



Tennessee Valley Authority, 1101 Market Street, Chattanooga, TN 37402

CNL-16-134

August 11, 2016

10 CFR 2.101  
10 CFR 52.15

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Clinch River Nuclear Site  
NRC Project No. 785

Subject: Schedule for Submittal of Supplemental Information in Support of Early Site Permit Application for Clinch River Nuclear Site

Reference: Letter from TVA to NRC, CNL-16-081, "Application for Early Site Permit for Clinch River Nuclear Site," dated May 12, 2016

By letter dated May 12, 2016 (Reference), Tennessee Valley Authority (TVA) submitted an application for an early site permit for the Clinch River Nuclear (CRN) Site in Oak Ridge, TN. TVA used the requirements in 10 CFR Part 52 and associated regulatory guidance to guide the scope and detail of the application. Subsequent to the submittal of the application and consistent with interactions with NRC staff, TVA further reviewed the NRC's internal guidance related to review of new reactor applications, specifically, NRO-REG-100, "Acceptance Review Process for Early Site Permit, Design Certification and Combined License Application."

In its description of the technical sufficiency review, NRO-REG-100 focuses on ensuring that the scope and depth of the information in the application will allow the staff to conduct its detailed technical review within a predictable timeframe. In that context, TVA has identified certain aspects of the application that it intends to supplement. A description of the planned supplemental information is provided in the Enclosure to this letter. By submitting this supplemental information, TVA is seeking to ensure that, upon completion of the acceptance review, the NRC staff will be in a position to docket the application and develop a review schedule that can be realized on a predictable timeframe.

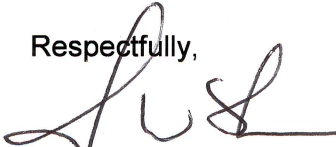
TVA anticipates this supplemental information will consist of multiple submittals no later than December 15, 2016, to include "mark-ups" of associated application text where appropriate. As necessary, TVA may request one or more public meetings with the NRC staff to ensure common understanding of the planned supplemental material.

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There are no new regulatory commitments associated with this submittal. If any additional information is needed, please contact Dan Stout at (423) 751-7642.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 11th day of August 2016.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

Enclosure:

Summary of Planned Early Site Permit Application Supplemental Information

cc (Enclosure):

Executive Director of Operations  
Regional Administrator, Region II  
Deputy Executive Director for Reactor and Preparedness Programs  
Director, Office of New Reactors  
Director, Division of New Reactor Licensing  
Branch Chief, Division of New Reactor Licensing  
Project Manager, Division of New Reactor Licensing  
Project Manager, Division of New Reactor Licensing  
Project Manager, Division of New Reactor Licensing  
Acting Assistant Secretary, Office of Nuclear Energy, Department of Energy  
Deputy Assistant Secretary, Nuclear Reactor Technologies, Department of Energy  
Light Water Reactor Technologies, Department of Energy  
Program Manager, Licensing Technical Support Program, Department of Energy  
Project Manager, Licensing Technical Support Program, Department of Energy  
Regulatory Specialist, Eastern Regulatory Field Office, Nashville District, U.S. Army  
Corp of Engineers

ENCLOSURE

Tennessee Valley Authority Clinch River Nuclear Site  
Summary of Planned Early Site Permit Application Supplemental Information

## ENCLOSURE

By letter dated May 12, 2016 (Reference 1), Tennessee Valley Authority (TVA) submitted an application for an early site permit for the Clinch River Nuclear (CRN) Site in Oak Ridge, TN. TVA used the requirements in 10 CFR Part 52 and associated regulatory guidance to guide the scope and detail of the application. Subsequent to the submittal of the application and consistent with interactions with NRC staff, TVA further reviewed the NRC's internal guidance related to review of new reactor applications, specifically, NRO-REG-100, "Acceptance Review Process for Early Site Permit, Design Certification and Combined License Application."

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### **Site Safety Analysis Report**

#### **General**

TVA will evaluate the references provided to the NRC staff with the intent of identifying and providing additional non-copyrighted documents the staff may find useful in conducting their review.

#### **Geologic Characterization Information**

- A. TVA will provide a markup of the applicable Early Site Permit Application (ESPA) sections to more fully characterize the Chestnut Ridge Fault. TVA will provide sufficient data or information in the applicable ESPA sections to support age estimates or extent.

TVA's markup will demonstrate that this fault does not represent potentially significant seismic or surface deformation hazards at the site, and will include:

- A complete discussion of Lemiszki, et al (2013) basis for a fault interpretation,
- Details on structural style and kinematics that clearly relate this fault to Alleghanian orogeny or more recent tectonism,
- Results of a field review of Quaternary alluvial deposits and river terraces overlying the fault that demonstrate deformation, or not, and
- Appropriate maps and cross-sections (based on borehole data) to illustrate the final interpretation.

- B. TVA will provide a markup of the applicable ESPA sections to more fully characterize and analyze the Shear Fracture Zone at the site location to demonstrate that this zone does not represent a potentially significant hazard for surface deformation at the site. TVA will:

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- Include maps and cross-sections to illustrate location, geometry and stratigraphic position.
  - Provide a conceptual model or illustration to clarify cross-cutting relationships between structural elements, addressing how the latest stylolites might be related to Cenozoic compressional stress directions.
  - Clarify with greater detail how this feature should be considered analogous to Foreman and Dunne's (SSAR Ref. 2.5.3-19) or Lemiszki's (SSAR Ref. 2.5.1-215) features.
  - Assess cross-cutting relationship with Quaternary age river terraces and alluvium/colluvium stratigraphic units that overly or are in contact with the Shear Fracture Zone.
  - Provide an assessment of the age of the Shear Fracture Zones in support of TVA's conclusion of Alleghanian age.
- C. TVA will provide a markup of the applicable ESPA sections to more fully characterize and analyze the East Tennessee Seismic Zone (ETSZ) to demonstrate that it does not represent a potentially significant seismic hazard for the site, including:
- Results of the field work and re-excavated trenches in the ETSZ that were completed by TVA.
  - Discussion of the bases of alternative hypotheses.
  - Detailed documentation on the Senior Seismic Hazard Analysis Committee (SSHAC) Level 2 study, including how alternative data and interpretations were considered in the seismic hazard analysis.

### **Vibratory Ground Motion**

- A. TVA will provide a markup of the applicable ESPA sections to provide the technical bases for key physical parameters used in the site response calculations. Supplemental information will include:
- Descriptions of the 1D versus 2D site response comparisons and information to justify the use of the 1D site response in the site-specific seismic hazard analysis.
  - Assumptions and technical justifications used in determining key site-response parameters, such as the shear wave velocity profiles, degradation curves, and their uncertainties.
  - Information supporting the use of the generalized regional geologic cross-section information for a site-specific seismic hazards analysis, including the deeper velocity structure.
  - Information supporting the estimated site kappa value used for the site-specific seismic hazards analysis, including an evaluation of uncertainties.
- B. TVA will provide a markup of the applicable ESPA sections to justify the use of input parameters used in the Probabilistic Seismic Hazard Analysis (PSHA), including a description of the SSHAC process used in determining the input parameters.

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### **Surface Deformation**

TVA will assess the potential for hypogenic karst development including the 2016 D. Doctor paper and the significance for surface and sub-foundation deformation at the CRN Site. TVA will provide a markup of the applicable ESPA sections that describe the results of this assessment.

### **Stability of Subsurface Materials and Foundation**

TVA will provide a markup of the applicable ESPA sections to include additional information for "Karst Features," regarding:

- the size (both in vertical and horizontal directions) and spatial distribution of subsurface voids at the site, and;
- a plan for additional geophysical studies and a preliminary grouting program to evaluate and address the voids within the sub-foundation area (zone of influence) are large enough to affect the stability of foundations and structures during the life time of a planned nuclear power plant.

### **Radiation Protection and Accident Consequences**

TVA will provide a markup of the applicable ESPA sections to clarify the basis for deriving the annual normal liquid and normal gaseous radioactive effluent releases provided in the plant parameter envelope and the methodology used to compute the daughter products and maximum decay activities for the accidental liquid radwaste release source term.

### **Meteorology**

By letter June 23, 2016 (Reference 2), TVA provided input and output files associated with the XOQDOQ analysis. By letter dated July 28, 2016 (Reference 3), TVA provided input and output files associated with the CALPUFF analysis. The input and output files associated with the XOQDOQ and CALPUFF analyses were provided to support the NRC staff's review of the comparison between the CALPUFF and XOQDOQ modeling results.

In addition, TVA will provide a description of the assumptions that were made in the XOQDOQ and CALPUFF analyses.

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### Hydrology

By letter dated July 28, 2016 (Reference 4), TVA provided hydrology calculation input and output files in support of the NRC staff's review of the analysis of flooding in streams and rivers, and the analyses of hydrologic, seismic, and sunny day dam failure.

TVA also will provide a description of the assumptions that were made in these analyses. In addition, TVA will provide the following:

- Markups of applicable ESPA sections that support an evaluation of the aquifer parameter and characterization of the groundwater flow system,
- Input and output files used to characterize the radionuclide transport, including how existing and likely future surface and groundwater users effects these parameters groundwater gradients, flow directions and velocities and, decay calculations for potential radionuclide pathways in the groundwater system under accidental conditions, and
- Markups of applicable ESPA sections describing the basis and assumptions used in developing the source term, radionuclide distributions and concentrations to ensure that the highest potential radioactive material inventory is selected among the expected types of liquid and wet waste streams processed by plant systems.

### **Environmental Report**

#### **Site Selection**

- A. TVA will define each exclusionary and avoidance criterion applied at each step of the screening process from ROI to candidate sites, so that the screening results may be independently assessed for the staff to reach a conclusion on the reasonableness of TVA's site selection process. TVA will provide, to the extent practical, objective screening criteria. Specifically, TVA will:
- Define in detail exclusionary criteria derived from two of TVA's project objectives of: (1) narrowing the region of interest to areas in "close proximity" to TVA's six federal customers as preliminary Candidate areas; and (2) Describing how TVA has defined "close proximity." TVA will also clarify when more than one exclusionary criterion was applied during this step in the screening process.
  - Define in detail the screening criteria that were derived from the Environmental Report (ER) Section 9.3.1 listed criteria for assessing "preliminary candidate area suitability": (1) Sufficient acreage available to incrementally construct two or more SMRs, (2) Proximity to a Federal installation, (3) Proximity to a water source, (4) Proximity to transmission lines, and (5) Proximity to existing transportation infrastructure.

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- Define in detail the avoidance screening criteria that were derived from the safety conditions listed in ER Section 9.3.3 for Candidate Area evaluation. The listed safety considerations included: (1) Geology/Seismology, (2) Atmospheric Dispersion, (3) Exclusion Area and Low-Population Zone, (4) Population, (5) Emergency Planning, (6) Security Plans, (7) Hydrology, and (8) Industrial, Military, and Transportation Facilities.
  - Provide clarification and usage of the term "exclusionary criteria" as used in the ER.
  - Define the ER section 9.3.3.1 exclusionary and avoidance criteria that were applied in a two-step process to identify Preliminary Potential Sites within the four Candidate Areas. The specific ER criteria are listed as: (1) Availability of land, (2) Proximity to a water source, (3) Proximity to sensitive resources such as wetlands and historic sites, (4) Proximity to transmission lines, (5) Proximity to existing transportation infrastructure, and (6) Obvious topographic concerns.
  - Define a second set of undefined criteria that were applied to Preliminary Potential sites. These include: (1) Presence of wetlands, (2) Known historic sites, (3) Land cover, and (4) Existing land uses.
  - Provide additional information for each Preliminary Potential Site that was eliminated, so that the rationale provided for elimination of Preliminary Potential Sites can be independently confirmed by the staff.
- B. TVA will explain the scoring process for evaluation of Potential Sites. TVA will provide scoring criteria and associated characteristics for each Potential Site. As part of this discussion, TVA will provide the basis for the qualitative vs. quantitative distinctions in evaluating the sites. Where practical, TVA will perform quantitative evaluations. When qualitative evaluations are used, a basis for the evaluation will be provided.
- C. TVA will clarify the "scored" criteria used in evaluating the Potential Sites as compared to the scoring criterion used previously as exclusionary criteria in identifying the Preliminary Potential Sites.
- D. TVA will provide quantitative cumulative impact information commensurate with the level of knowledge and analyses for an alternative site. Specifically, TVA will provide:
- Quantitative information that summarizes and compares the environmental impacts (wetlands, floodplains, streams, sensitive land uses) of the candidate sites, quantification (using reconnaissance level information) of impacts to resources such as aquatic ecology (i.e., streams, open waters) based on conceptual site boundaries, plant footprints (e.g., amount of dredging required for water intake/discharge facilities and barge docking facilities), and quantification of land use and terrestrial impacts that includes corridors for linear facilities (access roads, rail spur, water pipeline routes, transmission line corridor to nearest substation).
  - Justification for the assumptions used when evaluating the equivalency of the cumulative impacts across the sites.
  - The cumulative impacts for each affected resource.

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- E. TVA will provide the details for the Preliminary Potential Site evaluation of the proximity to wetlands and the associated criterion for wetland avoidance.
- F. TVA will provide a clearer comparison of the sites in the ER. In addition, TVA will provide the staff with a table and supporting text that compares the cumulative impacts at the proposed and alternative sites that can be utilized by the staff to independently verify the results of the comparison.

This information will be provided in a revised siting study and a markup of associated ER sections.

### **Cumulative Radiological Health**

TVA will provide markups of the applicable ESPA sections to clarify the cumulative radiological health impacts, including an appropriate cumulative environmental impact finding that clearly discusses contributions from nearby U.S. Department of Energy nuclear facilities, as well as other nearby facilities that may use radiological materials. Reference material applied in the determination of the environmental impact finding will also be provided.

The ESPA markups will also provide a discussion of the potential cumulative radiological health impacts from past, present and reasonably foreseeable future radiological releases from nearby nuclear facilities from all pathways with a finding from these releases when combined with CRN impacts.

### **Transportation to and from Alternative Sites**

TVA will provide a markup of the applicable ESPA sections describing the transportation of radioactive material to and from the proposed alternative sites. This supplemental information will address an analysis of the proposed means of transporting radioactive materials to and from alternative sites, as well as consideration and treatment of transportation accidents involving radioactive materials.

### **Alternative System Designs**

TVA will provide supplemental information regarding the evaluation of alternative circulating water system designs for intake system design, water supply, and evaluation of environmental impacts of the alternative system designs as compared to the proposed circulating water system.

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### Historic and Cultural Resources

TVA will provide supplemental information discussing the historic and cultural significance of the Melton Hill Dam and the expanded Area of Potential Effects.

TVA will provide the staff with a copy of the Programmatic Agreement executed between TVA and the Tennessee State Historic Preservation Office (SHPO), including any related consultation correspondence. In addition, TVA will provide copies of the cultural resource reports with a request to withhold sensitive information contained therein.

#### References:

1. Letter from TVA to NRC, CNL-16-081, "Application for Early Site Permit for Clinch River Nuclear Site," dated May 12, 2016
2. Letter from TVA to NRC, CNL-16-103, "Submittal of Calculation Input and Output Files in Support of Early Site Permit Application for Clinch River Nuclear Site," dated June 23, 2016
3. Letter from TVA to NRC, CNL-16-125, "Submittal of Atmospheric Dispersion Calculation Input and Output Files in Support of Early Site Permit Application for Clinch River Nuclear Site," dated July 28, 2016
4. Letter from TVA to NRC, CNL-16-124, "Submittal of Hydrology Calculation Input and Output Files in Support of Early Site Permit Application for Clinch River Nuclear Site," dated July 28, 2016