Chapter 1
Introduction and Purpose and Need

1.0 INTRODUCTION AND PURPOSE AND NEED

1.1 Introduction

As required by the Nuclear Energy Innovation Capabilities Act of 2017 (NEICA) (Pub. L. 115–248), the U.S. Department of Energy (DOE) assessed the mission need for a versatile reactor-based fast-neutron[1] source (or Versatile Test Reactor [VTR]) to serve as a national user facility. DOE has determined that there is a need for a VTR and, in accordance with NEICA, is pursuing construction and operation of the VTR. To this end, DOE has prepared this environmental impact statement (EIS) in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) and DOE NEPA regulations (40 Code of Federal Regulations [CFR] 1500 through 1508 and 10 CFR 1021, respectively). This EIS evaluates alternatives for a VTR and associated facilities for the irradiation and post-irradiation examination of test and experimental fuels and materials. The analysis also addresses options for VTR fuel production and evaluates the management of spent nuclear fuel (SNF) from the VTR.

1.2 Background

DOE's mission includes advancing the energy, environmental, and nuclear security of the United States and promoting scientific and technological innovation in support of that mission. DOE's 2014 to 2018 Strategic Plan (DOE 2014a) states that DOE will "support a more economically competitive, environmentally responsible, secure and resilient U.S. energy infrastructure." Specifically, "DOE will continue to explore advanced concepts in nuclear energy that may lead to new types of reactors with further safety improvements and reduced environmental and nonproliferation concerns."

In support of DOE's mission, the Office of Nuclear Energy has established research objectives intended to provide research, development, and demonstration activities that enable development of an advanced reactor pipeline. These objectives also are intended to enhance the long-term viability and competitiveness of the existing U.S. reactor fleet and implement and maintain a national strategic fuel cycle and supply chain infrastructure. Each of these research, development, and demonstration goals would benefit from a test reactor capable of a high flux of fast-spectrum neutrons, in other words, a reactor that would generate a large number of neutrons per second that are more energetic than those typical in a commercial light-water nuclear reactor. The United States currently lacks a facility able to produce a prototypic, fast-neutron-spectrum irradiation environment with high neutron flux. Such a facility would support the above objectives and is essential to testing and effective evaluation of nuclear fuels, materials, sensors, and instrumentation for use in advanced reactors.

Advanced reactors that operate in the fast-neutron spectrum offer the potential to have inherent safety characteristics incorporated into their designs. They can operate for long periods without refueling and reduce the volume of newly generated nuclear waste. Effective testing and development of advanced reactor technologies requires the use of fast neutrons comparable to those that would occur in actual advanced reactors. The high flux of fast neutrons allows accelerated testing, meaning that a comparatively short testing period would accomplish what would otherwise require many years to decades of exposure in a test environment with lower energy neutrons, a lower flux, or both. This accelerated testing would contribute to the development of materials and fuels for advanced reactors and generate data allowing advanced reactor developers, researchers, DOE, and regulatory agencies to

[1] Fast neutrons are highly energetic neutrons (ranging from 0.1 million to 5 million electron volts [MeV] and travelling at speeds of thousands to tens of thousands kilometers per second) emitted during fission. The fast-neutron spectrum refers to the range of energies associated with fast neutrons.

improve performance, understand material properties, qualify improved materials and fuels, evaluate reliability, and ensure safety. Accelerated testing capabilities would also benefit these same areas for the current generation of light-water reactors.

Many commercial organizations and universities are pursuing advanced nuclear energy fuels, materials, and reactor designs that complement DOE and its laboratories' efforts to advance nuclear energy. These designs include thermal[2] and fast-spectrum reactors that target improved fuel resource utilization and waste management, and the use of materials other than water for cooling. Their development requires an adequate infrastructure for experimentation, testing, design evolution, and component qualification. Available irradiation test capabilities are aging (most are over 50 years old). These capabilities are focused on testing materials, fuels, and components in the thermal neutron spectrum and do not have the ability to support the needs for fast reactors. Only limited fast-neutron-spectrum testing capabilities, with restricted availability, exist outside the United States.

Recognizing that the United States lacks a dedicated, fast-neutron-spectrum testing capability, DOE assessed current testing capabilities (domestic and foreign) against those needed to support the development of advanced nuclear technologies (DOE 2018a). DOE's purpose was to assess the mission need for, and cost of, a versatile reactor-based fast-neutron source with a high neutron flux, irradiation flexibility, multiple experimental environment (e.g., use of different coolants) capabilities, and sufficient volume for many concurrent users. This assessment identified a gap between required testing needs and available capabilities. That is, there currently is an inability to effectively test advanced nuclear fuels and materials in a fast-neutron-spectrum irradiation environment at high neutron fluxes. The Nuclear Energy Advisory Committee (NEAC) report, *Assessment of Missions and Requirements for a New U.S. Test Reactor* (NEAC 2017), confirmed the need for fast-neutron testing capabilities in the United States and acknowledged that no such facility is readily available domestically or internationally. The NEAC study was consistent with the conclusions of an earlier study, *Advanced Demonstration and Test Reactor Options Study* (INL 2017d). One strategic objective established in the 2017 study was to "provide an irradiation test reactor to support development and qualification of fuels, materials, and other important components/items (e.g., control rods, instrumentation) of both thermal and fast neutron-based…advanced reactor systems." DOE needs to develop the capability for large-scale testing, accelerated testing, and qualifying advanced nuclear fuels, materials, instrumentation, and sensors. This testing capability is essential for the United States to modernize its nuclear energy infrastructure and to develop transformational nuclear energy technologies that re-establish the United States as a world leader in nuclear technology commercialization.

The key recommendation of the NEAC report was that DOE "proceed immediately with pre-conceptual design planning activities to support a new test reactor" to fill the domestic need for a fast-neutron test capability. The considerations for such a capability include:

- An intense, neutron-irradiation environment with prototypic spectrum to determine irradiation tolerance and chemical compatibility with other reactor materials, particularly with coolants.
- Testing that provides a fundamental understanding of materials performance, validation of models for more rapid future development, and engineering-scale validation of materials performance in support of licensing efforts.
- A versatile testing capability to address diverse technology options and sustained and adaptable testing environments.

[2] Thermal neutrons are neutrons that are less energetic than fast neutrons (generally, less than 1 electron volt and travelling at speeds of less than 5 kilometers per second), having been slowed by collisions with other materials such as water. The thermal neutron spectrum refers to the range of energies associated with thermal neutrons.

- Focused irradiations, either long- or short-term, with heavily instrumented experimental devices, and the possibility to do in situ measurements and quick extraction of samples.
- An accelerated schedule to regain and sustain U.S. technology leadership and to enable the competiveness of U.S-based entities in the advanced reactor markets. This can be achieved through use of mature technologies for the reactor design (e.g., sodium coolant in a pool-type and metallic-alloy-fueled fast reactor) while enabling innovative experimentation.

A summary of preliminary requirements that respond to these considerations include providing:

- A high peak neutron flux with a prototypic fast-reactor-neutron-energy spectrum (i.e., neutron energy greater than 0.1 million electron volts); the target flux is 4×10^{15} neutrons per square centimeter per second or greater.
- A high neutron dose rate for materials testing (quantified as displacements per atom); the target is 30 displacements per atom per year or greater.
- An irradiation length that is appropriate for fast reactor fuel testing; the target is 0.6 meter to 1 meter.
- A large irradiation volume within the core region; the target is 7 liters.
- Innovative testing capabilities through flexibility in testing configuration and testing environment (coolants).

> - 4×10^{15} neutrons per square centimeter per second = 2.6×10^{16} neutrons per square inch per second
> - 0.6 meter to 1 meter = 2 feet to 3.3 feet
> - 7 liters = 0.25 cubic feet

- The ability to test advanced sensors and instrumentation for the core and test positions.
- Expedited experiment life cycle by enabling easy access to support facilities for experiments fabrication and post-irradiation examination.
- Management of the reactor driver fuel (fuel needed to run the reactor) while minimizing cost and schedule impacts.
- Access to the facility for testing as soon as possible by using proven technologies with a high technology readiness level.

Having identified the need for the VTR, NEICA directs DOE "to the maximum extent practicable, complete construction of, and approve the start of operations for, the user facility by not later than December 31, 2025." Secretary of Energy Rick Perry announced the launch of the VTR project on February 28, 2019, as a part of modernizing the nuclear research and development (R&D) user facility infrastructure in the United States.

The DOE *Mission Need Statement for the Versatile Test Reactor (VTR) Project, A Major Acquisition Project* (DOE 2018a) embraces the development of a well-instrumented, sodium-cooled, fast-neutron-spectrum test reactor in the 300 megawatt-thermal power level range. This design would offer a flexible, reconfigurable testing environment for known and anticipated testing. It is the most practical and cost-effective strategy to meet the mission need and address the constraints and considerations identified above. The deployment of a sodium-cooled, fast-neutron-spectrum test reactor is consistent with the conclusions of the test reactor options study (INL 2017d) and the NEAC recommendation (NEAC 2017).

DOE expects that the VTR, coupled with existing supporting R&D infrastructure, would offer the basic and applied physics, materials science, nuclear fuels, and advanced sensor communities a unique research capability. This capability would enable a comprehensive understanding of the multi-scale and multi-physics performance of nuclear fuels and structural materials to support developing and deploying advanced nuclear energy systems. To this end, DOE is collaborating with universities, commercial industry, and national laboratories to identify needed experimental capabilities.

1.3 Purpose and Need for Agency Action

The purpose of this DOE action is to establish a domestic, versatile, reactor-based fast-neutron source and associated facilities that meet identified user needs (e.g., providing a high neutron flux of at least 4×10^{15} neutrons per square centimeter per second and related testing capabilities). Associated facilities include those for the preparation of VTR driver fuel and test/experimental fuels and materials and those for the ensuing examination of the test/experimental fuels and materials; existing facilities would be used to the extent possible. The United States has not had a viable domestic fast-neutron-spectrum testing capability for over two decades. DOE needs to develop this capability to establish the United States' testing capability for next-generation nuclear reactors—many of which require a fast-neutron spectrum for operation—thus enabling the United States to regain technology leadership for the next generation nuclear fuels, materials, and reactors. The lack of a versatile fast-neutron-spectrum testing capability is a significant national strategic risk affecting the ability of DOE to fulfill its mission to advance the energy, environmental, and nuclear security interests of the United States and promote scientific and technological innovation. This testing capability is essential for the United States to modernize its nuclear energy industry. Further, DOE needs to develop this capability on an accelerated schedule to avoid further delay in the U.S. ability to develop and deploy advanced nuclear energy technologies. If this capability is not available to U.S. innovators as soon as possible, the ongoing shift of nuclear technology dominance to other nations will accelerate, to the detriment of the U.S. nuclear industrial sector.

1.4 Proposed Action and Scope of this EIS

DOE proposes to construct and operate the VTR at a suitable DOE site. DOE would use existing or expanded, co-located, post-irradiation examination capabilities as necessary to accomplish the mission. DOE would also use or expand existing facility capabilities to produce VTR driver fuel and to manage radioactive wastes and SNF. The DOE facilities would be capable of receiving test articles from the user community, as well as fabricating test articles for insertion in the VTR.

Candidate sites for construction and operation of the VTR include the Idaho National Laboratory (INL) near Idaho Falls, Idaho, and the Oak Ridge National Laboratory (ORNL), near Oak Ridge, Tennessee. DOE would perform most post-irradiation examination in existing, modified, or new facilities near the VTR, although there may be instances when test items would be sent to another location for evaluation. DOE would produce VTR driver fuel at the INL Site or the Savannah River Site (SRS) near Aiken, South Carolina. **Figure 1–1** shows the locations of these DOE sites. Chapter 2 describes the alternatives and options evaluated in this VTR EIS.

1.5 Decisions to be Supported

This VTR EIS provides the DOE decision-maker with important information regarding potential environmental impacts for use in the decision-making process. In addition to environmental information, DOE will consider other factors (e.g., cost, schedule, strategic objectives, technology needs, and safeguards and security) when making its decision. Decisions to be made by the DOE decision-maker regarding the VTR EIS project are whether to:

- Construct a VTR to create a fast-neutron source;
- Establish, through modification or construction, co-located facilities for post-irradiation examination of test products and for management of spent VTR driver fuel;
- Locate the VTR at the INL Site or at ORNL; and
- Establish VTR driver fuel production capabilities for feedstock preparation and fuel fabrication at the INL Site, SRS, or a combination of the two sites.

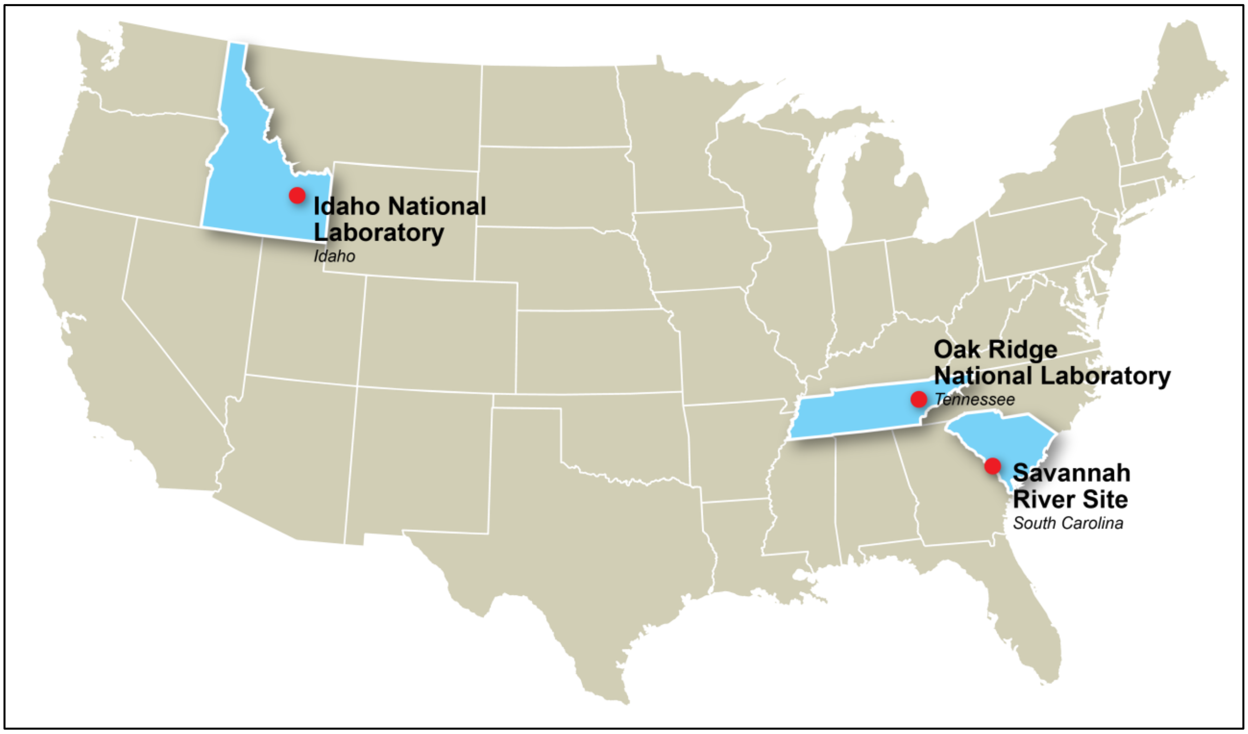

Figure 1–1. Location of Facilities Evaluated in this VTR EIS

There are subjects related to the VTR for which DOE will not make decisions based on the VTR EIS analysis. These subjects include:

DOE will not make a decision to employ a different reactor technology to provide the testing capabilities to meet the need for a fast-neutron source.

As directed by NEICA, DOE has determined that there is a mission need for a versatile reactor-based fast-neutron source. Having made that determination, to the maximum extent practicable, DOE is planning to complete construction of and approve the start of operations of a VTR by as soon as 2026.[3] To support this schedule, DOE proposes construction of a pool-type test reactor using sodium as a coolant. As discussed in Chapter 2, Section 2.2.1, DOE is selecting this technology because of its level of technical maturity. Because other technologies are less well developed, as discussed in Section 2.7, DOE will not make a decision regarding use of a different reactor technology to establish a fast-neutron source.

DOE will not make a decision to terminate R&D in support of nuclear energy.

As indicated in Section 1.2, Background, part of DOE's mission is to advance the energy, environmental, and nuclear security interests of the United States and to promote scientific and technological innovation in support of that mission. In fulfilling that mission, DOE will continue to explore advanced concepts in nuclear energy and support R&D that advances the state of knowledge, promotes safety, and may lead to new types of reactors.

[3] DOE's schedule is consistent with the NEICA direction for DOE "to the maximum extent practicable, complete construction of, and approve the start of operations for, the user facility by not later than December 31, 2025." Completion of construction and startup of operations are dependent on a number of factors including completion of this EIS, progress on design, and congressional appropriations.

1.6 Related NEPA Documents

DOE and other Federal agencies have prepared other NEPA documents related to the scope of the VTR project. These documents are discussed below. General or multi-site NEPA documents are discussed first followed by INL, ORNL, and SRS NEPA documents.

1.6.1 General or Multi-Site NEPA Documents

Liquid Metal Breeder Reactor NEPA Documents – In the 1970s, the U.S. Energy Research and Development Administration (ERDA), a predecessor agency of DOE, proposed the Liquid Metal Fast Breeder Reactor Program. ERDA prepared a programmatic EIS on the Liquid Metal Fast Breeder Reactor Program in 1975 (ERDA 1975), and prepared an EIS on Expansion of the U.S. Breeder Reactor Program, in June 1976 (ERDA 1976). DOE prepared a supplement to the 1975 document in May 1982 (DOE 1982). The U.S. Nuclear Regulatory Commission prepared an environmental statement in connection with its licensing process (NRC 1977). A supplement was published in 1982 (NRC 1982). As part of this program, the Clinch River Breeder Reactor Plant was a proposed liquid-sodium-cooled fast breeder reactor to be constructed and operated in East Tennessee. The project was terminated in 1983 (BRC 1985). Although the VTR would not be a breeder reactor, these NEPA documents are relevant because they were prepared for liquid-metal-cooled reactors that would use uranium-plutonium fuel.

Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility **(NI PEIS) (DOE/EIS-0310) (DOE 2000b)** – Under the authority of the Atomic Energy Act of 1954, as amended, DOE is responsible for ensuring the availability of isotopes for medical, industrial, and research applications. DOE is also responsible for meeting the nuclear material needs of other Federal agencies and undertaking R&D activities related to development of nuclear power for civilian use. To meet these responsibilities, DOE maintains nuclear infrastructure capabilities that support various missions. In the NI PEIS, DOE proposed to enhance these capabilities to:

- Produce isotopes for medical and industrial uses,
- Produce plutonium-238 for use in advanced radioisotope power systems for future National Aeronautics and Space Administration (NASA) space exploration missions, and
- Meet the Nation's nuclear R&D needs for civilian application.

In the Record of Decision (ROD) for the NI PEIS, published in the *Federal Register* on January 26, 2001 (66 FR 7877), DOE decided to reestablish domestic production of plutonium-238 to support U.S. space exploration. For this purpose, the Advanced Test Reactor (ATR) at the INL Site and the High Flux Isotope Reactor (HFIR) at ORNL would be used to irradiate neptunium-237 targets. Plutonium-238 production would not interfere with existing primary missions at ATR and HFIR. The Radiochemical Engineering Development Center at ORNL would be used for fabricating targets and separating plutonium-238 from the irradiated targets. In addition, the Fast Flux Test Facility (FFTF) near Richland, Washington, would be deactivated permanently and DOE would not construct the new accelerator(s) and new research reactor described in the NI PEIS. The NI PEIS is relevant because in the ROD (66 FR 7877), DOE decided that FFTF would be permanently deactivated and a new research reactor would not be constructed. This NEPA document is also relevant because some of the same facilities could be used to support the VTR project.

Final Waste Management Programmatic Environmental Impact Statement for Managing, Treatment, Storage, and Disposal of Radioactive and Hazardous Waste **(DOE/EIS-0200) (DOE 1997a);** ***Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement Eddy County, near Carlsbad, New Mexico*** **(DOE/EIS-0026-S-2) (DOE 1997b); and** ***Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security***

***Administration Nevada National Security Site and Off-Site Locations in the State of Nevada* (DOE/EIS-0426) (DOE 2013c)** – Collectively, these three EISs evaluated waste management activities that affect many DOE sites and programs. The facilities discussed below would be used for managing waste generated by the VTR program.

Following the analysis in the *Waste Management Programmatic EIS*, DOE issued its programmatic decision selecting the alternatives for disposal of low-level and mixed low-level radioactive waste at regional disposal facilities. DOE's decision included continuing the use of onsite disposal for certain sites (including INL) where practicable (64 FR 69241). The Nevada Test Site (now the Nevada National Security Site [NNSS]) was one of the identified regional disposal sites. DOE also announced its decision that each DOE site would prepare its own transuranic waste for disposal at the Waste Isolation Pilot Plant (WIPP) facility (63 FR 3629).

The WIPP Disposal Phase Final Supplemental EIS was prepared to assess the potential environmental impacts of continuing the phased development of WIPP as a geologic repository for the safe disposal of transuranic waste. Following that analysis, DOE announced its decision to dispose of defense transuranic waste at WIPP following preparation of waste to meet WIPP's waste acceptance criteria (63 FR 3624).

The Final Site-Wide EIS for Continued Operation of the Nevada National Security Site analyzed the potential environmental impacts of alternatives for continued management and operation of NNSS, including its Environmental Management Mission, which includes operation of onsite low-level radioactive waste disposal facilities. In its December 30, 2014 ROD, the National Nuclear Security Administration selected the Expanded Operations Alternative for the low-level radioactive waste disposal portion of its Environmental Management Mission (79 FR 78421). The NNSS waste disposal facility is one of DOE's regional facilities that accepts waste meeting acceptance criteria for disposal. The selected alternative provides capacity to receive waste from offsite generators. The INL Site is one of the DOE sites that sends authorized waste streams to NNSS for disposal.

***Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (Hanford Tanks EIS) (DOE/EIS-0391) (DOE 2012a)** – The Hanford Tanks EIS addressed proposed actions in three major areas: 1) retrieving and treating radioactive waste from underground storage tanks at Hanford; 2) decommissioning the FFTF and its auxiliary facilities; and 3) continued and expanded solid waste management operations, including disposal of low-level and mixed low-level radioactive waste. Only the FFTF activities are relevant to the VTR EIS and are discussed below.

The Hanford Tanks EIS evaluated three FFTF decommissioning alternatives: (1) No Action, (2) Entombment, and (3) Removal. DOE's Preferred Alternative for FFTF decommissioning was Alternative 2: Entombment, which would remove all above-grade structures, including the reactor building. Below-grade structures, the reactor vessel, piping, and other components would remain in place and be filled with grout to immobilize the remaining radioactive and hazardous constituents. An engineered modified Resource Conservation and Recovery Act Subtitle C barrier would be constructed over the filled area. The remote-handled special components would be processed at INL and returned to Hanford for disposal. Bulk sodium would be processed at Hanford for use in the Hanford Waste Treatment Plant.

In the ROD for the Hanford Tanks EIS (78 FR 75913), DOE decided to implement FFTF Decommissioning Alternative 2: Entombment. This alternative was chosen because it fulfills the programmatic objectives for closure of the FFTF facilities, is more cost effective, and is also the environmentally preferred alternative. Implementation of the Entombment Alternative would result in very low impacts to human health and the environment. This NEPA document is relevant because it evaluated FFTF decommissioning alternatives and reaffirmed DOE's decision in the NI PEIS to decommission FFTF. To date, this alternative has not been implemented and surveillance and maintenance activities continue at FFTF.

1.6.2 Idaho National Laboratory

Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement **(SNF PEIS) (DOE/EIS-0203) (DOE 1995)** – The SNF PEIS analyzed, at a programmatic level, the potential environmental consequences over a 40-year period of alternatives related to the transportation, receipt, processing, and storage of SNF under the responsibility of DOE. It also addressed the site-wide actions anticipated to occur at the INL Site for waste and SNF management. In the first ROD (60 FR 28680), DOE decided to manage its SNF by type (fuel cladding and matrix material) at the Hanford Site, INL, and SRS. Under this decision, the fuel type distribution would be as follows:

- Hanford production reactor fuel would remain at the Hanford Site.
- Aluminum-clad fuel would be consolidated at SRS.
- Non-aluminum-clad fuels (including Naval SNF) would be transferred to INL.

In an amended ROD (64 FR 23825), DOE announced a decision to use a multi-purpose canister or comparable system for the loading and storage of DOE-owned SNF at the INL Site and transportation of this SNF for ultimate disposition outside the State of Idaho. Many of the issues addressed in the SNF PEIS are similar to the issues addressed in this VTR EIS, including SNF management, and management of other radioactive materials and nuclear wastes at INL.

Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel **(Sodium-Bonded EIS) (DOE/EIS-0306) (DOE 2000a)** – The Sodium-Bonded EIS evaluated strategies to remove or stabilize the reactive sodium contained in a portion of DOE's SNF inventory to prepare the SNF for disposal in a geologic repository. The Sodium-Bonded EIS analyzed, under the proposed action, six alternatives that employed one or more of the following technology options at nuclear fuel management facilities at SRS or INL. These options were electrometallurgical treatment, the plutonium-uranium extraction process, packaging in high-integrity cans, and the melt and dilute treatment process. In the ROD (65 FR 56565), DOE decided to implement the preferred alternative of electrometallurgically treating the Experimental Breeder Reactor-II SNF and miscellaneous small lots of sodium-bonded SNF at Argonne National Laboratory-West (now the Materials and Fuels Complex [MFC]) at INL. Because of the different physical characteristics of the Fermi-1 sodium-bonded blanket SNF (also analyzed in the Sodium-Bonded EIS), DOE decided to continue to store this material while alternative treatments are evaluated. This NEPA document is relevant because the sodium-bonded SNF used in the VTR would also need to be treated prior to disposal.

Resumption of Transient Testing of Nuclear Fuels and Materials at the Idaho National Laboratory, Idaho **(DOE/EA-1954) (DOE 2014b)** – This Environmental Assessment (EA) evaluated DOE activities associated with its proposal to resume testing of nuclear fuels and materials under transient high-power test conditions at the Transient Reactor Test (TREAT) Facility located about 0.5 miles northwest of MFC. The TREAT Facility provides a power transient test capability for fuels that would be tested under steady-state irradiation conditions in the VTR. This EA resulted in a Finding of No Significant Impact (FONSI) (DOE 2014c). This NEPA document is relevant because some of the same support facilities could be used for the VTR project.

Categorical Exclusion Determination, Sample Preparation Laboratory **(DOE-ID 2019c)** – This categorical exclusion determination considered constructing and operating an approximately 49,000 square foot, three-story, Sample Preparation Laboratory at MFC. The facility would supplement current capabilities at

MFC (e.g., the Irradiated Materials Characterization Laboratory and Hot Fuel Examination Facility) with a building dedicated to non-alpha sample preparation to study fuel and material performance in the nuclear environment at the micro, nano, and atomic scale. This project includes a shielded hot cell(s) to support sample preparation of non-alpha bearing materials with the ability to receive small- and medium-sized casks, as well as sort, size, polish, mount, and conduct initial analysis of materials specimens. This NEPA document is relevant because the Sample Preparation Laboratory is a support facility that could be used by the VTR project.

1.6.3 Oak Ridge National Laboratory

***Environmental Assessment, Management of Spent Nuclear Fuel on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/EA-1117) (DOE 1996a)** – This EA evaluated the potential impacts of the management of SNF on the Oak Ridge Reservation (ORR) (including ORNL). SNF would be retrieved from storage; loaded into containers and transport casks that meet regulatory requirements; and shipped via truck to offsite storage at either SRS or INL. If separation by fuel type or repackaging were required, the SNF would be transferred by truck to a hot-cell facility for processing prior to offsite shipment. The proposed action also included construction and operation of a dry cask SNF storage facility at ORNL to enable reactor operations to continue in the event of an interruption of offsite SNF shipment. This EA resulted in a FONSI (DOE 1996b). This document is relevant because it deals with the management of SNF generated at ORNL.

1.6.4 Savannah River Site

***Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (DOE/EIS-0283-S2) (DOE 2015a)** – This Supplemental EIS evaluated the potential environmental impacts of alternatives for the disposition of surplus plutonium, which had no previously assigned disposition path. The evaluation included plutonium from pits declared “excess” to national defense needs and surplus non-pit plutonium. The analysis considered the impacts from disassembling pits at SRS or Los Alamos National Laboratory (LANL), so the plutonium could be further processed. The analysis also evaluated installation and operation of gloveboxes at the K Area Complex at SRS or LANL to process the plutonium to an appropriate form for disposition.

This Supplemental EIS is relevant to the VTR project because this VTR EIS evaluates an option of performing VTR driver fuel production at SRS. VTR reactor fuel production would involve the installation and operation of glovebox lines in an existing building at SRS. This Supplemental EIS also evaluated the use of gloveboxes installed in an existing SRS building. Although the processes are different, estimates of the installation and operation parameters for the Supplement EIS provided a basis for estimating certain parallel activities for this VTR EIS.

1.7 Public Involvement

On August 5, 2019, DOE published a Notice of Intent (NOI) in the *Federal Register* (84 FR 38021) to prepare this VTR EIS to evaluate the potential environmental impacts of constructing and operating a VTR capability. Publication of the NOI initiated a 30-day public scoping period.

NEPA-implementing regulations require an early and open process for determining the scope of an EIS and for identifying the significant issues related to the proposed action. To ensure that a full range of issues related to the proposed action are addressed, DOE invited Federal agencies, State, local, and tribal governments, and the general public to comment on the scope of the VTR EIS. Specifically, DOE invited comments on the identification of reasonable alternatives and specific environmental issues to be addressed.

During the scoping period, DOE hosted two interactive webcasts on August 27 and 28, 2019. The purpose of the webcasts was two-fold. The first purpose was to present information to the public about the NEPA process and the VTR project. The second was to invite public comments on the scope of the VTR EIS.

DOE received 45 comment documents,[4] in which 173 comments[5] were identified. Analysis of written and oral public comments submitted during the scoping period helped DOE further identify concerns and potential issues considered in the VTR EIS. Appendix G summarizes the scoping comments.

DOE is offering opportunities for public review and comment, including public hearings, on this Draft VTR EIS. Public involvement opportunities and public hearing information will be announced in newspapers in communities near potentially affected areas and in other communications with stakeholders. Comments received during the public comment period will be evaluated in preparing the Final VTR EIS. Comments received after the close of the public comment period will be considered to the extent practicable.

DOE plans to publish the Final VTR EIS in 2021. As required by CEQ regulations (40 CFR 1506.10), DOE will issue a ROD no sooner than 30 days after publication of the Environmental Protection Agency's Notice of Availability of the Final VTR EIS.

[4] A comment document is a communication in the form of a letter, an electronic communication (email), a transcription of a recorded phone message, or a transcript from an individual speaker at a public meeting or hearing, that contains comments from a sovereign nation, government agency, organization, or member of the public regarding the VTR EIS.

[5] A comment is a statement or question regarding the EIS content that conveys approval or disapproval of proposed actions, recommends changes, or seeks additional information.