

## CHAPTER 1 INTRODUCTION TO THE ENVIRONMENTAL REPORT

This Environmental Report (ER) is prepared and submitted as part of the Tennessee Valley Authority (TVA) application for an Early Site Permit (ESP) under Title 10 of the Code of Federal Regulations (10 CFR) Part 52 for the Clinch River Nuclear (CRN) Site in Oak Ridge, Roane County, Tennessee. The ESP would represent U.S. Nuclear Regulatory Commission (NRC) approval of the CRN site for new nuclear power units demonstrating small modular reactor (SMR) technology. This is separate from the filing of a combined license application (COLA) for such a facility. The site location is shown in Figure 1.1-1. In accordance with NRC regulations, TVA has prepared this ER to analyze the environmental effects of construction, operation, and decommissioning of two or more SMRs at the CRN Site. The NRC uses this ER to develop an Environmental Impact Statement to meet the requirements of the National Environmental Policy Act (NEPA) for federal agencies to consider the environmental effects of their action (e.g., issuance of an ESP).

### 1.1 THE PROPOSED ACTION

The proposed federal action is the NRC issuance, under the provisions of 10 CFR Part 52, of an ESP to TVA approving the CRN Site as a suitable site for future demonstration of the construction and operation of two or more SMRs. In this ESP application (ESPA), TVA identifies a proposed site suitable for deployment of two or more SMRs. The SMR technology is designed with inherent enhanced safety and security features. SMR deployment will demonstrate that the technology is capable of incrementally supplying clean, secure, reliable power that is less vulnerable to disruption to facilities owned by federal agencies (e.g., U.S. Department of Energy (DOE), U.S. Department of Defense (DoD), TVA, etc.).

This ER provides an analysis of the effects on the environment from site preparation, construction, operation, and decommissioning of two or more SMRs at the CRN Site. The proposed action does not include any decision or approval to build the facility. As TVA is not requesting limited work authorization as part of this ESPA, an NRC-issued combined license (COL) is required prior to initiation of construction.

#### 1.1.1 Purpose and Need

The purpose and need for the NRC proposed action, issuance of the ESP, is to provide for early resolution of site safety and environmental issues, which provides stability in the licensing process.

TVA proposes to deploy two or more SMRs with a maximum total electrical output of 800 megawatt electric (MWe) for the site, to demonstrate the capability of SMR technology. SMRs provide the benefits of nuclear-generated power in situations where large nuclear units, with an approximate electrical output exceeding 1000 MWe, are not practical, because of transmission system constraints, limited space or water availability, or constraints on the availability of capital for construction and operation.

In 2009, Executive Order (EO) 13514 was issued on *Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13514 directed all Federal Agencies to reduce their greenhouse gas (GHG) emissions by 28% by 2020 (Reference 1-1). This was followed by EO 13693 (March 2015), *Planning for Federal Sustainability in the Next Decade* (Reference 1-2), which called for further reduction of Federal facility GHG emissions to 40 percent by 2025, and identified SMRs as one of the “alternative energy” options for meeting clean energy goals.

In 2013, Executive Order (EO) 13636 was issued on *Improving Critical Infrastructure Cybersecurity* and *Presidential Policy Directive (PPD) 21 on Critical Infrastructure Security and Resilience* (Reference 1-3). EO 13636 and PPD-21 are designed to strengthen the security and resilience of critical infrastructure against evolving threats and hazards.

TVA and DOE, based on a Memorandum of Understanding, began working together to explore various options under which TVA could license, construct, operate, and maintain two or more SMR units (Reference 1-4).

By letter dated February 17, 2016, DOE expressed its support to TVA for the development and licensing of SMRs as a means to meet DOE goals of improving the environmental, economic, and energy security outlook for the United States (Reference 1-5). DOE believes that SMR deployment near federal facilities could provide enhanced reliability and other benefits, by providing continued operation during a widespread and extended loss of the electrical power grid, meeting reliability needs with clean energy that supports carbon reduction directives. DOE specifically requested TVA to assess, as a part of the deployment project planning and licensing process, the ability of SMRs to continue to supply electricity to nearby offsite customers during a disruption to offsite power supplies. This includes electricity transmission to those customers in a manner less vulnerable to intentional destructive acts and natural phenomena that could disrupt the power supply.

The main objectives of the Clinch River (CR) SMR Project are to demonstrate that:

- Power generated by SMRs could be used for addressing critical energy security issues. Their use on or immediately adjacent to DoD or DOE facilities, using robust transmission (e.g., armored transformers, underground transmission), could address national security needs by providing reliable electric power in the event of a major grid disruption. A more reliable electric power supply could be accomplished by the SMR operation in “power island” mode with robust transmission to critical facilities. In addition, intentional destructive acts (e.g., terrorist attacks) and natural phenomena (e.g., tornadoes, floods, etc.) could disrupt the grid and the ability to restore most generation sources. SMRs can provide reliable energy for extended operation. Because nuclear reactors require fuel replenishment less frequently than other power generation sources (coal, gas, wind and solar), SMRs are less vulnerable to interruptions of fuel supply and delivery systems. TVA could demonstrate this “power islanding” and secure supply concept as part of the CR SMR project by utilizing controls, switching, and transmission capabilities to disconnect the SMR power plant from the electrical grid while maintaining power from the SMR power plant to a specified DOE

power need. Such a demonstration would show that SMR technology is capable of supplying reliable power that is less vulnerable to disruption from intentional destructive acts and natural phenomena.

- SMR technology can assist federal facilities with meeting carbon reduction objectives. Energy-related carbon dioxide (CO<sub>2</sub>) emissions account for more than 80 percent of GHG emissions in the United States (Reference 1-6). Studies show that on average coal combustion generates approximately 894-975 grams of CO<sub>2</sub> per kilowatt-hour (g/kWh) of electricity generated. Natural gas generates an estimated 450-519 g/kWh. Nuclear power emission rates have been calculated to range from 6 - 26 g/kWh. (Reference 1-7)
- SMR design features include underground containment and inherent safe-shutdown features, longer station blackout coping time without external intervention, and core and spent fuel pool cooling without the need for active heat removal. These key features advance safety by eliminating several design basis accident scenarios. Development of a security-informed design efficiently provides the same or better protection against the threats large reactors must consider. Physical security is designed into the SMR plant architecture, incorporating lessons learned from significant shifts in security posture since 2001, and the opportunity to build more inherently secure features into the initial design.
- SMR power generating facilities are designed to be deployed in an incremental fashion to meet the power generation needs of a service area. Generating capacity can be added in increments to match load growth projections. For the CR SMR project, two or more SMRs would be constructed and brought into operation incrementally to achieve up to 800 MWe.

#### 1.1.2 Proposed Project

This subsection provides a brief description of the proposed project, the applicant and owner, the site location, the selected reactor types and other plant design features, preapplication public participation activities, and major project activity dates.

##### 1.1.2.1 The Applicant and Owner

TVA is the applicant and owner and sole point of contact with the NRC in all matters related to this ESPA. TVA is a corporate agency of the United States that provides electricity for business customers and local power distributors serving 9 million people in parts of seven southeastern states. As authorized by the Tennessee Valley Authority Act, TVA is committed to maintaining a national leadership role in technological innovation (Reference 1-8). Innovation is a part of the agency's mission as set forth by the TVA Act, and an important element of its mission to be a leader in the generation of affordable, clean power and a conservator of the Tennessee Valley's precious natural resources. Compared to a large nuclear plant, small modular reactors offer advantages in enhanced safety, less construction time and reduced expenditures. TVA's work on a deployment of this technology demonstrates its leadership in a movement toward cleaner, lower-cost, and more reliable electricity for our customers.

#### 1.1.2.2 Site Location

The CRN Site is located on the northern bank of the Clinch River arm of the Watts Bar Reservoir in Oak Ridge, Roane County, Tennessee from approximately Clinch River Mile (CRM) 19 to approximately CRM 14.5 (Reference 1-9). The CRN Site is approximately 7 miles (mi) east of Kingston, Tennessee and approximately 25 mi west-southwest of Knoxville, Tennessee. Figure 1.1-1 shows the location of the CRN Site. Additional information regarding the CRN Site location is provided in Section 2.1, *Site Location*.

#### 1.1.2.3 Reactor Information

This ESPA is intended to demonstrate the suitability of the CRN Site for the deployment of two or more SMRs to demonstrate the capability of SMR technology. TVA has not yet selected a specific SMR technology. However, the design characteristics of four SMR designs under consideration were used to develop a plant parameter envelope (PPE) to describe the proposed plant. Additional information regarding the description of the PPE is provided in Section 3.1, *External Appearance and Plant Layout*. An SMR is a nuclear power generating unit with an electrical output of no more than 300 MWe, which is considerably less than the electrical output of approximately 1000 MWe provided by a typical commercial reactor in the United States. SMRs are manufactured in factories as large, fabricated components and shipped to the facility site. Therefore, less onsite construction is required for installation of SMRs than for installation of a typical commercial reactor. SMRs may provide the benefits of nuclear-generated power in situations where large nuclear units are not practical because of transmission system constraints, limited space or water availability, or limited available capital for construction and operation. Additional information regarding SMRs is provided in Section 3.2, *Reactor Power Conversion System*.

#### 1.1.2.4 Cooling System Information

The SMRs being considered for deployment at the CRN Site use a recirculating (closed-cycle) cooling water system. Mechanical draft cooling towers are most suitable for use at the CRN Site. A new shoreline intake structure would supply makeup water from the Clinch River arm of the Watts Bar Reservoir to the facility. A new discharge structure located downstream of the intake structure would convey cooling tower blowdown and other planned discharges to the Clinch River arm of the Watts Bar Reservoir. Additional information regarding the cooling system is provided in Section 3.4, *Cooling System*.

#### 1.1.2.5 Transmission System Information

The CRN Site would be served by a new 500-kilovolt (kV) switchyard. The Watts Bar NP-Bull Run FP 500 kV line is to be looped in with approximately 0.7 mi of double circuit transmission line. In addition, a new 161-kV switchyard may be constructed for auxiliary station service and looped in to the Kingston FP-Fort Loudoun HP#1 161-kV transmission line with approximately 0.2 mi of double circuit transmission line. Additional transmission system upgrades would be

required to support the added generation capacity to the system. A portion of the Kingston FP – Fort Loudoun HP #1 161-kV transmission line is to be relocated within the CRN Site.

A new 69-kV underground transmission line (approximately 5 mi) could be constructed to connect the CRN Site switchyard via 500 kV to 69 kV transformers to the Bethel Valley Substation. This 69-kV transmission line would follow the existing Watts Bar NP – Bull Run FP 500-kV transmission line corridor on DOE property.

Additional information regarding the transmission system is provided in Section 3.7, *Power Transmission System*.

#### 1.1.2.6 Preapplication Public Involvement

The possibility of deployment of SMRs at the CRN Site and SMR development in general has been publicized widely in the local and national press, trade journals, electronic media, and professional conferences. NRC and TVA have participated in numerous preapplication public meetings at NRC headquarters in Rockville, Maryland. These meetings have occurred since 2010 and covered various technical topics, including regulatory framework meetings that preceded TVA's change from a construction permit application to an ESPA in 2014. At the time of submittal of the application, no public outreach meetings specifically designed to comply with NEPA requirements have been conducted.

#### 1.1.2.7 Construction Start Date

The ESP does not constitute a decision or approval to build new units. A limited work authorization application under NRC regulation 10 CFR 50.10 is not included with this ESPA.

At this time, TVA has not established a date for preconstruction activities. It is estimated that site preparation activities (preconstruction) will take between 6 and 18 months to complete. Based on estimates provided by the reactor vendors, assuming that appropriate licenses are obtained, actual construction of the SMR units is expected to take between three and five years.

### 1.2 STATUS OF REVIEWS, APPROVALS AND CONSULTATIONS

Numerous federal, state, regional, and local and affected Native American tribal agencies environmental protection licenses, permits, reviews, approvals, and/or consultations (collectively referred to as "authorizations") are required to support the preconstruction, construction, and operation phases of the project. Tables 1.2-1 and 1.2-2 identify, for each authorization, the following information:

- Permit/authorization
- Responsible agency
- Applicable law, ordinance, or regulation

- Principal environmental factors covered by the authorization

Appropriate consultations with federal, state, and local agencies have been initiated. However, authorizations from federal, state, and local authorities for construction and operation are not yet necessary because an ESP is limited to establishing the acceptability of the CRN Site for future development. TVA plans to apply for and receive any required authorizations prior to initiating preconstruction, construction, and operational activities. The following subsections describe the activities to be authorized.

#### 1.2.1 ESP Issuance

The following statutes summarize the agency consultations necessary for the ESP. Table 1.2-1 lists ESP authorizations required prior to NRC issuance of an ESP.

Endangered Species Act: The Endangered Species Act requires federal agencies to ensure that agency action is not likely to jeopardize any species that is listed or proposed for listing as endangered or threatened. The Endangered Species Act requires consultation with the U.S. Fish and Wildlife Service (USFWS). In addition, as a matter of policy, the NRC consults with states regarding state-protected species.

National Historic Preservation Act: The National Historic Preservation Act requires federal agencies having the authority to license any major federal action, prior to issuing the license, to take into account the effect of the undertaking on historic properties and to afford the Advisory Committee on Historic Preservation an opportunity to comment on the undertaking. Committee regulations provide for establishing an agreement with any State Historic Preservation Officer (SHPO) to substitute state review for Committee review (36 CFR 800.7). The NRC consults with the Tennessee SHPO.

Coastal Zone Management Act: The Federal Coastal Zone Management Act imposes requirements on applicants for a federal license to conduct an activity that could affect a state's coastal zone. The Coastal Zone Management Act requires the applicant to certify to the licensing agency that the proposed activity is consistent with the state's federally-approved coastal zone management program. Tennessee does not have any coastal barrier resource areas; therefore no action is required.

Clean Air Act: The Clean Air Act imposes regulatory requirements on federally-licensed projects where construction and operation may have an impact on state and regional air quality. The portion of Roane County in which the CRN Site is located is in attainment for all air pollutants. The NRC consults with the Tennessee Department of Environmental Control (TDEC) Division of Air Pollution Control on nonattainment issues.

Clean Water Act/Rivers and Harbors Act: The Clean Water Act requires that federal agencies consider the potential impacts to jurisdictional "waters of the United States." Section 401 of this Act regulates the issuance of a Water Quality Certification, Section 402 regulates point source and non-point source discharges under the National Pollutant Discharge Elimination System,

and Section 404 regulates the placement of fill in waters of the United States. The U. S. Army Corps of Engineers (USACE) regulates dredge and fill activities in navigable waters pursuant to Section 10 of the Rivers and Harbors Act. As a matter of policy, the NRC consults with the USACE and TDEC regarding potential impacts to waters of the United States.

#### 1.2.2 Preconstruction, Construction, and Operation Activities

Permits and authorizations for future construction and operation of two or more SMRs are to be obtained in accordance with applicable statutes and regulations. Applications for these authorizations are to be developed after a reactor technology has been selected and detailed design is initiated. Table 1.2-2 lists authorizations that are anticipated for preconstruction, construction, and operation of two or more SMRs.

### 1.3 METHODOLOGY

NRC regulation 10 CFR 52.17(a)(2), *Contents of Applications; Technical Information*, specifies the contents of an ER for an ESPA. Regulatory Guide (RG) 4.2, *Preparation of Environmental Reports for Nuclear Power Stations*, Revision 2, July 1976, provides guidance to applicants preparing ERs for nuclear power stations. NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan*, provides guidance to the NRC staff when conducting environmental reviews of applications related to nuclear power plants. Attachment 3 of NRC's Office of Nuclear Reactor Regulation Review Standard (RS) -002, *Processing Applications for Early Site Permits* provides guidance to NRC staff when conducting environmental reviews associated with ESPs.

In preparing this ER, TVA used NUREG-1555 and RS-002 for guidance in establishing the format and content of its ER and NRC RG 4.2 for guidance on the preparation of the ER. Table 1.3-1 lists regulatory requirements and where in the ER each requirement is addressed.

### 1.4 REFERENCES

Reference 1-1. The White House, "Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance," The White House, Office of the Press Secretary, EO 13514, October 5, 2009.

Reference 1-2. The White House, "Executive Order 13693 - Planning for Federal Sustainability in the Next Decade," EO 13693, March 19, 2015.

Reference 1-3. The White House, "Executive Order 13636 - Improving Critical Infrastructure Cybersecurity," EO 13636, February 19, 2013.

Reference 1-4. Tennessee Valley Authority and U.S. Department of Energy, "Memorandum of Understanding: Construction of Small Modular Nuclear Reactors and Power Supply Arrangements," May 31, 2012.

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Reference 1-5. U.S. Department of Energy, Secure Supply of Electricity from SMRs to Oak Ridge Facilities, February 17, 2016.

Reference 1-6. U.S. Energy Information Administration, Emissions of Greenhouse Gases in the U.S., Website: [http://www.eia.gov/environment/emissions/ghg\\_report/ghg\\_carbon.cfm](http://www.eia.gov/environment/emissions/ghg_report/ghg_carbon.cfm), March 31, 2011.

Reference 1-7. World Nuclear Association, Energy Balances and CO2 Implications, Website: <http://www.world-nuclear.org/info/Energy-and-Environment/Energy-Balances-and-CO2-Implications/>, March, 2014.

Reference 1-8. United States Congress, "Tennessee Valley Authority Act," 1933.

Reference 1-9. Watts Bar - Clinch Watershed Team, Final Watts Bar Reservoir Land Management Plan, Panel 4; Alternative B "Preferred", January 23, 2009.

Reference 1-10. Not used.



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**Table 1.2-1  
Consultations Required for Early Site Permit**

<b>Agency</b>	<b>Authority</b>	<b>Requirement</b>	<b>Activity Covered</b>
USFWS	Endangered Species Act , 16 U.S. Code (USC) 1536	Consultation regarding potential to adversely affect protected non-marine species.	Concurrence with no adverse effect or consultation on appropriate mitigation measures.
	Bald and Golden Eagle Protection Act, 16 USC 668-668c	Consultation regarding potential to adversely affect bald eagles.	Concurrence with no adverse effect or consultation on appropriate mitigation measures.
TDEC – Division of Natural Heritage and Tennessee Wildlife Resources Agency	Rare Species Protection and Conservation Act, TN Code §70-8-101	Consultation regarding potential to adversely affect protected species.	Concurrence with no adverse effect or consultation on appropriate mitigation measures.
Tennessee Historical Commission	National Historic Preservation Act, 16 USC 470 et seq.	Consultation with Tennessee SHPO regarding potential to adversely affect historic resources.	Confirm that site construction and operation activities would not affect protected historic resources or would be mitigated if unavoidable.
Tennessee Historical Commission	National Historic Preservation Act 36 CFR Part 800	Section 106 Review: Consultation with SHPO to determine National Register of Historic Places listing of property.	Complete Tennessee SHPO Initial Review Request Checklist.
TDEC – Division of Air Pollution Control	Clean Air Act, USC 42 et seq.	Consultation regarding potential adverse effects on ozone standards.	Concurrence with no adverse effect or consultation on appropriate mitigation measures.
USACE	Federal Clean Water Act, 33 CFR 330 Rivers and Harbors Act, 33 USC 403	Consultation regarding potential to adverse effects on waters of the United States.	Concurrence with no adverse effect or consultation on appropriate mitigation measures.

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**Table 1.2-2 (Sheet 1 of 5)**  
**Authorizations Required for Preconstruction, Construction, and Operation Activities**

Agency	Authority	Requirement	Activity Covered
NRC	Atomic Energy and Energy Reorganization Acts 10 CFR 52 Subpart C or 10 CFR 50.10(e)(1)	ESP and COL or Limited Work Authorization, in addition to applicable By-Product License, Source Material License, and Special Nuclear Material License	Site Licensing, including safety-related construction activities and operation of a nuclear power facility
Federal Aviation Administration	Federal Aviation Act 49 USC 1501; 14 CFR 77	Construction Notice	Notice of erection of structures greater than 200 feet high that potentially may affect air navigation.
U.S. Department of Transportation (DOT)	Hazardous Material Transportation Act 49 CFR 107 Subpart G	Certificate of Registration	Transportation of hazardous materials.
Tennessee Department of Transportation (TDOT)	TCA 54-5-302	Entrance Permits	This includes ramps, driveways, and other access points. Requires traffic studies and engineering designs to show design and potential impacts of proposed changes
TDOT	TCA 54-5-302	Right-of-way (ROW) permit	Required for installing utilities in highway ROWs.
USACE	Clean Water Act 33 CFR 323 and 330	Section 404 Permit	Disturbance, crossing or filling-in of wetland areas or navigable waters from site.
	Rivers and Harbors Act 33 USC 403	Section 10 Permit	Construction and maintenance of intake, discharge and barge structures in navigable waters of the United States.
U.S. Coast Guard	Ports and Waterways Safety Act 33 USC 1221, et seq.	Private Aids to Navigation Permit	Construction of discharge pipeline in navigable waters.
U.S. Environmental Protection Agency (EPA) and TDEC	Resource Conservation and Recovery Act, Section 3010	Acknowledgement of Notification of Hazardous Waste Activity	Hazardous Waste Generation
	EPA Facility Response Plan (40 CFR 9 and 112), and the EPA Hazardous Waste Contingency Plan	Facility Response Plan Approval	Spill/Discharge Response Program
	Spill Prevention, Control and Countermeasures (SPCC) rule (40 CFR 112), Appendix F, Sections 1.2.1 and 1.2.2	SPCC/Integrated Pollution Prevention (IPP) Plan	Spill/Discharge Prevention Plan

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**Table 1.2-2 (Sheet 2 of 5)**  
**Authorizations Required for Preconstruction, Construction, and Operation Activities**

Agency	Authority	Requirement	Activity Covered
USFWS	Endangered Species Act Section 7 (16 USC 1536)	Consultation/Biological Assessment	Evaluation of effects on listed species.
USFWS	Migratory Bird Act/Executive Order 13186	Responsibility of Federal Agencies to Protect Migratory Birds	TVA is exempt from the Act requirements, but complies voluntarily. TVA is subject to the Executive Order
City of Oak Ridge		Site Plan Approval	Coordination with the Planning Board and/or Zoning Board of Adjustment for development of the site in compliance with city ordinances.
		Flood Encroachment Permit / Floodplain Permit	Compliance With City of Oak Ridge Zoning Article IX Special Districts 9.08 a, b, c Floodway Districts, Floodway Fringe Area. Mostly covered in Stormwater Pollution Prevention Plan and grading permit.
		Sanitary Sewer connection	Compliance with the City Industrial Pre-treatment Program if required, or connection to the City Waste Water Treatment System
		Potable Water	A potable water line on the SMR Site would tap into the existing City of Oak Ridge water line on Bear Creek Road. If the existing waterline has to be extended for TVA, additional planning and approvals would be necessary by the city.
		Construction Permits	Construction of the new plant facilities in compliance with city ordinances.

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**Table 1.2-2 (Sheet 3 of 5)**  
**Authorizations Required for Preconstruction, Construction, and Operation Activities**

Agency	Authority	Requirement	Activity Covered
TDEC	Federal Clean Water Act (33 USC 1251 et seq.) and Tennessee Code Annotated (TCA) § 69-3-108: Tennessee Water Quality Control Act of 1977	Notice of Intent (NOI) for coverage under an Individual National Pollution Discharge Elimination System (NPDES) Permit for stormwater discharges associated with construction activities.	<p>Compliance with federal and state water quality standards, discharges to waters of the state due to construction of the new plant, switchyards, and transmission lines (aboveground and underground). Construction/operation of stormwater control measures (detention basins, etc.). Provided that pollution prevention measures are implemented, the construction general permit covers discharges associated with:</p> <ul style="list-style-type: none"> <li>• Construction activities</li> <li>• Construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas)</li> <li>• Dewatering of work areas of collected stormwater and groundwater</li> <li>• Water used to wash vehicles</li> <li>• Water used to control dust</li> <li>• Routine building washdown</li> <li>• Uncontaminated groundwater</li> <li>• Unpolluted foundation or footing drains</li> </ul> <p>Appropriate dewatering controls include, but are not limited to: weir tank, dewatering tank, gravity bag filter, sand media particulate filter, pressurized bag filter, cartridge filter or other control units providing the level of treatment necessary to comply with permit requirements.</p>

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**Table 1.2-2 (Sheet 4 of 5)**  
**Authorizations Required for Preconstruction, Construction, and Operation Activities**

TDEC (continued)	Federal Clean Water Act (33 USC 1251 et seq.) and TCA § 69-3-108: Tennessee Water Quality Control Act of 1977 (continued)	Stormwater Pollution Prevention Plan, to include Common Plan of Development, Soil Erosion and Sediment Control Plan (structural control measures, engineering design of sediment basin/controls for projects 10 acres or greater), etc.	Compliance with federal and state water quality standards, discharges to waters of the state due to construction of the new plant, switchyards, and transmission lines (aboveground and underground).
		Aquatic Resource Alteration Permit required for alterations of a stream or wetland, including diversion of surface waters of the state.	Clinch River arm of the Watts Bar Reservoir water required for cooling purposes. Portions of the new plant site, proposed causeway, switchyards, and onsite and potential offsite transmission lines may be located in freshwater wetlands and transitional areas.
		NPDES Industrial Stormwater General Permit for plant operation activities; EPA Application Forms 2D (Application for Permit to Discharge Process Wastewater) and 2F (Application for Permit to Discharge Stormwater Discharges Associated with Industrial Activity)	Cooling water, service water, and stormwater runoff discharge from plant operations.
		NOI for NPDES General Permit of Discharges from the Application of Pesticides (TNP100000)	Point source discharges of pesticides used for mosquito and other flying insect pest control, weed and algae control, animal pest control, and forest canopy pest control to waters of the state.
		Sanitary Waste Water - Portable Facilities	Must use licensed wastewater hauler
		Permanent Sanitary Waste Water	Connect to Waste Water Treatment Plant
	TCA §§ 69-7-301, et seq.	Water Resources Notification; Water Withdrawal Registration	Surface water or groundwater withdrawal of an average of 10,000 gallons or more per day.
	Federal Clean Air Act, 42 USC 7401	Title V Operating Permit; Prevention of Significant Deterioration Preconstruction Permit	Discharge of air pollutants from cooling tower(s), emergency generators, auxiliary boiler(s), and ancillary equipment.

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**Table 1.2-2 (Sheet 5 of 5)**  
**Authorizations Required for Preconstruction, Construction, and Operation Activities**

Agency	Authority	Requirement	Activity Covered
Texas Department of State Health Services , Radiation Control Program, Radiation Safety Licensing Branch	25 Texas Administrative Code (TAC) §289.252 "Licensing of Radioactive Material"	Emergency Plan for the response to an accident or incident involving shipments of radioactive waste. Proof of financial responsibility such as insurance that the carrier has in order to comply with DOT requirements.	Transportation of low level radioactive waste (LLRW) to the Texas Disposal Facility.
	25 TAC §289.257 "Packaging and Transportation of Radioactive Material"	Provide list of approved shipping containers along with their certificates of compliance or other certifying documentation. For a shipper that manufactures their own containers they must submit their quality assurance procedures.	Shipping of LLRW to the Texas Disposal Facility.
TDEC Division of Radiological Health (DRH)	TCA § 68-23-212; TDEC Rule 0400-20-10-.32	Obtain a License-for-Delivery from the DRH (Form RHS 8-30). Persons whose activities result in the generation of radioactive waste have the primary responsibility to assure that a License-for-Delivery is obtained.	Transportation of radioactive waste within the State of Tennessee to a disposal/processing facility.
TN State Historic Preservation Office (SHPO) Tribal Preservation Officer (TPO)	Section 106 of the National Historic Preservation Act	As a Federal agency, TVA is required to comply with Section 106 of the NHPA, which includes SHPO/TPO, and identification of potentially affected resources, i.e., a site survey.	Protection of archaeological and historical resources.

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**Table 1.3-1 (Sheet 1 of 2)**  
**Environmental Report Responses to Early Site Permit Regulatory Requirements**

No.	Regulatory Requirement (10 CFR) <sup>1</sup>	Responsive Environmental Report Section
1	51.45(a), Signed original	Transmittal letter
2	51.45(b), Description of proposed action	Chapter 3, <i>Plant Description</i>
3	51.45(b), Statement of purpose of proposed action	Section 1.1, <i>The Proposed Project</i>
4	51.45(b), Description of environment affected by proposed action	Chapter 2, <i>Environmental Description</i>
5	51.45(b)(1) and 51.50(b), Environmental impact of proposed action	Chapter 4, <i>Environmental Impacts of Construction</i> ; Chapter 5, <i>Environmental Impacts of Station Operation</i> ; Chapter 7, <i>Environmental Impact of Postulated Accidents Involving Radioactive Materials</i> ; and Chapter 10, <i>Environmental Consequences of the Proposed Action</i>
6	51.45(b)(2), Unavoidable adverse impacts	Section 10.1, <i>Unavoidable Adverse Environmental Impacts</i>
7	51.45(b)(3), Alternatives to proposed action	Chapter 9, <i>Alternatives to the Proposed Action</i>
8	51.45(b)(4), Relationship between short-term use and long-term productivity	Section 10.3, <i>Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment</i>
9	51.45(b)(5), Irreversible and irretrievable commitments of resources	Section 10.2, <i>Irreversible and Irretrievable Commitments of Resources</i>
10	51.45(c) and 51.50(b), Comparison of environmental effects of proposed action and alternatives	Chapter 4, <i>Environmental Impacts of Construction</i> ; Chapter 5, <i>Environmental Impacts of Station Operation</i> ; Chapter 7, <i>Environmental Impact of Postulated Accidents Involving Radioactive Materials</i> ; Chapter 10, <i>Environmental Consequences of the Proposed Action</i> ; and Chapter 9, <i>Alternatives to the Proposed Action</i>
11	51.45(c), Description of impacts of the preconstruction activities	Chapter 4, <i>Environmental Impacts of Construction</i>
12	51.45(c), Alternatives for reducing or avoiding adverse environmental impacts	Section 4.6, <i>Measures and Controls to Limit Adverse Impacts During Construction</i> ; and Section 5.10, <i>Measures and Controls to Limit Adverse Impacts During Operation</i>
13	51.45(d), Federal permits and other entitlements and status of compliance	Section 1.2, <i>Status of Reviews, Approvals, and Consultations</i>
14	51.45(d), Compliance with federal and other environmental quality standards and requirements	Section 1.2, <i>Status of Reviews, Approvals, and Consultations</i>
15	51.45(d) and 51.50(b), Compliance for alternatives	Section 9.3, <i>Alternative Sites</i>
16	51.45(e), Adverse information	Section 10.1, <i>Unavoidable Adverse Environmental Impacts</i>
17	51.50(a), 51.50(b) and 51.51(a), Uranium fuel cycle	Section 5.7, <i>Uranium Fuel Cycle and Transportation Impacts</i>

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**Table 1.3-1 (Sheet 2 of 2)**  
**Environmental Report Responses to Early Site Permit Regulatory Requirements**

<b>No.</b>	<b>Regulatory Requirement (10 CFR)<sup>1</sup></b>	<b>Responsive Environmental Report Section</b>
18	51.50(a) and 51.52, Fuel and waste transportation	Section 3.8, <i>Transportation of Radioactive Materials</i> and Section 7.4, <i>Transportation Accidents</i>
19	51.50(a) and 51.50(b), Reporting and record keeping procedures	Chapter 6, <i>Environmental Measurements and Monitoring Programs</i>
20	51.50(a) and 51.50(b), Conditions and monitoring	Chapter 6, <i>Environmental Measurements and Monitoring Programs</i>

<sup>1</sup> 10 CFR 51.45, 10 CFR 51.50, 10 CFR 51.51, and 10 CFR 51.52



This map displays the Knoxville, Tennessee metropolitan area and surrounding regions. The Clinch River arm of the Watts Bar Reservoir is prominent on the left side. The CRN Site is highlighted in pink near Oak Ridge. Major transportation routes include Interstate 75 running north-south and Interstate 40 running east-west. Numerous cities are labeled, such as Lake City, Norris, Clinton, Powell, Knoxville, and Maryville. County boundaries for Scott, Campbell, Anderson, Morgan, Roane, Loudon, Monroe, Blount, and Union counties are shown. A legend at the bottom defines symbols for cities, counties, city/town boundaries, rivers and lakes, highways, major roads, railroads, airports, interstate roads, and Bear Creek Road. An inset map shows the location of the study area within the state of Tennessee.