessee, and Oak Ridge Reservation Site 2 in Roane County, Tennessee.

system (SWS), the review team evaluated heat-dissipation alternatives only for the CWS. The SWS is not described in the Environmental Report submitted as a component of the ESP to NRC from TVA, but the review team assumed that the SWS heat-dissipation needs would be a small fraction of the 5.593 × 109 BTU/hr heat dissipation required from the CWS. The review team evaluated alternative intake and discharge designs, as well as alternative CWS water supply sources.

TDEC has reviewed the Draft EIS and has the following comments regarding the proposed action and its alternatives:

Water Resources

- The TVA ESP Application (ML16144A086) and EIS note that due to the interactions of the Watts Bar Dam, Melton Hill Dam and Fort Loudon Dam, the river flow "can be upstream, downstream or quiescent, depending on the modes of operation" within the vicinity of the site. This could mean that for short periods of time, the intake at the CRN Site would be downstream of the National Pollution Discharge Elimination System (NPDES) discharge point for the facility. The Draft EIS does not discuss how the thermal loading from the discharge may impact the intake for the CRN site. Analysis on thermal loading includes consideration of 400 cubic feet per second continuous flow bypass at Melton Hill Dam to address the thermal load. Would a Melton Hill Dam keep the flow reversals from occurring or at least minimize the possibility? TDEC recommends including additional discussion relating to the Melton Hill Dam bypass and potential impacts on reservoir flow reversals in the Final EIS.

- Page 2-34 of the Draft EIS states that "TVA used the groundwater hydraulic head measurements to infer the vertical and horizontal groundwater-flow directions at the CRN Site." However, the U.S. Environmental Protection Agency (EPA) recommends that tracing studies be conducted as opposed to simply using hydraulic head measurements as a means for determining connectivity and directionality of groundwater flow. TDEC recommends NRC include tracing studies in the Final EIS or discussion as to why this technique was not used at this site.[4]

- Page 2-37 of the Draft EIS discusses the frequency of observation of conduits based on boreholes; however, there is extensive scientific evidence that probability of wells and boreholes intersecting channels or conduits is very low.[5] TDEC recommends the Final EIS include discussion as to how the probability of intersecting conduits was considered and factored into the groundwater research approach selected by TVA.

- Page 2-39 of the Draft EIS discusses the use of a 1.5 mile vicinity for identifying and studying groundwater well users with proximity to the CRN Site. TDEC recommends the Final EIS discuss why a 1.5 mile distance was selected and why it is determined to be adequate given the potential for groundwater flowpaths exceeding 1.5 miles.

- Page 3-11 of the Draft EIS describes "Other Structures with a Temporary Environmental Interface" including dewatering systems. There is limited discussion of dewatering systems throughout the Draft EIS. TDEC recommends the Final EIS include additional discussion relating to how TVA plans to ensure potentially contaminated groundwater may not be re-discharged through use of a dewatering system.

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[4] Reference "RCRA Ground-Water Monitoring: Draft Technical Guidance" (1992) which can be found at https://www.epa.gov/quality/rcra-ground-water-monitoring-draft-technical-guidance.

[5] See Benson and La Fountain, 1984, "Evaluation of subsidence or collapse potential due to subsurface cavities."

- Page 4-63 of the Draft EIS states "Increased water turbidity during dredging activities could affect nearshore water quality, but the effect would be minimized through adherence to permit requirements and BMPs." In multiple instances throughout the Draft EIS, it is stated that dredging activities are not anticipated, TDEC recommends the Final EIS clarify the potential for occurrence of dredging activities.[6]

Land Resources[7]

- Figure 2-21 on Page 2-32 of the Draft EIS maps karst features in the CRN Site Area, however none of the preceding discussion to the map describes TVA and NRC's qualitative or quantitative thresholds for karst features. TDEC recommends that the Final EIS include additional discussion regarding karst features and what is being considered by this review.

Natural Resources

- Page 2-93 and 2-94 of the Draft EIS does not include discussion regarding whether benthic macroinvertebrate studies were conducted for the CRN Site or barge/traffic area (BTA). TDEC recommends the Final EIS provide discussion as to why benthic macroinvertebrate studies were not conducted or include relevant information if studies have been conducted.

- Page G-14 of the Draft EIS states that "The NRC estimated doses to nonhuman biota from liquid effluents using fish, invertebrates, and algae as surrogate aquatic biota species. Muskrats, raccoons, herons, and ducks are used as surrogate terrestrial biota species." TDEC recommends the Final EIS include discussion as to whether physical samples of any of the listed biota were collected from the CRN Site or BTA for analysis to establish a baseline.

- Page G-14 of the Draft EIS states that "It was assumed that doses for raccoons and ducks were equivalent to adult human doses for inhalation, vegetation ingestion, and the plume." TDEC recommends the Final EIS include discussion as to why doses for raccoons and ducks were modeled as being equivalent to adult humans given the vast difference in diet and likely exposure times between wildlife and humans.

Emergency Planning

- TDEC recognizes that based on the information presented, setting the Emergency Planning Zone (EPZ) at the site area boundary would be adequate. However, in the interest of health, safety, and emergency response preparedness, TDEC's position is that the EPZ should be set at a more conservative 2 miles. A 2 mile EPZ affords the State and Local agencies an ability to prepare for a worst case, or beyond worst case scenario and because this is new technology globally, the state of Tennessee believes the more conservative EPZ is in the best interest of the health and safety of Tennesseans.

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[6] Page 4-13, Paragraph 3 it is stated "Building the intake and discharge structures would not require any dredging of Clinch River sediments, but would require some nearshore underwater excavation." On Page 4-38, Paragraph 6 it is stated "TVA has indicated that no in-stream dredging would be required for activities to build the intake or place the discharge, although shoreline excavation or underwater excavation would be necessary (TVA 2017-TN4921)."On Page 4-39, Paragraph 3 it is stated "Dredging activities are not anticipated; however, piles could be used during the barge facility improvements."

[7] The Draft EIS discusses the potential for TVA to construct and operate a solid waste disposal facility to dispose of construction waste associated with the development of the CRN Site. Information about the permitting process and required application materials can be found at http://www.tn.gov/environment/article/permit-waste-landfill-permit.

TDEC appreciates the opportunity to comment on this Draft EIS. Please note that these comments are not indicative of approval or disapproval of the proposed action or its alternatives, nor should they be interpreted as an indication regarding future permitting decisions by TDEC. Please contact me should you have any questions regarding these comments.

Sincerely,

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