DOE/EA-2151

FINAL ENVIRONMENTAL ASSESSMENT FOR THE TRITIUM FINISHING FACILITY AT THE SAVANNAH RIVER SITE

National Nuclear Security Administration

March 2021

CONVERSION CHART

To Convert Into Metric			To Convert Into English		
If You Know	**Multiple By**	**To Get**	**If you Know**	**Multiple By**	**To Get**
Length					
Inch	2.54	Centimeter	Centimeter	0.3937	Inch
Foot	30.48	Centimeter	Centimeter	0.0328	Foot
Foot	0.3048	Meter	Meter	3.281	Foot
Yard	0.9144	Meter	Meter	1.0936	Yard
Mile	1.60934	Kilometer	Kilometer	0.62414	Mile
Area					
Square inch	6.4516	Square centimeter	Square centimeter	0.155	Square inch
Square foot	0.092903	Square meter	Square meter	10.7639	Square foot
Square yard	0.8361	Square meter	Square meter	1.196	Square yard
Acre	0.40469	Hectare	Hectare	2.471	Acre
Square mile	2.58999	Square kilometer	Square kilometer	0.3861	Square mile
Volume					
Fluid ounce	29.574	Milliliter	Milliliter	0.0338	Fluid ounce
Gallon	3.7854	Liter	Liter	0.26417	Gallon
Cubic foot	0.028317	Cubic meter	Cubic meter	35.315	Cubic foot
Cubic yard	0.76455	Cubic meter	Cubic meter	1.308	Cubic yard
Weight					
Ounce	28.3495	Gram	Gram	0.03527	Ounce
Pound	0.45360	Kilogram	Kilogram	2.2046	Pound
Short ton	0.90718	Metric ton	Metric ton	1.1023	Short ton
Force					
Dyne	0.00001	Newton	Newton	0.00001	Dyne
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5th then add 32	Fahrenheit

METRIC PREFIXES

Prefix	Symbol	Multiplication factor
exa-	E	1,000,000,000,000,000,000 = 10^{18}
peta-	P	1,000,000,000,000,000 = 10^{15}
tera-	T	1,000,000,000,000 = 10^{12}
giga-	G	1,000,000,000 = 10^{9}
mega-	M	1,000,000 = 10^{6}
kilo-	k	1,000 = 10^{3}
deca-	D	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	µ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}

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ACRONYMS AND ABBREVIATIONS

AoA	Analysis of Alternatives
ARF	airborne release fraction
BLM	Bureau of Land Management
C&D	construction and demolition
CAA	*Clean Air Act*
CD	critical decision
CDR	Conceptual Design Report
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CHA	consolidated hazards analysis
Ci	curies
CSWTF	Central Sanitary Wastewater Treatment Facility
D&D	decontamination and decommissioning
DART	days away, restricted, or on job transfer
DoD	Department of Defense
DOE	U.S. Department of Energy
DR	damage ratio
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FONSI	finding of no significant impact
FR	*Federal Register*
FY	fiscal year
GTS	Gas Transfer Systems
HANM	H-Area New Manufacturing facility
HAOM	H-Area Old Manufacturing facility
HC	hazard category
HIVES	highly invulnerable encased safe
HVAC	heating, ventilation, and air conditioning
I	Interstate
kV	kilovolt
kW	kilowatt
LA	Limited Area
LCF	latent cancer fatality
LLW	low-level radioactive waste
LOC	loss of confinement
LOS	level of service
LPF	leak path factor
MAR	material at risk
MEI	maximally exposed individual
MLLW	mixed low-level radioactive waste
mrem	millirem
NAAQS	National Ambient Air Quality Standards

National Register	National Register of Historic Places
NDC	Natural Phenomena Hazard Design Category
NEPA	*National Environmental Policy Act of 1969*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NNSA	National Nuclear Security Administration
NPDES	National Pollution Discharge Elimination System
NPH	natural phenomena hazard
pCi	picocuries
PGA	peak ground acceleration
PLP	pre-loading process
PM_n	particulate matter less than or equal to n microns in aerodynamic diameter
RF	respirable fraction
ROD	Record of Decision
ROI	region of influence
RRS	returned reservoir storage
SCDHEC	South Carolina Department of Health and Environmental Control
SRNS	Savannah River Nuclear Solutions
SRS	Savannah River Site
SRS TFF EA	*Environmental Assessment for the Tritium Finishing Facility at the Savannah River Site*
ST	source term
SWM	solid waste management
SWPPP	Stormwater Pollution Prevention Plan
TEF	Tritium Extraction Facility
TFF	Tritium Finishing Facility
TRC	total reportable cases
UPS	uninterruptible power supply
U.S.	United States
U.S.C.	United States Code
USGS	U.S. Geological Survey
VRM	Visual Resource Management

1 INTRODUCTION

1.1 Background

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States (U.S.) Department of Energy (DOE), has the primary responsibility to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. The National Security Enterprise, overseen by the NNSA, includes production sites and design laboratories across the country. One of the critical production sites is the Savannah River Site (SRS), which occupies approximately 310 square miles primarily in Aiken and Barnwell counties in South Carolina (Figure 1-1). The majority of tritium-related missions for the National Security Enterprise are conducted at SRS (*see* Section 1.2). The management and operating contractor at SRS for NNSA for the Nuclear Security Enterprise is Savannah River Nuclear Solutions (SRNS).

What is Tritium?

Tritium is a radioactive isotope of hydrogen that occurs naturally in the environment in small quantities. However, it must be manufactured to obtain useful quantities. Tritium is not a fissile material and cannot be used by itself to construct a nuclear weapon. It is, however, an essential component of every nuclear weapon in the current and projected stockpile. These weapons depend on tritium to perform as designed. Tritium decays at about 5.5 percent per year; therefore, it requires periodic replacement.

Tritium, which is the subject of this environmental assessment (EA), is an essential component of every weapon in the current and projected U.S. nuclear weapons stockpile. Unlike other nuclear materials used in nuclear weapons, which have half-lives of thousands of years, tritium decays at a rate of 5.5 percent per year. Accordingly, as long as the nation relies on a nuclear deterrent, the tritium in each nuclear weapon must be replenished periodically.

In accordance with the Council on Environmental Quality (CEQ) regulations at 40 *Code of Federal Regulations* (CFR) Parts 1500−1508[1] and DOE *National Environmental Policy Act* (NEPA) implementing procedures at 10 CFR Part 1021, NNSA has prepared this *Environmental Assessment for the Tritium Finishing Facility at the Savannah River Site* (SRS TFF EA) to analyze the potential environmental impacts from constructing and operating the Tritium Finishing Facility (TFF) at SRS. The TFF would be used to inspect, store, finish, assemble, and package the gas transfer systems (GTSs), which contain the tritium reservoirs used in a nuclear weapon. See Section 2.2 of this EA for a detailed discussion of the Proposed Action.

Environmental Assessment

The primary purpose of an EA is to determine whether a proposed action would have significant environmental impacts. If none, no further NEPA documentation is required. If the analysis determines there would be significant environmental impacts, an environmental impact statement is required.

Depending on the results of the analysis presented in this SRS TFF EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an environmental impact statement (EIS); or (2) determine that a finding of no significant impact (FONSI) is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

[1] On July 16, 2020, the CEQ issued a final rule to update its regulations for Federal agencies to implement NEPA (85 *Federal Register* (FR) 43304). The effective date for the new regulations is September 14, 2020. Because this EA was initiated after that effective date, this EA has been prepared in accordance with the new CEQ regulations.

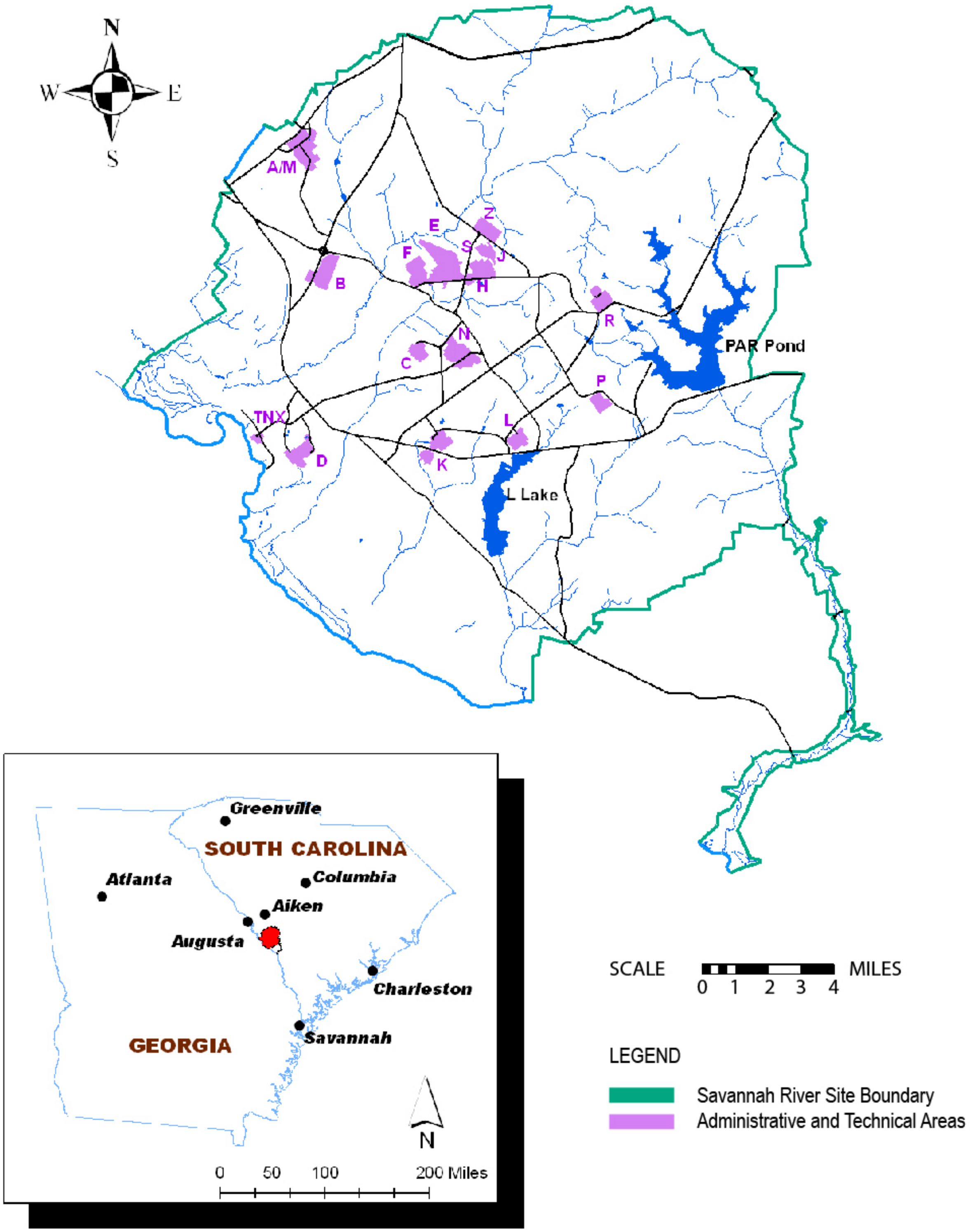

Figure 1-1—Location of the Savannah River Site

1.2 Purpose and Need for Agency Action

SRS is responsible for five enduring tritium-related missions that are vital to U.S. national security:

- **Tritium Supply –** extraction of tritium from irradiated burnable absorber rods (irradiation occurs in Tennessee Valley Authority nuclear power reactors) and management of the tritium inventory for the nuclear stockpile. Tritium extraction occurs in the Tritium Extraction Facility (TEF).

- **Nuclear Stockpile Maintenance –** loading of tritium and deuterium[2] into reservoirs that are used in the GTS of a nuclear weapon. This mission is currently accomplished in various buildings in the Tritium Area (inside H-Area), including Building 234-H (H-Area Old Manufacturing [HAOM]) and Building 233-H (H-Area New Manufacturing [HANM]), as shown on Figure 1-2.

- **Nuclear Stockpile Evaluation –** surveillance of GTS to support certification of the stockpile in the absence of nuclear testing. Some of these surveillance activities would be transferred from HAOM to the proposed TFF.

- **Helium-3 Recovery –** recovery of this byproduct of tritium's radioactive decay for use in neutron detectors. This mission is accomplished in HANM.

- **GTS/Tritium Research and Development –** In partnership with the National Security Laboratories, conduct research and development to support new GTS designs for alterations, modifications, and Life Extension Programs, and to enhance gas processing. This mission is supported by a number of SRS tritium facilities but would not involve the TFF.

The TFF and associated support facilities would relocate mission-critical operations from original 1950s vintage buildings to more modern buildings. This process started with Building 232-F, which was shut down in October 1958 and demolished in the mid-1990s. Building 232-H replaced 232-F and initially began operations in 1958, housing tritium extraction and gas purification processes. The tritium extraction process was relocated to a new facility (TEF) in 2006. The tritium gas purification process was relocated to the HANM building in 2004. Other smaller capabilities were also relocated to other, newer buildings within the Tritium Area. Building 232-H was placed in partial deactivation[3] in 2006 (SRNS 2020a).

The purpose of the TFF is to ensure that these capabilities and functions are available and reliable for the foreseeable future. The new TFF complex would reduce both annual and overall lifecycle costs and ensure the safety and security of the ongoing Tritium Mission at SRS (SRNS 2020a).

[2] Deuterium is a stable isotope of hydrogen that has an additional neutron in its nucleus as opposed to hydrogen-1, which does not.

[3] Partial deactivation includes removal of all waste materials, including radioactive, hazardous, and mixed wastes. Building 232-H was de-inventoried by removing all operational inventory of tritium. The facility was placed in an environmentally safe condition.

The initiative to relocate mission-critical operations started in fiscal year (FY) 2009 with the transitioning of functional capabilities out of Building 236-H. The Helium-3 recovery process, previously housed in Building 236-H, was relocated to HANM in 2012. Building 236-H was built in 1966 and is now shut down. The tritium reservoir reclamation process was conducted in Building 238-H, which was constructed in 1966. Reclamation operations ceased at the end of FY 2015, thus allowing Building 238-H to be shut down.

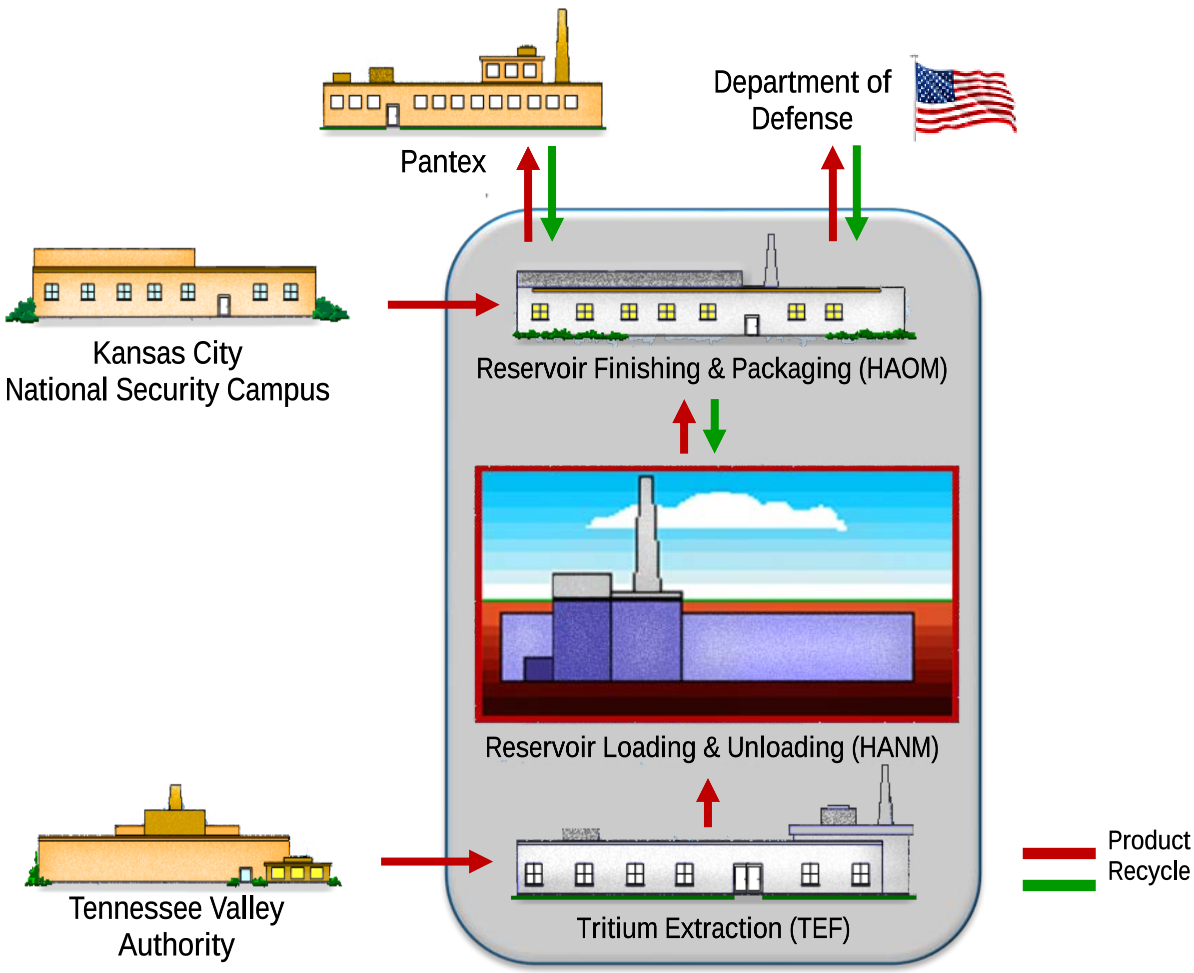

Figure 1-2—Overview of Tritium Operations at SRS

The last remaining legacy facility is Building 234-H, HAOM, which began operations in 1958. The original gas loading and unloading operations were relocated from HAOM to HANM in 1993. Reservoir-related, mission critical activities now housed in HAOM must be housed in areas that are not a substantial risk to the enduring Tritium Mission (SRNS 2020a; Parsons 2018a).

1.3 Proposed Action Evaluated in this Environmental Assessment

NNSA's Proposed Action is to construct and operate the TFF at SRS. The primary component of the proposal includes construction of two new buildings within the existing Tritium Area in H-Area; Building 1 would be a hazard category (HC)-2 nuclear facility and Building 2 would be a

HC-3 facility.[4] The TFF Proposed Action would include transfer of capabilities (inventory, processes, and equipment[5]) from HAOM to the TFF complex. More details about the Proposed Action are provided in Section 2.2 of this SRS TFF EA.

The existing HAOM would be put into cold standby; meaning, the facility would no longer be used for operations activities after the complete transfer of capabilities to the TFF. The functions, essential equipment, and tritium inventory would be removed from HAOM and transferred to TFF, and HAOM would be maintained in a cold standby condition to allow any tritium contamination in the building to decay over time. Decontamination and decommissioning (D&D) of HAOM would likely occur in the future; however, a specific end state for this facility has not been finalized; therefore, plans for addressing the facility are premature at this time. As a decision on the end state of HAOM is made, along with a schedule for addressing HAOM, NNSA would engage with regulators to ensure that regulatory requirements are completely addressed and met. This deferral of action is consistent with other tritium facilities that no longer support mission-related work scope. As with other tritium facilities that are determined to be excess and have no future mission, NNSA will prepare a separate NEPA review of HAOM, documenting how HAOM would be dispositioned.

1.4 *National Environmental Policy Act* Documents Related to the Proposed Action

This section identifies and discusses other NEPA documents that are relevant to this SRS TFF EA.

Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site (DOE/EIS-0271) (DOE 1999). This EIS presented potential environmental impacts associated with DOE's proposal to construct and operate a TEF at H-Area of SRS. The TEF provides the capability to extract tritium from commercial light-water reactor targets and from targets of similar design. The record of decision (ROD) for the TEF EIS announced DOE's decision to design, construct, test, and operate a new TEF in the H-Area immediately adjacent to and west of Building 233-H at SRS. This facility began operations in 2007 (64 FR 26369). As shown in Figure 1-2, the TEF is a facility that is critical to the Tritium Mission and is located about 500 feet west of the proposed TFF. The TEF EIS evaluated potential impacts related to a tritium mission in the same region of influence as the Proposed Action in this SRS TFF EA.

Final Environmental Assessment for the Tritium Facility Modernization and Consolidation Project at the Savannah River Site (DOE/EA-1222; DOE 1998). This EA (and accompanying FONSI) evaluated consolidation of tritium activities previously performed in Building 232-H into Buildings 233-H (HANM) and 234-H, as mentioned above in Section 1.2. All tritium processing operations conducted in Building 232-H, with the exception of extraction and obsolete or

[4] Under 10 CFR Part 830, DOE assigns hazard categories to nuclear and radiological facilities in accordance with the potential consequences of a radiological accident. The hazard category is based on the quantities of hazardous radiological materials, per DOE-STD-1027-1992. An HC-2 nuclear facility has the potential for significant onsite, but beyond localized, consequences. An HC-3 nuclear facility would only have the potential for localized consequences.

[5] In accordance with the TFF Equipment Reuse Plan (SRNS 2020j), most of the major equipment/components would be purchased or built new as a replacement for equipment currently used in HAOM.

abandoned systems, were relocated to HANM. The operations transferred included tritium processing to support the reservoir loading mission occurring in HANM. Building 234-H was evaluated to house the non-gas processing equipment moved out of Building 232-H. This project has several similarities with the Proposed Action of this SRS TFF EA, including the relocation of tritium processes to reduce the use of older tritium facilities in favor of newer, more technologically advanced structures, as described in Section 1.2. Figure 1-2 illustrates how the HANM supports the tritium mission.

1.5 Scope and Organization of this Environmental Assessment

In accordance with the CEQ regulations at 40 CFR Parts 1500−1508 and DOE NEPA implementing procedures at 10 CFR Part 1021, NNSA has prepared this SRS TFF EA to assess the potential environmental impacts of the Proposed Action and the No-Action Alternative. As such, this SRS TFF EA:

- Provides an introduction and background discussion of the Proposed Action and the purpose and need for NNSA's action (Chapter 1);
- Describes the Proposed Action and No-Action Alternative (Chapter 2);
- Describes the existing environment relevant to potential impacts of the alternatives and analyzes the potential environmental impacts that could result from the alternatives (Chapter 3);
- Presents a bibliographic listing of the references cited in this SRS TFF EA (Chapter 4).

1.6 Stakeholder Participation

In accordance with DOE's NEPA implementing procedures at 10 CFR 1021.301(d), on January 21, 2021, DOE provided the SRS TFF Draft EA to stakeholders with the State of South Carolina and the State of Georgia for a 21-day review. The South Carolina Department of Health and Environmental Control (SCDHEC) submitted comments on the Draft EA on February 10, 2021. SCDHEC's comments on the Draft EA are addressed in this SRS TFF Final EA and reproduced below:

> "The Department [SCDHEC] supports modernizing facilities that are used for the Savannah River Site's tritium mission including replacing legacy facilities when needed to ensure the safety and security of the tritium mission.
>
> The Department provides the following comments on the draft EA.
>
> Section 1.3 discusses that the HAOM (Building 234H) will be put in cold standby and that decommissioning and decontamination will occur in the future. We recommend that this section also identify that in the future Building 234H will be added to the schedule in the Federal Facilities [sic] Agreement (FFA).
>
> Section 3.4.1.1 Identifies that the tritium releases in 2019 were lower than the releases in 2018 because there were no major maintenance activities during 2019 in the tritium

processing facilities. Will activities associated with relocating equipment from the HAOM to the TFF result in any temporary increases in tritium releases similar to those from major maintenance activities?

Section 3.8.2. The proper consolidation and modernization of the current system to create the Tritium Finishing Facility should reduce the impacts to the environment and Environmental Justice communities."

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Development of the Proposed Action

In accordance with DOE Order 413.3B, "Program and Project Management for the Acquisition of Capital Assets," the TFF (formerly referred to as the Tritium Production Capability) underwent Critical Decision 0 (CD-0), which was signed on June 20, 2015. The mission need is to maintain tritium reservoir-related, mission-critical capabilities. These capabilities are housed in an outdated building that requires ever-increasing maintenance and infrastructure upgrades to meet reservoir delivery schedules.

NNSA prepared an Analysis of Alternatives (AoA), which was included in a Conceptual Design Report (CDR), that evaluated 16 alternatives to cover a wide range of options. The initial alternatives included new construction, modification of existing facilities both on and off site, repairing the current facility, and outsourcing the mission (Parsons 2018a).

The CDR used screening and evaluation criteria to assess if the alternatives could meet the mission need. During the screening process, four alternatives were eliminated, which included outsourcing and moving the process outside the Tritium Area at SRS.

NEPA and the Design Process

The design process for a major facility such as the TFF is carried out in accordance with DOE Order 413.3B. Within DOE, projects typically progress through five critical decisions (CDs), which serve as major milestones. Following approval of the first milestone, CD-0 (Mission Need), conceptual design activities begin. CD-1 approval marks the completion of the project definition and the conceptual design. Following CD-1, a project enters the execution phase, which includes preliminary design. The NEPA evaluation is generally completed between CD-0 and CD-2 and must be completed before CD-3 (Approve Start of Construction/Execution). After completion of CD-4, the project is ready to start operations. Conducting NEPA review early in the CD process provides environmental input into the design.

During an initial review and risk analysis, six additional alternatives were identified as unsuitable for continued evaluation. For the six remaining alternatives, data were gathered to assess how each alternative met the following qualitative criteria:

- Operational efficiency
- Feasibility of project implementation
- Safety to worker and public
- Impact to schedules (during construction)

The CDR and AoA identified the preferred alternative to be Alternative 9, which is to build a new facility for nuclear processes (with the appropriate HC classification for the facility function) and build an additional new facility for nonnuclear processes. Both of these new facilities are proposed to be constructed within the Tritium Limited Area (LA). In December 2019, NNSA approved the alternative selection and cost range (CD-1). The Proposed Action in this SRS TFF EA generally reflects the alternative approved in CD-1. The differences are described in Section 2.2.

2.2 Proposed Action

As identified in Section 1.3 of this SRS TFF EA, NNSA's Proposed Action is to construct and operate the TFF. The Proposed Action includes two new buildings within the existing Tritium Area; Building 1 (Building 249-12H) would be an HC-2 nuclear facility and Building 2 (Building 249-13H) would be an HC-3 nuclear facility.[6] The Proposed Action also includes construction of an external corridor to connect the existing 233-1H hallway from HANM into the proposed Building 249-12H,[7] removal of three nonradiological warehouses, replacement of one warehouse, and upgrades and infrastructure to support these facilities. After completion of construction activities, the Proposed Action includes the transfer of capabilities (inventory, processes, and limited equipment) from HAOM to the new facilities. Figure 2-1 provides an overview of the TFF (SRNS 2020a, 2021).

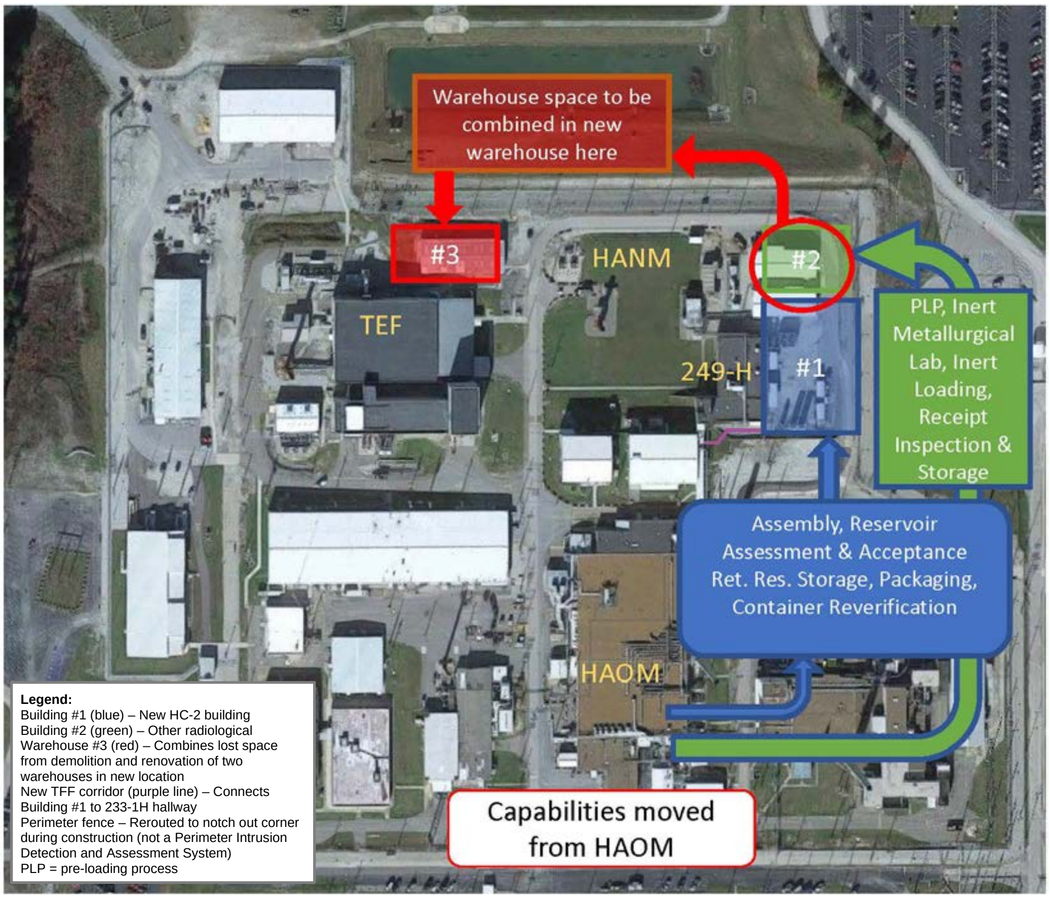

Figure 2-1—Tritium Finishing Facility Overview (Source: SRNS 2021)

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[6] The TFF Facility Design Description (SRNS 2020a) and the SRS TFF Draft EA describe Building 249-13H as a below HC-3 radiological facility. When developing the design documentation for the facility, NNSA revised the hazard classification to an HC-3 nuclear facility, which requires a more robust design (Buchanan 2021).

[7] In October 2020, SRNS prepared the 249-H Value Engineering Study (SRNS 2020i) to evaluate alternatives for TFF design without renovating Building 249-H. In January 2021, NNSA selected Alternative 4 (NNSA 2021) for the Proposed Action. This alternative includes the proposed construction of a new corridor and enlargement of Buildings 1 and 2 to accommodate the functions that were initially planned for Building 249-H. This Final EA reflects the current design.

Section 2.2.1 of this SRS TFF EA provides a description of construction activities associated with the Proposed Action. Section 2.2.2 provides a description of the functions and processes associated with operations of the TFF.

2.2.1 Tritium Finishing Facility Construction

The classified nature of the work requires TFF to be located within the Tritium LA. The Proposed Action includes construction and operation of two new buildings and a corridor to connect existing tritium facilities to the TFF: Building 249-12H and Building 249-13H. Prior to construction of the new buildings and the corridor, site preparation would include removal of three existing warehouses, and construction of a replacement warehouse (Building 233-38H).

Site preparation would include demolition and removal of three existing warehouses within the Tritium LA (Buildings 233-22H, 233-23H, and 233-24H) (Figure 2-2). These warehouses are all single story, metal construction on concrete slabs and do not contain any tritium or other nuclear materials. The warehouses have been used for storage and office space and have an approximate footprint of about 6,200 square feet (Building 233-22H) and 3,800 square feet (Buildings 233-23H and 233-24H). Scrap metal from the demolition and removal would be recycled. Construction debris would be disposed of at the Three Rivers Solid Waste Authority Regional Landfill (Three Rivers Landfill) (SRNS 2020b).

Figure 2-2—Site Preparation Activities

Construction of the replacement warehouse (Building 233-38H) would occur in the northwest corner of the Tritium LA on the footprint of existing Building 233-22H. The replacement warehouse would have a larger footprint at about 7,600 square feet; half of the replacement warehouse would be climate controlled. The purpose of the replacement warehouse would be to provide capacity, security, and climate control to shelter inventory currently located in the three existing warehouses. The new warehouse would provide office space and mechanical, electrical, and communications rooms. There would be no tritium in the warehouse during either construction or operations (SRNS 2020c).

An external corridor would be constructed to connect the existing 233-1H hallway from HANM to the proposed Building 249-12H. The hallway would allow transport of loaded reservoirs and containers between Building 249-12H and HANM. The corridor would be designed as an HC-2 facility and include fire suppression equipment and tritium air monitoring (SRNS 2020a, 2020i).

Construction of the TFF would also include installation of a new electrical substation to provide power to the new facilities. The existing electrical substation would be retained. TFF would require a robust and redundant normal 13.8-kilovolt (kV) power system similar to that designed and installed for TEF. Backup electrical power for TFF operations would include the installation of a diesel generator. The TFF backup power diesel would provide 1,250 kilowatts (kW) (SRNS 2020c).

The water systems installed during construction would include domestic water, chilled water, and cooling-tower water. The domestic water system would provide a continuous source of clean and filtered water for domestic (potable) use as well as to supply service water needs. A domestic water line would be provided to the new warehouse for safety showers. The closed-loop chilled water system would provide cooling services to TFF process and heating, ventilation, and air conditioning (HVAC) systems. The cooling-tower water system would be an isolated cooling system that removes heat from the chilled water system and disperses it to the atmosphere. Cooling-tower water also has makeup water and blowdown features to maintain water chemistry balances and would be treated with ozone to control biological growth. Cooling-tower water effluents would be discharged to an existing permitted outfall (Outfall H-02).

The existing sanitary sewer system currently connects with Building 249-H. The existing system would remain unchanged. Personnel working in the proposed TFF facilities would use the existing restroom facilities in Building 249-H. Sanitary waste from tritium facilities is piped to a lift station, which pumps the waste to the H-Area Central Waste Collection System. It is then sent to the SRS sanitary waste treatment plant for final treatment and disposal.

Other activities that would occur during site preparation include (SRNS 2020b, 2021):

- Rough-grading and drainage of the area proposed for Buildings 249-12H and 249-13H construction;

- Removal of three office trailers (Buildings 249-7H, 249-8H, and 249-9H) that are outside and east of the Tritium LA fence. The location of these trailers would be used as a laydown area for TFF construction. The trailers would be staged at another location on SRS pending reuse;

- Replacement and relocation of a cooling tower adjacent to Building 249-H. The new cooling tower would meet the same design requirements as the current equipment but would be relocated to facilitate TFF construction;

- The existing nitrogen storage tanks, evaporator, and pad outside of Building 249-H would be removed and replaced with new tanks and evaporator on a new pad within the Tritium LA;
- Relocation of the existing Building 249-H sump tank;
- Eastward shift of the north-south fire water loop to a location east of the perimeter road;
- Eastward shift of the north-south perimeter road outside of the Tritium LA fence; and
- Eastward shift of the north-south Tritium LA perimeter fence.

TFF construction activities, including site preparation, are estimated to take approximately three years, followed by three years of startup preparations, testing, and operational readiness reviews. During the construction period, the Proposed Action would require a peak of about 170 construction workers.

The construction parameters associated with the TFF are provided in Table 2-1. Figure 2-3 provides a conceptual diagram of the proposed TFF.

Table 2-1—Key Construction Parameters for the Tritium Finishing Facility

Parameter	Value
Resources	
Additional land disturbance on previously disturbed land (acres)	2.5
Additional land disturbance on previously undisturbed land (acres)	0
Construction duration (years)	3
Diesel fuel (gallons/year)	100,000
Peak water use (gallons/year)	480,000
Peak construction workforce (persons)	170
Wastes	
Nonhazardous solid waste (cubic yards)	3,100
Hazardous waste	minimal
Low-level radioactive waste	minimal
Mixed low-level radioactive waste	minimal

Source: SRNS 2020c

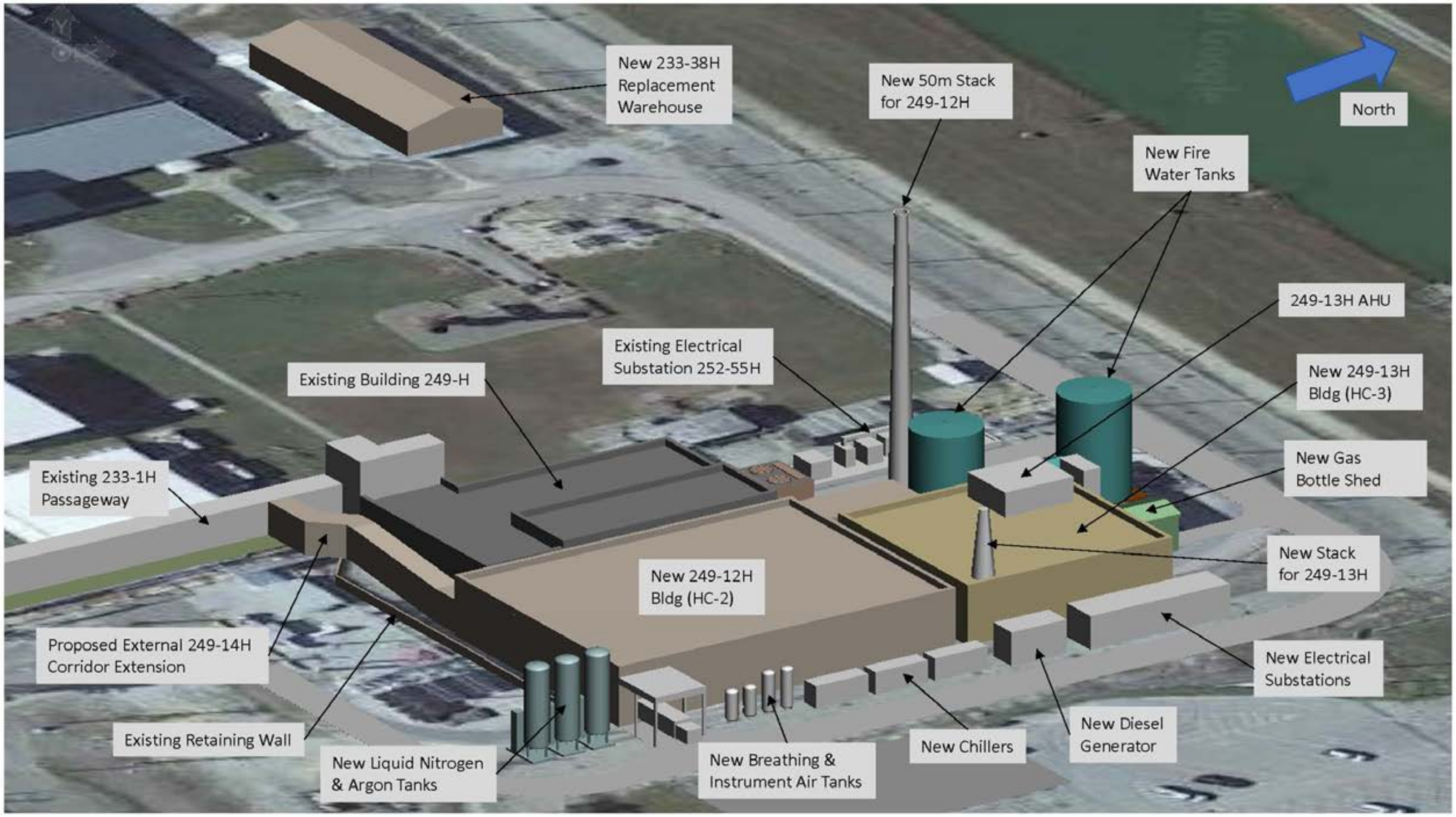

Figure 2-3—Conceptual Diagram of the Tritium Finishing Facility (Source: SRNS 2021)

Building 249-12H (Building 1)

Building 249-12H (footprint of approximately 17,650 square feet, height about 25 feet) would be constructed to house operations for product-loaded[8] reservoirs and containers (SRNS 2020c, 2021). The building would be designed and constructed as a hardened HC-2 nuclear facility and include a 130-foot-high stack for building exhaust. Both the building and the stack would be designed to meet Natural Phenomena Hazard Design Category-3 (NDC-3) criteria.[9] The stack would include exhaust air activity monitoring. Fire suppression equipment for the building would include two independent systems, each with a fire water tank, fire water pump, pump house, instrumentation, controls, and piping. An uninterruptible power supply (UPS) for each fire suppression pumping system would also be required to ensure the fire water supply system remains operable upon loss of power. An independent diesel generator (500 kW) would be provided for each pumping system to provide emergency power to the uninterruptible power supply (including charging of batteries), controls, instrumentation, and freeze protection (SRNS 2020a). The tritium-related functions and processes proposed for Building 249-12H are described in Section 2.2.2 of this SRS TFF EA.

Building 249-13H (Building 2)

Building 249-13H (footprint of approximately 10,900 square feet, height about 25 feet) would house the preloading process; Inert Metallurgical Laboratory; inert reservoir loading; receipt, inspection, and storage; and support systems and utilities. The building would be designed and constructed as an HC-3 nuclear facility and include a 50-foot-high stack for building exhaust. Building 249-13H would be designed to meet NDC-2 criteria. The stack would include exhaust air activity monitoring (SRNS 2020a, 2020c, 2021). A new firewater line would enter the east side of Building 249-13H from a new outside underground firewater line tied to the existing tritium underground loop. The tritium-related functions and processes proposed for this building are further described in Section 2.2.2 of this SRS TFF EA.

External Corridor

A recent design evolution involves the construction of an external corridor to connect Building 249-12H to the existing 233-1H hallway from HANM (Figure 2-4). This external corridor would allow transport of loaded reservoirs and containers between HANM and Building 249-12H. The external corridor would be an HC-2 nuclear facility and would include a fire suppression system and tritium air monitoring system (SRNS 2020a, 2020i). The inclusion of this external corridor into the TFF design was one factor that made it possible to eliminate the renovation of Building 249-H, which was the initial design described in the Facility Design Description (SRNS 2020a) and evaluated in the SRS TFF Draft EA.

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8 "Product" could refer to either tritium and/or deuterium.

9 In accordance with definitions in DOE-STD-1020-2016, an NDC is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from failure of the building due to natural phenomena hazards on workers, the public, and the environment. Buildings may be assigned NDCs that range from 1 through 5.

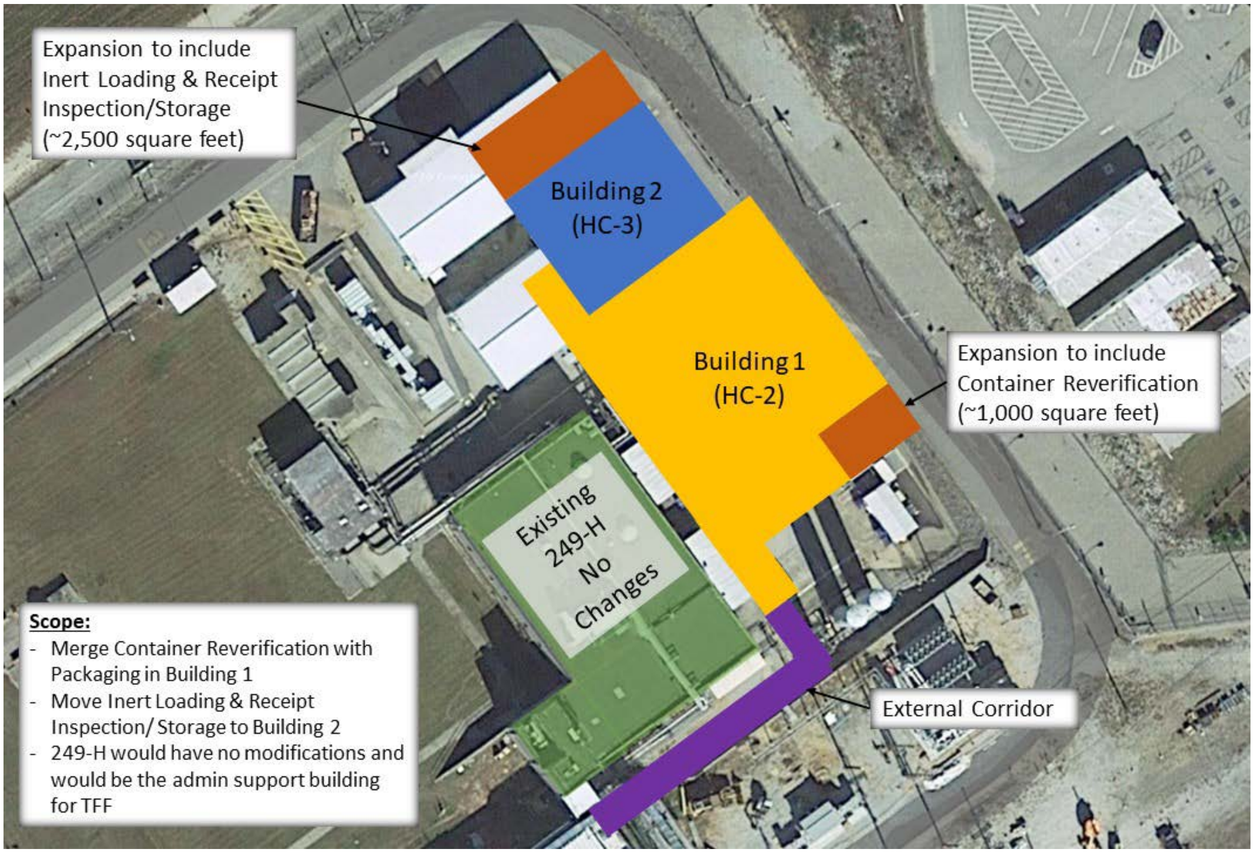

Figure 2-4—TFF Layout Reflecting Recent Design Evolution (Source: SRNS 2020i)

2.2.2 Tritium Finishing Facility Operations

Once construction is completed, the Proposed Action would also include the transfer of capabilities (inventory, processes, and limited equipment) from HAOM to the new facilities. Operations of the TFF would include the same functions and processes that currently occur at HAOM and support facilities, including the existing warehouses. Figure 1-2 illustrates the relationship of TFF operations to the other tritium missions at SRS.

The number of operational workers, including security personnel, would not change from that currently employed at HAOM (approximately 75). After completion of the TFF construction, NNSA would conduct startup preparations, testing, and operational readiness reviews that would last for approximately three years. NNSA would operate both TFF and HAOM for a prove-in period, then transition all of the HAOM staff over to the new facilities. There could be a short-term increase of operations personnel during the startup testing and transition period; however, the staffing levels would return to their current levels after this period (SRNS 2020c).

Figure 2-5 shows the proposed TFF relative to other buildings in the Tritium Area. The operational parameters associated with the TFF Proposed Action are provided in Table 2-2.

Figure 2-5—Location of the Tritium Finishing Facility within the Tritium Area

Table 2-2—Key Operational Parameters for the Tritium Finishing Facility

Parameter	Annual Value
Resources	
Diesel fuel (gallons)[a]	25,000
Domestic water (gallons)[b]	1,600,00
Total Tritium Finishing Facility workers (persons)[b]	75
Wastes[b]	
Low-level radioactive waste (cubic yards)	0
Hazardous (cubic yards)	minimal
Sanitary wastewater (gallons)	820,000

a. Based on diesel testing, assuming one hour per week per generator. Diesels include 1,250 kW backup power, two 500-kW backup power for fire protection system, and two 500-kW fire water pumps.
b. These values are consistent with those associated with HAOM operations and unlikely to change under the Proposed Action.
Source: SRNS 2020c

The primary mission of TFF operations would be to receive, prepare, and ship GTS reservoirs to U.S. Department of Defense (DoD) installations (SRNS 2020a). The specific processes and the building in which they would be contained are as follows (SRNS 2020a, 2021):

1. **Receive and Inspect Returned Reservoirs:** Receive incoming GTSs from off site (DoD installations, Pantex, or other NNSA facilities), unpack and inspect contents, and transfer to storage. Reservoirs returned from off site would be received and stored in Building 249-12H prior to being transferred to HANM, where the tritium is removed for purification and recycling.

2. **Provide Storage for Returned Robust Containers:** Provide a secured storage area within the new NDC-3 structure for long-term storage of robust containers that contain hydrogen isotopes. The returned reservoir storage area would be in Building 249-12H.

3. **Receive, Inspect, and Store New Empty Clean Reservoirs:** Receive new empty, clean reservoirs from the Kansas City National Security Campus, inspect for dents, scratches, nicks, and burrs to confirm integrity and that they meet requirements, and store the reservoirs in Building 249-13H until ready for pre-loading and/or loading.

4. **Prepare Reservoirs for Loading:** Prepare certain reservoirs for loading, subjecting them to multiple requirements specified by the design agencies. This process would occur as part of the preloading process in Building 249-13H and would be performed in a nitrogen-inert glovebox. Once prepared, reservoirs would be transferred to HANM for the loading process.

5. **Load Inert Gases into Reservoirs:** Load inert reservoirs with non-tritium gases. This function includes gas storage and conveyance, gas compression, reservoir fixturing, leak testing, gas analysis, and pinch welding. Gas analysis requires a mass spectrometer. The inert loading area would also provide some reservoir finishing functions, including stem cutoff, net fill weight, stem trimming and gauging, and leak testing. Certain receipt inspection equipment would also be located in the Inert Loading Area. A borescope, pressure testing, and nitrogen backfill station would be installed in the Inert Loading Area in Building 249-13H. Gases that would be stored and could be used for loading include argon, nitrogen, deuterium, and helium.

6. **Assess Loaded Reservoirs in Preparation for Assembly, Packaging and Shipment:** After reservoirs are loaded with tritium in HANM, transfer them back to Building 249-12H for assessment. The assessment would include automatic leak detection and calorimetry on loaded reservoirs.

7. **Assemble and Disassemble Reservoirs:** Assemble parts required for reservoir assembly prior to preparation for acceptance and shipment. Functions of the assembly or disassembly process in HAOM that would be relocated include verification and inspection of parts and reservoirs, assembly of component parts, gauging, helium leak testing, rate of rise leak testing, performance of electrical continuity on squib valves, marking of assemblies, processing and dismantling of reservoir assemblies returned from DoD, disposal of hazardous materials, and reconditioning reusable parts. Assembly/disassembly of reservoirs would occur in Building 249-12H.

8. **Perform Final Inspection and Acceptance of Reservoir Assemblies:** Provide capabilities and capacity to store, stage, examine, and inspect reservoirs for final acceptance. This final inspection and acceptance of reservoir assemblies would be performed in Building 249-12H prior to packaging.

9. **Package and Ship Reservoirs/Assemblies:** Package reservoirs/assemblies in H1616 shipping containers and other shipping containers and miscellaneous packages. This process includes inspection and leak testing of shipping containers. The packaging area would be the same area used for receipt and inspection of returned reservoirs (see item #1 above). There would be no increase in the number of shipments of loaded H1616 shipping containers to or from SRS from implementation of the TFF. The exact size and composition of the enduring nuclear weapons stockpile is determined on an annual basis.

Therefore, the annual requirement for loaded tritium reservoirs could change over time but would be independent of the Proposed Action.

10. **Perform Inert Metallography:** Section and examine process vessels for hydrogen effects. This testing would occur in Building 249-13H, in the Inert Metallurgical Laboratory.

11. **Store and Reverify H1616 Shipping Containers for Continued Use:** Store H1616 shipping containers, stage for use in packaging and shipping (see #9 above), and verify the gas containment capability of shipping containers on an annual basis. This includes inspection, leak testing, replacement of parts as needed, and data checks to ensure containers are eligible for reuse. This storage and reverification process would be performed in Building 249-12H.

Building 249-12H (Building 1)

Building 249-12H would contain the majority of the tritium inventory associated with the TFF. It would house operations pertaining to tritium-loaded reservoirs and containers. This would include receipt, unpacking, and storage of returned reservoirs from the DoD, assessment (finishing) of newly loaded reservoirs from HANM, assembly and testing of components, final acceptance of reservoirs for shipment, and packaging/shipment. Building 249-12H would also include storage and reverification of H1616 shipping containers.

The HVAC systems for the TFF complex would remove heat from the processes and equipment, provide personnel comfort and climate control for the operation of the instrumentation used in the various systems in each building, and maintain the air flow and differential pressures during operations.

A once-through process ventilation system in Building 249-12H would be provided for the areas that handle tritium reservoirs, including the external corridor. As discussed in Section 2.2.1, the exhaust systems from areas within Building 249-12H that could become contaminated would be connected to a stand-alone stack (SRNS 2020a, 2021).

Building 249-13H (Building 2)

A once-through process ventilation system in Building 249-13H would be provided for the process areas. Exhaust systems from areas within Building 249-13H that could become contaminated would be connected to an exhaust stack on the roof (SRNS 2020a).

2.3 No-Action Alternative

Under the No-Action Alternative, NNSA would not construct the TFF. As a result, NNSA would continue to use HAOM beyond its intended life. This could result in increased maintenance and infrastructure upgrades to meet reservoir delivery schedules. The No-Action Alternative could also increase annual and overall lifecycle costs and the risk to the safety and security of the ongoing Tritium Mission at SRS.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter includes an analysis of the potential environmental consequences or impacts that could result from the Proposed Action and No-Action Alternative. The affected environment presented for each of the environmental resources areas is the result of past and present activities at SRS and provides the baseline from which to compare impacts from the Proposed Action and No-Action Alternative.

Information related to potential environmental impacts is presented for the following resource areas:

- Land use and visual resources
- Geology and soils
- Water resources
- Air quality and noise
- Ecological resources
- Cultural and paleontological resources
- Infrastructure
- Socioeconomics and environmental justice
- Waste management
- Human health (normal operations, accidents, and intentional destructive acts)
- Transportation

3.1 Land Use and Visual Resources

3.1.1 Land Use

3.1.1.1 Affected Environment

SRS is located along the Savannah River in the sandhills area of three western South Carolina counties: Aiken, Allendale, and Barnwell. SRS encompasses a circular area of approximately 310 square miles (198,400 acres). It is sited in a generally rural area about 15 miles southeast of Augusta, Georgia, and 12 miles south of Aiken, South Carolina, the nearest population centers (*see* Figure 1-1). SRS is a controlled area, with public access limited to through traffic on State Highway 125, U.S. Highway 278, and the CSX railway line.

Regional land uses in the vicinity of SRS include agricultural, recreational, industrial, and, to a lesser extent, urban and residential. SRS is bordered mostly by forest and agricultural land. The nearest residences are located to the west, north, and northeast of SRS, some within 200 feet of the SRS boundary (NNSA 2020).

SRS is largely undeveloped except for the major industrial areas, where development is concentrated. Land use at SRS can be classified into three major categories: forest/undeveloped, water/wetlands, and developed facilities. When the area was originally acquired by the Federal government in 1950 for the SRS, approximately 67 percent was forested and 33 percent was in cropland or pastureland. Presently, open fields and forests make up 73 percent of the site, while 22 percent is wetlands, streams, and two lakes. Production and support areas, roads, and utility corridors account for the remaining five percent of the land area (NNSA 2020). H-Area is a densely developed industrial area near the center of SRS, approximately seven miles from the nearest (western) SRS boundary.

As depicted in Figure 3-1, SRS is divided into six management areas based on existing biological and physical conditions, operations capability, and suitability for mission objectives. The 38,444-acre Industrial Core Management Area contains the major SRS facilities. The primary objective of this area is to support facilities and site missions. Other important objectives of the SRS management areas are to promote conservation and restoration, provide research and educational opportunities, and generate revenue from the sale of forest products.

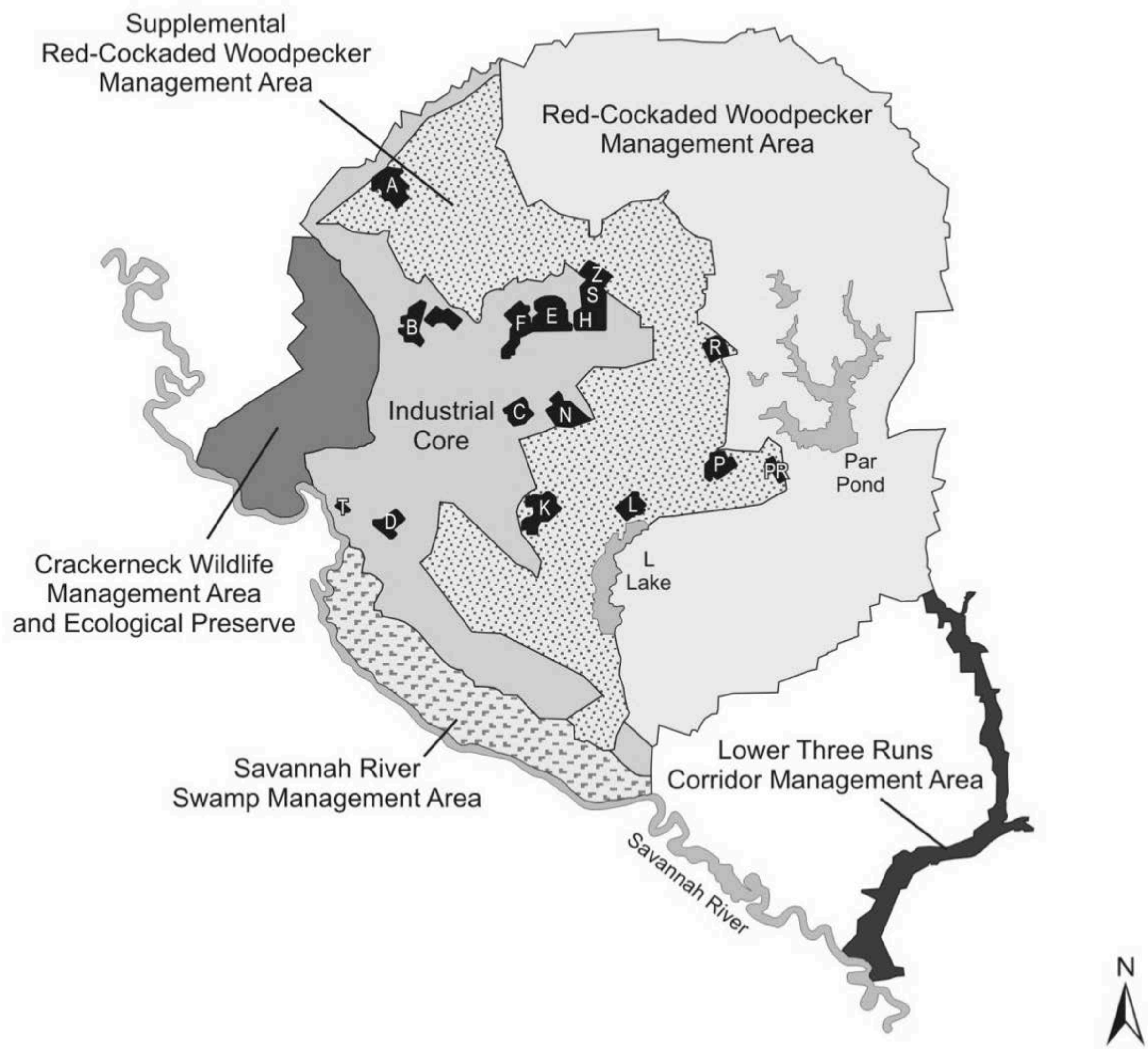

Figure 3-1—SRS Management Areas (Source: NNSA 2020)

In 1972, all of SRS was designated a National Environmental Research Park. The purpose of the National Environmental Research Park is to conduct research and education activities to assess and document environmental effects associated with energy and weapons material production, explore methods for eliminating or minimizing adverse effects of energy development and nuclear materials on the environment, train people in ecological and environmental sciences, and educate the public (SREL 2019). DOE has also established a set-aside program to provide reference areas for understanding human impacts on the environment. The SRS set-aside program currently contains 30 research reserves totaling 14,006 acres.

3.1.1.2 Proposed Action Impacts

The tritium facilities at SRS are located within the Industrial Core in the H-Area, which was originally developed in the early 1950s. Land within a six-mile radius of the proposed TFF lies entirely within SRS's boundaries and is used for industrial purposes associated with SRS and as forest land.

As described in Section 2.2, development of the TFF would require site preparation work, construction of two process buildings and an external corridor, removal of three nonradiological warehouses, construction of one warehouse, and upgrades and infrastructure to support these facilities (*see* Figure 2-3). Construction of the TFF would disturb approximately 2.5 acres within H-Area. This represents approximately 0.001 percent of the total land at SRS. The affected land has been previously disturbed and no new land disturbance would occur. The use of the land for the TFF would be consistent with the H-Area mission and historic uses of SRS. Once operational, long-term impacts from the TFF facilities on land use at SRS would be similar to existing development within H-Area.

3.1.1.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no additional impacts to land use beyond current and planned activities.

3.1.2 Visual Resources

3.1.2.1 Affected Environment

The scenic quality or character of an area consists of the landscape features and social environment from which they are viewed. The landscape features that define an area of high visual quality may be natural, such as mountain views, or manmade, such as a city skyline. To assess the quality of visual resources in the project area, this section describes the overall visual character and distinct visual features on, or in, the viewshed of SRS.

Locations of visual sensitivity are defined in general terms as areas where high concentrations of people may be present or areas that are readily accessible to large numbers of people. They are further defined in terms of several site-specific factors, including:

- Areas of high scenic quality (i.e., designated scenic corridors or locations);
- Recreation areas characterized by high numbers of users with sensitivity to visual quality (i.e., parks, preserves, and private recreation areas); and
- Important historic or archaeological locations.

SRS consists primarily of natural or managed forest lands, with only five percent of its surface area developed for industrial and administrative uses. The SRS landscape is characterized by wetlands and upland hills. Vegetation includes bottomland hardwood forests, scrub oak and pine forests, and forested wetlands. The viewshed, which is the extent of the area that may be viewed from SRS, consists mainly of forested land. The closest urban area, Aiken, South Carolina, is 12 miles from SRS. Viewpoints affected by DOE facilities are primarily associated with the public access roadways through SRS and the CSX railway. There are no visually sensitive locations on SRS.

Most of the large facilities are in the interior portions of the site in the Industrial Core Management Area (*see* Figure 3-1) and are not visible to the general public because of their distance from the site boundary or the presence of natural forest screening adjacent to public access roads. While facilities are scattered throughout SRS in different management areas, they are primarily concentrated in the core and are brightly lit at night. The only areas visually impacted by the DOE facilities are those within the view corridors of State Highway 125 and U.S. Highway 278 (NNSA 2015).

To assess environmental impacts of the Proposed Action on visual resources, this EA uses the Bureau of Land Management's (BLMs) Visual Resource Management (VRM) Classification System (Table 3-1). While the VRM system was designed for BLM-managed undeveloped and open land, it is an effective tool for rating the scenic quality of SRS and surrounding areas for visual resource management and planning activities. The developed areas and utility corridors (transmission lines and aboveground pipelines) of SRS are consistent with a VRM Class IV. The remainder of SRS is consistent with a VRM Class II or Class III designation.

Table 3-1—Bureau of Land Management Visual Resource Management Class Objectives

Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II	The objective to this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV	The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements found in the predominant natural features of the characteristic landscape.

Source: BLM 1986

H-Area is about 5.3 miles from State Highway 125 and 5.8 miles from U.S. Highway 278. Public views of the facilities within H-Area are screened by heavily wooded areas and the nature of the terrain bordering segments of State Highway 125 and U.S. Highway 278. Moreover, facilities are not visible from the Savannah River, which is about 8.2 miles from H-Area. As shown on Figure

3-2, industrial facilities within H-Area consist of large concrete structures, smaller administrative and support buildings, trailers, and parking lots. The structures range in height from 10 to 71 feet, with a few stacks and towers that reach up to 200 feet (SRNS 2020d; Murphy et al. 1991). Visual resource conditions within H-Area are consistent with a VRM Class IV designation. Areas to the north and west of the H-Area are forested and designated as a preservation area offering visual screening from existing contiguous blocks of hardwood and mixed pine forests.

Figure 3-2—Aerial View of H-Area

3.1.2.2 Proposed Action Impacts

Development of the TFF would be driven by function and purpose and would be similar in visual appearance to the existing industrial facilities in H-Area. Construction of the TFF would result in short-term visual impacts in H-Area due to the presence of construction equipment, new buildings in various stages of construction and demolition, and possibly increased dust. Cranes used during construction and temporary construction laydown areas would also create short-term visual impacts but would not be out of character for an industrial site such as H-Area. Figure 3-3 shows the proposed construction and laydown areas. Because the TFF would be located in the interior of the SRS, construction-related activities would not be noticeable at or beyond the SRS boundary (approximately seven miles away). Site visitors and employees observing construction would find these activities similar to past construction activities at SRS.

Figure 3-3—TFF Site Plan with Construction Lay-Down Areas (Source: Parsons 2018a)

After construction of the TFF is complete, cranes and temporary construction office trailers would be removed and construction laydown areas would be restored. A rendering of the TFF, once operational, is provided in Figure 2-3. Because of the distance to the SRS boundary, coupled with the rolling terrain and heavy vegetation, the proposed TFF within the H-Area would not be visible from off site or from roads with public access. The tallest structure associated with the TFF would be the 130-foot-high ventilation stack for Building 249-12H. That stack would be similar in height and appearance to existing stacks in H-Area and would not be visible from offsite locations or from public access roads on SRS. There would be no visible emissions from any of the TFF stacks. Once the TFF is operational, H-Area would remain a highly developed area with an industrial appearance, and there would be no change to the VRM Management Class IV.

3.1.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no additional impacts to visual resources beyond current and planned activities.

3.2 Geology and Soils

3.2.1 Affected Environment

SRS is located on the southeastern Atlantic Coastal Plain (a wedge of unconsolidated river and marine sediments), in an area named the Aiken Plateau (SRNS 2020e, p. 1-3). The Atlantic Coastal

Plain sedimentary sequence near the center of SRS consists of about 1,000 feet of sand, clay, and silt formations. Of note is a formation called the Tinker/Santee, which consists of 50 to 70 feet of moderately sorted yellow and tan sand, calcareous sand and clay, and limestone. This layer is noteworthy because it contains small, discontinuous, thin calcareous sand zones that could subside, potentially causing settling of the ground surface. Soft zones occur throughout SRS but are more prevalent moving across the site to the southeast. These zones were encountered in exploratory borings in F-Area, H-Area, K-Area, and S-Area at depths between 100 and 150 feet (NNSA 2015, p. 3-8).

3.2.1.1 Tectonic Characteristics

Tectonic characteristics consist of geological structural elements including faults, seismicity, and earthquakes. The only known faults capable of producing an earthquake within a 200-mile radius of SRS are within the Charleston seismic zone, approximately 70 miles southeast of SRS (NNSA 2015, p.3-8).

Geophysical studies of SRS have identified several subsurface faults that do not reach the surface, stopping several hundred feet below grade, and therefore do not present any surface expression or displacement at ground level. One of the faults, the Pen Branch fault (located southeast of H-Area), has been regarded as the primary structural feature at SRS that has the characteristics necessary to pose a potential seismic risk (DOE 1990).

Richter Magnitude

The magnitude of most earthquakes is measured on the Richter scale. The Richter magnitudes are based on a logarithmic scale (base 10), which means that for each whole number increase on the Richter scale, the amplitude of the ground motion recorded by a seismograph goes up 10 times. Using this scale, a magnitude 5 earthquake would result in 10 times the level of ground shaking as a magnitude 4 earthquake.

Modified Mercalli Intensity

The effect of an earthquake on the earth's surface is called the intensity. Although numerous intensity scales have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli Intensity scale. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead, it is a subjective ranking based on observed effects.

Levels of earthquake activity within the region are usually low, with magnitudes generally less than or equal to 3.0 on the Richter scale. In 2014, the U.S. Geological Survey (USGS) issued a report (Petersen et al. 2014) that updates the 2008 United States National Seismic Hazard Maps (Petersen et al. 2008). NNSA evaluated the 2014 report to determine if the earthquake hazard (peak ground acceleration [PGA]), as depicted in the USGS maps, has significantly changed at SRS. Probabilistic PGA (horizontal) data were used to indicate seismic hazard. The PGA values cited are based on a two-percent probability of exceedance in 50 years. This corresponds to an annual occurrence probability of about 1 in 2,500. The USGS estimate for PGA at depth near the Tritium Area decreased from about 0.17 *g* in 2008 to about 0.156 *g* in 2014. Most of the PGA is related to the proximity of SRS to the Charleston seismic zone and not from locally generated earthquakes. Local seismicity associated with SRS and the surrounding region is characterized by occasional small shallow events (WSRC 2000) with Richter magnitudes between 2.0 and 3.0 and Modified Mercalli Intensities of III or less (USGS 2019a).

Only two moderate earthquakes have occurred within 250 miles of SRS since the turn of the 20th century (USGS 2019a). The most recent event occurred on August 9, 2020, near Sparta, North Carolina, approximately 220 miles north of SRS, with a Richter scale magnitude of 5.1. The earthquake occurred as a result of faulting in the upper crust of the North American plate and occurred in the interior of the plate. Such mid-plate earthquakes are known as intraplate earthquakes and are generally less common than earthquakes that happen near tectonic plate boundaries. The earthquake could be felt in some areas surrounding SRS with reported Modified Mercalli Intensity values of II to III (USGS 2020).

3.2.1.2 Soils and Mineral Resources

Many different soils exist on SRS, and, in some areas, change within a short distance. Composition ranges from mostly sand-sized particles with high hydraulic conductivity rates to high clay content with moderately low to low hydraulic conductivity rates. Most SRS soils within the fence lines of E-Area, F-Area, H-Area, K-Area, and S-Area have been disturbed to accommodate buildings, parking lots, and roadways. Disturbed soils within these areas are considered to be urban land covered by structures or well-drained, heterogeneous soil materials that are the spoil or refuse from excavations and major construction activities and are often heavily compacted. The surface soils allow precipitation to drain rapidly. Because of their sandy texture and drainage characteristics, some soil units at SRS meet the requirements as prime farmland. However, the Natural Resources Conservation Service does not identify these areas as prime farmlands because they are not available for agricultural use (NNSA 2015).

The mixed sands, gravels, and clays commonly found beneath SRS are widespread and therefore are of limited commercial value as a mineral resource. A possible exception might be well-sorted quartz sand, which is valuable as a filtration medium, an abrasive, and engineering backfill (NNSA 2015).

3.2.2 Proposed Action Impacts

There is no appreciable discrimination of geological and soils impacts between the construction and operational phases of the Proposed Action because all land disturbances have already occurred to accommodate the existing facilities, and any new land disturbances under the Proposed Action would occur on previously disturbed land. Therefore, the impacts analysis addresses construction and operations together.

Construction of two new buildings and the external corridor, removal of three warehouses, and rebuilding a warehouse on one of the footprints would not disturb additional land beyond the existing Tritium Area footprint. Construction of new ancillary and support facilities and buildings would also occur on previously disturbed land and would not constitute additional impacts to geological resources. Potential soft-zone sedimentary formations in the area occur at depths greater than that required for construction of new facilities and do not constitute a potential impact. The existing construction pads (disturbed footprint) would be designed and sited using engineering cut and fill practices appropriate for foundation stability.

As discussed in Section 3.2.1, there are no faults located within SRS that intersect the ground surface; therefore, ground displacement near the Tritium Area is highly unlikely. While there are several faults that have been mapped beneath SRS, their features stop several hundred feet below grade with the Pen Branch fault being the primary structural feature capable of producing an earthquake. However, the evidence collected to date suggests that movement along the fault has not occurred in the past 500,000 years; therefore, the fault is not considered a capable fault. While the risk for an earthquake exists in association with faults within the Charleston seismic zone (approximately 70 miles southeast of SRS), ground shaking could occur that would affect primarily the integrity of inadequately designed or non-reinforced structures, but not damage property or specially designed facilities such as the proposed TFF. Unknown potential faults and seismic events cannot be quantified; however, known geologic conditions effectively contribute to the understanding of seismic potential at SRS, with added confidence through modern seismic design parameters incorporated into new facilities. Thus, the relatively small-scale site tectonic conditions would not likely affect the facilities associated with the proposed construction and operation of the TFF and associated support structures. To minimize the potential hazards associated with earthquakes, the new facilities would be constructed in accordance with DOE-STD-1020-2016, *Natural Phenomena Hazard Analysis and Design Criteria for Department of Energy Facilities*, and current International Building Code guidelines for facilities in seismic zones, which would minimize life-threatening structural damage during an earthquake. Buildings 1 and 2 would be constructed to ensure continuation of all required functions even after a design-basis earthquake. Facility accident analyses from natural phenomena, including earthquakes, are presented in Section 3.11 of this EA.

Soils within the vicinity of the proposed TFF have been disturbed to accommodate buildings, parking lots, and roadways. While the soils near the Tritium Area meet the definition of prime farmland, the disturbed area would not be converted for farming, as it is not presently farmed and would not be available for farming in the future due to the restricted status of the lands at SRS. The *Farmland Protection Policy Act* (7 U.S.C. § 4201 et seq.) and associated regulations require agencies to make evaluations of the conversion of farmland to non-agricultural uses by Federal projects and programs. SRS is exempt from the *Farmland Protection Policy Act* under Section 1540(c)(4) because the acquisition of SRS property occurred prior to the Act's effective date of June 22, 1982. Aggregate and other geologic resources (e.g., sand) would be required to support construction activities in the project area, but these resources are abundant in the region.

Although not known to be present in the area, contaminated soils and possibly other media could be encountered during excavation and other site activities. Prior to commencing any new ground disturbance, NNSA would survey potentially affected areas to determine the extent and nature of any contaminated media and required remediation in accordance with the procedures established under SRS's environmental restoration program and in accordance with applicable requirements and agreements. Any contaminated soils and media would be managed in accordance with existing waste management practices.

3.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no additional impacts to geology and soil resources beyond current and planned activities.

3.3 Water Resources

3.3.1 Affected Environment

This section addresses surface water and groundwater in the area of the Proposed Action. The discussion of groundwater is brief because the Proposed Action has little potential to generate groundwater impacts. This section also addresses water usage in the region and includes both surface water and groundwater usage.

3.3.1.1 Surface Water

General Setting

The SRS lies almost entirely within the Savannah River Basin and within the smaller area designated the Middle Savannah River watershed (Hydrographic Unit Code 03060106) (SCDHEC 2020; Seaber et al. 1987). In this watershed, surface water drainage is generally toward the Savannah River or toward tributaries that flow to the Savannah River. As shown on Figure 3-4, the Savannah River borders the southwest side of the SRS and is almost nine miles southwest of the site's H-Area, where the proposed TFF would be located. Surface drainage from the proposed TFF site is toward the northwest and into the stream designated the Crouch Branch. The Crouch Branch flows to the northwest roughly a mile before joining the Upper Three Runs, which flows west, then southwest to the Savannah River. Portions of H-Area to the southeast of the proposed TFF site slope in the other direction and drain toward tributaries of the Fourmile Branch.

Flood Zones, Wetlands, and Other Special Designations

Neither the Savannah River along the SRS border nor any of the streams or tributaries on the site are federally designated Wild and Scenic Rivers or state-designated Scenic Rivers (NNSA 2020). The applicable Flood Insurance Rate Map (i.e., Map Number 45003C0695F) published by Federal Emergency Management Agency, as well as the online South Carolina Watershed Atlas (SCDHEC 2020), show the 100-year flood zone nearest to H-Area to be that associated with the Upper Three Runs. This irregular-shaped flood zone runs along the creek and appears to extend several hundred feet from the normal creek sides in places, but these areas are still well away from H-Area. DOE regulations require that critical actions, where any adverse impacts from flooding would be unacceptable, be evaluated for potential impacts from the larger, but less frequent, 500-year flood event. In 2000, SRS reported the results of a hydrologic study that developed facility-specific probabilistic flood levels for return periods extending to 100,000 years. With regard to H-Area, the conclusion of the study was that the probabilities of facility flooding from either Upper Three Runs or Fourmile Branch are significantly less than 0.00001 per year (Chen 2000). That is, water elevations in either stream from a 100,000-year flood event would not reach H-Area.

According to the U.S. Fish and Wildlife Service's National Wetlands Inventory (USFWS 2020a), the nearest wetland to the H-Area is the Crouch Branch riverine wetland that appears (in the mapper) to extend to the northwest fence of H-Area. However, an area extending approximately 600 feet to the northwest of this fence has already been heavily disturbed and no longer contains any natural wetlands or stream bed. This area is now the location of an engineered wetland constructed to provide treatment for water discharged from the northwest operations area of H-Area. Previously, wastewater consisting of cooling water and stormwater runoff from the northwest portion of H-Area was discharged through Outfall H-02 to Crouch Branch. Sampling

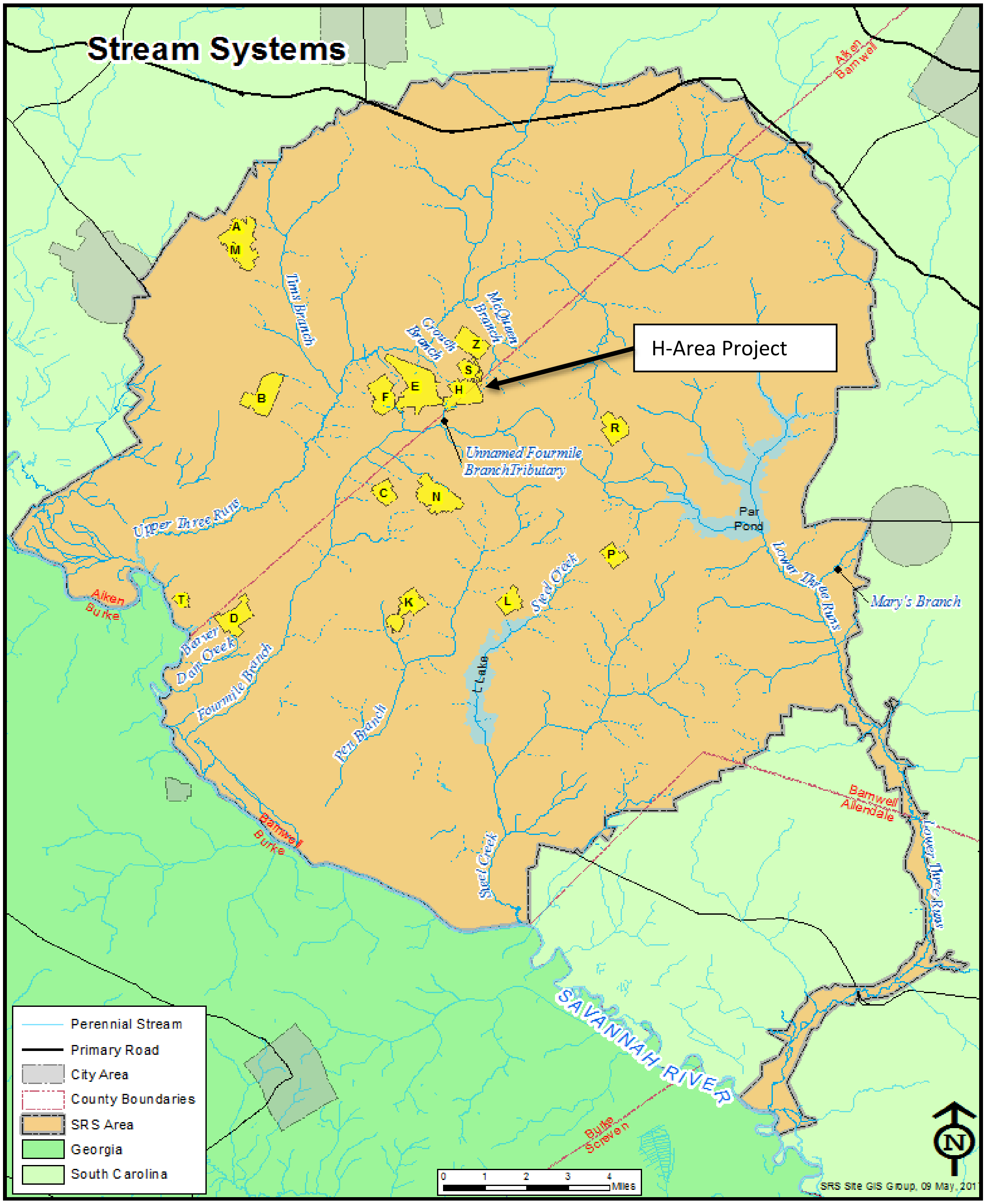

Figure 3-4—Stream Systems within the SRS (Source: SRNS 2020e)

of this outfall, regulated under National Pollution Discharge Elimination System (NPDES) Permit No. SC0000175, indicated that certain constituents (primarily copper, lead, and zinc) were occasionally being discharged in concentrations above permit limits. The SCDHEC-approved remedy was the Wetlands Treatment Facility now in place to intercept surface flow from the northwest portion of H-Area before it discharges through Outfall H-02. The treatment facility is a gravity flow system consisting primarily of a 3.3-million-gallon earthen detention basin that discharges to two, 0.5-acre wetland cells, planted with giant bulrush plants. Water flowing through the parallel wetland cells then combines to flow through Outfall H-02 to Crouch Branch. The treatment system is designed to handle an average cooling water flow rate of 110,000 gallons per day plus any stormwater runoff generated (ENTRIX 2007).

Surface Water Quality

The segment of the Savannah River adjacent to SRS and the SRS streams that drain to the Savannah River are classified by South Carolina as freshwater sources (Class FW). This indicates the water is suitable for primary- and secondary-contact recreation, drinking water supply (after appropriate treatment), fishing, industrial use, and agricultural use. SCDHEC is the regulatory authority for determining if water quality standards for surface waters, including those set for Class FW waters, are being met and issues effluent discharge permits and performs surface water monitoring for this purpose. In its latest listing of impaired waters (i.e., those not meeting the applicable water quality standards), SCDHEC identified the Savannah River adjacent to SRS as impaired due to high mercury levels and the Upper Three Runs as impaired due to high *Escherichia Coli* (E. Coli) levels. Other parameters supporting the FW classification are being met, and the site has developed a Total Maximum Daily Load for E. Coli in the Upper Three Runs to bring it to standard (SCDHEC 2018).

SRS monitors many other industrial wastewater outfalls under NPDES Permit No. SC0000175. In 2019, the site monitored 28 industrial outfalls, including Outfall H-02 and four others on the south and east sides of H-Area. Of the 2,638 analyses performed under this permit in 2019, SRS reported only four exceptions to permit requirements. One of those was for a high daily maximum copper level at Outfall H-02. SRS also monitored 39 stormwater outfalls in 2019 under its General Permit for Stormwater Discharges Associated with Industrial Activities (Permit No. SCR000000). These stormwater outfalls include eight around the outskirts of H-Area, with two of those to the east of the TFF project site and one to the west. In instances where there were discharges to sample in 2019, SRS met permit requirements for all analytes at all but three outfalls; none of those were H-Area outfalls (SRNS 2020e).

SRS also routinely monitors liquid effluent discharge points, stormwater basins, and site streams for radiological parameters and reports results and trends in the annual SRS environmental reports. In characterizing its liquid effluent releases, SRS identifies tritium as the radioactive material released in the highest quantities, in terms of curies (Ci). In 2019, 424 Ci of tritium were released to SRS streams from a combination of (1) direct releases from process areas and (2) shallow groundwater migration. This 2019 total represents a decrease of about 20 percent from the 531 Ci of tritium released in 2018. Of the 424 Ci of tritium released in 2019, the contribution from direct releases was 62.1 Ci of tritium; this portion of the total release has shown a general decreasing trend over the last 10 years (SRNS 2020e).

SRS routinely samples streams to detect and quantify levels of radioactivity reaching the Savannah River from direct releases and from shallow groundwater transport. This is accomplished primarily by sampling the five primary streams flowing from SRS into the Savannah River. Sampling locations on the streams lie between SRS operating areas and the receiving river. Two of the five primary streams sampled are Upper Three Runs and Fourmile Branch, both include drainage from the H-Area (SRNS 2020e). Upper Three Runs receives drainage from the site of the Proposed TFF (via Crouch Branch) and Fourmile Branch receives drainage from the southern portion of H-Area. Figure 3-5 provides a 10-year overview of the annual average tritium concentrations in the two streams before flowing into the Savannah River. As a reference point or benchmark, the figure also shows the U.S. Environmental Protection Agency's (EPA's) drinking water standard for tritium (from 40 CFR Part 141). The figure shows that while tritium concentrations in Fourmile Branch generally decrease over time, concentrations have remained above drinking water standards. Concentrations in Upper Three Runs, however, have remained well below the drinking water standard, varying between approximately 1,500 and 500 picocuries (pCi) per liter during the 10-year span shown in the figure.

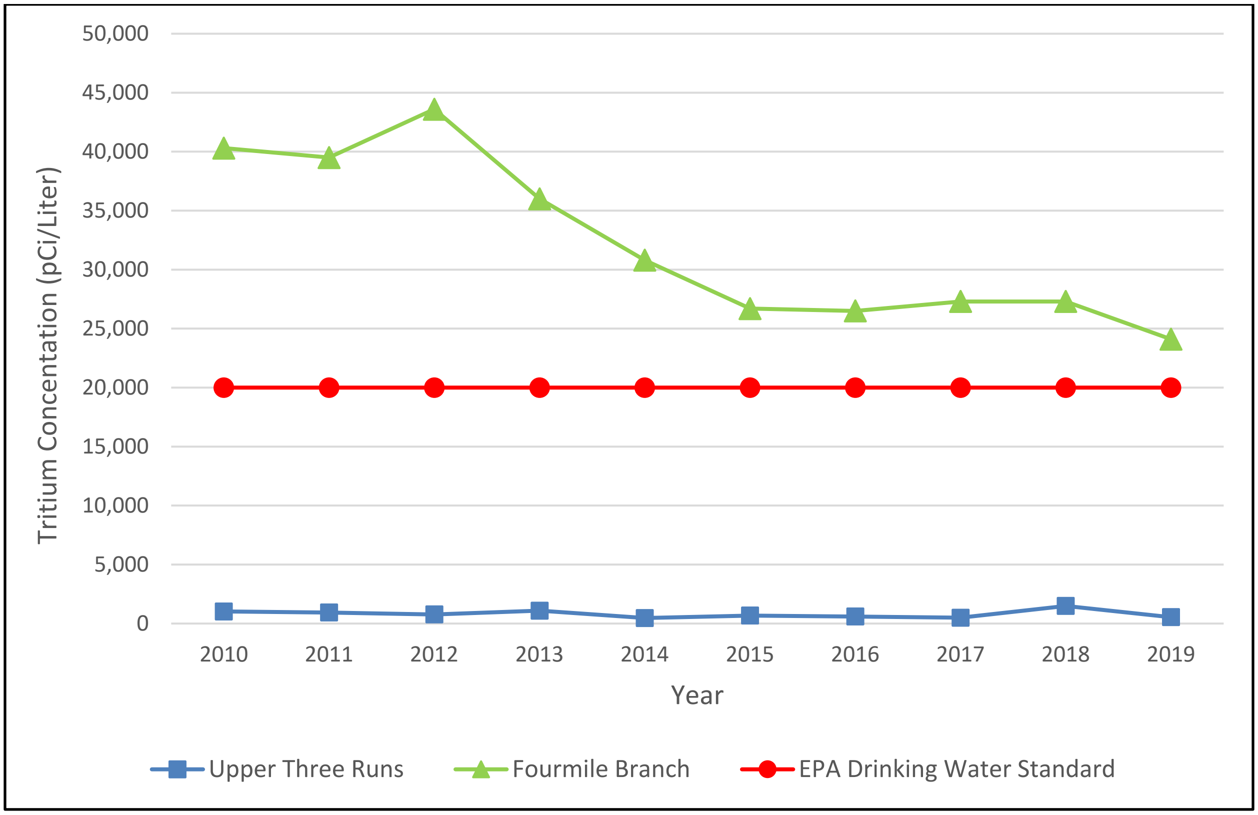

Figure 3-5—Average Tritium Concentrations in Upper Three Runs and Fourmile Branch (Source: SRNS 2011–2018, 2019a, 2020e)

The relatively high historical tritium concentration in Fourmile Branch is attributed largely to shallow groundwater migration from historic seepage basins and the E-Area Solid Waste Disposal Facility (SRNS 2020e). SRS has undertaken and continues to implement multiple measures to reduce the movement of contaminants toward surface waters. These have included measures to remove or stabilize contaminants in overlying soils as well as the shallow groundwater. The SRS remediation program is described briefly in the groundwater discussion that follows and, as indicated below, many sources of additional information are available on the program.

The other surface water discharge that potentially could be affected by the Proposed Action is that from the Central Sanitary Wastewater Treatment Facility (CSWTF). The CSWTF receives 97 percent of the sanitary wastewater generated at SRS, has a capacity of 1.05 million gallons per day, and is currently operating at about 30 percent capacity (NNSA 2020). The CSWTF is fed by a sewer collection system that includes H-Area and it discharges treated water through a NPDES-permitted outfall.

3.3.1.2 Groundwater

The general area of SRS is underlaid by a complex groundwater system with multiple regional aquifers and multiple regional confining units. In Aiken County, which includes the northern third of the SRS, most wells are screened across the Crouch Branch aquifer, which occupies the interval from about 200 to 300 feet below land surface, and the McQueen Branch aquifer, which occupies the interval from about 325 to 450 feet below land surface (USGS 2019b). Water movement in these deeper aquifers is generally horizontal toward the Savannah River or the coast. Flow in the higher aquifers, including the Water Table aquifer, is often toward the nearest intersecting stream, but some may also move downward into the deeper regional aquifers (NNSA 2020).

Groundwater quality in the deeper aquifers is generally described as being of high quality, requiring little treatment prior to use (USGS 2019b). Past SRS chemical and radioactive waste management actions have resulted in contamination of soil and water resources. These contamination sites, including groundwater contamination plumes in the upper aquifers, are being monitored and remediated pursuant to the SRS Federal Facility Agreement (FFA) and other regulatory drivers. The FFA is a 1993 agreement among DOE, EPA, and the State of South Carolina. One of the groundwater contamination plumes being managed under this effort is the upper aquifer under the proposed project site in the Tritium Area. The major contaminants of concern in this area are identified as trichloroethylene, gross alpha, nonvolatile beta, and tritium (SRNS 2020e). The SRS environmental remediation program has been underway for more than 20 years and has resulted in an overall reduction in the size of most groundwater plumes (SRNS 2020e). The status of the SRS environmental cleanup efforts is reported in the annual SRS environmental reports and in regulatory documentation, all of which are available to the public.

Groundwater, supplied through a network of about 40 production wells scattered across the site, sources the SRS's domestic and process water. Eight of these wells supply the primary drinking water system, which consists of the A-Area treatment plant and distribution lines that reach the primary site facilities, including those in H-Area. Other production wells serve several remote sites with their own drinking water systems, and many of the sites have their own production wells for process water needs. Drinking water sampling performed by SRS in 2019 met all state and federal drinking water quality standards. Additionally, the A-Area drinking water system was inspected by SCDHEC in 2019 and given a "satisfactory" rating, the highest rating given by SCDHEC (SRNS 2020e).

3.3.1.3 Water Use

According to USGS, water use in 2015 for the combined area of Aiken, Barnwell, and Allendale counties in South Carolina averaged approximately 177 million gallons per day (Dieter et al. 2018). Water use includes both surface water and groundwater sources. The greatest water user, by far, in the three-county area was the thermoelectric-power industry (i.e., electricity generating plants), averaging 96 million gallons per day using almost entirely surface water. Excluding the thermoelectric category, average rates of groundwater and surface water usage were similar, at approximately 36 and 44 million gallons per day, respectively. After the thermoelectric-power industry, municipal water supplies and irrigation were the largest two users of groundwater, and municipal water supplies and industrial were the largest two users of surface water.

For comparison purposes, SRS water use in 2010 averaged approximately two million gallons per day of groundwater and three million gallons per day of surface water (NNSA 2020). Groundwater was used for domestic (potable), process, and service water needs. Surface water was used for makeup water to L-Lake and, at specific locations, for fire protection, steam production, and boiler feed water.

3.3.2 Proposed Action Impacts

This section addresses potential impacts to water resources from construction and operation of the proposed TFF. Estimated water requirements associated with the Proposed Action are provided in Table 3-2. Note that the same water demand is presented in terms of two units: (1) gallons per year and (2) gallons per day (i.e., gallons per year divided by 365 days per year). The "one time" need is associated with filling water tanks for fire protection and is separated out because it would not be a typical water need after the first year of operation.

Table 3-2—Estimated Water Requirements under the Proposed Action

Proposed Action Phase	Water Requirement (gallons per year)	Average Water Requirement (gallons per day)
Construction	480,000	1,315
Operations	1,585,800 + 400,000 (one time)	4,345 + 1,096 (one year)

3.3.2.1 Construction Impacts

During the three-year construction period, land disturbances could affect runoff quality or quantity and the presence of construction equipment could increase potential for spills or leaks of hazardous substances (fuels and lubricants) that could be transported to surface waters. Additional demands for water to support construction activities could also affect general water availability.

Construction would take place in developed areas within H-Area. As a result, work would occur largely in areas that currently have buildings, pavements, or compacted soils where surfaces are relatively impermeable and stormwater runoff is high. Under these conditions, any runoff is less likely to carry away loose soil. Disturbances involving excavation (i.e., new building foundations and underground utility connections and changes) would generate areas with lower runoff rates due to more permeable surfaces and increased potential for loose soil particles being carried away by runoff. Because areas of excavation and disturbed (more permeable) soils would be temporary and small in comparison to the size of the affected watershed, and because most of the area is relatively flat, adverse impacts would not be expected from runoff quantity changes. Changes, if any, in the amount of stormwater runoff reaching surface waters would be very minor and, correspondingly, any changes to groundwater recharge due to more water soaking into the ground would be very minor. The latter condition is important, considering the contamination plume in the shallow groundwater beneath H-Area that is being managed and monitored under the FFA.

The potential for adverse impacts due to changes to runoff quality, from either picking up soil particles or from spills or leaks of hazardous materials, would also be very low. SRS has permits, plans, and procedures in place to minimize the potential for stormwater runoff to carry contaminants away from construction areas. SRS operates under a NPDES permit for industrial discharges that include Outfall H-02 for cooling water and stormwater runoff from the northwest portion of H-Area. The site also operates under another NPDES permit for stormwater discharges associated with industrial activities. In addition to Outfall H-02, multiple outfalls surrounding H-Area are regulated and monitored under these permits. These permits require that SRS prepare and implement plans to "control or eliminate discharges of toxic pollutants, oil, hazardous substances, sediment, and contaminated stormwater" (SRNS 2020e). These plans include: (1) a best management plan for identifying and controlling discharges of hazardous and toxic substances; (2) a Stormwater Pollution Prevention Plan (SWPPP); and (3) a Spill Prevention, Control, and Countermeasure Plan. Implementation of these plans requires that appropriate soil and sediment control measures be put into effect as necessary during construction. The plans also require SRS to take actions to address the potential for contaminants to be released from construction equipment and staged fuel containers, if used. This includes taking actions such as putting fuel or other hazardous material containers within secondary containment and identifying the type and location of equipment available to respond to spills or leaks. Monitoring of industrial and stormwater outfalls, as required by the discharge permits, would verify the effectiveness of control measures. Construction of the proposed TFF is not expected to require large quantities of hazardous materials (e.g., fuels), and considering the control measures SRS is required to implement (and pass on to construction contractors in contract requirements), contamination of stormwater and then to receiving surface waters is unlikely.

It should be noted that equipment access for construction of warehouse 233-38H is expected to be through H-Area's northwest fence, which is parallel to and about 150 feet from the detention pond that is part of the Wetlands Treatment Facility. The space between the fence and the pond also has a slope greater than any within the built-up portion of H-Area; it slopes down about 25 feet in elevation to the edge of the detention pond. There is a small, relatively flat area and road just outside the fence that would provide the primary access for construction equipment, but there could be ground disturbance that extends into the sloped area. Preliminary plans for the Proposed Action include installation of a silt fence in the area just below the access road. This or some other protective measures would be expected in this area. Even if some soil particles washed down this slope, the intended purpose of the detention pond is to equalize flow to the wetland cells and to facilitate sediment removal. Because of the control measures that would be taken and the design of the Wetlands Treatment Facility, it is unlikely there would be any adverse impacts to either the wetland cells or the receiving stream after discharge through Outfall H-02.

Water use during the three-year construction period is estimated to average a little more than 1,300 gallons per day and is expected to come from groundwater sources. This water demand would be in excess of current water needs of the Tritium Area, as current operations would be continuing much as they are at present. The 1,300-gallon-per-day usage represents about 0.004 percent of the groundwater typically used each day in the three-county area of Aiken, Barnwell, and Allendale. It also represents only 0.066 percent of the two million gallons per day of groundwater used within SRS. It is expected that this very small addition to SRS water demand would have no notable impact on the area's water availability.

Sanitary wastewater would be unlikely to increase during construction. Although there would be up to 170 additional construction personnel, the sanitary wastewater would be managed through use of portable toilets and temporary bathroom trailers (SRNS 2020c).

3.3.2.2 Operations Impacts

TFF operations would have the same potential impacts to water resources as existing tritium facilities. Under the Proposed Action, operations would involve no new discharges of waste or water to either surface water or groundwater. Cooling water discharges would be similar in quantity and composition to current discharges and would continue to drain to the Wetlands Treatment Facility and permitted Outfall H-02. The site's ability to meet NPDES permit requirements at this location or other permitted outfalls around H-Area would not be affected. There would be no change in the types or quantities of hazardous materials used at the TFF that would represent an added risk of accidental release. As indicated in Section 2.2.2, there could be a short-term increase in personnel during startup testing and transition, but increased amounts of sanitary wastewater would be minor and would not be expected to adversely impact the capabilities of the onsite sewage treatment system. Impacts on the sanitary wastewater infrastructure are also discussed in Section 3.7.2.

Under the Proposed Action, typical water demand during operations is estimated to be more than 4,300 gallons per day. This is more than three times the quantity evaluated for the construction phase, but it is still a small portion of the water used in the three-county area or on the SRS. More importantly, this water demand represents a continuation of water needs for HAOM operations; overall water usage in the Tritium Area is not expected to notably change. The only exception is the 400,000 gallons of water that would be needed on a one-time basis during the first year of operation to fill fire protection tanks. Averaged over the year, this is equivalent to another 1,100 gallons per day. Potential impacts to water availability would be minor.

3.3.3 No-Action Alternative Impacts

Under the No-Action Alternative, actual and potential impacts to water resources from H-Area operations would remain unchanged. Over the long-term, aging and associated degradation of facilities could lead to an increase in the potential for release of hazardous materials. NNSA would continue to operate tritium facilities in compliance with applicable regulations and permit requirements.

3.4 Air Quality and Noise

3.4.1 Air Quality

3.4.1.1 Affected Environment

Air quality is affected by air pollutant emission characteristics, meteorology, and topography. Air pollution originates from many types of point sources, such as power plants and industrial processing, and mobile sources, such as cars, trucks, and trains. Air pollutants are transported, dispersed, or concentrated by meteorological and topographical conditions.

The National Ambient Air Quality Standards (NAAQS) define ambient limits for criteria air pollutants such as sulfur dioxide, particulate matter equal to or less than 10 microns (PM_{10}), particulate matter equal to or less than 2.5 microns ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, ozone, and lead (40 CFR Part 50). The EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) establish limits for noncriteria pollutants, such as radionuclides and other toxic compounds (40 CFR Part 61).

South Carolina is in compliance with the NAAQS for criteria air pollutants (EPA 2019). Air pollutant concentrations attributable to SRS are in compliance with applicable guidelines and regulations (SRNS 2020e). Under Title V of the *Clean Air Act of 1990* (42 U.S.C. § 7401, et seq.) (CAA), SRS is considered a "major source" of nonradiological air emissions and, therefore, must comply with the CAA Part 70 Operating Permit program. Under the Title V permit, SRS is subject to operating and emission limits, as well as emissions monitoring and recordkeeping requirements. The permit also requires SRS to demonstrate compliance through air dispersion modeling and by submitting an emissions inventory of air pollutant emissions every three years, with the next inventory due March 31, 2021. SRS is in compliance with all air permit requirements (SRNS 2020e).

Atmospheric radionuclide emissions from SRS are limited under EPA's NESHAP regulation at 40 CFR Part 61, Subpart H, which details the methods for estimating and reporting radioactive emissions from DOE-owned or operated sources. SCDHEC has the authority to regulate radioactive airborne pollutant emissions for each major source of airborne emissions at SRS via the Title V permit, which gives specific limitations and monitoring requirements.

SRS quantifies the total amount of radioactive material released to the environment by the following methods:

- Data obtained from monitored air effluent release points (stacks or vents),
- Calculated releases of unmonitored radioisotopes from the dissolution of spent fuel, and
- Estimates for unmonitored sources based on approved EPA calculation methods.

The EPA annual effective dose equivalent limit to members of the public is 10 millirem (mrem) per year. The total effective dose for 2019 at SRS was less than one percent of the 10 mrem per year limit (SRNS 2020e). Historically, nearly 80 percent of the radionuclides emitted at SRS are tritium compounds. As shown in Figure 3-6, annual tritium releases have had a downward trend, with 9,250 Ci of tritium released in 2019. The 2019 levels were lower when compared to 2018 due to no major maintenance activities in the tritium-processing facilities. In 2018, a large number of maintenance activities were performed as part of a scheduled outage. Additionally, the amount of tritium released during routine operations at SRS also fluctuates due to changes in SRS missions and in the annual production schedules of the tritium-processing facilities. About 5,800 Ci of tritium are released annually from the five monitored stacks in H-area (SRNS 2020c).

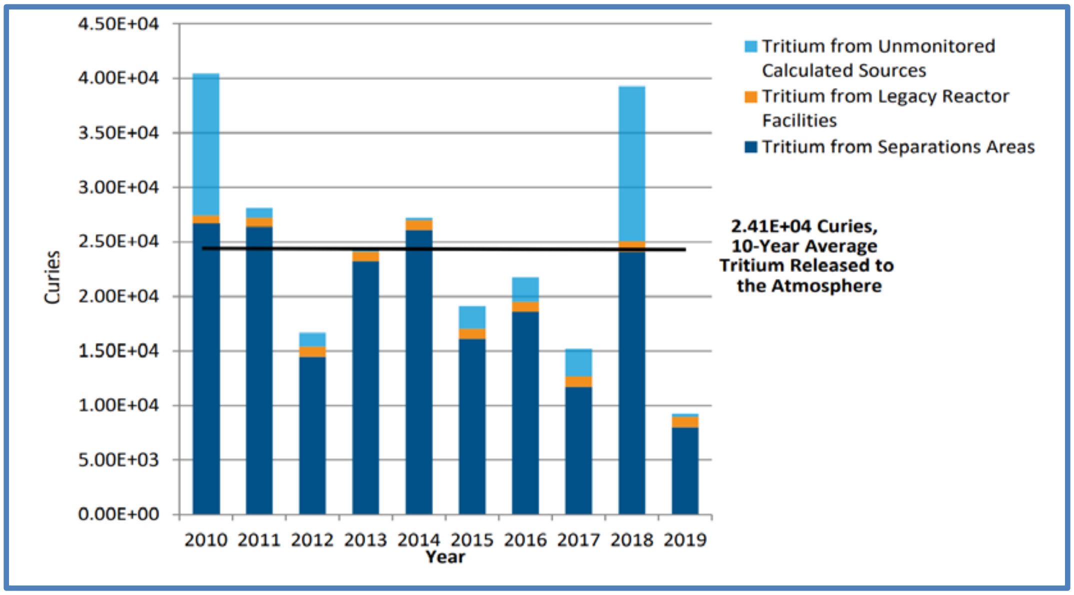

Figure 3-6—10-Year History of SRS Annual Tritium Releases to the Air (Source: SRNS 2020e, Figure 5-2)

SRS has met or exceeded the greenhouse gas management goals outlined in its environmental management system (SRNS 2020e, Section 2.3).

3.4.1.2 Proposed Action Impacts

During construction, nonradiological emissions (e.g., nitrogen oxides, carbon monoxide, sulfur dioxide) from heavy equipment would be minor and would temporarily affect air quality. Fugitive dust emissions (PM) from site grading would be minimal due to the small area of land disturbance (less than 2.5 acres) and use of water suppression or other dust control methods. Radiological emissions are not expected to increase during construction since there is no known residual radiological contamination in the impact area (SRNS 2020c).

Under the Proposed Action, the air pollutant stationary sources during operations would consist of backup diesel generators, fire pumps, and TFF exhaust stacks. The diesel generators and fire pumps would: (1) only be operated for testing and emergency use, (2) be included in the Title V permit revision, (3) comply with all regulations, and (4) have fuel limitations. The expected fuel use for the generators and pumps would be less than one percent of the facility-wide permitted fuel use. In addition, the generators would comply with the New Source Performance Standards reciprocating internal combustion engine regulations that require lower emission rates than the older, existing backup units (40 CFR Part 60). Small emission increases from the new diesel fired equipment would not affect air quality.

TFF process emissions would result from parts cleaning, finishing, and milling and would consist of minor amounts of volatile organic compounds, particulate matter, and hazardous air pollutants. These emissions would be released from the stacks, with no net increase over existing levels (SRNS 2020c).

Because the Proposed Action would transfer functions from HAOM to the proposed TFF and there would be no net increase in production, mobile source emissions from waste transportation would not increase over existing levels. Employee staffing levels would also remain the same as existing levels except for a small increase during startup; therefore, any small increase in mobile source emissions associated with personnel commuting would be minor and temporary.

Radiological air emissions (consisting primarily of tritium) would continue to be measured via in-stack monitoring and would comply with the NESHAP radionuclide requirements. The proposed operation of the TFF would not result in measurable tritium releases during normal operations. During operations at the TFF, very small amounts of tritium gas could be released from the metal matrix of returned reservoirs and other tritium-contaminated materials. Any tritium released would be exhausted via gloveboxes, hoods, or local exhausts into the stack. These very small amounts (estimated to be less than 1 Ci annually) would not measurably contribute to increased health impacts to the offsite public (SRNS 2020c).

The transfer of processes and limited equipment (most replacement equipment would be purchased new) would not result in increased tritium emissions. Additionally, the activities associated with putting HAOM into a cold standby state would not increase the off-gassing or release of tritium emissions from HAOM.

3.4.1.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to air quality beyond current and planned levels. Over the long-term, aging and associated degradation of facilities could lead to an increase in the potential for tritium release. NNSA would continue to operate tritium facilities in compliance with applicable regulations and permit requirements.

3.4.2 Noise

3.4.2.1 Affected Environment

Major noise sources at SRS occur primarily in developed or active areas and include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, public address systems, and construction and materials-handling equipment). Other major noise sources include onsite vehicular and rail traffic. Existing SRS-related noise sources of importance to the public are those related to transportation of people and materials to and from the site, including trucks, private vehicles, helicopters, and trains. Another important contributor to noise levels is traffic to SRS along access highways through the towns of New Ellenton, Jackson, and Aiken, South Carolina (NNSA 2015, p. 3-23).

Neither South Carolina nor Georgia has established state noise regulations. To prevent activity interference or annoyance, EPA guidelines recommend an average day-night level of 55 decibels or less (EPA 1974).

3.4.2.2 Proposed Action Impacts

Construction noise from heavy equipment such as backhoes and excavators would be temporary and confined to the construction site. The nearest site boundary to H-Area greater than six miles is to the west. Facilities in this area are far enough from the site boundary that noise levels from sources in this area would not be measurable or easily distinguishable from background levels. No distinguishing noise characteristics would increase during operation of the proposed TFF. The cooling tower replacement would be an in-kind replacement of an existing unit and would not affect noise.

3.4.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to noise beyond current and planned levels.

3.5 Ecological Resources

3.5.1 Affected Environment

3.5.1.1 Terrestrial Resources

<u>Vegetation</u>

The proposed TFF would be located within the existing Tritium Area. The area is industrial, covered with buildings, parking lots, and bare soil. No native vegetation occurs within the area, with only small (i.e., less than one acre) patches of installed grass lawn along roads and among industrial and construction facilities. The undeveloped portions of the area provide poor terrestrial wildlife habitat. The area is surrounded by buildings, parking lots, and roads to the east and south. To the west is a narrow strip of land (about 150 feet) that has been cleared of pine or mixed forest vegetation and is now grassland or scrub-shrub vegetation. Beyond the strip of land is mixed forest vegetation, bottomland hardwood, and deciduous forests within the Crouch Branch stream corridor (DOE 1999). The area to the north contains an engineered Wetlands Treatment Facility, constructed to provide habitat for amphibians, reptiles, and plants (SREL 2020).

<u>Wildlife</u>

As discussed in Section 2.2 of this EA, the proposed TFF would be located in an existing industrial area that contains no native vegetation and only small patches of grass lawns. The Tritium Area provides habitat for only those animal species typically classified as urban wildlife (DOE 1999). However, urban wildlife studies on SRS have documented the presence of 144 species in developed areas of SRS (Wike et al. 2006, Table 3-13). Only 29 percent of those species were considered common, and an even smaller number, four percent, were classified as abundant. In a highly developed site such as the Tritium Area, it is less likely that these common species would be present. The species considered abundant in developed areas include the rock dove (*Columba livia*), common crow (*Corvus brachyrhynchos*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus*). These are all bird species that are known to be highly adaptable to human development. Small mammals (e.g., house mouse, opossum, and raccoon) might also be present in open areas at certain times of the year, depending on the level of human activity (DOE 1999).

3.5.1.2 Aquatic Resources

Wetlands

Wetlands are habitats dominated by hydrophytes, have saturated soils, or are periodically or permanently covered with water. The location of the proposed TFF is in an existing industrial area that does not contain any wetlands. An engineered wetland is located outside the perimeter fence to the north of the Tritium Area (USFWS 2020a).

Floodplains

Floodplains are defined by Executive Order 11988, "Floodplain Management," as "the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, including at a minimum, the area subject to a 1 percent or greater chance of flooding in any given year" (that area inundated by a 100-year flood). Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency do not identify any floodplains within the Tritium Area. The proposed TFF footprint is within an area identified as minimal flood hazard (FEMA 2020).

Aquatic Habitat and Species

The land within the Tritium Area has been previously developed for industrial use. As a result, no open water or wetlands exist within the Tritium Area boundary. There are, however, aquatic resources, including Upper Three Runs Creek, Crouch Branch, and associated bottom hardwood wetlands in the nearby areas outside of the Tritium Area. In addition, the Wetlands Treatment Facility provides habitat for amphibians, reptiles, and plants (SREL 2020). Aquatic plant and animal species do not occur within the Tritium Area boundary because of the absence of aquatic habitat.

3.5.1.3 Threatened, Endangered, or Sensitive Species.

The *Endangered Species Act of 1973,* as amended (16 U.S.C. § 1531), is intended to prevent the further decline of endangered or threatened species and to bring about the restoration of these species and their habitat. When a species is proposed for either endangered or threatened status, areas essential to its survival or conservation may be proposed as critical habitats. Table 3-3 presents federally or state listed threatened, endangered, and other special-status species known to occur on SRS. None of these species are known to inhabit or otherwise use the Tritium Area (DOE 1999). No critical habitat for threatened or endangered species exists in the Tritium Area (USFWS 2020b).

Table 3-3—Federal or South Carolina Endangered or Threatened Plants and Animals Known to Occur on the Savannah River Site

Scientific Name	Common Name	Status	
		Federal	State
Plants			
Echinacea laevigata	Smooth purple coneflower	E	E
Lindera melissifolia	Pondberry	E	E
Animals			
Haliaeetus leucocephalus	Bald eagle	Not Listed[a]	T
Picoides borealis	Red-cockaded woodpecker	E	E

Scientific Name	Common Name	Status	
		Federal	State
Mycteria americana	Wood stork	T	E
Acipenser brevirostrum	Shortnose sturgeon	E	E
Elanoides forficatus	American swallow-tailed kite	Not Listed	E
Gopherus polyphemus	Gopher tortoise	Not Listed	E
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Not Listed	E

a. Protected under the *Bald and Golden Eagle Protection Act*.
E = endangered; T = threatened.
Source: SCDNR 2019; Wike et al. 2006, p. 3-45

3.5.2 Proposed Action Impacts

Potential impacts to biological resources are evaluated based on the degree to which various habitats or species could be affected by the Proposed Action. Impacts to wildlife are evaluated in terms of disturbance, displacement, or loss of wildlife.

3.5.2.1 Construction

Terrestrial Resources

Under the Proposed Action, potential impacts during construction could include erosion and sedimentation, human disturbance, and noise. Construction activities would occur on previously disturbed land in the Tritium Area. No disturbance on previously undisturbed lands is expected. Therefore, beyond removal of existing grasses in the construction area, there would be no impacts to vegetation.

Because no vegetation communities on or surrounding the proposed TFF would be disturbed, impacts to wildlife species from habitat loss would not occur. During construction, presence of human activity and associated construction noise can cause wildlife species to avoid habitats surrounding a construction site; however, no new impacts to wildlife species are expected from human presence and noise from TFF construction.

Aquatic Resources

No wetlands occur within the footprint of the proposed TFF. Section 3.3.1.1 of this EA indicates that the potential for adverse impacts to surface water, including wetlands, is low. Therefore, impacts to wetland habitats would be unlikely. No construction activity would occur within a floodplain; therefore, floodplains would not be affected.

Aquatic species do not occur within the Tritium Area boundary because of the absence of suitable habitat. Erosion and sedimentation from potential stormwater runoff would be managed through the NPDES permit and SWPPP, and discharges to aquatic habitats are not expected to impact water quality. Appropriate soil erosion and sediment control measures (e.g., sediment fences, stacked hay bales, mulching disturbed areas) would be employed during construction to minimize suspended sediment and material transport, as well as potential water quality impacts. No notable construction impacts are expected to aquatic species in the Upper Three Runs watershed.

Threatened or Endangered and Other Protected Species.
Several threatened or endangered and protected species occur on SRS, but none occurs in the vicinity of the proposed TFF. No critical habitat designated for threatened or endangered species would be affected by project construction as no critical habitat is located on SRS.

3.5.2.2 Operation

Impacts to ecological resources from the operation of the TFF would be similar to those associated with current operations at HAOM. Potential impacts could occur from changes in land use, radiological and nonradiological air emissions, stormwater and wastewater discharge, and human disturbance, including operational noise. As noted in Section 3.1.1, there would be no changes to land use. Per Section 3.4.1, there would be no additional radiological or nonradiological emissions associated with the Proposed Action. Section 3.3.3 indicates that the Proposed Action would not result in an increase in stormwater or wastewater discharge. During operations, most of the human activity would occur inside TFF buildings. As reported in Section 3.4.2, noise levels during operations are not expected to be greater than existing levels. As a result, the Proposed Action is not expected to impact any ecological resource.

No federal or state-listed threatened or endangered species have been identified in the vicinity of the TFF. Monitoring to assure that there are no negative impacts to threatened and endangered or special-status species would continue.

3.5.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to ecological resources beyond current and planned levels.

3.6 Cultural and Paleontological Resources

3.6.1 Cultural Resources

3.6.1.1 Affected Environment

Cultural resources are physical manifestations of culture—specifically, archaeological sites, architectural properties, ethnographic resources, and other historical resources and places relating to human activities, society, and cultural institutions—that define communities and link them to their surroundings. The Federal Government maintains the National Register of Historic Places (National Register), which is a listing of prehistoric, historic, and ethnographic buildings, structures, sites, districts, and objects that are considered significant at a national, state, or local level. Cultural resources that meet the criteria for listing on the National Register are considered National Register-eligible and are afforded the same considerations as listed resources.

Approximately 36.4 percent of SRS has been surveyed for archaeological resources and historic-era buildings and structures, with 70,458 acres surveyed as of 2018 (NNSA 2020). Surveyors have identified a total of 2,043 archaeological sites and 7 historic buildings/structures that date prior to 1950 on SRS. SRS contains no National Historic Landmarks. All of the Cold War-era resources on SRS constructed between 1950 and 1989 were inventoried in 2004. Cold War-era properties include buildings and structures associated with the development of nuclear materials and technologies for use in weapons, power generation, and medical treatments. One Cold War-era historic district, which includes a landscape, sites, buildings, and structures, has been determined eligible for listing on the National Register (NNSA 2020; DOE 2005a).

Within the proposed construction area, intact archaeological or ethnographic resources are not expected to remain due to the extensive amount of ground disturbance that has occurred there since the 1950s for the development of the existing tritium separation facilities and associated infrastructure and utilities. Buildings 249-H, 233-22H, 233-23H, and 233-24H were evaluated for their significance under the Cold War theme and found not eligible for listing in the National Register (DOE 2005a, pp. 39–40). The three office trailers (Buildings 249-7H, 249-8H, and 249-9H) are recent in age and thus not eligible for listing. The HAOM (Building 234-H; Manufacturing Building No. 3) was also evaluated under the Cold War theme and was found to be both individually eligible to the National Register and a contributing property to the Cold War-era historic district. Its significance derives from its direct association with the Cold War, a defining national historic event that lasted over four decades, as well as for its unique architectural and engineering attributes as part of the early development of the SRS by DuPont (DOE 2005a, pp. 22–23, 40, and 58).

3.6.1.2 Proposed Action Impacts

Under the Proposed Action, all construction-related activities would occur on previously disturbed lands and no impacts to archaeological resources or historic-era buildings or structures would be expected. Any inadvertent discoveries during construction would be evaluated and, if needed, mitigated in accordance with the *Archaeological Resource Management Plan of the Savannah River Archaeological Research Program* (SRARP 2013), which addresses overall cultural resource management and compliance efforts for the SRS.

All buildings and structures that would be demolished or removed have been found not eligible for listing on the National Register. Removal of equipment from the HAOM, a National-Register-eligible building, would not affect the eligibility of that building, as no changes would occur to the building itself. New Buildings 1 and 2 and the external corridor would be similar in look and design to existing buildings and structures in H-Area and would not have an adverse visual effect on the setting of Cold War-era historic architecture. Finally, best management practices would be implemented to reduce the short-term visual effects of construction dust to H-Area Cold War-era historic properties. Thus, there would be no impacts to historic architecture from the Proposed Action.

Operational activities would not be expected to impact cultural resources because such activities would occur either inside new buildings or in previously disturbed and developed outdoor areas. Activities observed from Cold War-era historic properties in H-Area would be similar to activities that currently occur and thus would not introduce visual elements that conflict with the historic setting.

3.6.1.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to cultural resources beyond current and planned levels.

3.6.2 Paleontological Resources

3.6.2.1 Affected Environment

Paleontology is the study of life in past geological time and the chronology of Earth's history. Paleontological resources are the fossil remains of past life forms. Fossils are the remains of once-living organisms such as plants, animals, fungi, and bacteria that have been replaced by rock material. Paleontological resources that have significant research potential are protected under the *Antiquities Act of 1906* (54 U.S.C. §§ 320301–320303).

Paleontological resources on SRS largely date from the Eocene Age (54 to 39 million years ago) and include fossilized plants, invertebrate animals, and deposits of giant oysters, other mollusks, and bryozoa. With the exception of giant oysters, all other fossils on SRS are fairly widespread and common, and thus the assemblages have low research potential or scientific value (NRC 2005, p. 3-39). While some fossil-bearing strata are known to exist on SRS, paleontological resources are not likely to occur in the location of the proposed TFF due to the highly disturbed nature of the area.

3.6.2.2 Proposed Action Impacts

Paleontological resources are not likely to occur in the proposed TFF construction area due to the highly disturbed nature of the area. All construction, demolition, and operational activities under the Proposed Action would be expected to have no impacts on paleontological resources.

3.6.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to paleontological resources beyond current and planned levels.

3.7 Infrastructure

3.7.1 Affected Environment

Site infrastructure includes those basic resources and services required to support planned construction and operations activities and the continued operation of existing facilities that would support the TFF. For the purposes of this EA, infrastructure is defined as electricity, water and sanitary systems, and fuel. Utility connections include electrical power, fire water, domestic water, storm and sanitary sewer, process sewer, and communications systems (SRNS 2020a).

Electricity

Most of the electrical power consumed by SRS is generated by offsite, coal-fired, and nuclear power plants supplied by Dominion Energy (formerly supplied by South Carolina Electric and Gas Company). Power is supplied by three transmission lines. SRS uses a 115-kilovolt power line system in a ring arrangement to supply electricity to the operations areas (DOE 2005b, Sec. 3.1.4). Approximately 310,000 megawatt-hours per year of electricity is used at SRS, with an available capacity of 4,400,000 megawatt-hours per year (NNSA 2015, p. 3-42). The peak load use is estimated to be 60 megawatts, with a peak load capacity of 500 megawatts. The existing facilities in the Tritium Area receive power from a substation adjacent to Building 249-H.

Water and Sanitary Systems

Domestic water is supplied from groundwater wells in several SRS areas. Three large domestic water supply systems at SRS deliver the vast majority of the site's requirements. These water treatment facilities are located in A-Area and K-Area. A smaller system located in B-Area is a backup to the facility in A-Area. Raw water is drawn from subsurface aquifers through 20-inch-diameter production wells using vertical turbine pumps. Once treated, the potable water is stored in five elevated storage tanks and distributed to the various facilities through a network of piping (NNSA 2015, p. 3-42). The SRS domestic water distribution system has an annual capacity that exceeds 2.9 billion gallons, and the current annual SRS demand is approximately 320 million gallons. Process water for individual areas is supplied through separate groundwater wells or river intake systems. Process sewer system water for the Tritium Area is discharged either to the Effluent Treatment Plant or to an existing permitted outfall depending on its constituents.

The CSWTF, located on Burma Road and installed in 1995, collects and treats 97 percent of sanitary wastewater generated at SRS. Also constructed in 1995, 18 miles of pressurized sewer line and 12 lift stations are used to transport sanitary wastewater to the CSWTF. The balance of the sanitary wastewater is treated at three smaller, and older, independent facilities located in K-Area and L-Area. The original treatment facilities, lift stations, and 40 miles of gravity pipe were installed in the 1950s. Collectively, the sanitary wastewater systems include the CSWTF, three smaller treatment facilities, 46 lift stations, and 58 miles of sewer pipe (DOE 2005b, Sec. 3.1.4). The CSWTF and other smaller treatment units are estimated to collect and treat approximately 250 million gallons of sanitary wastewater per year with a capacity to treat up to 383 million gallons per year of sanitary wastewater (NNSA 2015, p. 3-43). The existing sanitary wastewater system for the Tritium Area currently connects with Building 249-H.

The H-Area lift stations and sanitary wastewater collection systems are operating at or near capacity (SRNS 2020c, 2019a). As reported in the 2019 *Infrastructure Alignment Study* (SRNS 2019a, Section 12), "...attention has been placed on the operating areas' collection systems and lift stations that have exceeded or are at the end of design life. The priority for replacement or upgrading the lift stations was determined by evaluating the overall risk to the site's missions and goals as well as environmental impact. Approximately 15 lift stations have been completely replaced or had their life expectancy extended by replacing individual control panels, instrumentation, and mechanical components. This process is expected to continue for the foreseeable future." There is no current schedule for the upgrades to the H-Area collection system and lift stations. The sanitary wastewater from H-Area represents approximately 37 percent of the sanitary wastewater managed on SRS (SRNS 2019a).

Fuel

Biomass, backed up with diesel/fuel oil, is used at SRS to produce steam in boiler plants (SRNS 2019a). Diesel/fuel oil is also used to power backup and emergency generators. SRS uses an estimated 410,000 gallons of diesel/fuel oil per year (NNSA 2015, p. 3-42).

3.7.2 Proposed Action Impacts

Electricity

Electrical power consumption during construction would be minimal and supplied through existing and temporary systems and generators. The electrical power and distribution system for the TFF would supply and distribute normal, standby, and uninterruptible power to the TFF in the quantity and form required by TFF processes and associated support and utility systems during applicable modes of operation. Normal power for operations would be supplied from the existing 251-H electrical substation through redundant 13.8 kV underground feeds to a new TFF double-ended substation (SRNS 2020f). This new substation would reduce the voltage to 480 volts alternating current for distribution throughout the TFF to motor control centers, power panels, and equipment loads. Design components of this substation would include features to enhance its reliability and to prevent a challenge to safety-significant and safety-class systems caused by a single failure.

Because the building processes would be the same as HAOM and the proposed TFF would use more energy-efficient construction and equipment, the amount of electricity used annually for TFF would be expected to be less than that currently used for HAOM. Because SRS currently uses less than 10 percent of its available capacity for electrical power, TFF operational power consumption would be well within sitewide available capacity.

Backup power would be supplied by a dedicated 1,250-kW diesel generator (SRNS 2020c). Standby power would be supplied during loss of normal power for safety functions, which would also ensure power is available for other, nonsafety-related essential functions. Emergency standby power would be provided by two safety-class 500-kW diesel generators that supply critical fire protection systems (SRNS 2020f).

Water and Sewer Systems

Typical water uses during construction would include dust suppression and construction site hose down, flushing of piping, and other miscellaneous activities. The domestic water system during operations would include potable water, chilled water, and cooling tower water.

The domestic water system would provide a continuous source of clean and filtered water for domestic (potable) use as well as to supply service water needs during operations. Domestic water would be provided for sinks, restrooms, safety showers, eyewash stations, and water for humidity control. Process water would be provided for makeup water for the chilled water, cooling tower, and any other cooling water systems. The domestic water system does not supply, interconnect, or share its function with the fire protection water supply. A new domestic water line would enter the east side of Building 249-13H from a new outside underground domestic water line (SRNS 2020g, p. 180).

Construction personnel would use a combination of temporary bathroom trailers and portable toilets; therefore, the Proposed Action would have no impact on the H-Area sanitary wastewater system during construction. There would be no additional bathroom facilities installed in Buildings 1 or 2 or in the proposed warehouse.

During TFF operations, personnel would use restroom facilities in existing Building 249-H. The sanitary wastewater would continue to be piped from Building 249-H to a central waste collection system in H-Area, which would then be sent to the CSWTF for final treatment and disposal (SRNS 2020g, p. 143). As identified above, the H-Area lift stations and sanitary wastewater collection systems are operating at or near capacity. Per Section 2.2.2, for the first three years of startup and operations of TFF, there could be a slight increase in operations personnel beyond that currently required for HAOM operations. This increase could further stress the capacity of the H-Area sanitary wastewater system. Considering that the startup testing period would not begin for at least five years, some of the improvements or upgrades to the H-Area system could be implemented. Regardless, the sanitary wastewater system is monitored real time and replacements for equipment or transfer lines would be implemented as necessary within existing utility corridors with no additional environmental impacts. The CSWTF would have sufficient capacity for sanitary wastewater treatment demand during operations of the TFF because current usage is approximately 30 percent of its capacity.

The TFF process sewer system would provide the means to collect, confine, and channel wastewater streams generated from the TFF processes. The wastewater from Buildings 1 and 2 would be collected in an underground tank where it would be sampled and analyzed. Depending on the results of the sampling, the wastewater would either be discharged to an NPDES outfall or sent to the Effluent Treatment Plant (SRNS 2020g, p. 133).

A new firewater line would enter the east side of Building 249-13H from a new outside underground firewater line. The routing of the new outside underground firewater line would be determined during design in coordination with the domestic water and existing firewater lines. Two new safety-class fire water tanks and fire pump systems would be designed for Building 249-12H fire suppression. The new tanks and pumping systems would be located on the east side of Building 249-13H (SRNS 2020a, p. 159).

The SRS domestic water distribution system has an annual capacity that exceeds 2.9 billion gallons, and the current annual SRS demand is approximately 320 million gallons. The peak annual water demand of 480,000 gallons from construction activities (SRNS 2020c) would represent a very small fraction of the unused SRS domestic water capacity and would therefore have a minimal impact on the SRS water distribution system. The annual water demand of approximately 1.6 million gallons from TFF operations would also represent a very small fraction (less than 0.06 percent) of the unused SRS domestic water capacity and would therefore have a minimal impact on the SRS water distribution system.

Fuel

An estimated 100,000 gallons per year of diesel fuel would be required to support construction activities with an additional 25,000 gallons per year during operations. Capacity would generally not be limited, as delivery frequency would be increased to meet demand. Furthermore, temporary storage tanks could be installed to supplement fuel consumption needs during construction activities. The delivery of fuel would have minimal impact on the existing SRS infrastructure.

3.7.3 No-Action Alternative Impacts

Under the No-Action Alternative, the NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to SRS infrastructure beyond current and planned levels. The H-Area lift stations and sanitary wastewater collection systems would continue to be at or near capacity.

3.8 Socioeconomics and Environmental Justice

3.8.1 Socioeconomics

3.8.1.1 Affected Environment

A socioeconomics analysis considers the attributes of human social and economic interactions of a Proposed Action and the impacts that such action could have on the region of influence (ROI). For this analysis, the ROI is a four-county area in South Carolina and Georgia where a majority of the SRS workforce resides: Aiken and Barnwell counties in South Carolina and Columbia and Richmond counties in Georgia. Socioeconomic areas of discussion include the regional and local economy, local demographics, local housing, and community services. Socioeconomic impacts are defined as the environmental consequences of a proposed action in terms of potential demographic and economic changes.

From 2010 through 2019, the labor force in the ROI increased by 5.3 percent to 243,592 persons. During the same time period, employment in the ROI increased by 12.5 percent to 234,947 persons, and the number of unemployed decreased by 61.5 percent, reflecting economic recovery after the recession of 2008–2010. Over that same period, the unemployment rate declined from 9.7 percent to 3.5 percent. South Carolina and Georgia experienced similar trends in unemployment rates, decreasing from 11.2 percent to 2.8 percent in South Carolina and from 10.5 percent to 3.4 percent in Georgia (BLS 2020). Table 3-4 presents the employment profile in the ROI, South Carolina, and Georgia for 2010 and 2019.

Table 3-4—Employment Profile in the Region of Influence

Area	Labor Force		Employment		Unemployment		Unemployment Rate	
	2010	2019	2010	2019	2010	2019	2010	2019
Aiken	72,368	75,105	65,639	72,929	6,729	2,176	9.3%	2.9%
Barnwell	9,489	8,268	7,913	7,916	1,576	352	16.6%	4.3%
Columbia	61,522	75,134	57,027	72,860	4,495	2,274	7.3%	3.0%
Richmond	87,887	85,085	78,209	81,242	9,678	3,843	11.0%	4.5%
SRS ROI	**231,266**	**243,592**	**208,788**	**234,947**	**22,478**	**8,645**	**9.7%**	**3.5%**
South Carolina	2,155,668	2,376,069	1,915,045	2,308,362	240,623	67,707	11.2%	2.8%
Georgia	4,696,676	5,110,318	4,202,052	4,935,310	494,624	175,008	10.5%	3.4%

Source: BLS 2020

The proposed TFF would be constructed in the Tritium Area at SRS, located in Aiken County, South Carolina. Aiken County had a per capita personal income of $42,511 and ranked 11th in the state in 2018. In 2008, the per capita personal income was $32,496. The 2018 per capita personal income reflected an increase of 2.7 percent from 2008 (BEA 2019). The median income for households in Aiken County was $50,749 in 2018 (USCB 2020a). Aiken County had a total of 2,797 employer establishments in 2018, with a combined annual payroll of approximately $2.2 billion (USCB 2019).

Major employment sectors in the ROI are presented in Figure 3-7. In 2019, federal, state, and local government services and enterprises accounted for approximately 21 percent of the total employment in the ROI (BEA 2020). Retail trade, administrative and support services, and healthcare services accounted for approximately 10 percent of employment in the ROI, followed by leisure and hospitality services, manufacturing, and construction, ranging from 7 to 5 percent of employment in the ROI (BEA 2020). The distribution of employment in South Carolina and Georgia was generally similar (BEA 2020).

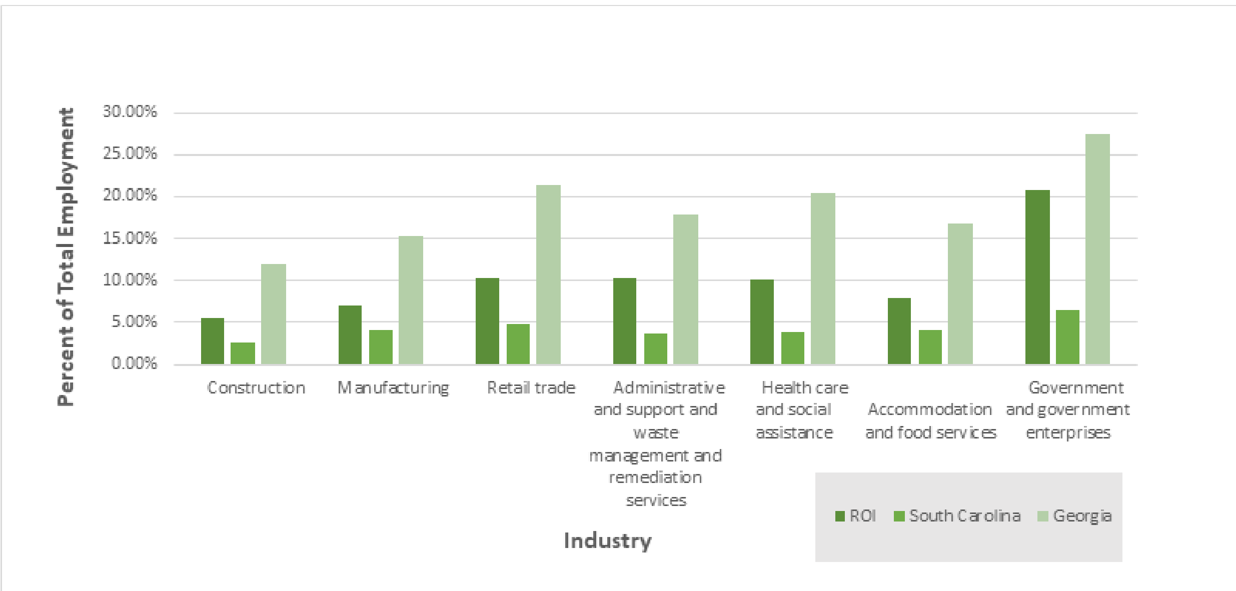

Figure 3-7—Major Employment Sector Distribution

In 2018, the population in the ROI was estimated to be 537,261 persons (USCB 2020b). From 2010 to 2018, the total population in the ROI increased by 5.9 percent, which was lower than the growth rate in South Carolina and Georgia (USCB 2020b). From 2018 to 2029, the population of the ROI is projected to steadily increase. In 2029, the population in the ROI is projected to be 578,502 persons (GAOPB 2021; SCRFAO 2019). Table 3-5 presents the historic and projected population of the ROI, South Carolina, and Georgia.

Table 3-5—County and State Historic and Projected Population

Area	2010	2018	2020	2026	2027	2028	2029
Aiken	160,099	166,926	171,320	176,360	177,075	177,810	178,285
Barnwell	22,621	21,577	20,655	19,285	19,060	18,840	18,610
Columbia	124,053	147,295	158,631	171,983	173,732	175,476	176,694
Richmond	200,549	201,463	202,240	204,270	204,595	204,922	204,913
SRS ROI	**507,322**	**537,261**	**552,846**	**571,898**	**574,462**	**577,048**	**578,502**
South Carolina	4,325,364	4,955,925	5,213,370	5,609,755	5,677,300	5,744,970	5,813,390
Georgia	9,687,653	10,297,484	10,833,472	11,787,398	11,924,534	12,061,740	12,177,024

Source: USCB 2020a, 2020b; GAOPB 2021; SCRFAO 2019

As of 2018, the ROI had 230,803 housing units of which 18.6 percent were vacant. Of the estimated 42,868 vacant units, 28,939 were estimated to be vacant rental units, or 12.5 percent of the housing stock (USCB 2020c). A majority of vacant rental units are considered “other vacant” (USCB 2020d). Temporary housing is available in the form of daily, weekly, and monthly rentals in motels, hotels, campgrounds, and recreational vehicle parks.

Community services within the ROI include public schools, hospitals, and public safety (i.e., law enforcement and firefighting). The ROI has eight school districts with a total of 140 schools serving a student population of 87,663 youth during the 2019–2020 school year (NCES 2020). There are seven hospitals serving the ROI, all of which provide short-term acute medical care and emergency services. There are six hospitals in Richmond County, Georgia, and one hospital in Aiken County, South Carolina. There are no hospitals in Barnwell or Columbia counties (AHD 2019). There are 20 police and sheriff departments within the ROI, employing approximately 690 law enforcement personnel (445 officers and 245 civilians) (USACops 2019). There are 36 fire departments in the ROI, with 1,493 career and volunteer firefighters and 123 civilian and volunteer nonfirefighting personnel (USAFireDept 2019).

3.8.1.2 Proposed Action Impacts

The TFF implementation timeframe is FY 2023–FY 2029, with construction activities, including site preparation, estimated to take approximately three years, followed by three years of startup preparations, testing, and operational readiness reviews. In terms of employment and income, NNSA estimates that the Proposed Action would require a peak of 170 construction workers (*see* Table 2-1). It is anticipated that some portion of construction materials would be purchased locally. Payroll and materials expenditures would have a positive impact on the local economies. Estimated direct construction jobs may result in additional indirect jobs, providing increased local revenue. Most construction materials and temporary construction workers would most likely be drawn from the local community. As a result, permanent increases in population would not occur and housing and community services would not be permanently impacted. Because the peak construction workforce (170 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts during construction, although beneficial, are expected to be negligible. The increase in economic activity would be temporary and would subside when construction is completed.

The number of operational workers, including security personnel, would not change from that currently employed at HAOM (approximately 75); therefore, socioeconomic impacts during operations would be negligible. Other socioeconomic impacts during operations of the TFF are summarized as follows:

- **Population:** Based on the estimated number of new direct jobs and the assumption that existing SRS workers would fill direct jobs and local workers in the ROI would fill indirect jobs, impacts to population would be negligible.

- **Housing:** Based on the estimated number of jobs and the assumption that existing SRS workers would fill direct jobs and local workers in the ROI would fill indirect jobs, there would be no need for additional housing. Local personnel would not require temporary housing and, thus, would have neither adverse nor beneficial impacts on temporary housing. If there was a need for temporary housing, the current market would be able to meet that need.

- **Community Services:** Based on the number of estimated jobs created and the assumption that existing SRS workers would fill direct jobs and local workers in the ROI would fill indirect jobs, no impact to public schools, hospitals, or public safety capabilities is anticipated.

3.8.1.3 No-Action Alternative Impacts

Under the No-Action Alternative, the NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to socioeconomic resources beyond current and planned levels.

3.8.2 Environmental Justice

3.8.2.1 Affected Environment

Under Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” federal agencies are responsible for identifying and addressing the possibility of disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. Minority populations refer to persons of any race self-designated as Asian, Black, Native American, or Hispanic. Low-income populations refer to households with incomes below the federal poverty thresholds.

Environmental justice concerns the environmental impacts that proposed actions may have on minority and low-income populations, and whether such impacts are disproportionate to those on the population as a whole in the potentially affected area. The threshold used for identifying minority populations surrounding specific sites was developed consistent with CEQ guidance (CEQ 1997, Section 1-1) for identifying minority populations using either the 50-percent threshold or another percentage deemed “meaningfully greater” than the percentage of minority individuals in the general population. CEQ guidance does not provide a numerical definition of the term “meaningfully greater.” CEQ guidance was supplemented using the *Community Guide to Environmental Justice and NEPA Methods* (EJ IWG 2019) and provides guidance using “meaningfully greater” analysis. For this analysis, meaningfully greater is defined as 20 percentage points above the population percentage in the general population.

The significance thresholds for environmental justice concerns were established at the state level. The average minority population percentage in South Carolina is 36 percent and in Georgia is 47 percent (USCB 2020b). Comparatively, a meaningfully greater minority or low-income population percentage relative to the general population of the state would exceed the 50-percent threshold. Therefore, the lower threshold of 50 percent is used to identify areas with meaningfully greater minority populations surrounding SRS. Meaningfully greater low-income populations are identified using the same methodology described above for identification of minority populations.

The average low-income population percentage in South Carolina and Georgia is 16 percent (USCB 2020e). Comparatively, a meaningfully greater low-income population percentage using this value would be 20 percentage points greater than the state low-income population (36 percent in South Carolina and Georgia).

This analysis used estimates from the U.S. Census Bureau's 2013–2018 American Community Survey 5-Year estimates to identify minority and low-income populations. There are 204 census tracts in the potentially affected area. Of the 204 census tracts, 82 exceed the threshold for minority populations (40.2 percent) (USCB 2020b, 2020e). Census tracts that exceed minority and/or low-income thresholds are predominantly located in the Augusta area, approximately 25 miles from the proposed TFF. Because of site access control, there are no residents within the two census tracts immediately surrounding the proposed TFF. Black or African American populations are the largest minority group making up 36.4 percent of the population within a 50-mile radius around the Tritium Area. The Hispanic or Latino population makes up 5 percent of the population. Of the 204 census tracts that surround the proposed TFF, 15 exceed the threshold for low-income populations (7.4 percent).

3.8.2.2 Proposed Action Impacts

Environmental impacts from most projects tend to be highly concentrated at the actual project site and tend to decrease as distance from the project site is increased. There are 82 census tracts that meet the definition of minority populations, which includes 15 census tracts that also exceed the threshold for low-income populations. During construction and operation of the proposed TFF, it is anticipated that environmental, health, and occupational safety impacts would be minimal, temporary, and confined to the Tritium Area (*see* Section 3.10). Based on the impacts analysis for resource areas, no high and adverse effects are expected from construction or operation of the TFF. It is expected that any impacts would affect all populations in the area equally. There would be no discernable adverse impacts to any populations, land uses, visual resources, noise, water, air quality, geology and soils, ecological resources, socioeconomic resources, or cultural resources.

In the long term, as DOE consolidates and modernizes the tritium facilities at SRS, the expected releases of tritium into the environment would be reduced, thus further reducing potential impacts to the environment and low-income and minority populations.

3.8.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, the NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental environmental justice impacts beyond current and planned levels.

3.9 Waste Management

3.9.1 Affected Environment

SRS generates and manages a variety of waste types. This includes categories of radioactive and hazardous waste. Hazardous wastes are not expected to be routinely generated at the TFF.[10] Some radioactive wastes (specifically high-level radioactive waste and transuranic waste) would also not be associated with the Proposed Action. Therefore, these waste types are not addressed in this EA.

SRS operations, including management of liquid waste in the Effluent Treatment Plant and salt wastes going through the Saltstone Production and Disposal Facilities, generate low-level radioactive waste (LLW) streams. These operations are not related to the Proposed Action and are not addressed in this EA.

The waste types that could be produced as part of the Proposed Action include LLW and solid waste. This section addresses the manner in which SRS manages these two waste types.

3.9.1.1 Low-Level Radioactive Waste

LLW is radioactive waste that is not classified as high-level waste, transuranic waste, spent fuel, or byproduct material and does not contain hazardous waste as regulated under the Resource Conservation and Recovery Act. LLW is generated by most SRS organizations and generally consists of materials such as job control waste, equipment, plastic sheeting, gloves, and soil that is radioactively contaminated. Some LLW is also accepted from offsite generators, primarily the Naval Reactors Program.

The SRS Solid Waste Management (SWM) group is responsible for taking general LLW from site generators (and occasionally from offsite generators) and verifying that the waste is as characterized by the generator and meets the receiving facility's waste acceptance criteria. The receiving facility is the E-Area LLW Facility, where multiple types of engineered disposal units are used for disposition of the waste. The E-Area LLW Facility, located immediately west of H-Area (*see* Figure 1-1), uses three types of trenches, two types of vaults, and a laydown area for waste disposal. The type of disposal unit used depends on the characteristics and nature of the LLW. The three trench types are engineered, slit, and component-in-grout. The first two types are backfilled with soil after waste emplacement; in the third, waste is encapsulated with grout before backfilling. The two types of vaults used are designated low-activity waste vault and intermediate-level vault, which consist of at-grade and subsurface concrete structures, respectively. The laydown area is designated the Naval Reactor Component Disposal Area and is set aside for activated metal or surface-contaminated components from the Naval Reactors Program (NNSA 2020). This last area would not be considered for waste from the Proposed Action.

The series of trenches and vaults have their own general acceptance parameters and, together, offer a hierarchy of disposal options depending on how much isolation is needed for the specific LLW

[10] Hazardous waste would not be routinely generated during TFF operations; however, small quantities of hazardous waste could be generated during maintenance activities. Any hazardous waste would be managed in accordance with SRS site procedures and permits.

being considered. LLW accepted by SWM is generally taken directly to one of the disposal units. The trenches are usually opened as needed and there may be more than one trench of a single type open at a time.

If LLW exceeds acceptance parameters for any of the E-Area LLW Facility units, then disposal at an approved offsite facility is pursued. If necessary, LLW may even be sent off site for treatment and then returned to SRS for disposal.

From FY 2011 through FY 2015, SWM managed LLW in quantities averaging of about 19,000 cubic yards per year (Humphries 2016). More recent LLW generation is estimated at approximately 13,100 cubic yards per year (NNSA 2020).

3.9.1.2 Solid Waste

For this analysis, solid waste is waste that is neither hazardous nor radioactive. It includes sanitary waste (often called municipal solid waste) and construction and demolition (C&D) waste that consists of bulky debris and rubble.

Sanitary Waste

SRS sanitary waste consists mainly of office building and cafeteria waste and is collected in dumpsters at or near the point of origin. Compactor trucks usually pick-up dumpsters of office waste on a weekly basis and take their loads to the North Augusta Material Recovery Facility for segregation into recycle and disposal streams. The disposal stream from this facility is transported to the Three Rivers Landfill. Cafeteria waste is sent directly from SRS to the Three Rivers Landfill.

Three Rivers Landfill is a regional municipal and commercial landfill that serves the nine counties in the Three Rivers Solid Waste Authority as well as SRS (TRSWA 2020). The landfill, opened in 1998, operates under a Resource Conservation and Recovery Act Subtitle D permit and is located on 1,400 acres of land within the SRS and leased from DOE. It has a current footprint of 300 acres, receives 1,000 tons per day or about 250,000 tons per year, and is projected to have an operational life of 120 years. The waste authority indicates 1.3 percent of the waste going to the landfill comes from SRS (TRSWA 2020).

From FY 2011 through FY 2015, SWM managed an average of about 18,400 cubic yards of sanitary waste per year (Humphries 2016). More recent sanitary waste generation is estimated at approximately 6,500 cubic yards per year (NNSA 2020).

Construction and Demolition Waste

C&D waste is typically made up of bulky, inert debris and wood waste generated from activities such as land clearing, construction, site preparation, and demolition. Since 2003, SRS has operated its own C&D landfill near N-Area. This landfill is permitted and regulated by SCDHEC as a Part III construction, demolition, and land-clearing debris landfill (Humphries 2016). If waste does not meet the C&D landfill waste acceptance criteria, it is sent to the Three Rivers Landfill for disposal. From FY 2011 through FY 2015, SWM managed an average of about 63,000 cubic yards of C&D waste per year (Humphries 2016).

The C&D landfill and the Three Rivers Landfill are both SCDHEC-approved landfills (NNSA 2020).

3.9.2 Proposed Action Impacts

3.9.2.1 Construction Impacts

The three warehouses proposed to be removed (Buildings 233-22H, 233-23H, and 233-24H) are not known to contain any radioactive materials or contamination. These buildings would also be emptied of materials before demolition, including any materials that might be considered hazardous waste. Similarly, the construction sites for the two new buildings (Buildings 249-12H and 249-13H), the external corridor, and new warehouse (Building 233-38H) are not expected to be contaminated with hazardous or radioactive materials. Construction contractors would be required to remove any unused materials they bring onto the site, including any that might be considered hazardous waste. As a result, no LLW, mixed low-level radioactive waste (MLLW), or hazardous waste would be generated during construction. As a standard measure to protect construction workers, SRS would monitor work areas, including soil areas to be disturbed, as appropriate to ensure no unexpected contamination was encountered. Should hazardous or radioactive contamination be found, SRS would involve necessary site expertise and require contaminated waste to be packaged and managed in accordance with applicable rules and regulations. SRS has well established mechanisms and procedures to manage LLW, MLLW, and hazardous waste; if any such wastes were generated under the Proposed Action, the quantities would be minor in comparison to existing waste management efforts.

Sanitary wastes would be generated during the three-year construction period. Such waste would be expected to include items such as packaging from building materials and equipment installation, as well as residues from consumables (e.g., food and supplies) brought in by the workforce. Sanitary waste generated during construction would not be expected to be unique in nature or otherwise require special handling or management. SRS would require construction contractors to either manage these waste materials on their own (collecting and removing the waste periodically) or direct them to onsite receptacles for placement of such waste. This waste would be removed periodically by the existing SRS waste collection system. Waste quantities would not be expected to overwhelm the existing SRS waste collection system or the operating capacity of the Three Rivers Landfill.

During construction, there would be more C&D waste generated than sanitary waste. C&D waste would include building materials from the three removed warehouses, concrete rubble from broken-up foundations, asphalt rubble from clearing areas for construction, and various types of construction debris (e.g., cuts of framing materials, set-up concrete from truck washouts or overages, off-specification or broken building materials). SRS has an active recycling program, including setting a goal as part of its sustainability program of diverting 50 percent of C&D waste from disposal (SRNS 2020e). As indicated in Section 2.2.1, scrap metal from removal of the three warehouses would be recycled; since they are metal buildings, this would represent a significant portion of their composition. Other materials generated during construction would be recycled or recovered as appropriate. It is expected that C&D waste not recovered would be transported to the Three Rivers Landfill for disposal. The C&D landfill may also be an option for disposal of the C&D waste, or a portion of it. Under the Proposed Action, C&D waste would not be expected to be unique in anyway and would be appropriate for disposal in either location. The volume of C&D waste expected from demolition of the three existing warehouses and the existing cooling tower would be approximately 3,100 cubic yards, or 1,500 tons (SRNS 2020c). This amount would not impact the existing operational capacity of either location.

3.9.2.2 Operations Impacts

The proposed TFF is being designed as a clean facility. Its operation is expected to produce no LLW, hazardous waste, or MLLW. Work in the TFF would be performed in glovebox settings and LLW, such as personal protective equipment, would typically not be generated during normal operations. This type of waste could be produced in the event of plant upset conditions, but overall generation of LLW, hazardous waste, and MLLW from the entire Tritium Area operations would be expected to decrease as a result of the Proposed Action.

Generation of sanitary waste would be expected to continue in quantities similar to existing conditions at HAOM. The number of workers would be expected to stay about the same (*see* Section 2.2.2) and the types of activities generating routine sanitary waste would continue at a similar level. There would be a minor exception during the first three years of TFF operations, when there would be startup preparations, testing, and operational readiness reviews (*see* Section 2.2.1). During this period, there would be additional personnel working in the area to perform these tasks. These additional workers would be expected to generate additional sanitary waste, but the increases would be minor. Adverse impacts to the existing operational capacity of either the SRS waste collection system or the Three Rivers Landfill would not be expected.

Operation of the TFF would not be expected to result in additional C&D waste.

3.9.3 No-Action Alternative Impacts

Under the No-Action Alternative, the NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts to waste management beyond current and planned levels.

3.10 Human Health – Normal Operations

3.10.1 Affected Environment

Tritium is the only radioactive isotope of hydrogen. Its symbol is H-3, ^{3}H, or T. The nucleus of a tritium atom consists of a single proton and two neutrons. The most common forms of tritium are tritium gas, also called "elemental," and tritium oxide, also called "tritiated water." At the facilities in the Tritium Area, the tritium release is composed of about 84 percent tritiated water and 16 percent elemental (SRNS 2020h, Table D-1). Tritium has a radiological half-life of 12.3 years. During its decay to helium, tritium emits a low-energy beta particle, with a maximum energy of 18.6 kiloelectron volts and an average energy of 5.7 kiloelectron volts. Because of its low energy, tritium's beta particle cannot penetrate a layer of clothing or the dead layer of skin that exists on the outside of the human body. Thus, tritium does not usually present an external radiation hazard. Rather, it is most harmful when inhaled or ingested. Inside the human body, tritium is uniformly distributed through all biological fluids within one to two hours. Tritium is eliminated from the body with a biological half-life of about 10 days, the same as water.

Routine operations in the HAOM do not involve hazardous materials. Hazardous chemicals used in the HAOM are mostly related to maintenance tasks by workers who have been properly trained in their use.

Occupational Exposures

As described above, tritium's low-energy beta radiation results in low direct exposures; the use of gloveboxes to confine tritium results in low inhalation and ingestion exposures for both the HAOM and other facilities in the Tritium Area.

As an example, the DOE Occupational Radiation Exposure Report for Calendar Year 2018 (DOE 2020a) presents occupational exposures for the SRS TEF. For the TEF, 46 percent of the monitored workers received no measurable dose in 2018, while the remaining 54 percent received an average of 16 mrem (DOE 2020a, Exhibit B-15). These results are conservatively representative for normal occupational exposures received at the HAOM (Building 234-H) because operations in the HAOM (and TFF) do not involve access to tritium outside of sealed reservoirs. DOE's current administrative exposure guideline for workers limits personnel exposure to 500 mrem per year.

Public Exposures

Under the Proposed Action, there would be no tritium releases to water; therefore, this section focuses on tritium emissions to air, which could result in public doses. Public exposures from the HAOM are directly related to tritium emissions. Annual tritium emissions for SRS are provided in the annual site environmental reports. For calendar year 2019, SRNS (2020e Sec. 5.3.2.1) provides the following:

> "During the past 10 years, the total annual tritium release has ranged from about 9,000 to 40,000 Ci per year, with an annual average tritium release of 24,100 Ci [*see* Figure 3-6 of this EA]. The 2019 SRS tritium releases totaled 9,250 Ci, which is the lowest in 10 years. The 76 percent decrease in tritium releases was due to there being no major maintenance activities in the Tritium Facility in 2019 as conducted in 2018. Additionally, the amount of tritium released during routine operations at SRS fluctuates due to changes in SRS missions and in the annual production schedules of the tritium-processing facilities."

In Figure 3-6 in Section 3.4.1 above, "Separations Areas" includes separations, waste management, and tritium facilities in F and H Areas. As Figure 3-6 shows, the tritium releases to air during 2010 and 2018 were significantly higher than during the other eight years. The SRS annual environmental reports provide the following explanations for these higher releases:

> "A significant reduction in tritium emissions is reported for 2011 as a result of refinement in the calculation methodology for the Mixed Waste Management Facility Phytoremediation project" (SRNS 2012, p. 4-2).

> "The increase in tritium releases from 2017 to 2018 is mainly attributed to releases associated with both monitored and unmonitored releases from the Tritium

> Facilities. The increase in monitored releases is due to short-term maintenance activities in the Tritium Facilities. The increase in unmonitored releases from the Tritium Facilities is due to 1) an increase of material stored in waste containers and 2) a more conservative emission factor being used in the calculation" (SRNS 2019b, Sec. 5.3.2.1).

The average tritium release to air over this 10-year period was 24,100 Ci/yr, as shown in Figure 3-6 above. If the two outlier years (i.e., 2010 and 2018) are excluded, then the average tritium release over this period is 20,200 Ci/yr.

Table 3-6 shows that the current average monthly tritium emission from the facilities in the Tritium Area is about 487 Ci, or about 5,844 Ci/yr, which is consistent with Figure 3-6.

The estimated radiological dose from the 2019 air releases to a representative, offsite person is 0.018 mrem (SRNS 2020e, Sec. 6.4.2.3). This represents 0.18 percent of the EPA air pathway limit of 10 mrem per year. The radionuclides that accounted for most of the dose were tritium oxide (79 percent) and elemental tritium (12.5 percent). The 2019 estimated dose is 78 percent lower than the 2018 estimated dose of 0.082 mrem. SRS attributes most of this decrease to the 79-percent decrease in tritium oxide releases during 2019 (SRNS 2020e, Sec. 6.4.2.3).

Table 3-6—Facilities in the Tritium Area Monthly Tritium Emissions

Building	Current Monthly Average Emission (Curies)	Notes
232-H	181	Emissions from off-gassing are expected to decrease over time.
233-H	108	Operational emissions.
234-H (HAOM)	121	Emissions from off-gassing are expected to decrease over time.
238-H	9	Building is being decommissioned.
264-H	68	Operational emissions.

3.10.2 Proposed Action Impacts

There is no appreciable discrimination of occupational and public exposures between the construction and operational phases of the Proposed Action. Therefore, the impacts analysis addresses construction and operations together.

Occupational Exposures

The TFF is a replacement facility for HAOM performing the same activities. The TFF would be designed as a clean facility, whereby any processes with the potential for tritium off-gassing would be performed in gloveboxes or ventilation hoods. Therefore, measurable worker doses are not expected during TFF normal operations (SRNS 2020c).

As with the existing facility, routine operations in the TFF would not use hazardous materials. Hazardous chemicals used in the TFF would be mostly related to maintenance tasks by workers who would be properly trained in their use.

Public Exposures

Table 3-6 indicates that some of tritium emissions from the facilities in the Tritium Area are expected to decrease with time. These decreases are not associated with the construction or future operation of the TFF; they are associated with less off-gassing from older facilities as residual tritium decays over time. The only potential for release of tritium from TFF operations is associated with the diffusion of tritium from the metal matrixes of returned reservoirs and other tritium-contaminated materials. This diffusion would occur when these used reservoirs or materials are in TFF. The amount of tritium that could be released from these operations would be very small (estimated at less than 1 Ci annually) and not be measurable on the stack air monitors (SRNS 2020c). Therefore, public exposures are not expected to change during the construction or operation of the TFF.

3.10.3 No-Action Alternative Impacts

For both occupational workers and the public, impacts from the No-Action Alternative would be similar to those under the Proposed Action, with the exception of impacts from increased maintenance activities on the aging HAOM. As Figure 3-6 shows, these periodic impacts could result in a nearly doubling of the tritium releases (i.e., from about 20,200 Ci/yr to about 39,300 Ci/yr), with a corresponding doubling of the public exposures, but only for the year in which HAOM maintenance activities occur. More frequent maintenance requirements for the HAOM than for the TFF also have the potential to result in higher occupational exposures. However, even if tritium releases were to double, the resultant dose to a member of the public would be less than one percent of the EPA air pathway limit of 10 mrem per year.

3.11 Human Health – Accidents and Intentional Destructive Acts

3.11.1 Affected Environment

Accidents at SRS can result in adverse impacts to workers and the public. This section provides an overview of current and historical information relevant to accidents at the site.

In preparing this analysis, DOE reviewed SRS annual environmental reports to determine if there were any unplanned releases of radioactivity to the environment from SRS (including H-Area) during the most recent five years for which data are available (2015–2019); no unplanned releases were reported (SRNS 2016, 2017, 2018, 2019b, 2020e).

With regard to nonradiological releases, the CAA, Section 112(r), requires any facility that maintains specific hazardous or extremely hazardous chemicals in quantities above specified threshold values to develop a risk management plan. SRS (including H-Area) has maintained hazardous and extremely hazardous chemical inventories below their specific threshold values; therefore, SRS has not been required to develop a risk management plan. There were no reportable Section 112(r)-related hazardous or extremely hazardous chemical releases at SRS (including H-Area) during the most recent five years for which data are available (2015–2019) (SRNS 2016, 2017, 2018, 2019b, 2020e).

The CAA mandates air quality standards for the protection of stratospheric ozone. Releases of chemical gases, such as chlorofluorocarbons, hydrofluorocarbons, halons, and other ozone-depleting substances, widely used as refrigerants, insulating foams, solvents, and fire extinguishers, cause ozone depletion. For the period 2015–2019, SRS reported no exceedances of ozone-depleting substance release limits (SRNS 2016, 2017, 2018, 2019b, 2020e).

DOE uses the Computerized Accident Incident Reporting System to keep track of worker injuries for all its sites (DOE 2020b). The total reportable cases (TRC) and days away, restricted, or on job transfer (DART) days and cases that have been reported at the SRS from 2015 through 2019 are shown in Table 3-7. In Table 3-7, the TRC and DART case rates are based on 200,000 hours (approximately 100 work-years).

Table 3-7—SRS Reported Injuries 2015–2019

SRS Organization	TRC Rate	DART Case Rate	TRC	DART Cases	Workdays Lost	Total DART Days	Hours Worked
SR Nuclear Solutions	0.3	0.1	60	15	1,095	1,651	38,900,066
SRR Operations	0.3	0.2	31	16	508	1,079	18,585,983
SR National Lab	0.1	0.0	3	2	129	227	8,164,783
SRR Construction	1.1	0.4	26	11	0	1,168	4,947,237
SRNS Construction	0.6	0.2	13	5	8	395	4,509,961
Parsons Construction	1.0	0.7	15	10	56	269	2,887,204
Security – Centerra	1.9	1.5	69	55	838	5,172	7,153,479
All Others	0.8	0.4	32	16	203	460	7,766,503
Total SRS Site	0.5	0.3	249	130	2,837	10,421	92,915,216

DART = days away, restricted, or on job transfer; TRC = total recordable cases
Source: DOE 2020b

As Table 3-7 shows, the SRS organization with the highest TRC and DART case rates is Security. The Table 3-7 construction rates are the next highest; however, the SRS construction rates are lower than the national average for heavy and civil engineering construction (NAICS: 237) of TRC: 2.4 and DART Cases: 1.5 (DOL 2020). Likewise, the SRS operations rates are lower than the national average for basic chemical manufacturing (NAICS: 3251) of TRC: 1.8 and DART Cases: 1.1 (DOL 2020).

3.11.2 Proposed Action Impacts

This section discusses the potential consequences from postulated radiological accidents, chemical release accidents, and intentional destructive acts.

Latent Cancer Fatality

A death resulting from cancer that has been caused by exposure to ionizing radiation. For exposures that result in cancers, the generally accepted assumption is that there is a latent period between the time an exposure occurs and the time a cancer becomes active.

Radiation Dose Units

Individual doses from radiation are most often expressed in “mrem.” Collective doses, which represent more than one person, are most often expressed in “person-rem.” One person-rem equals 1,000 person-mrem.

<u>Radiological Accidents</u>

In the event of a radiological accident at the TFF, workers and the public could be impacted. This EA estimates the doses and health consequences (e.g., latent cancer fatalities [LCFs]) to three receptors: (1) a maximally exposed individual (MEI, a hypothetical member of the public located at the closest site boundary); (2) a noninvolved worker (a worker located 0.06 mile from the TFF); and (3) the projected 2030 surrounding population within 50 miles of the TFF.

The radiological source term for each accident was calculated by the equation:

$$\text{Source Term} = \text{MAR} \times \text{DR} \times \text{ARF} \times \text{RF} \times \text{LPF}$$

where:

MAR = The amount and form of radioactive material at risk of being released to the environment under accident conditions.
DR = The damage ratio reflecting the fraction of MAR that is damaged in the accident and available for release to the environment.
ARF = The airborne release fraction reflecting the fraction of damaged MAR that becomes airborne as a result of the accident.
RF = The respirable fraction reflecting the fraction of airborne radioactive material that is small enough to be inhaled by a human.
LPF = The leak path factor reflecting the fraction of respirable radioactive material that has a pathway out of the facility for dispersal in the environment.

As described in the following bullets, data and results from existing documents were used to estimate the radiological accident impacts for this EA:

1. The accidents were obtained from *Tritium Production Capability Project Preliminary Hazards Analysis*, which analyzed numerous radiological accidents at the proposed TFF (Parsons 2018b, Table 7-16). Parsons (2018b) examined accidents in the following categories: (1) Fires, (2) Explosions, (3) Loss of Confinement, (4) Direct Exposure – Radiological, (5) Direct Exposure – Chemical, (6) Criticality, (7) External Events, and (8) Natural Phenomena. From all the accidents examined, Parsons (2018b) selected the candidate design-basis accidents. This EA includes only the 12 design-basis accidents that were shown to result in a dose above zero to the MEI. Those 12 accidents are listed in Table 3-8.

Table 3-8—Radiological Accident Frequency and Source Term—Proposed Action

Design-Basis Accident	Frequency[a]	MAR (g)	DR	ST (g)
LOC in Building 249-12H process area	A	6,000	0.05	300
Fire in 249-H corridor	A	2,000	1.00	2,000
NPH in 249-H corridor	U	2,000	1.00	2,000
LOC in RSS (outside HIVES)	A	200	1.00	200
LOC in 249-H corridor	A	200	1.00	200
External impact to 249-H corridor (non-crane)	BEU	2,000	1.00	2,000
External impact to 249-H (crane)	EU	2,000	1.00	2,000
NPH in process area	U	6,000	0.20[b]	1,200
Fire in Building 249-12H process area	A	6,000	0.20[b]	1,200
Fire in RRS	U	15,000	0.10[b]	1,500
Fire in Building 249-12H spreads from process areas to RRS	A	20,000	0.10[b]	2,000
NPH in Building 249-12H with fire	U	20,000	0.10[b]	2,000

a. A = Anticipated ($f \geq 10^{-2}$/yr); BEU = Beyond Extremely Unlikely ($f < 10^{-6}$/yr); EU = Extremely Unlikely ($10^{-6} \leq f < 10^{-4}$/yr); U = Unlikely ($10^{-4} \leq f < 10^{-2}$/yr)
b. Credit for the safety class Fire Suppression System bringing the fire under control.
DR = damage ration; HIVES = highly invulnerable encased safe; LOC = loss of confinement; MAR = material at risk; NPH = natural phenomena hazard; RRS = returned reservoir storage; ST = source term.
Source: Parsons 2018b

2. The frequency for the 12 mitigated design-basis accidents in Table 3-8 were estimated based on mitigated accident frequencies in Parsons (2018b)

3. The MAR and DR for each of the 12 design-basis accidents in Table 3-8 were obtained from Parsons (2018b). For 5 of the 12 accidents, Parsons (2018b, Table 7-16) indicates that credit was taken for the safety class Fire Suppression System bringing the fire under control. For those five accidents, the DR was assumed to be as specified in the footnotes to Table 7-16 in Parsons (2018b).

4. The ARF, RF, and LPF for each of the 12 design-basis accidents were conservatively assumed to be equal to 1.0. The ST for the 12 accidents in Table 3-8 is based on the assumed MAR, DR, ARF, RF, and LPF.

5. The potential doses to the MEI and the noninvolved worker were obtained from Parsons (2018b, Table 7-16) and scaled to reflect median meteorological conditions (SRNL 2019, Data Table A-3). The MEI is assumed to be located 7.1 miles from H-Area, while the noninvolved worker is assumed to be 0.06 mile from the release point.

6. The 50-mile population doses were estimated based on the ratio of the population to MEI doses from NNSA (2008, Table 5.8.12-1), adjusted for the estimated 2030 population of 862,957 people.

7. LCFs were calculated based on the ratio of 0.0006 LCF per rem (DOE 2003).

Table 3-9 presents the radiological accident frequency and calculated consequences for the Proposed Action. As shown in Table 3-9, none of the accidents would result in an LCF to the MEI, offsite population, or a noninvolved worker. The consequences reported in Table 3-9 for events in the 249-H corridor are all conservatively higher than those that would be expected in the external corridor proposed in the current design. The MAR for the external corridor would be less than half of the MAR previously analyzed for the 249-H corridor (Cross 2021).

Table 3-9—Radiological Accident Consequences—Proposed Action

Design-Basis Accident	Maximally Exposed Individual[a,b]		Offsite Population[c]		Noninvolved Worker[b,d]	
	Dose (rem)	Latent Cancer Fatality	Dose (person-rem)	Latent Cancer Fatality	Dose (rem)	Latent Cancer Fatality
LOC in Building 249-12H process area	0.034	2.0×10^{-5}	150	0.09	0.26	1.5×10^{-4}
Fire in 249-H corridor	0.22	1.3×10^{-4}	990	0.59	1.71	1.0×10^{-3}
NPH in 249-H corridor	0.22	1.3×10^{-4}	990	0.59	1.71	1.0×10^{-3}
LOC in RSS (outside HIVES)	0.022	1.3×10^{-5}	99	0.059	0.17	1.0×10^{-4}
LOC in 249-H corridor	0.022	1.3×10^{-5}	98	0.059	0.085	5.1×10^{-5}
External impact to 249-H corridor (non-crane)	0.22	1.3×10^{-4}	990	0.59	0.0	0.0
External impact to 249-H (crane)	0.22	1.3×10^{-4}	990	0.59	0.0	0.0
NPH in process area	0.14	8.4×10^{-5}	620	0.37	1.61	9.6×10^{-4}
Fire in Building 249-12H process area	0.14	8.4×10^{-5}	620	0.37	1.03	6.2×10^{-4}
Fire in RRS	0.17	1.0×10^{-4}	740	0.44	1.28	7.7×10^{-4}

Design-Basis Accident	Maximally Exposed Individual[a,b]		Offsite Population[c]		Noninvolved Worker[b,d]	
	Dose (rem)	Latent Cancer Fatality	Dose (person-rem)	Latent Cancer Fatality	Dose (rem)	Latent Cancer Fatality
Fire in Building 249-12H spreads from process areas to RRS	0.22	1.3×10^{-4}	990	0.59	1.71	1.0×10^{-3}
NPH in Bldg. 249-12H with fire	0.22	1.3×10^{-4}	990	0.59	1.71	1.0×10^{-3}

a. At 7.1 miles from the TFF.
b. The MEI and the noninvolved worker scenarios each assumes that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the LCFs would be multiplied by the number of persons exposed.
c. Based on a projected future population (year 2030) of 862,957 persons residing within 50 miles of SRS.
d. At a distance of 100 meters (0.06 mile).
HIVES = highly invulnerable encased safe; LOC = loss of confinement; NPH = natural phenomena hazard; RRS = returned reservoir storage

Chemical Release Accidents

Regarding toxic chemicals at the TFF, the safety analysis (SRNS 2020h, Sec. 3.3.2.2.2) states:

> "Based on the chemical screening results evaluated in the CHA [consolidated hazards analysis] (…), no major chemical consequences were identified for the TFF and the total hazardous chemical inventory for TFF is consistent with an 'Other Industrial Facility' hazard classification."

Additionally, the consolidated hazards analysis (CHA) (SRNS 2019c, p. B-2) states:

> "The hazardous chemical inventory for Tritium Facilities is consistent with an 'Other Industrial Facility' hazard categorization. In addition, none of the chemicals present at Tritium Facilities are considered to be hazard event initiators and may be excluded from further analysis in this CHA."

Based on these conclusions, analysis of TFF chemical release accidents is not necessary for this EA.

Intentional Destructive Acts

Whether intentional destructive acts would occur, and the exact nature and location of the events, or the magnitude of the consequences of such acts if they were to occur is inherently uncertain—the possibilities are infinite. However, the TFF would be constructed and operated within a highly secure LA, under a high level of security. If an intentional destructive act involving the TFF occurred, the potential consequences would be dependent on the MAR of the facility and would be similar to the unmitigated accidents evaluated in Parsons (2018b) or approximately an order of magnitude higher than the design-basis accidents identified in Table 3-9.

3.11.3 No-Action Alternative Impacts

If the TFF is not constructed, the existing HAOM would continue to operate. The *Tritium Facilities Safety Analysis Report* analyzes nine radiological accidents that could occur at the

HAOM (SRNS 2020h, Table 3-9).[11] Table 3-10 present the radiological accident frequency and calculated consequences for the No-Action Alternative. As shown in Table 3-10, none of the accidents in the existing HAOM would cause an LCF to the MEI or a noninvolved worker. Potential LCFs to the offsite population would range from 1.2 to 3.3.

In the event of an intentional destructive act at the HAOM, the potential consequences would be no greater than the highest consequence accident presented in Table 3-10.

Table 3-10—Radiological Accident Frequency and Consequences—No Action Alternative

Design-Basis Accident	Frequency[a]	Maximally Exposed Individual[b,c]		Offsite Population[d]		Non-involved Worker[c,e]	
		Dose (rem)	Latent Cancer Fatality	Dose (person-rem)	Latent Cancer Fatality	Dose (rem)	Fatality
Fires	A	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	8.8	5.3×10^{-3}
Tritium explosion plus fire	A	1.3	7.5×10^{-4}	5.5×10^{3}	3.3	9.5	5.7×10^{-3}
Explosion	EU	6.6×10^{-1}	3.9×10^{-4}	2.9×10^{3}	1.7	5.0	3.0×10^{-3}
Loss of confinement	A	4.5×10^{-1}	2.7×10^{-4}	2.0×10^{3}	1.2	3.5	2.1×10^{-3}
Tornado/high winds	A	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	8.8	5.3×10^{-3}
Seismic	U	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	8.8	5.3×10^{-3}
External severe impact	EU	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	8.8	5.3×10^{-3}
Stack collapse	U	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	1.1	6.7×10^{-1}
External fire	U	1.2	6.9×10^{-4}	5.1×10^{3}	3.1	8.8	5.3×10^{-3}

a. A = Anticipated ($f \geq 10^{-2}$/yr); BEU = Beyond Extremely Unlikely ($f < 10^{-6}$/yr); EU = Extremely Unlikely ($10^{-6} \leq f < 10^{-4}$/yr); U = Unlikely ($10^{-4} \leq f < 10^{-2}$/yr)
b. At 7.1 miles from the TFF.
c. The MEI and the noninvolved worker scenarios each assumes that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the LCFs would be multiplied by the number of persons exposed.
d. Based on a projected future population (year 2030) of 862,957 persons residing within 50 miles of SRS.
e. At a distance of 0.06 mile.

3.12 Transportation

3.12.1 Affected Environment

The regional transportation network services the four South Carolina counties (Aiken, Allendale, Bamberg, and Barnwell) and two Georgia counties (Columbia and Richmond) that generate nearly all of the SRS commuter traffic (NNSA 2008a, p. 4-375). The closest Interstate highway to SRS is Interstate 20 (I-20), west of Aiken and Augusta, and is the major transportation route from the local area to Columbia, South Carolina, and Atlanta, Georgia, and points beyond. I-520 is a loop that circles Augusta and North Augusta, merging with I-20 at each end of the loop. Truck shipments to and from SRS primarily enter the region on I-20. Trucks to and from SRS primarily use I-520 and State Highway 125 (NNSA 2008a, p. 4-375).

Figure 3-8 shows the vehicular access to SRS and onsite roads and railways. SRS is managed as a controlled area with limited public access. In the South Carolina counties immediately surrounding SRS (Aiken, Barnwell, and Allendale), the roads with the highest levels of traffic

[11] The *Tritium Facilities Safety Analysis Report* (SRNS 2020h) details the assumptions associated with the accidents evaluated in this EA.

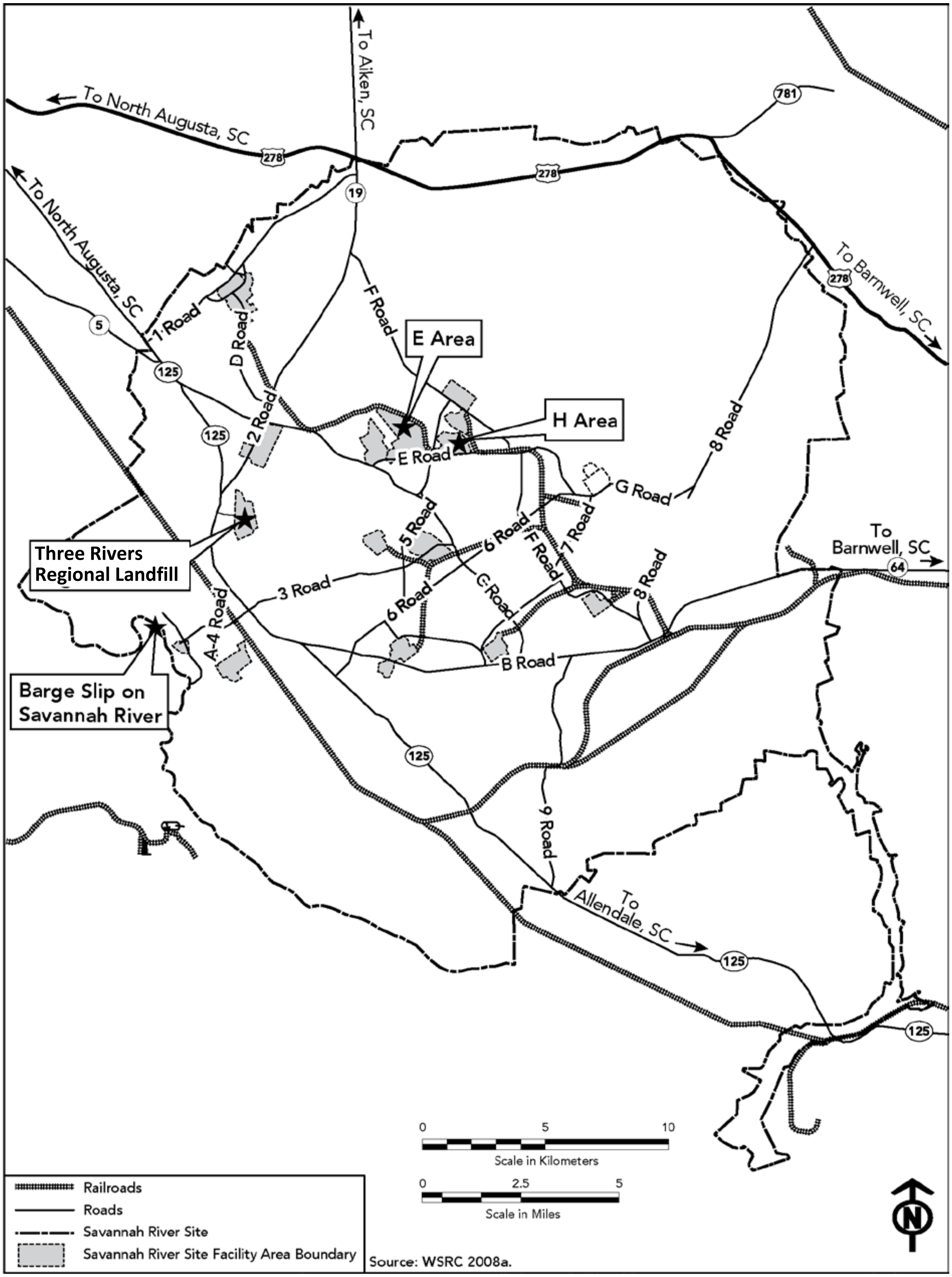

Figure 3-8—Savannah River Site Transportation Infrastructure
(Source: NNSA 2015, Fig. 3-6, modified)

operate at level of service (LOS)[12] "A" (LSCOG 2017). In Augusta-Richmond County, Georgia, I-520 from I-20 to Peach Orchard Road operates below LOS "C." Principal arterial roads in Augusta-Richmond County that primarily carry commuters that operate below LOS "C" include segments of Deans Bridge Road (U.S. Highway 1), Doug Barnard Parkway (County Road 1518), Mike Padgett Highway, Peach Orchard Road, and Washington Road (ARC 2018, Table T-10).

A CSX rail line traverses the site outside (west) and approximately parallel to State Highway 125. SRS operates and maintains its own railroad system, which interfaces with the commercial tracks, for providing direct rail service to various areas within SRS. A rail spur provides rail access to H-Area and E-Area (*see* Figure 3-8).

3.12.2 Proposed Action Impacts

3.12.2.1 Construction

Construction of the TFF would involve nonradiological shipments on and off SRS. Shipments would include construction materials from offsite locations and the disposal of construction debris at the Three Rivers Landfill, located within the SRS site boundary on State Highway 125, just south of its intersection with Road 2 (*see* Figure 3-8). Shipments associated with disposal of LLW and MLLW would be minimal (*see* Table 2-1). Transportation of hazardous waste would also be minimal. Construction activities would also require a small, temporary (three-year) increase in workers commuting to H-Area up to 170 commuting trips (*see* Table 2-1). Because of the small, temporary increase in worker commuting traffic, transport of construction materials from off site, and the disposal of construction debris on site, NNSA expects that there would be no impact to the LOS of the roads and highways in the region surrounding the SRS. NNSA also concludes that the impact to onsite traffic would be minimal. Existing parking lots can sufficiently serve the construction workers.

3.12.2.2 Operations

NNSA would continue to receive and ship tritium to and from Pantex, DoD installations, or other NNSA facilities (*see* Figure 1-2). NNSA's Office of Secure Transport is responsible for the safe and secure transport of government-owned special nuclear materials in the contiguous United States (NNSA 2019), including the tritium shipments occurring as part of this Proposed Action. Tritium is shipped to and from SRS using the H1616 package, a Type B transportation package, and other shipping containers and miscellaneous packages. These shipments must comply with DOE Order 461.1C, "Packaging and Transportation for Offsite Materials of National Security Interest," which requires that packaging and transportation of all nuclear material are conducted in accordance with the U.S. Department of Transportation and U.S. Nuclear Regulatory Commission regulations (the Department of Transportation regulates the transport of hazardous and nuclear materials, while the Nuclear Regulatory Commission regulates the packaging of nuclear material). According to 49 CFR 173.7(d), packagings made by or under the direction of DOE may be used for transporting Class 7 materials (radioactive materials) when the packages are

[12] Road performance is measured using level of service (LOS) ratings. LOS ratings range from "A" to "F," with "A" as the best travel conditions and "F" the worst. Most planners aim for LOS "C," which is defined as roads that are below, but close to, capacity and traffic generally flows at the posted speed.

evaluated, approved, and certified by DOE against packaging standards equivalent to those specified in 10 CFR Part 71.

DOE issued the Pantex SWEIS in 1997 with the ROD (62 FR 3880, January 27, 1997) to continue operations.[13] The Pantex SWEIS evaluated the impacts of transporting tritium to and from SRS (the Pantex SWEIS was withdrawn from the public domain after the terrorist attacks of September 11, 2001). Construction of the TFF would not change previously evaluated incident-free and accident impacts associated with the transportation of tritium to and from Pantex, DoD facilities, or other NNSA facilities because the number of shipments, modes of transportation, and the type of packagings would not change. Because tritium emits a weak form of radiation—a low-energy beta particle similar to an electron—tritium radiation does not travel very far in air and cannot penetrate the skin (NRC 2019); therefore, tritium is not considered a significant source of external radiation dose.

Onsite shipment of LLW to LLW disposal facilities in E-Area would not affect members of the public because roads between SRS processing areas are closed to the public; therefore, shipments would only affect onsite workers. E-Area is within about two miles of the tritium facilities in H-Area; therefore, exposure risk to noninvolved workers on site roads would be minimal, especially given the isotopic nature of tritium.

As described in Section 2.2.2, the number of operations workers would not notably change under the Proposed Action; therefore, NNSA expects that operation of the TFF would not impact the LOS of the roads and highways in the region surrounding the SRS or within the site. While there would be a temporary (about three years), small increase in the workforce during startup testing and transition period, NNSA expects that the associated impacts to the LOS of regional roads and highways and onsite traffic would be negligible. The number of shipments of nonradiological materials necessary for TFF operations and the shipment of hazardous waste off site for disposition are also not expected to change from levels associated with current operations; therefore, there would be no transportation-related impacts.

3.12.3 No-Action Alternative Impacts

Under the No-Action Alternative, the NNSA would not construct the TFF. Current and planned activities at the existing Tritium Area would continue as required to support the tritium-related missions. There would be no incremental impacts related to transportation beyond current and planned levels.

[13] NNSA has re-evaluated the Pantex SWEIS with four supplement analyses in accordance with DOE's NEPA implementing procedures at 10 CFR 1021.314 (NNSA 2003, 2008b, 2012, and 2018).

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