U.S. Department of Energy
Office of Nuclear Energy
National Environmental Policy Act
Determination

NEPA Identification.: DOE-ID-26-007

Proposed Action Title: Standard Nuclear Pilot Fuel Facility- SN-T

Location(s) (City/County/State): Oak Ridge, TN

Proposed Action Description

Standard Nuclear, Inc. proposes to operate a pilot fuel facility (SN-T) on Standard Nuclear-owned land in Oak Ridge, TN under U.S. Department of Energy (DOE) authorization. SN-T will process uranium with U-235 enrichment <20 wt% into tri-structural isotropic (TRISO)- based nuclear fuel in quantities sufficient to meet an annual capacity of at least 1,000 kgU. The SN-T facility is within the East Tennessee Technology Park (ETTP), the site of the former K-25 gaseous diffusion plant previously owned by DOE. It was extensively remediated and characterized by the DOE office of Environmental Management (DOE-EM) after which the brownfield site was turned over for private industrial use. As a part of this project, the site has an extensive characterization history, to include an environmental assessment (EA) conducted in October of 2011 (DOE/EA-1640) that resulted in a Finding of No Significant Impact for the conveyance (lease, easement, and/or title transfer) of DOE property located at ETTP and surrounding area for mixed use economic development. The relative location to Oak Ridge National Laboratory and the Y-12 National Security Complex are demonstrated within Figure 1.



Figure 1: Location of ETTP relative to Oak Ridge National Laboratory and Y-12 Complex



Figure 2: Satellite view of the SN-T facility footprint

This site is roughly 10.8 acres and is bounded on the north by Oak Ridge fire department building and to its west by a DOE building (K-1650) and DOE land. See Figures 3 and 4 below for a photo of the SN-T facility and location on the site. The specific location selected for the plot is expected to minimize environmental concerns for Standard Nuclear.



Figure 3: *Tennessee CAT II facility located on the northeast of Standard Nuclear campus in Oak Ridge, TN (former K25 site).*

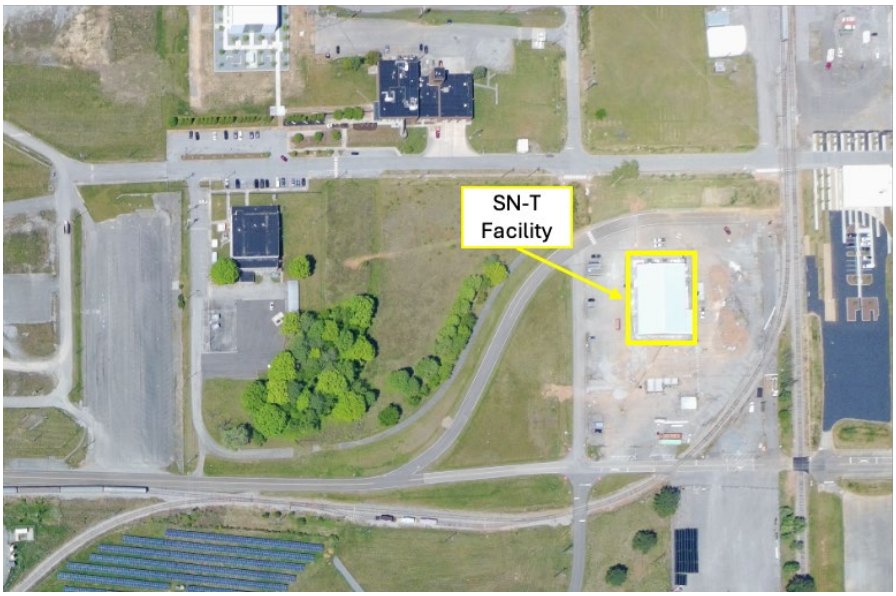


Figure 4: *Overhead Photo of SN-T site for CAT II facility located on the northeast of Standard Nuclear campus in Oak Ridge, TN (former K25 site).*

The SN-T facility will be utilizing the same manufacturing process proven at Standard Nuclear's existing Tennessee facility (SN-0). The structures for the SN-T facility consists of a pre-engineered metal building (PEMsB) for all fuel development and manufacturing activities and a tank farm with tanks of various capacity to hold process gases used in manufacturing. The SN-T facility construction is a non-Federal action that is not subject to DOE authorization activities and therefore NEPA does not apply.

SN-T meets the definition of "small-scale" in relation to industry norms found in the U.S. Department of Energy NEPA Implementing Procedures. For a relevant commercial nuclear fuel industry comparison, Westinghouse Electric Company's Columbia Fuel Fabrication Facility is ~550,000 sqft and occupies ~1100 acres. This is roughly 40x the square footage and 100x the land use of SN-T.

The SN-T facility operations will involve activities that include research and development. The work at SN-T to develop and manufacture fuel in support of the Reactor Pilot Program will involve development of reactor-specific fuel (i.e. the ultimate fuel specification will differ by the reactor end user) required for reactor demonstration.

Attribute	Description
Fuel Type	Tri-structural isotropic (TRISO)-based advanced fuel (TRISO fuel particles with final fuel forms that may be compacts, pebbles, or pellets)
SNM Form	Enriched uranium (<20% LEU)
Site Size	10.8 acres

Power Demand	< 1.5 MW with an uninterrupted power supply (UPS)
Water/Utility Use	Utilities will be provided by the local utility (City of Oak Ridge). If connected, there will be discharge from restroom facilities for ~20 employees and discharge from an industrial process that will be sampled prior to discharge. Comparable operations at SN-0 are sampled to confirm contaminants are at or below drinking water standards for Tennessee prior to discharge to the local sanitary sewer system.
Emissions	Negligible (non-significant emissions unit). HEPA filtered air output maintaining negative pressure for operations within the radiological facility.

Environmental Aspects/Impacts

Existing environment and potential/anticipated environmental impacts:

All construction activities, including any lay-down areas, will be confined to previously disturbed areas, minimizing ecological disruption. Environmental impacts from construction will not be outside the impacts expected from construction of a pre-engineered metal building. The Tennessee Department of Environment and Conservation (TDEC) assessment of current Standard Nuclear operations in Tennessee, which are similar in scale and magnitude with respect to emissions and environmental impacts, showed no environmental impacts for the manufacturing and waste disposition process. The SN-T pilot facility will use the same manufacturing process. Therefore, it is not expected that emissions, effluents, or noise concerns will change from the existing Standard Nuclear facility. Operational impacts are expected to be consistent with existing industrial activities at ETTP. No significant changes to land use patterns are anticipated.

Land Use: The proposed 10.8-acre parcel is within the former site of the K-25 Gaseous Diffusion Plant where uranium was enriched for weapons and commercial reactors until the plant was permanently shut down in 1987. Since then, it has undergone brownfield decommissioning and is now a public industrial park. The parcel has been previously disturbed, minimizing the likelihood of encountering undisturbed ecological or cultural resources. Prior to site preparation as a part of this project, it was a vacant asphalt parking lot.

Current Land Usage: The SN-T site is designated within the City of Oak Ridge for industrial use and previously supported DOE operations over several decades. No agricultural or residential activities are present.

Utility Infrastructure: The parcel is adjacent to existing local utility corridors that include electrical transmission lines. The City of Oak Ridge has verified that existing utility infrastructure is sufficient to support this project. These assets are mapped and managed under local infrastructure planning protocols, and no new corridors are anticipated unless project-specific needs dictate otherwise.

Land Use Impacts from Construction and Operation: Construction activities, to include any laydown or staging areas, will be confined to previously disturbed areas, minimizing ecological disruption. Operational impacts are expected to be consistent with existing industrial activities at ETTP. No significant changes to land use patterns are anticipated.

Waste Disposal Considerations: Waste generated during construction will be properly disposed of. During operations the facility generates very little low-level radioactive waste, and virtually all scrap materials are recycled in the manufacturing processes. It will be disposed of by commercial vendors as done at Standard Nuclear's current radiological facilities today (i.e. Energy Solutions). Any toxic and hazardous waste streams will be evaluated for Resource Conservation and Recovery Act of 1976 applicability, and disposal will follow DOE and EPA protocols.

Effluent Discharges and Settling Ponds: Effluent discharges will comply with applicable state and federal regulations. At present, no settling ponds are planned; however, if effluent characteristics warrant such infrastructure, design and permitting will be coordinated with TDEC. All water use and discharge will be subject to review under applicable state and federal regulations.

Air quality: The proposed project site at 200 Europia Avenue in Oak Ridge, Tennessee lies within EPA Region 4 and is regulated under the Tennessee State Implementation Plan (SIP) for air quality, with local oversight coordinated through state and regional air quality agencies. The area is part of a federally designated air quality planning region under the Clean Air Act and is subject to National Ambient Air Quality Standards (NAAQS). There are no expected radiological releases from normal operations.

Hydrologic conditions/water quality: The SN-T site is located outside of both the 100-year and 500-year floodplains.

Geologic/soil conditions: The ETTP is underlain by carbonate bedrock of the Chickamauga and Knox Groups and clastic bedrock of the Rome Formation. Site geology is complex due to faults, folds, fractures, and karst features, including the Whiteoak Mountain and K-25 faults, which have placed Rome Formation rocks over Chickamauga Group rocks and juxtaposed Knox Group rocks in the northeastern area. These faults are no longer active, with the last significant movement occurring more than 200 million years ago.

Vegetation resources: Vegetation within the fenced industrialized area of ETTP includes a mixture of mowed grasses with a few shrubs and trees (especially around buildings), small areas of mixed tree/shrub/grass associations, or mixed evergreen-deciduous vegetation. Many of the shrubs and trees have been planted as landscaping, although some native species are found in un-mowed areas around ponds and along waterways. The Duct Island area and the former K-25 Powerhouse area include planted pine trees, second-growth mixed coniferous-deciduous vegetation, and open areas, particularly with transmission line right of way. Vegetation within the project parcel is extremely limited due to the site being covered in asphalt since the DOE transitioned this land to ETTP.

DOE conducted an Environmental Assessment in 2011 (DOE/EA-1640) and determined the following to be true: "Adverse environmental impacts to existing habitat or wildlife would be limited because construction activities would primarily occur within existing or previously disturbed areas. Development would result in the removal of native vegetation and minor habitat fragmentation in some previously developed and undeveloped areas. However, the actual footprint of disturbance in these areas would be relatively small, and there are large areas of similar habitat adjacent to these sites. Normal facility operations would not have any adverse impacts on wildlife or pose any unacceptable ecological risk. The potentially affected areas are primarily industrialized, fragmented, and disturbed; no rare, threatened, and endangered plant and animal species are known to occur, therefore adverse impacts are not anticipated". Since this assessment, there have been no changes to that would impact the nature of these findings due to the massive cut and fill operations that were executed at the former DOE K-25 site.

Wildlife resources: The resulting diversity of wildlife species ranges from common species found in urban and suburban areas of eastern Tennessee to species with more restrictive requirements, such as interior forest bird species. The Oak Ridge Reservation hosts more than 70 species of fish; about 45 species of reptiles and amphibians; more than 200 species of migratory, transient, and resident birds; and more than 30 species of mammals, as well as innumerable invertebrate species. Nevertheless, limited habitat is available for native animals within the industrialized main ETTP area. These areas host urbanized species that adapt well to disturbance and the presence of humans. These include small rodents, groundhogs, birds such as starlings, pigeons, Canada geese, and small reptiles. Large wildlife such as white-tailed deer are frequently seen in the vicinity. Other common mammals that are present within the lesser-developed areas of the study area include the Virginia opossum, gray squirrel, eastern chipmunk, eastern cottontail rabbit, and raccoon. Normal facility operations would not have any adverse impacts on wildlife or pose any unacceptable ecological risk. The potentially affected areas are primarily industrialized, fragmented, and disturbed; no rare, threatened, and endangered plant and animal species are known to occur, therefore adverse impacts are not anticipated. DOE has no Endangered Species Act requirements or separate consultation procedures to complete DOE's proposed action.

Visual resources: There are no known or recorded visual resources (scenic vistas or aesthetic environments) within or immediately adjacent to the facility footprint (i.e. the ETTP).

Historic/cultural resources: The proposed project has a low potential to affect archaeological sites or Native American sites and religious practices. The proposed project area has been disturbed by past construction and demolition of facilities and landscaping. A cultural resource survey was completed for the Oak Ridge K-25 Site in 1994. The survey included an architectural survey in the plant area proper and an archaeological survey of the adjacent areas outside the plant boundaries. No known prehistoric archaeological resources are known to exist within the area proposed for conveyance. Because of the massive cut and fill operations causing extensive disturbance during the construction of the former K-25 Site, there are likely no intact archaeological sites to be found within the ETTP security fences. Subsequently, DOE has determined that DOE's proposed action has no reasonably foreseeable impacts that would cause effects under Section 106 of the National Historic Preservation Act and has "no potential to cause effects" to historic properties per 36 C.F.R. §800.3(a)(1).

Waste generation: Waste during operations is limited chemical or radiological waste streams will be disposed of by qualified vendors. These are external licensed vendors that will receive and process these waste streams. No waste processing will be carried out at the SN-T pilot facility.

- Industrial/office waste:
  - Standard office supplies
  - Plastic/wrapping from deliveries
  - Wood Pallets
  - Cardboard
  - Vegetation
  - Food waste (packaging, etc.)
- Liquid discharge from scrubber – sampled prior to discharge. Current process for SN-0 is sampled at below drinking water standards for Tennessee prior to discharge.
- Fabrication Waste

  - Graphite dust and scrap: Generated during the shaping and machining of graphite compacts.
  - Pyrolytic carbon and silicon carbide residues: From coating processes that apply these layers to fuel kernels.
  - Defective particles: TRISO particles that fail quality control due to coating defects or kernel irregularities.
- Chemical Waste
  - Chlorinated compounds: Used in chemical vapor deposition processes, particularly for SiC layer formation.
  - Acids and solvents: Used in cleaning and etching steps during fabrication.
- Radiological Waste
  - Contaminated equipment and filters: From handling uranium-bearing materials.
  - Low-level radioactive waste: Includes gloves, Tyvek suits, booties, wipes, and other consumables used in the fabrication environment.

Health and safety aspects: The ETTP parcel is currently designated for industrial use and has supported various DOE and contractor operations over several decades. No agricultural or residential activities are present. The majority of the parcel is paved space surrounded by access roadways. Utilities will be located within the parcel.

The TDEC & City of Oak Ridge assessment of current Standard Nuclear operations in Tennessee showed no emissions, effluents, or noise concerns. The SN-T pilot facility will use the same manufacturing process. Therefore, it is not expected that emissions, effluents, or noise concerns will change from the existing Standard Nuclear facility.

Health and safety consequences for SN-T were evaluated using the Preliminary Documented Safety Analysis (PDSA) accident-analysis framework for selected representative and bounding postulated accidents, not solely from the qualitative hazard evaluation. The PDSA identifies the principal postulated accidents requiring consequence evaluation as an inadvertent nuclear criticality, hazardous material release, and radioactive/hazardous material release resulting from a combined natural phenomena hazard (NPH) facility-collapse scenario.

For these scenarios, radiological material-at-risk (MAR) and total effective dose (TED) consequences were evaluated for the facility worker, collocated worker, and public receptor using DOE-STD-3009-2014, NE-STD-1020-2025, and DOE-HDBK-1224 methods, and bounding chemical release consequences, including applicable concurrent releases, were evaluated against Protective Action Criteria (PAC) values. The PDSA/NPH scoping consequence analyses found radiological consequences for evaluated NPH scenarios below applicable NDC-3 evaluation thresholds and chemical concentrations below PAC-2 limits; for potential accident scenarios that could challenge evaluation guidelines without controls, SN-T credits passive safety class and safety significant controls along with appropriate TSR-level and administrative controls.

Based on the PDSA accident/consequence evaluation and credited controls, SN-T operations are expected to maintain risk to facility workers, collocated workers, the public, and the environment at acceptable levels and are not expected to result in significant adverse health and safety impacts.

Environmental regulation: As stated above, the SN-T pilot facility will use the same chemicals, equipment, process gases, etc. as the current Standard Nuclear operations in Tennessee. It is anticipated that the same regulations will govern the SN-T pilot facility. These are listed below.

- Compliance with Clean Water Act requirements
- Compliance with Tennessee Air Pollution Control Regulations
- Compliance with City of Oak Ridge Industrial and Commercial User Wastewater Discharge Regulations

- Compliance with Tennessee Hazardous Waste Management Act
- Other Transaction Agreement (OTA) between by DOE and Standard Nuclear
- DOE-STD-1271 - *Authorization Pathway for Nuclear Facilities*

References:

B3.6 “Small-scale research and development, laboratory operations, and pilot projects”

Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Environmental Assessment, Transfer of Land and Facilities within the East Tennessee Technology Park and Surrounding Area, Oak Ridge, Tennessee (DOE/EA-1640)

For Categorical Exclusion Determinations

The proposal fits within the classes of actions listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE’s NEPA Implementing Procedures and satisfies the conditions that are integral elements of the classes of actions therein. The proposal does not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Appendix B.

There is no extraordinary circumstance related to the proposal that is likely to cause a reasonably foreseeable significant adverse effect or for which DOE does not know the environmental effect. Extraordinary circumstances are unique situations presented by specific proposals, including, but not limited to, scientific controversy about the environmental effects of the proposal; uncertain effects or effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources.

The proposal has not been segmented to meet the definition of a categorical exclusion. Segmentation can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action. However, segmentation does not include proposals that are developed and potentially implemented over multiple phases where each phase results in a decision whether to proceed to the subsequent phase.

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Based on my review of the proposed action, I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer:

JASON ANDERSON

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