DOE/EIS-0387-SA-01

April 2016

SUPPLEMENT ANALYSIS FOR THE SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT FOR THE Y-12 NATIONAL SECURITY COMPLEX (DOE/EIS-0387-SA-01)

[April 2016]

U.S. Department of Energy
National Nuclear Security Administration
NNSA Production Office, Y-12

SUMMARY

The Y-12 National Security Complex (Y-12) is the primary site for uranium operations, including enriched uranium (EU) processing and storage, and it provides manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. On March 4, 2011, the National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), issued the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (SWEIS). The SWEIS analyzed the potential environmental impacts of ongoing and future operations and activities at Y-12. Five alternatives were analyzed in the Y–12 SWEIS: (1) No Action Alternative (maintain the status quo), (2) Uranium Processing Facility (UPF) Alternative, (3) Upgrade in-Place Alternative, (4) Capability-sized UPF Alternative, and (5) No Net Production/Capability-sized UPF Alternative. In the Record of Decision (ROD) dated July 20, 2011, NNSA decided to construct and operate a Capability-sized UPF at Y-12 as a replacement for certain EU processing facilities that are more than 50 years old.

Since publication of that ROD, concerns about UPF cost and schedule growth have prompted NNSA to reevaluate its strategy for meeting EU requirements, including the UPF design approach. Under the updated strategy, NNSA would meet EU requirements using a hybrid approach of upgrading existing EU facilities and building new UPF facilities. This is different from the Capability-sized UPF Alternative NNSA selected in the SWEIS ROD, which only included a new facility. The updated strategy is consistent with recommendations from a project peer review of the UPF ["Final Report of the Committee to Recommend Alternatives to the Uranium Processing Facility Plan in Meeting the Nation's Enriched Uranium Strategy" (the Red Team Report)]. In relation to the UPF specifically, the single-structure UPF concept would be separated into multiple buildings, with each constructed to safety and security requirements appropriate to the building's function. This separation would provide cost-saving opportunities in both building construction and equipment installation. Chapter 2 of the 2011 Y-12 SWEIS identifies and discusses the missions at Y-12. Because there has been no significant change in Y-12's mission to serve as NNSA's primary site for uranium operations, the purpose and need for agency action (to support the Stockpile Stewardship Program and to efficiently and safely meet the missions assigned to Y-12 in the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* ROD), remains the same as it was at the time that the SWEIS was prepared. Thus, the scope of this supplement analysis (SA) focuses on the proposed action of upgrading existing EU facilities and building the UPF (which is defined as one facility with multiple buildings).

NNSA has prepared this SA in accordance with the *National Environmental Policy Act of 1969* (NEPA; 42 U.S.C. § 4321 *et seq*.) and DOE regulations (10 CFR 1021.314(c)) to determine if additional NEPA analysis would be required to support amending the ROD to implement the proposed action. This SA evaluates the proposed action in relation to the analysis contained in the SWEIS to determine if there are substantial changes in environmental impacts or if there are significant new circumstances or information relevant to environmental concerns that bear on the proposed action or its impacts.

The analysis in this SA indicates that the identified and projected environmental impacts of the proposed action would be similar in nature and would not be expected to differ significantly from those NNSA identified and analyzed in the SWEIS. After comparing the analysis of impacts associated with the proposed actions in this SA with the impacts analyzed for the Capability-sized UPF and Upgrade-in-Place alternatives in the SWEIS, NNSA has determined that there are no significant new circumstances or information relevant to environmental concerns that warrant preparation of a supplemental or new EIS. Based on the analysis in this SA, the proposed action is adequately supported by existing NEPA documentation and consistent with 10 CFR 1021.315(e), the existing ROD for the SWEIS can be amended, and no further NEPA documentation is required to implement the proposed action at Y-12.

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ACRONYMS AND ABBREVIATIONS

AMIPA	American Medical Isotopes Production Act of 2012
CFR	*Code of Federal Regulations*
CSB	Construction Support Building
DOE	U.S. Department of Energy
EIS	environmental impact statement
EFPC	East Fork Poplar Creek
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
EU	enriched uranium
FR	*Federal Register*
FY	fiscal year
GHG	greenhouse gas
HEU	highly enriched uranium
HEUMF	Highly Enriched Uranium Materials Facility
HHS	U.S. Department of Health and Human Services
HVAC	heating, ventilation, and air conditioning
IFDP	Integrated Facility Disposition Project
LCF	latent cancer fatality
LEU	low-enriched uranium
LLW	low-level radioactive waste
MAR	material at risk
MEI	maximally exposed individual
MEB	Mechanical/Electrical Building
MeV	megaelectron-volt (1 million electron-volts)
MPB	Main Process Building
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act of 1969*
NFRR	Nuclear Facilities Risk Reduction
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NPO	NNSA Production Office
NPS	National Park Service
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PIDAS	Perimeter Intrusion, Detection, and Assessment System
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PSB	Personnel Support Building
PSF	Process Support Facility
ROD	Record of Decision
ROI	region of influence
SA	supplement analysis
SAB	Salvage and Accountability Building
SNS	Spallation Neutron Source
SWEIS	*Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority

ULTB	Uranium Lease and Take-Back
UPF	Uranium Processing Facility
USC	*United States Code*
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Y-12	Y-12 National Security Complex

CONVERSION FACTORS

English to Metric		
Multiply	**By**	**To get**
Acres	0.4046873	Hectares
Square feet	0.092903	Square meters
Miles	1.6093	Kilometers
Feet	0.3048	Meters
Inches	2.54	Centimeters
Tons (short)	0.90718	Metric tons
Pounds	0.45359	Kilograms
Gallons	3.78533	Liters
Cubic yards	0.76456	Cubic meters

Metric to English		
Multiply	**By**	**To get**
Hectares	2.47104	Acres
Square meters	10.764	Square feet
Kilometers	0.62137	Miles
Meters	3.2808	Feet
Centimeters	0.3937	Inches
Metric tons	1.1023	Tons (short)
Kilograms	2.2046	Pounds
Liters	0.26418	Gallons
Cubic meters	1.3079	Cubic yards

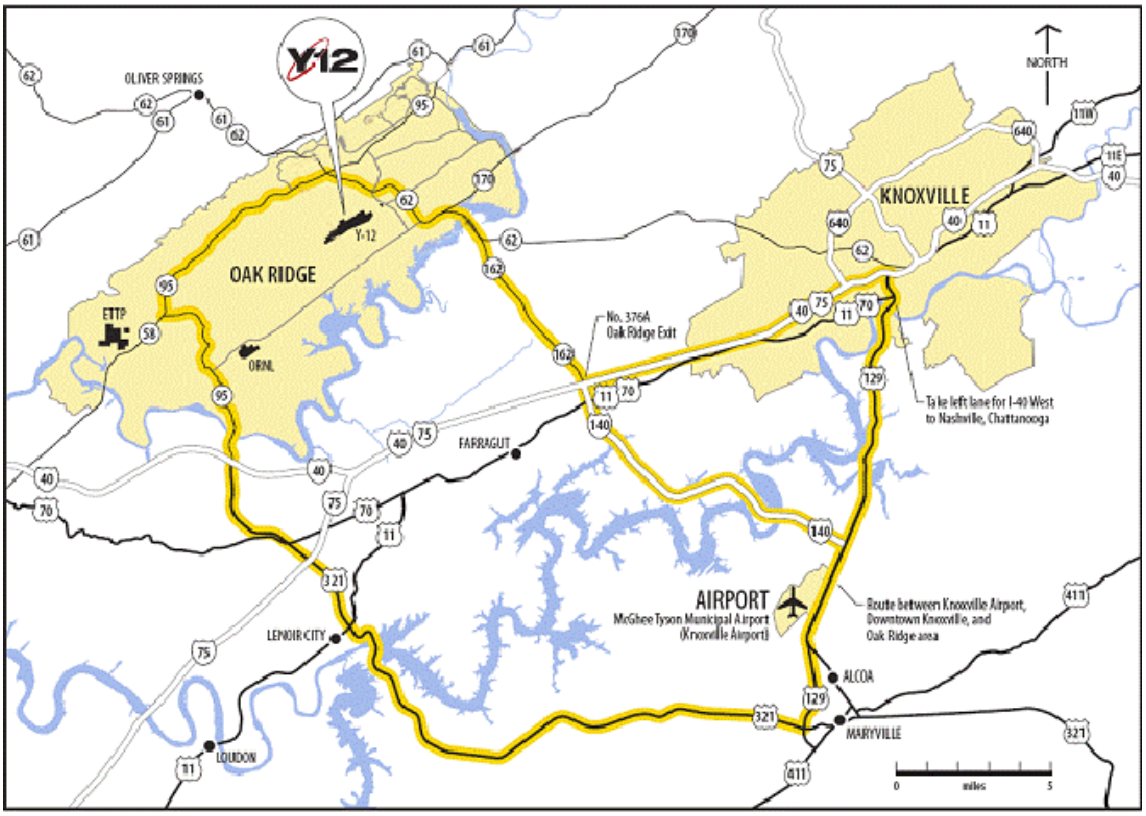
1.0 INTRODUCTION

1.1 Background

The Y-12 National Security Complex (Y-12) is the primary site for uranium operations, including enriched uranium (EU) processing and storage, and it provides manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Y-12 is unique in that it is the only source of secondaries, cases, and other nuclear weapons components for the National Nuclear Security Administration (NNSA) nuclear security mission. Figure 1-1 shows the location of Y-12. Uranium materials and manufacturing capabilities are essential to the missions of NNSA's national security programs. Maintaining the required expertise and capabilities to deliver uranium products as identified in the NNSA "Uranium Mission Requirements Document" (NNSA 2016a), while modernizing the production facilities is a key goal of NNSA's uranium mission strategy. Because many of the EU facilities at Y-12 are old, oversized, and inefficient, NNSA has initiated a Modernization Program at Y-12. The Uranium Processing Facility (UPF) would provide Y-12 with a modern facility comprised of multiple buildings to replace a subset of the capabilities currently located in Building 9212. The UPF design includes those processes that cannot be transitioned to or sustained in enduring Y-12 facilities. Therefore, UPF would provide processing capabilities for EU casting, metal oxidation, oxide material production, special material production, and salvage and accountability operations.

Secondaries and Cases

A secondary is a component of a nuclear weapon that contains the technology and materials needed to initiate the fusion reaction in a thermonuclear explosion. A case contains the secondary and other components.



Source: NNSA 2011.

Figure 1-1. Location of Y-12.

On March 4, 2011, the NNSA, a separately organized agency within the U.S. Department of Energy (DOE), issued the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (SWEIS; NNSA 2011). The SWEIS analyzed the potential environmental impacts of ongoing and future operations and activities at Y-12. Five alternatives were analyzed in the Y–12 SWEIS: (1) No Action Alternative (maintain the status quo), (2) UPF Alternative, (3) Upgrade in-Place Alternative (4) Capability-sized UPF Alternative, and (5) No Net Production/Capability-sized UPF Alternative. In the Record of Decision (ROD) on July 20, 2011 (76 FR 43319), NNSA decided to construct and operate a single-structure Capability-sized UPF at Y-12 as a replacement for existing facilities where EU processing activities are conducted that are more than 50 years old. Section 3.2.4 of the SWEIS describes the Capability-sized UPF, which NNSA would construct next to the Highly Enriched Uranium Materials Facility (HEUMF). Consistent with the Capability-sized UPF Alternative that was selected in the SWEIS ROD, four additional years of development and design activities have occurred (see Section 3.0).

On January 15, 2014, as a result of concerns about UPF cost and schedule growth, the Acting Administrator of the NNSA requested that the Director of the Oak Ridge National Laboratory (ORNL) lead a "project peer review" of the UPF (NNSA 2014a). Twenty-five reviewers from across the DOE and NNSA enterprise as well as the Atomic Weapons Establishment in the United Kingdom conducted the study. The result of that review, the "Final Report of the Committee to Recommend Alternatives to the Uranium Processing Facility Plan in Meeting the Nation's Enriched Uranium Strategy" (the Red Team Report) was released in April 2014 (ORNL 2014). The Red Team Report emphasized the importance of UPF in the context of a broader set of uranium mission requirements: sustaining and modernizing EU manufacturing capabilities; reducing material at risk (MAR) from Y-12's EU processing facilities; making investments in older, enduring buildings; and constructing new floor space; and enabling transition of critical Building 9212 capabilities into the UPF no later than 2025 (DOE 2015a).

Since publication of the Red Team Report, NNSA has (1) appointed a Uranium Program Manager, (2) developed a uranium mission strategy, and (3) completed conceptual design for the proposed modified UPF in June 2015. Under the updated strategy, NNSA is proposing to meet EU requirements using a hybrid approach of upgrading existing EU facilities and constructing multiple new buildings (e.g., UPF facility). This proposed action is different from the Capability-sized UPF Alternative selected in the SWEIS ROD, which only included a new facility. In relation to the UPF specifically, the single structure UPF concept would be separated into multiple buildings, to be constructed at the same site location as the single structure UPF analyzed in the SWEIS, with each building constructed to safety and security requirements appropriate to the building's function. This separation would provide cost-saving opportunities in both building construction and equipment installation (NNSA 2014b).

The proposed action evaluated in this Supplement Analysis (SA) is different from the Capability-sized UPF Alternative NNSA selected in the ROD for the SWEIS in that it combines elements from that alternative into a revised construction project proposal along with elements from the Upgrade in-Place Alternative. Section 1.3 of this SA discusses the scope of this SA and Section 3.0 describes the changes in more detail.

Proposed Action in this SA

The proposed action evaluated in this SA is to upgrade existing EU facilities and build multiple new facilities (e.g., UPF facilities).

1.2 Purpose and Need for this Supplement Analysis

An SA is a document NNSA prepares in accordance with the *National Environmental Policy Act of 1969* (NEPA) (42 U.S.C. § 4321 *et seq*.) and DOE regulations (10 CFR 1021.314(c)) to determine if a supplemental or new environmental impact statement (EIS) should be prepared or if no further NEPA

documentation is required. The purpose and need for this SA is to support a determination by NNSA as to whether the analysis in the SWEIS is sufficient to support implementation of the proposed action, or if additional NEPA documentation is necessary.

Relationship of Uranium Mission Strategy and Proposed Action in this Supplement Analysis

NNSA's uranium mission strategy communicates the vision, mission, and overarching goals for the management of essential uranium materials and continuity of uranium processing capabilities. A key outcome of the uranium mission strategy is to optimize the safe, secure, and responsible use of facilities and supporting infrastructure through sustainment and modernization of capabilities and facilities. To achieve this outcome, NNSA's proposed action is to upgrade existing EU facilities and build multiple new facilities (e.g., UPF facilities).

This SA evaluates that proposed action in relation to the analysis in the 2011 Y-12 SWEIS. If there are substantial changes in environmental impacts, or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts since NNSA issued the SWEIS, NNSA will prepare appropriate NEPA documentation for the proposed action. Otherwise, NNSA may make a determination that it may amend the ROD without further NEPA documentation and proceed with the proposed action.

The purpose and need for the proposed action is the same as that in the 2011 Y-12 SWEIS: to support the Stockpile Stewardship Program and to efficiently and safely meet the missions assigned to Y-12 in the Complex Transformation Supplemental Programmatic Environmental Impact Statement ROD. This SA evaluates the proposed action in relation to the analysis in the SWEIS. The proposed action is evaluated in comparison to the Capability-sized UPF Alternative and/or the Upgrade in-Place Alternative to determine if there are substantial changes in environmental impacts, or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts since NNSA issued the SWEIS. Because the No Action Alternative is not relevant to the comparisons, nor affected by this SA, there is no further discussion of the No Action Alternative.

NNSA has prepared this SA in accordance with the Council on Environmental Quality NEPA regulations (40 CFR Parts 1500 to 1508), DOE NEPA implementing regulations (10 CFR Part 1021), and *Recommendations for the Supplement Analysis Process* (DOE 2005).

1.3 Scope of this Supplement Analysis

Chapter 2 of the 2011 Y-12 SWEIS identifies and discusses the missions at Y-12. Because there has been no significant change in Y-12's mission to serve as NNSA's primary site for uranium operations, the purpose and need for agency action remains the same as it was at the time that the SWEIS was prepared. Thus, the scope of this SA focuses on the proposed action of upgrading existing EU facilities and building the UPF (which is defined as one facility with multiple buildings).

The scope of this SA does not include the Complex Command Center (CCC), which was a project evaluated as part of the four action alternatives in the Y-12 SWEIS. The CCC was intended to be a new Emergency Services Complex to house equipment and personnel for the Plant Shift Superintendent, Fire Department, and Emergency Operations Center. In the ROD for the Y-12 SWEIS, NNSA deferred making a decision on the construction and operation of the CCC. In October 2015, NNSA issued a *Final Environmental Assessment of the Emergency Operations Center Project* (DOE/EA-2014) and Finding of No Significant Impact to construct a new emergency response facility (containing some of the same functions planned for the CCC) that will more effectively and efficiently support Y-12 missions (NNSA 2015a). The potential impacts of the new emergency response facility are analyzed in the environmental assessment and considered in the cumulative impact section of this SA (Section 5.0).

1.4 Relevant National Environmental Policy Act Documents

This section identifies and discusses other NEPA documents that are potentially relevant to this SA. Decisions as a result of these other NEPA documents have affected (or will affect) activities at the Y-12 Site, or have affected (or will affect) the potential impacts of the proposed action NNSA evaluates in this SA.

***Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE/EIS-0387; NNSA 2011)**. The 2011 Y-12 SWEIS, which was the successor document to the 2001 Y-12 SWEIS, analyzed the potential environmental impacts of ongoing and future operations and activities at Y-12. Five alternatives were analyzed in the 2011 Y–12 SWEIS: (1) No Action Alternative (maintain the status quo), (2) UPF Alternative, (3) Upgrade in-Place Alternative, (4) Capability-sized UPF Alternative, and (5) No Net Production/Capability-sized UPF Alternative. In the ROD, NNSA decided to construct and operate a Capability-sized UPF at Y–12 next to the HEUMF. Section 3.2.4 of the SWEIS describes the Capability-sized UPF Alternative and Section 3.2.3 describes the Upgrade in-Place Alternative. The 2011 Y-12 SWEIS is the most current site-wide NEPA documentation for Y-12 and provides information about Y-12 site operations, baseline environmental conditions, and ongoing environmental impacts relevant to this SA. Section 1.7 of the 2011 Y-12 SWEIS includes a discussion of many other relevant NEPA documents (such as the Nuclear Facilities Risk Reduction [NFRR] Project Categorical Exclusion, the Y-12 Steam Plant Replacement Project Environmental Assessment, and the Potable Water Systems Upgrade Project Environmental Assessment) related to the operation of Y-12. Those NEPA documents are not repeated in this section, but are incorporated by reference to the 2011 Y-12 SWEIS.

***Complex Transformation Supplemental Programmatic Environmental Impact Statement* (DOE/EIS-0236-S4; NNSA 2008)**. NNSA issued a ROD for this document on December 19, 2008 (73 FR 77644) in which it decided to maintain the existing national security missions at Y-12 and build a UPF to provide a smaller and more modern highly enriched uranium (HEU) production capability to replace the existing 50-year old facilities. The SWEIS tiered from the Complex Transformation Supplemental Programmatic EIS and analyzed alternatives for implementing the decisions NNSA reached in the Complex Transformation Supplemental Programmatic EIS ROD.

***Electrorefining Project Categorical Exclusion* (NNSA 2015b)**. In 2015, a categorical exclusion was issued for the Electrorefining Project. Electrorefining converts impure uranium metals into purified uranium metal and is safer and simpler than the current purification processes in Building 9212. Electrorefining would eliminate many process steps in the current processing area at Y-12 and would (1) improve safety through the elimination of many wet chemistry systems and associated hazards and (2) significantly reduce high-equity EU solution handling (NNSA Production Office [NPO] 2015). Installation of the Electrorefining Project in Building 9215 is scheduled to begin in about 2018, with operations expected to commence in about 2021. This SA assumes that the Electrorefining Project will be operational and part of the operational baseline for the proposed action.

***Calciner Project Categorical Exclusion* (NNSA 2013)**. In 2013, a categorical exclusion was issued for the installation of a calciner furnace and associated appurtenances in the C-Wing area of Building 9212. The calciner furnace and associated appurtenances provides an alternative method to replace the 9212 wet chemistry process that is capable of converting low equity liquids into storable solids. The purpose of that calciner is to support cleanup operations in Building 9212. Although none of the Building 9212 equipment would be reused once it has completed its mission, two calciners are proposed in the UPF. This SA assumes that the Calciner Project will be operational and part of the operational baseline for the proposed action.

***Final Environmental Assessment of the Emergency Operations Center Project* (DOE/EA-2014; (NNSA 2015a)**. In October 2015, NNSA completed an environmental assessment and issued a Finding of No Significant Impact related to the potential environmental impacts of constructing a new emergency response facility (similar to the CCC) that would more effectively and efficiently support Y-12 missions. The potential impacts of the new emergency response facility are analyzed in the final environmental assessment and considered in the cumulative impact section of this SA (Section 5.0).

***Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (DOE/EIS-0423-S1; DOE 2015b)**. About 1,200 metric tons of mercury are stored at Y-12. In September 2013, DOE completed this Final Supplemental EIS, which evaluates alternative sites for the long-term storage of this mercury, as well as elemental mercury from other sources in the country. Neither Y-12 nor the Oak Ridge Reservation (ORR) is being considered as a long-term storage site for elemental mercury (DOE 2015b). DOE has not yet issued a ROD for this Supplemental EIS. The potential impacts of that action are analyzed in the Supplemental EIS and considered in the cumulative impact section of this SA (Section 5.0).

***Final Environmental Assessment: Property Transfer to Develop a General Aviation Airport at the East Tennessee Technology Park Heritage Center, Oak Ridge, Tennessee* (DOE/EA-2000; DOE 2016)**. In February 2016, DOE prepared an environmental assessment and issued a finding of no significant impact to evaluate title transfer of DOE property at the East Tennessee Technology Park (ETTP) Heritage Center to the Metropolitan Knoxville Airport Authority for the purpose of constructing and operating a general aviation airport. The potential impacts of that project are analyzed in the environmental assessment and considered in the cumulative impact section of this SA (Section 5.0).

***Building 9204-2E Canning Project Categorical Exclusion* (NNSA 2014c).** On May 20, 2014, a categorical exclusion was issued for the Building 9204-2E Canning Project. The purpose of this project is to design, procure, and install a double seamer canning machine to be used to can components from weapons tear down activities. The canning machine will be anchored to the existing floor in the tear down area and will require 120 volt electrical power to be connected to the equipment. This SA assumes that this canning project is part of the operational baseline for the proposed action.

***Construction of an Electrical Substation and the Transmission Line Feeds for the Uranium Processing Facility (UPF) at the Y-12 National Security Complex (Y-12) (NEPA #4201.16, rev. 1) Categorical Exclusion* (NNSA 2016b).** On April 19, 2016, a categorical exclusion was issued by NNSA for the purpose of constructing a 161 kV substation (Pine Ridge) and two transmission lines right-of-way corridors. The purpose of this action is to: (1) supply the UPF with sufficient and reliable power; (2) upgrade the Y-12 electrical system with modern equipment (allows for ease of maintenance and servicing) and provide Y-12 with a reliable power supply; and (3) allow TVA to maintain the capability and reliability of their bulk transmission system. One transmission line will connect to the Bull Run 161 kV feeder northeast of Y-12, and a second line will connect to the Spallation Neutron Source (SNS) 161 kV feeder southwest of Y-12. TVA will design and construct the transmission lines and substation under contract to DOE. The Pine Ridge substation will be located on cleared acreage south of the UPF Haul Road extension, just west of Bear Creek and Old Bear Creek Road intersection. The proposed route for the Bull Run feeder will run west from Scarboro Road along the crest of Pine Ridge (parallels Bear Creek Road, north of Y-12) to the new substation. The proposed route for the SNS feeder will run southwest from the substation connecting to the existing 161 kV line southeast of Landfill IV. The transmission lines will be less than approximately 3 miles in length. The categorical exclusion also supports the granting of an easement to TVA. TVA will install, and service, both transmission lines and the substation.

***Y-12 Fire Station Facility Categorical Exclusion* (NNSA 2015c).** In July 2015, a categorical exclusion was issued to construct a new Fire Station located in the Property Protected Area in the grassy area north of Building 9737 on the east end of Y-12. This building would be constructed within a previously developed area and would not affect any undeveloped areas.

2.0 CHANGES SINCE PREPARATION OF THE SWEIS

This section describes changes in the environment (Section 2.1) and changes in NNSA's approach to NEPA analyses (Section 2.2) that have occurred since issuing the SWEIS that are relevant to the analysis in this SA. Programmatic changes and evolution of the proposed action, including the UPF design, are discussed in Chapter 3 of this SA.

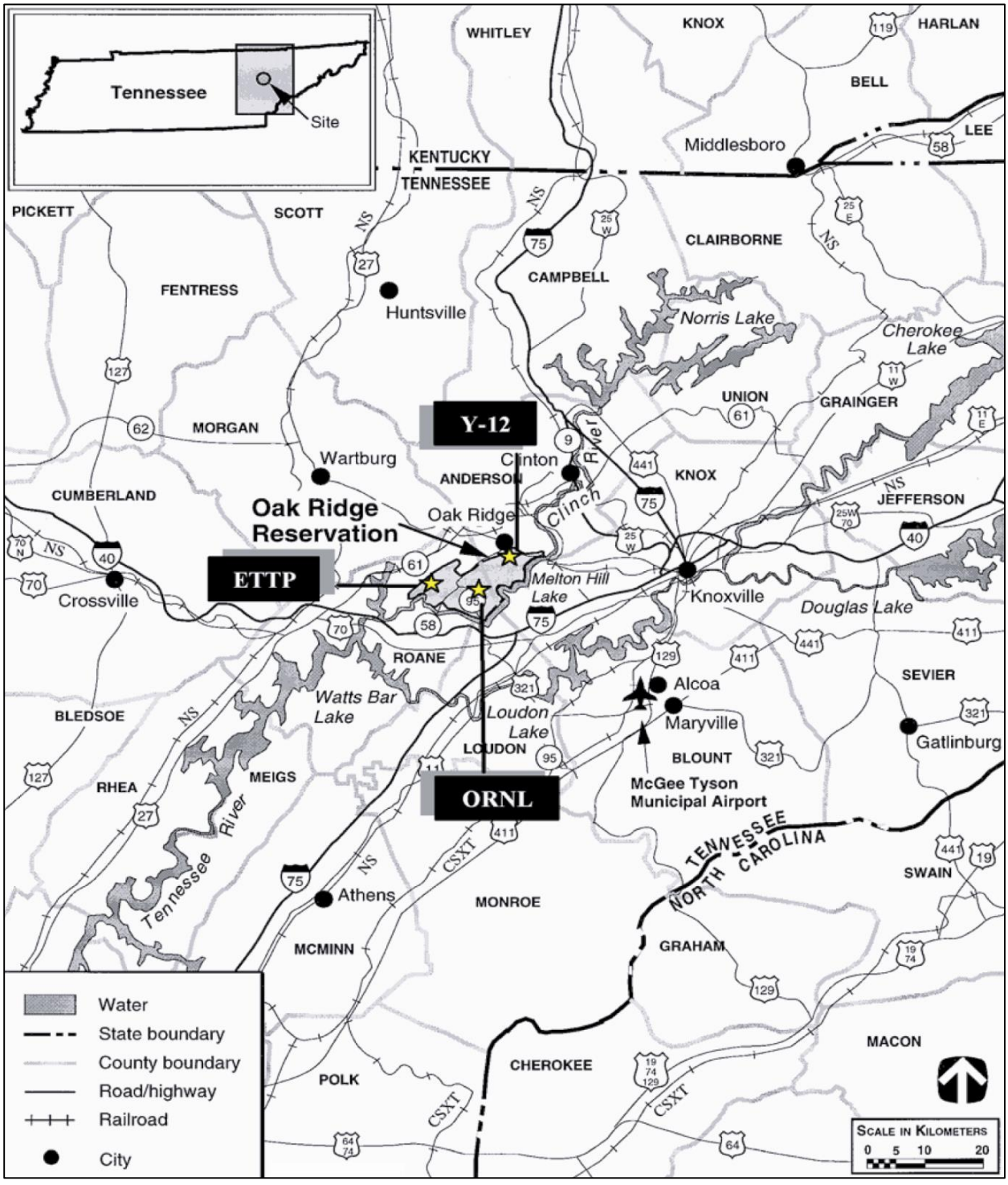
2.1 Environmental Changes

Environmental changes pertain to changes in the environmental resources that provide the baseline for evaluating environmental impacts or changes in the parameters and assumptions NNSA used for the environmental impacts analyses. This section summarizes environmental changes at Y-12, and where relevant in the region, since publication of the SWEIS. Environmental changes are based on information in the *Oak Ridge Reservation Annual Site Environmental Report 2013* (ORR 2014), other publically available information, and other information NNSA generated during the preparation of this SA (NNSA 2015d). The analysis demonstrates that the baseline natural environment as depicted in the SWEIS has not changed appreciably. The following sections describe significant changes, if any.

2.1.1 LAND RESOURCES

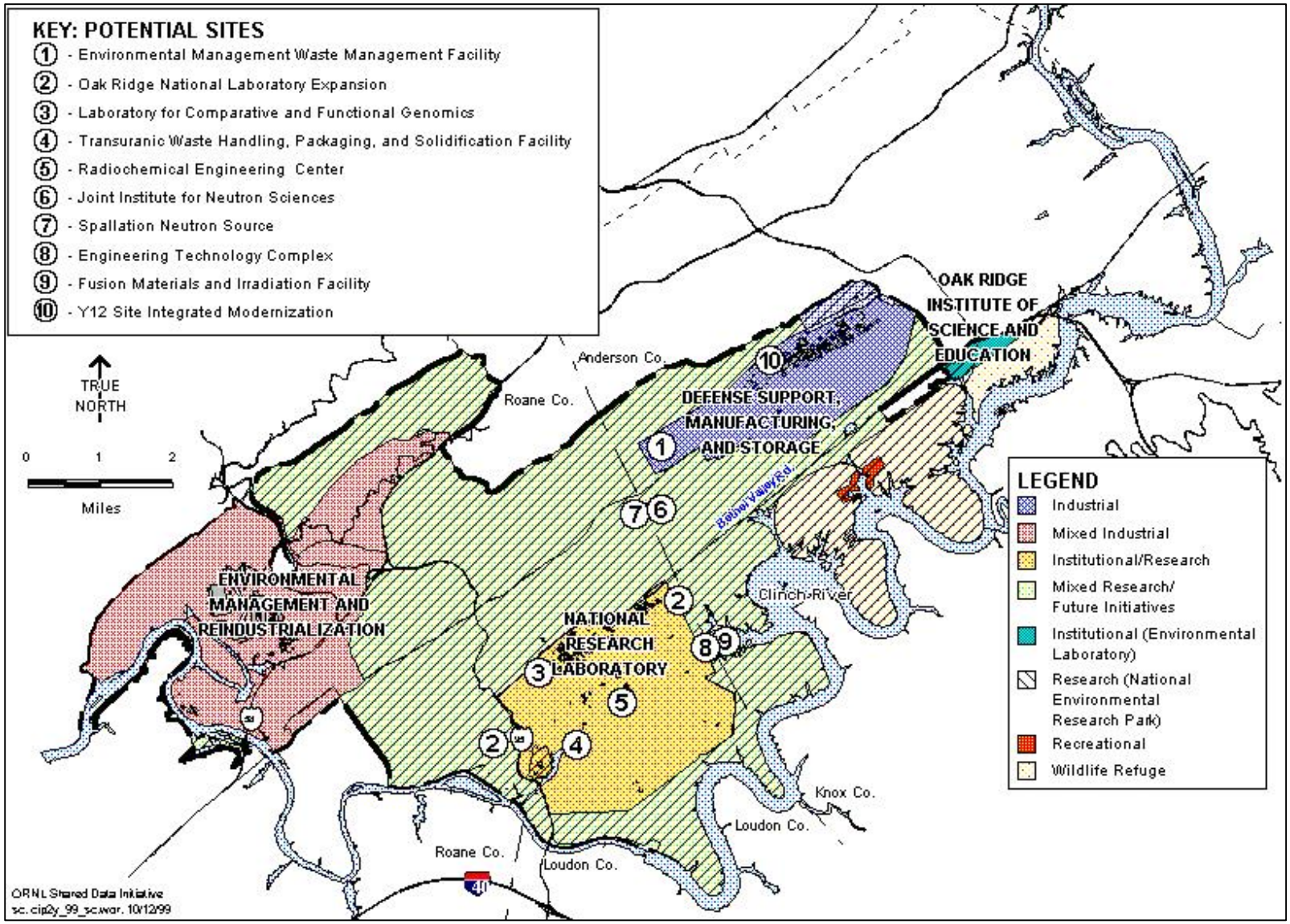
Y-12 is one of three primary installations on the ORR in Oak Ridge, Tennessee (Figure 2-1). Figure 2-2 shows general land uses at the ORR (including Y-12) and its vicinity. The site is classified as an industrial area. The only potential change in the classification or management of land resources at Y-12 since the issuance of the SWEIS is related to the establishment of the Manhattan Project National Historical Park, which was signed into law on December 19, 2014. The National Park Service (NPS) would establish visitor centers at three sites (Oak Ridge, Tennessee; Hanford, Washington; and Los Alamos, New Mexico) to provide a hub of information about the Manhattan Project on a national scale. Each site would then host specific exhibitions highlighting their unique histories within the larger historical context. The law that provides for the establishment of the Manhattan Project National Historical Park requires the Secretary of the Interior and the Secretary of Energy to create a Memorandum of Agreement (MOA) by December 19, 2015. A draft of the MOA was available for public comment through August 28, 2015 (NPS 2015). The MOA was signed on November 10, 2015. This MOA formally established the Manhattan Project National Historical Park and described how the NPS and DOE will work together to preserve, protect, and provide access to the historic resources associated with the Manhattan Project. The MOA establishes a broad framework for the management and interpretation of the two areas that are included in the Manhattan Project National Historical Park. Two facilities located at Y-12 are listed as part of the Park: Buildings 9731 and 9204-3 (Beta-3). Details regarding access to facilities or other operating aspects associated with the Manhattan Project National Historical Park will be further refined in a Joint Operating Plan to be issued for each DOE area and facility identified in the MOA.

In February 2016, DOE prepared an environmental assessment and issued a finding of no significant impact to evaluate title transfer of DOE property located at the ETTP Heritage Center to the Metropolitan Knoxville Airport Authority for the purpose of constructing and operating a general aviation airport (DOE 2016). Section 5.2 of this SA discusses that project.



Source: NNSA 2011.

Figure 2-1. Y-12 on the Oak Ridge Reservation.



Source: NNSA 2011.

Figure 2-2. Land Use on the Oak Ridge Reservation.

2.1.2 VISUAL RESOURCES

Y-12 remains a highly developed area. There has been no change in Y-12's visual resource contrast Class IV rating. It is not known if any visual resources would be affected by the Manhattan Project National Historical Park.

2.1.3 NOISE

Major noise sources at Y-12 have not changed, background noise levels at the site boundary remain low, and there have been no significant changes to noise impacts at Y-12.

2.1.4 AIR QUALITY

There have been no major changes in the air quality at the Y-12 Site since the 2011 SWEIS was issued. As was the case when the SWEIS was issued, the U.S. Environmental Protection Agency (EPA) has designated Anderson County as a basic nonattainment area for the 8-hour ozone standard as part of the larger Knoxville 8-hour basic ozone nonattainment area, which encompasses several counties. In addition, the EPA has designated Anderson, Knox, and Blount counties as a nonattainment area for particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) air quality standard. The greater Knoxville and Oak Ridge area continues to be classified as a National Ambient Air Quality Standards (NAAQS) attainment area for all other criteria pollutants for which EPA has made attainment designations (ORR 2014).

Airborne discharges from Y-12, both radioactive and nonradioactive, are subject to regulation by EPA and the Tennessee Department of Environment and Conservation (TDEC) Division of Air Pollution Control. All reporting requirements were met during 2013, and there were no permit violations or exceedances during the report period (ORR 2014).

The gas-fired steam plant has been the main source of reductions in greenhouse gases (GHGs) from Y-12. Since the 2008 baseline year, the site has reduced GHG emissions from stationary fuel combustion sources by 39.1 percent (ORR 2014). Table 2-1 lists the stationary fuel combustion GHG emissions from Y-12 from 2011 to 2013. Based on current greenhouse gas emissions data, the State of Tennessee released approximately 97 million metric tons of carbon dioxide equivalent (CO_2e) in 2012 (EIA 2015).

Table 2-1. Greenhouse Gas Emissions from Y-12 Stationary Fuel Combustion Sources.

Year	Greenhouse Gas Emissions (metric tons of carbon dioxide equivalent [CO_2e])
2011	70,187
2012	63,177
2013	61,650

Source: ORR 2014.

About 7.5×10^{-3} curies of uranium were released into the atmosphere in 2013 as a result of Y-12 process and operational activities. Once released, uranium can be inhaled by organisms or deposited in water and soil, which can result in radiological doses to organisms. The calculated radiation dose to the maximally exposed offsite individual from airborne radiological release points at Y-12 during 2013 was 0.1 millirem. This dose is well below the National Emission Standards for Hazardous Air Pollutants standard of 10 millirem and is less than 0.04 percent of the roughly 300 millirem that the average individual receives from natural sources of radiation (ORR 2014). Table 2-2 presents the total curies of uranium Y-12 discharged to the atmosphere from 2011 to 2013.

Table 2-2. Uranium Discharges from Y-12 to Air, 2011–2013.

Year	Curies of Uranium
2011	0.0085
2012	0.0067
2013	0.0075

Source: ORR 2014.

2.1.5 WATER RESOURCES

Water resources in the vicinity of Y-12 continue to be affected by activities at the site. Y-12 is a major user of surface water and discharges from Y-12 continue to affect both surface water and groundwater. One of the most significant changes related to water resources since issuance of the 2011 SWEIS involves the East Fork Poplar Creek (EFPC). EFPC, which discharges into Poplar Creek east of the ETTP, originates within the Y-12 Complex and flows northeast along the south side of the Y-12 Complex. Beginning in 1996, as a result of a negotiated agreement with TDEC, Y-12 supplied raw water from the Clinch River to the headwaters of EFPC to maintain a minimum flow of 7 million gallons per day through the creek. This flow augmentation was designed to maintain stream water levels typical of the late 1980s and improve ecological conditions in the stream. Increased mobilization of mercury from localized streambed contamination was an unintended consequence of that action. This flow augmentation was a major portion of site water use and averaged 4 to 5 million gallons per day. In an effort to reduce mercury input, this creek flow augmentation program was discontinued in 2014 at the direction of TDEC (NNSA 2015d).

The current Y-12 National Pollutant Discharge Elimination System (NPDES) permit (TN0002968) requires sampling, analysis, and reporting for about 56 outfalls. Data from this NPDES program are provided in a monthly report to TDEC. The percentage of compliance with permit requirements for 2013 (which is the most recent year in which data is available) was greater than 99.9 percent. About 3,100 measurements were obtained from sampling; only two noncompliances were reported. In 2015, as part of expanded groundwater studies sponsored by DOE, contaminants were identified that exceeded drinking water standards in 3 of 36 private wells that were sampled on property across the Clinch River from the ORR. However, those wells, and the groundwater that supplies them, are not currently used for home purposes, and Melton Valley and Bethel Valley residents are not exposed to any known chemicals and radionuclides in off-site groundwater at public health hazard levels (U.S. Department of Health and Human Services [HHS]) 2015). The Y-12 NPDES permit in effect during 2013 (TN0002968) was issued on October 31, 2011, and became effective on December 1, 2011. It will expire on November 30, 2016 (ORR 2014).

A radiological monitoring plan is in place at Y-12 to comply with DOE requirements and support the NPDES permit. The permit requires Y-12 to submit results from the radiological monitoring plan quarterly as an addendum to the NPDES discharge monitoring report. The NPDES permit does not set discharge limits for radionuclides, but rather requires only monitoring and reporting. In 2013, the total curies of uranium released from Y-12 at the easternmost monitoring station (Station 17 on upper EFPC) was 0.055 curie (ORR 2014). Table 2-3 presents the total curies of uranium discharged from Y-12 to the offsite environment as a liquid effluent from 2011 to 2013.

Table 2-3. Uranium Discharges from Y-12 as Liquid Effluent, 2011–2013.

Year	Curies of Uranium
2011	0.104
2012	0.039
2013	0.055

Source: ORR 2014.

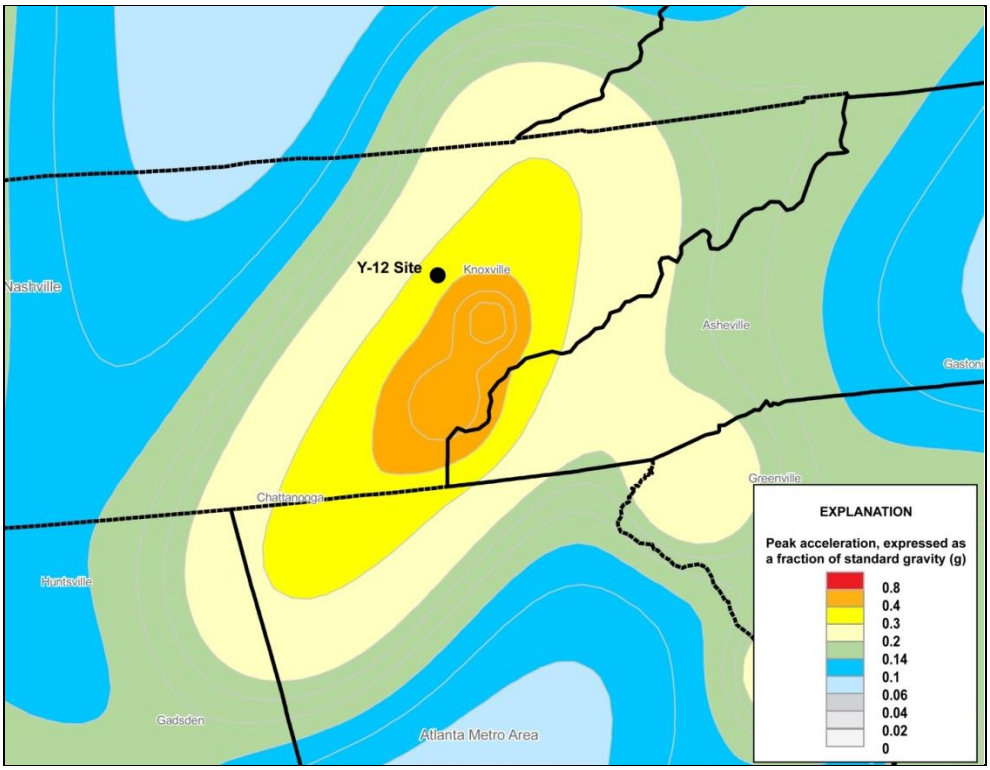
Groundwater monitoring at Y-12 is performed to comply with Federal and state requirements and to determine if impacts to the environment from legacy and current operations are occurring. More than 150 sites have been identified at Y-12 that represent known or potential sources of contamination to the environment as a result of past operational and waste management practices. Monitoring provides information on the nature and extent of contamination of groundwater, which is then used to determine what actions must be taken to protect the worker, public, and environment in compliance with regulations and DOE orders. Groundwater monitoring in the Y-12 vicinity shows that groundwater contaminant concentrations are generally declining or are stable after remedial actions (ORR 2014).

2.1.6 GEOLOGY AND SOILS

As was documented in the Y-12 SWEIS, ORR lies in the Valley and Ridge Physiographic Province of eastern Tennessee. The topography consists of alternating valleys and ridges that have a northeast-southwest trend, with most ORR facilities occupying the valleys. In general, the ridges consist of resistant siltstone, sandstone, and dolomite units, and the valleys, which resulted from stream erosion along fault traces, consist of less-resistant shales and shale-rich carbonates. The physiography of the region has not changed since the SWEIS was prepared.

In relation to soils, Y-12 is in Bear Creek Valley at the eastern boundary of ORR. Bear Creek Valley lies on well- to moderately well-drained soils underlain by shale, siltstone, and silty limestone. Developed portions of the valley are designated as urban land. Soil erosion from past land uses has ranged from slight to severe. Erosion potential is very high in those areas that have been eroded in the past, with slopes greater than 25 percent. Erosion potential is lowest in the nearly flat-lying permeable soils that have a loamy texture. Shrink-swell potential is low to moderate and the soils are generally acceptable for standard construction techniques. Although soil resources at Y-12 have not changed since the Y-12 SWEIS was issued, during excavation of an underpass for the Site Readiness Haul Road, various types of debris (concrete, wood, metal) were encountered, some of which was radiologically contaminated, and some of which was contaminated with mercury. The debris was found during a 20-foot-deep cut to lower the Haul Road for the underpass. Section 2.1.13 of this SA discusses how these wastes were managed.

Section 4.5.3 of the Y-12 SWEIS contains a detailed discussion of the seismic conditions in the region and at the site. That information remains valid and relevant and is not repeated in this SA. With regard to more recent information regarding seismicity, in 2014 the U.S. Geological Survey (USGS) released a report with updated national seismic hazard maps for the United States to account for new methods, models, and data since the 2008 maps were released (USGS 2014). Figure 2-3 is the new seismic hazard map for the eastern Tennessee area and shows that Y-12 is in an area that has a 2-percent probability over 50 years of exceeding a peak ground acceleration of 0.3g (where g is the acceleration due to gravity). In contrast, in 2008, the USGS estimated that Y-12 is in an area that has a 2-percent probability over 50 years of exceeding a peak ground acceleration of 0.2g (USGS 2014). The updated hazard maps are based on the possibility of earthquakes in eastern Tennessee that have a magnitude greater than 6. Although different, the new USGS seismic hazard map does not change the site-specific seismic data at Y-12 which is used to determine facility design and construction requirements. The site-specific design-basis earthquake spectra that would be factored into the requirements for any new UPF buildings has been conservatively developed, and contains margin to address both current requirements and possible future modification of the spectra input, such as the input from the recent USGS seismic hazard changes. Any new facilities would be designed and constructed in accordance with all applicable requirements, including DOE Standard 1020-2012, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities (DOE 2012).



Source: USGS 2014.

Figure 2-3. 2014 Seismic Hazard Map of Eastern Tennessee.

2.1.7 ECOLOGICAL RESOURCES

Ecological resources have not changed in any significant ways at Y-12 since issuance of the SWEIS with one exception. The SWEIS noted only one Federally listed threatened or endangered species on or near ORR: the gray bat (*Myotis grisescens*). The gray bat continues to remain endangered. The SWEIS also identified the Indiana bat (*Myotis sodalis*) as endangered. As part of the SWEIS process, NNSA prepared a Biological Assessment to determine if any of the SWEIS activities would be likely to affect either the gray bat or Indiana bat (see Appendix C of the SWEIS). NNSA concluded that there was not likely to be any impact. Consultation to comply with Section 7 of the *Endangered Species Act of 1973* (16 U.S.C. § 1531 *et seq.*) was conducted for the SWEIS with the U.S. Fish and Wildlife Service (USFWS). It resulted in the USFWS concluding that it does not anticipate adverse effects to Federally listed endangered species that occur near the project area.

Since publication of the SWEIS, the northern long-eared bat (*Myotis septentrionalis*) has been listed as threatened by the USFWS, and Y-12 falls within the range for this species (USFWS 2015). Additionally, acoustic analyses and mist net trapping conducted from 2013-2015 confirm that the Indiana bat, northern long-eared bat and gray bat are found across the ORR, which includes Y-12 (McCracken 2013, McCracken 2015). NNSA notes that these survey results are reported to the USFWS under Section 7 of the *Endangered Species Act* standard consultation procedures. On April 5, 2016, as part of the informal consultation process with the USFWS for this SA, NNSA determined that there will be no effect to threatened or endangered species beyond that described and mitigated for in the SWEIS (NNSA 2016c). The USFWS has concurred with that determination (USFWS 2016).

The SWEIS included a detailed Wetlands Assessment (see Appendix G of the SWEIS) prepared in accordance with 10 CFR 1022. In total, construction activities associated with the UPF were estimated to

result in the loss of 1.0 acre of wetlands. Mitigation of this loss was proposed through expansion and/or creation of wetland acreage (3.02 acres) at six locations within the Bear Creek watershed. This mitigation has been completed as planned.

2.1.8 CULTURAL RESOURCES

A site-wide Programmatic Agreement among DOE Oak Ridge Office, NNSA, the Tennessee State Historic Preservation Office, and the Advisory Council on Historic Preservation concerning management of historical and cultural properties at Y-12 has been in effect since it was approved on August 25, 2003 (ORR 2014). No American Indian sacred sites or cultural items have been found within or immediately adjacent to Y-12. No prehistoric sites have been found within or immediately adjacent to the Y-12 (NNSA 2011). Buildings 9212 and 9215 are historic facilities eligible for inclusion on the *National Register of Historic Places*. All construction activities for the proposed action involving these facilities would be reviewed and evaluated to satisfy the Section 106 requirements in the Programmatic Agreement.

As discussed in Section 2.1.1 of this SA, DOE and the NPS have been working towards establishment of the Manhattan Project National Historical Park. According to the MOA, and consistent with existing historic preservation plans, DOE will protect and maintain all DOE sites, structures, and landscapes included in the Manhattan Project National Historical Park, as well as associated contributing elements outside the Park, in accordance with the requirements of the *National Historic Preservation Act* (54 U.S.C. 100101 note). DOE will also follow the Secretary of the Interior's Standards for Treatment of Historic Properties and will make every effort to avoid adverse impacts to the Park's resources, values, and contributing historic elements.

2.1.9 SOCIOECONOMICS

This SA uses the same region of influence (ROI) for socioeconomic analysis as the SWEIS. The ROI is a four-county area in Tennessee that consists of Anderson, Knox, Loudon, and Roane Counties, where more than 90 percent of the Y-12 workforce resides. The SWEIS used 2000 Census data in its analysis. As would be expected, socioeconomic conditions in the ROI have changed since then. This SA uses data from the 2010 Census. Table 2-4 lists relevant socioeconomic information for the ROI from both the SWEIS and based on most current data available.

Table 2-4. Socioeconomic Data for the ROI.

Parameter	SWEIS Value	Current Value
ROI Population	596,192	623,659
ROI Labor Force	312,211	391,725
ROI Unemployment Rate	Low: 7.0 percent in Knox County; High: 8.8 percent in Anderson County	Low: 5.4 percent in Knox County; High: 6.4 percent in Roane County
Y-12 Employment	6,500	6,200

Source: NNSA 2011; USCB 2014.

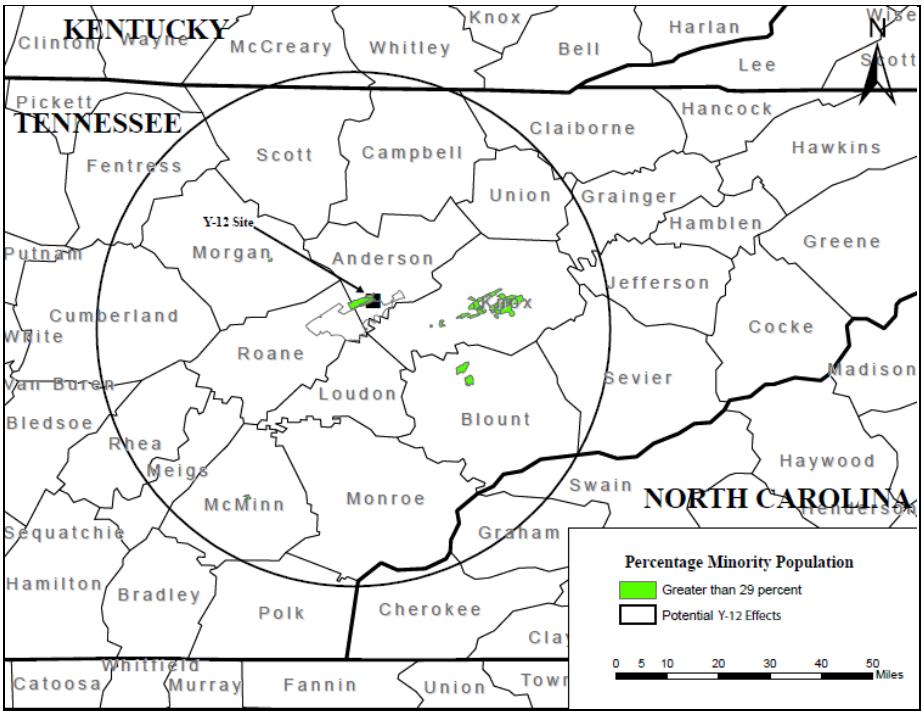
2.1.10 ENVIRONMENTAL JUSTICE

The SWEIS used data from the 2000 Census to determine the percentage of minority and low-income populations in the ROI. This SA updates the percentage of minority and low-income populations in the ROI using data from the 2010 Census. Table 2-5 lists the percentages of minority and low-income populations from the SWEIS and based on current information for Y-12. As shown in that table, the minority and low-income population percentages have increased in comparison with the percentages in the SWEIS. Figures 2-4 and 2-5 show the geographic distribution of minority and low-income populations near Y-12 based on data from the 2010 Census.

Table 2-5. Minority and Low-Income Populations for Y-12.

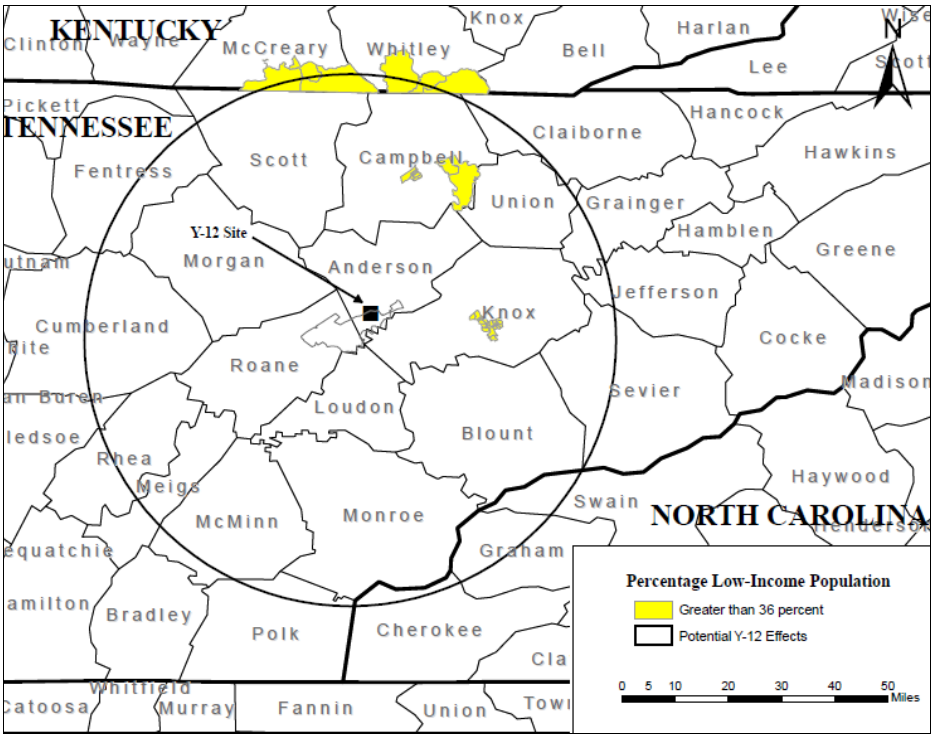
Population	Estimate in SWEIS (%)	Current Actual Data (%)
Minority Population	7.4	9.3
Low-Income Population	13.0	16.4

Source: NNSA 2011, USCB 2014.



Source: USCB 2014.

Figure 2-4. Minority Populations within 50 Miles of Y-12.



Source: USCB 2014.

Figure 2-5. Low-Income Populations within 50 Miles of Y-12.

2.1.11 INFRASTRUCTURE

The SWEIS analyzed several readiness activities associated with the Capability-sized UPF Alternative that have been conducted since publication of the SWEIS ROD. Changes to the infrastructure include the completion of the Site Readiness Haul Road extension and construction of the Bear Creek Road bypass. In addition, new potable water lines have been relocated, tied in, and are now delivering water to the Y-12 site. The proposed construction site for new facilities (UPF) has been cleared of electrical lines, and designated electrical and communication lines have been relocated. In addition, a wet spoils area and a west borrow area have been established to support future construction. All of these activities were analyzed in the SWEIS and were conducted in accordance with the SWEIS ROD (see Section 3.4).

As discussed in Section 1.4, a categorical exclusion was issued by NNSA for the purpose of constructing a 161 kV substation (Pine Ridge) and two transmission lines right-of-way corridors. The purpose of this action is to: (1) supply the UPF with sufficient and reliable power; (2) upgrade the Y-12 electrical system with modern equipment (allows for ease of maintenance and servicing) and provide Y-12 with a reliable power supply; and (3) allow TVA to maintain the capability and reliability of its bulk transmission system. Section 4.0 of this SA includes consideration of the impacts of the substation and transmission lines. Section 5.0 of this SA discusses potential future infrastructure facilities at ORR, such as a proposed new landfill, and identifies relationships between such future infrastructure facilities and the proposed action.

2.1.12 HUMAN HEALTH

The SWEIS stated that the total worker dose at Y-12 was about 49 person-rem per year and the total population dose (50-mile radius around the site) from existing Y-12 operations was about 7.8 person-rem per year (NNSA 2011). Based on more recent information, the total worker dose at the site is about

49.7 person-rem per year (DOE 2014a) and the total population dose is about 7.2 person-rem per year (ORR 2014). Table 2-6 lists the potential doses to workers and to members of the public (within 50-miles of Y-12) from the SWEIS and provides updates to these based on current information for Y-12. As shown in that table, doses have not notably changed in comparison with those in the SWEIS. The doses in Table 2-6 are based on the operation of existing facilities at Y-12 and do not include impacts from the UPF as analyzed in the SWEIS or the proposed action, including UPF facilities, addressed in this SA. Section 4.2 presents the potential doses from the SWEIS action alternatives and from the analysis of the proposed action in this SA.

Table 2-6. Radiological Doses at Y-12.

Dose	Data Presented in SWEIS	Current Actual Data
Total Worker Dose (person-rem per year)	49	49.7
50-Mile Population Dose (person-rem per year)	7.8 (Note 1)	7.2 (Note 2)

Sources: NNSA 2011; DOE 2014a; ORR 2014.
Note 1. This dose was based on a population of 1,040,041 people living within a 50-mile radius of Y-12 (NNSA 2011).
Note 2. The current dose is based on a population of 1,172,530 people living within a 50-mile radius of Y-12 (ORR 2014).

2.1.13 WASTE MANAGEMENT

Table 2-7 lists the radioactive and hazardous waste management data from the SWEIS along with more current data. Radioactive waste from routine operations includes low-level radioactive waste (LLW) and mixed LLW. Changes in the waste generation totals from year to year are somewhat driven by changes to mission-directed activities such as the NFRR work and other facility maintenance/modernization efforts along with various clean-up activities. Decreases in waste generation are due to source reduction, process efficiency improvements, and increasing categories of recyclable materials. Increases in waste generation are due to year-to-year operational variations as well as economic discard limit changes. Section 4.2 presents the potential waste quantities from the proposed action and analyzes the potential impacts of these wastes.

Table 2-7. Waste Generation at Y-12.

Waste Type	Data from SWEIS (Fiscal Year [FY] 2007)	Current Data (FY 2014)
LLW (Liquid) (gallons)	713	1,104
LLW (Solid) (cubic yards)	9,405	6,208
Mixed LLW (Liquid) (gallons)	1,096	5,907
Mixed LLW (Solid) (cubic yards)	126	237
Hazardous Waste (metric tons)	11.6	4.2

Source: NNSA 2011; NNSA 2015d.

In relation to the wastes that were encountered during excavation of an underpass for the Site Readiness Haul Road, the radiological contaminant was dominated by depleted uranium. Over 95 percent of the debris and surrounding soil (approximately 15 truckloads) met the waste acceptance criteria for the ORR sanitary/industrial landfill. Four containers of radiologically contaminated debris that exceeded the limits for disposal at the ORR landfill were managed as LLW and shipped for disposal off site. Two containers of radiologically contaminated soil were shipped to the Energy Solutions facility in Clive, Utah, for disposal. A total of 16 large concrete blocks and two concrete slabs had small mercury beads visible on their surfaces. These debris items were packaged and shipped for treatment and disposal at the Energy Solutions facility (B&W 2014). If similar discoveries should occur during execution associated with the proposed action, NNSA would manage any materials in accordance with all applicable regulatory requirements.

2.2 Changes in NNSA's Approach to NEPA Analyses

There have been no significant changes in NNSA's approach to NEPA documents since publication of the SWEIS in 2011. Although the current version of the DOE NEPA implementing regulations (10 CFR Part 1021) became effective November 14, 2011, which was after the Y-12 SWEIS and ROD were published, the most significant changes in those regulations involved updates and changes in relation to DOE Categorical Exclusions. Those changes do not affect this SA.

3.0 DESCRIPTION OF THE PROPOSED ACTION

The SWEIS was prepared using the best available data for the proposed UPF, based on early conceptual design information. Consistent with the Capability-sized UPF Alternative NNSA selected in the SWEIS ROD, four additional years of development and design activities have occurred. As explained in Section 1.1, in 2014 NNSA decided to stop design efforts on the single-structure Capability-sized UPF, and instead developed the proposed action addressed in this SA. This chapter describes the proposed action, which includes changes to the UPF, in detail.

3.1 Overview of the Proposed Action

The proposed action is a multifaceted approach centered on reducing safety and mission risks, as follows:

- To reduce the safety risks of operating aged facilities and equipment, inventory and MAR reduction will be employed.
- To reduce mission and safety risks, process reinvestments will be performed ranging from maintenance of existing equipment to replacement of processes with new technology in existing and enduring facilities.
- To reduce safety and mission risks, the mission-critical existing and enduring facilities and infrastructure will be maintained and upgraded through an extended life program.
- To reduce safety and mission risks, a new facility will be built to house those processes that cannot be sustained in existing, enduring facilities or through process improvements (NNSA 2016a).

Under the proposed action, NNSA would (1) construct and operate a new facility (the UPF) consisting of multiple buildings rather than the single-structure UPF facility as analyzed in the SWEIS and (2) include necessary maintenance and upgrades to some existing EU facilities. Table 3-1 identifies the capabilities the design would place in both the new and existing facilities. Under the original ROD, all of these capabilities were to be incorporated in the single-structure UPF. A key goal of the proposed action is to cease EU programmatic operations in Building 9212 and enable transition of critical Building 9212 capabilities into the UPF no later than 2025 (NNSA 2014b).

Table 3-1. Capabilities in New Facilities and Existing, Upgraded Facilities.

Capabilities in New Facilities	Capabilities in Existing Upgraded Facilities	
Casting	Machining	Quality evaluation
Chemical recovery	Metal purification	Assembly
Special oxide production	Low-energy radiography	Disassembly and dismantlement
Packing	Analytical chemistry	
Decontamination and maintenance	9 megaelectron-volt (MeV) radiography	

Source: NNSA 2014b.

As described in Section 3.2, the UPF would include a Main Process Building (MPB), Salvage and Accountability Building (SAB), Mechanical Electrical Building (MEB), Personnel Support Building (PSB), other support facilities, utility infrastructure, and security systems. Supporting facilities would include a Construction Support Building (CSB), Process Support Facility (PSF), fire system building, electrical substation and transmission lines, and a connector to HEUMF. In addition to constructing and operating the UPF, the proposed action would add or relocate some activities to existing EU facilities (see

Section 3.3). Section 3.4 describes construction activities for the proposed action, and Section 3.5 describes operations.

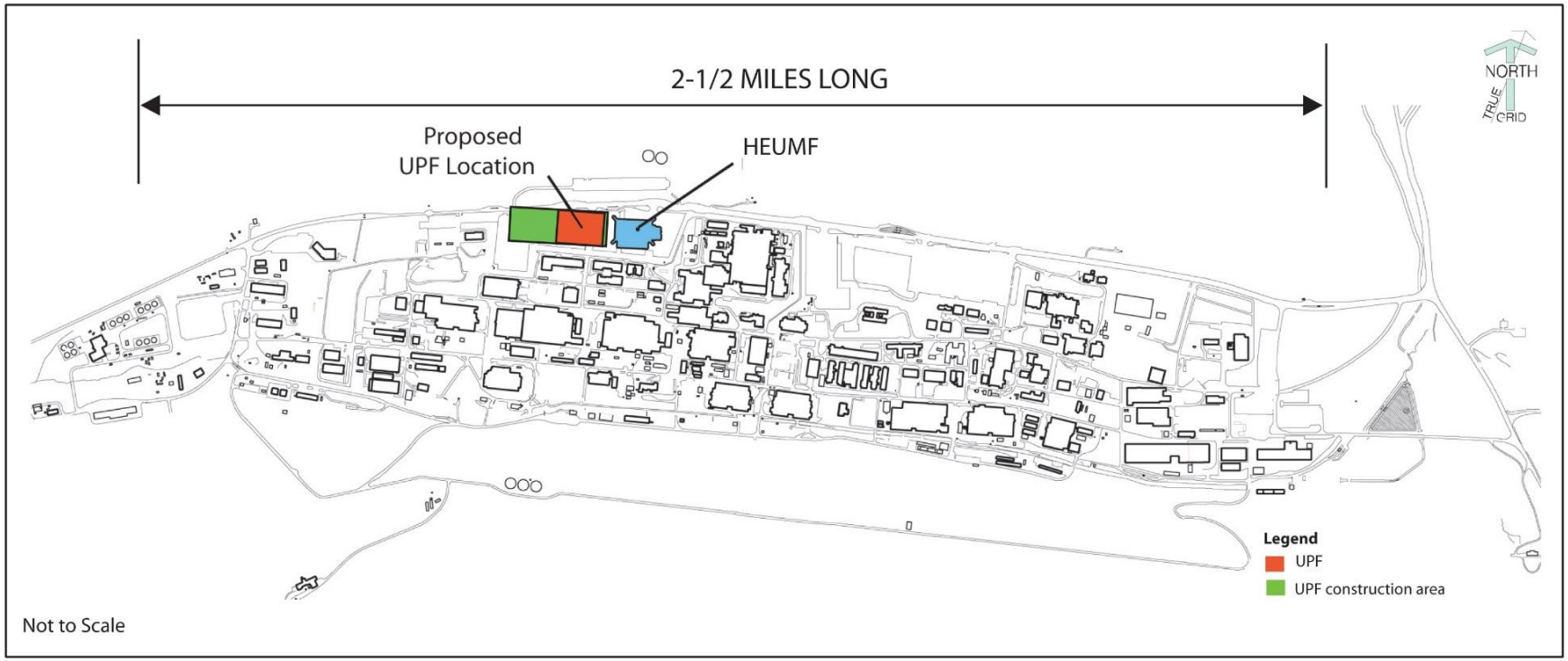
3.2 New Facilities (UPF)

Figure 3-1 shows the proposed location of the new facilities that are part of the UPF. The proposed facilities would be at the same location (but have a smaller footprint) as was identified in the SWEIS for the originally contemplated single-structure UPF. Each of these buildings would be designed to applicable process function, security, and nuclear and chemical hazard requirements. The MEB would be a two-story structure housing mechanical, electrical, utility, and support systems as well as heating, ventilating, and air conditioning systems for both the MPB and the SAB. The MEB would have a 34,000-square-foot footprint and contain about 67,000 square feet of floor space and would meet nonnuclear industrial construction standards. (NNSA 2014b).

The SAB would have a 46,000-square-foot footprint and contain about 134,000 square feet of floor space. The SAB would contain the following processes: waste preparation, decontamination, nondestructive analysis, the clean and contaminated maintenance shops, chemical recovery, calcination and leaching, electronics and calibration maintenance, filter room, and personnel-related rooms such as offices and lockers. The SAB would be constructed to standards commensurate with the radioactive hazard and security requirements for the materials and processes contained within (NNSA 2014d). The SAB would consist of lower and upper processing areas. A utility area on the third level would house primarily ventilation equipment and other utilities. Some processes (e.g., chemical recovery) would occur on this third level (NNSA 2014b).

The MPB would be the largest facility with an 82,000-square-foot footprint and about 240,000 square feet of floor space. It would house furnaces, special oxide production, casting, waste preparation, and spaces for process support such as the shift manager's office, restrooms, and other personnel-related rooms such as offices and lockers. The MPB would be constructed to nuclear standards commensurate with high-hazard materials and security for the processes to be carried out (NNSA 2014d). Any new facility would be categorized and operated in accordance with the appropriate hazard category, consistent with applicable regulations, including 10 CFR Part 830.202(b)(3), "Nuclear Safety Management, Safety Basis Requirements." The building would consist of a lower process level and an upper process level. A utility area on the third level would house primarily ventilation equipment and other utilities, but some processes would occur on this third level (e.g., special oxide production). An HEUMF Connector would connect the east side of MPB to the west side of the existing HEUMF. The HEUMF Connector would be structurally isolated from the MPB and HEUMF and would be used to transport material between the HEUMF and the MPB.

In addition to these facilities, the UPF would include necessary support facilities. On the west end of both the MPB and SAB, which would be physically separate facilities, a PSB would connect the two. The purpose of the PSB, which would have about 22,000 square feet of floor space, would be to accommodate both personnel and material movements into, out of, and between the MPB and SAB. The PSB would be a two-story structure housing a loading dock and personnel monitoring station. The loading dock would be the portal for supplies and equipment not involving special nuclear material that would be delivered to, or shipped from, the MPB and SAB (NNSA 2014b).



Source: Modified from NNSA 2011.

Figure 3-1. Location of UPF and HEUMF at Y-12.

Ancillary buildings would support construction and processing operations. Examples of such buildings include the CSB and the PSF (which would be located outside of the PIDAS and would house some of the process waste tankage and the demineralized water treatment system) (NNSA 2014b). Table 3-2 presents safety significant system information for the new facilities that would be constructed in support of the UPF. As shown on that table, ancillary support facilities such as the CSB and PSF would not require any safety significant systems. The CSB would be to the west of the new UPF facilities and would be used as office and warehouse space during construction. After completion of construction, the CSB would become an Administrative Building for the new UPF facilities to meet the need for additional administrative space at the Y-12 Site. Constructing a permanent CSB, and repurposing it after construction was complete, would enable NNSA to remove office space from the UPF design. The CSB would be designed to meet Leadership in Energy and Environmental Design Gold standards. As a separate facility, the CSB would be constructed to safety and security requirements appropriate to the building's function and would provide cost savings in both building construction and operation in comparison with housing this function in the original single-structure Capability-sized UPF concept.

As discussed in Section 1.4, NNSA has issued a categorical exclusion for the construction and operation of a 161 kV substation (Pine Ridge) and two transmission lines right-of-way corridors. The utility infrastructure upgrades would provide sufficient electrical capacity to meet UPF needs along with those of the Y-12 plant. Other utility systems include standby diesel generators and distribution system; potable water, demineralized water, chilled water, and fire water systems; and compressed air and industrial gases systems (argon, nitrogen, hydrogen, oxygen, and helium). The security systems would include a perimeter intrusion, detection, and assessment system (PIDAS) surrounding the EU processing facilities, security staging areas and access portal within the facility, and access control and alarm systems.

The potential impacts of operating the UPF are presented in Section 4.2 of this SA. As discussed in that section, within the context of the Y-12 industrialized production site, the potential hazards and impacts of operating the UPF would not be significantly different from those presented in the 2011 SWEIS.

Table 3-2. New Facility (UPF) Safety Significant Systems.

Facility	Manned/ Unmanned	Safety Systems
MPB	Manned	Casting: Cooling chambers, microwave casting furnaces, pressure relief devices and relief paths, casting mass interlock, metal oxidation (MPB) furnaces, low combustion air flow interlock and isolation valve, carbon monoxide analyzer and interlock, vacuum annealing furnace, housekeeping vacuum system design - knockout system gloveboxes, high oxygen concentration interlock-knockout system gloveboxes, and exhaust flow limiting device-knockout system gloveboxes. Chemical Recovery: Primary integrity-recovery furnaces and combustion air-recovery furnaces, special oxide-exhaust or diluting gas low flow interlock-conversion furnace, primary integrity-all furnaces, exhaust flow interlock-conversion furnace glovebox, flow limiting device-hydrogen supply, seismic shutdown interlock-hydrogen supply, housekeeping vacuum system design, calciner leak detection, pressure relief device and relief path- calciner, and calciner metering pump. Process cooling water differential pressure monitor. Fissile solution piping. Safety detection and response system. Criticality accident alarm system. Inert piping/tank systems throughout facility.
SAB	Manned	Chemical Recovery: Calciner leak detection, pressure relief device and relief path, calciner metering pump, decontamination uranium concentration monitor and isolation device, filter separate uranium concentration monitor and isolation valves, vent path-evaporator, seismic shutdown interlock-evaporator, temperature interlock-evaporator, and wastewater stream uranium concentration monitor and isolation valves. Process cooling water differential pressure monitor. Fissile solution piping. Liquid piping systems. Safety detection and response system. Criticality accident alarm system. Inert piping/tank systems throughout facility.
MEB	Unmanned	None
PSB	Manned	None
PSF	Manned (on as needed basis)	None
Construction Support Building (CSB)	Manned	None
Firewater Tanks and Pump Building	Unmanned	Fire protection water supply, fire water distribution system, fire water pump system, and fire water storage system. Safety significant for support provided HEUMF.
Electrical Switchyard	Unmanned	None
Standby Diesel Generators	Unmanned	None
Process Gas Storage Tanks	Unmanned	None

3.3 Existing Facilities

Table 3-3 lists the existing facilities that would be part of the proposed action, and the capabilities they would house. Under the Capability-based UPF Alternative, all of the existing facilities listed in Table 3-3 were proposed to be eliminated.

To reduce mission risk and support the closure of Building 9212, some processes from that facility would be transferred to other existing facilities. For example, chip processing currently performed in Building 9212 would be relocated to Building 9215 to reduce MAR in Building 9212 and provide operating efficiencies by colocating chip processing where chips are primarily produced. Because chips are currently handled in Building 9215, this is a minimal impact on the safety basis for the facility (NNSA 2016a). In addition, 2-MeV radiography would be relocated to Building 9204-2E, which would allow for more streamlined operations because radiography activities already exist in that building.

Sustaining uranium mission capabilities would also require upgrades to existing and enduring facilities and infrastructure. Such upgrades could include physical changes to buildings and systems as well as technology and process changes. Section 3.4.3 presents details about the upgrades planned for existing facilities. The Y-12 SWEIS, in its analyses for the Upgrade in Place Alternative, provides the NEPA analysis for upgrades to existing facilities. That analysis is supplemented by the analysis in this SA. As designs mature, NNSA will evaluate if additional NEPA documentation is required to support implementation of the proposed action.

Table 3-3. Existing Facilities and Capabilities.

Existing Capability	Facility Where Capability Currently Performed (Note 1)	Facility Where Capability Would be Performed After Upgrades	Facility Now Proposed to be Upgraded
Machining (HEU)	Building 9215	Building 9215 (No change)	Building 9215
Metal Purification and Chip Processing	Building 9212	Building 9215/9998	Building 9215/9998
Low-Energy Radiography (2 MeV)	Building 9981 (9212 annex)	Building 9204-2E	Building 9204-2E
Analytical Chemistry	Building 9995	Building 9995 (No change)	Building 9995
9-MeV Radiography	Building 9204-2E	Building 9204-2E (No change)	Building 9204-2E
Quality Evaluation	Buildings 9215 and 9204-2E	Buildings 9215 and 9204-2E (No change)	Buildings 9215 and 9204-2E
Assembly	Building 9204-2E	Building 9204-2E (No change)	Building 9204-2E
Disassembly/ Dismantlement	Building 9204-2E	Building 9204-2E (No change)	Building 9204-2E

Source: NNSA 2015d.

Note 1: Facilities in this column would have been upgraded under the 2011 Y-12 SWEIS Upgrade in-Place Alternative. Under the Upgrade in Place Alternative, no new construction would occur and all Y-12 EU mission functions would take place within existing facilities for the foreseeable future.

3.4 Construction

3.4.1 COMPLETED CONSTRUCTION

The Site Readiness subproject was approved on January 29, 2013, and completed on February 26, 2015. This subproject was needed to support future construction of the new facilities (UPF). This work was performed by both the site contractor and by the U.S. Army Corps of Engineers.

The specific Site Readiness scope included the Bear Creek Road relocation (including a bridge overpass of the Haul Road), installation of potable water lines paralleling the new road, electrical line demolition to make way for the road and clear the construction site, electrical line and communication cable installation, preparation of the West Borrow area to receive excess soil and preparation and maintenance of a spoil area for wet soil, extension of an existing Haul Road for access to the construction site, and jack-and-bore installation of casings for future utilities. These actions, which were addressed in the SWEIS and have not changed, were completed in accordance with the SWEIS ROD.

3.4.2 NEW FACILITIES (UPF)

Before constructing any of the new buildings as described in Section 3.2, the site would need to be made ready and additional supporting infrastructure and services would need to be established. These activities, which are proposed to occur prior to FY 2018, would include:

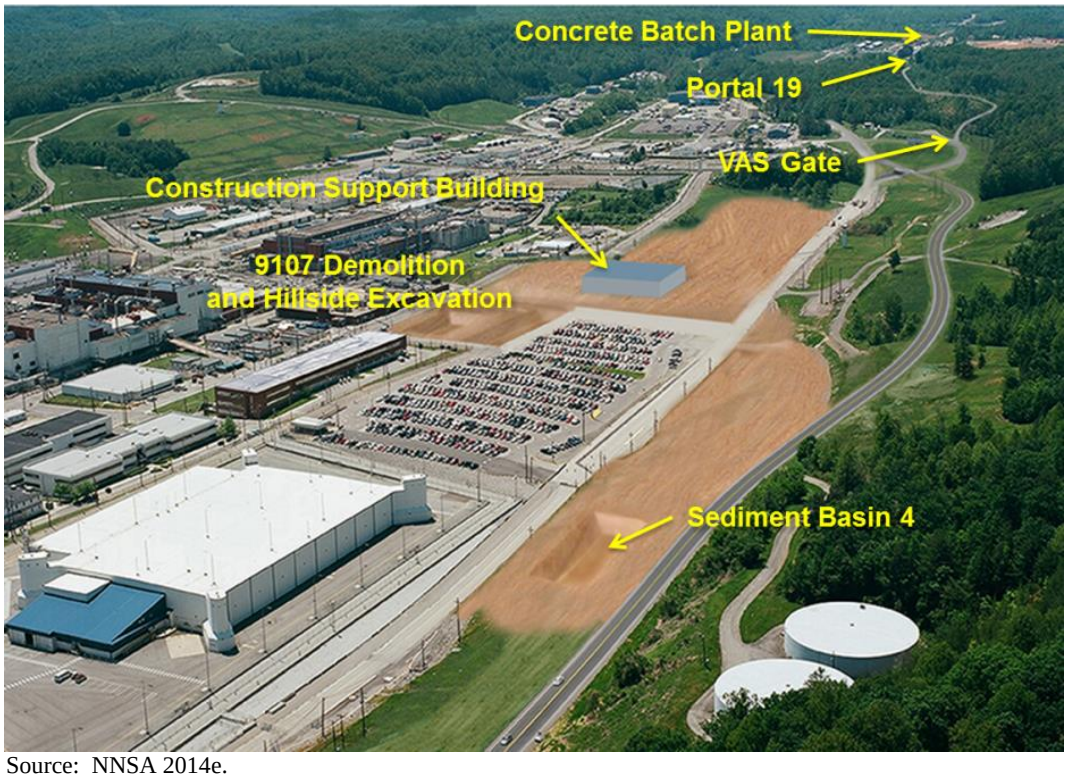
- Construction Support. Establishment of temporary utilities, a concrete batch plant, and warehousing.

- Civil Work. The construction of the CSB, development of sedimentation basins, demolition of Building 9107, site excavation and fill, site grading and concrete fill, and installation of permanent utilities (potable water, storm and sanitary sewer, electrical substation and transmission lines).

Figures 3-2 and 3-3 indicate the design locations of preconstruction activities, and Figure 3-4 shows the UPF site ready for construction. Table 3-4 lists the construction resource requirements, number of construction workers, and estimated waste generation for the proposed action. The data in Table 3-4 for the Proposed Action column were estimated by NNSA's UPF Team based on the conceptual design.

Source: NNSA 2014e.

Figure 3-2. Locations of Completed Preconstruction Activities.



Source: NNSA 2014e.

Figure 3-3. Locations of Additional Preconstruction Activities.

Source: NNSA 2014e.

Figure 3-4. UPF Site Made Ready for Construction.

Table 3-4. Proposed Action Construction Requirements.

Requirement	Data from 2011 SWEIS		Proposed Action (Note 1)
	Capability-sized UPF	Upgrade Alternative	
New Construction Floor Space (square feet)	350,000–651,000 (Note 2)	Not estimated	525,000 (Note 3)
Footprint of New Construction (square feet)	243,000	Not estimated	216,000
Peak Electrical Energy (megawatts)	30/year	Not estimated	22/year
Concrete (cubic yards)	200,000	Not estimated	235,000
Steel (tons)	27,500	Not estimated	27,500
Liquid fuel & oil (gal)	250,000	Not estimated	250,000
Water (gallons/day)	(Note 4)	(Note 4)	300,000
Aggregate (cubic yards)	5,000	Not estimated	7,500
Land Disturbed/Facility Footprint (acres)	35/8	7/2	35/5.4 (Note 5)
Wet Soils Disposal Area Land Disturbed (acres)	16.6	N/A	16.6
Peak Employment (workers)	950	300	1,050
Construction Period (years)	8–9	10	9 (Note 6)
LLW			
Liquid (gallons)	0	0	0
Solid (cubic yards)	70	0	70
Mixed LLW			
Liquid (gallons)	0	0	0
Solid (cubic yards)	0	0	0
Hazardous Waste			
Liquid (gallons)	0	0	0
Solid (tons)	4	0	4
Nonhazardous (Sanitary) Waste (tons)	800	400	800

Source: NNSA 2011, NNSA 2015d.
Note 1: Data includes construction requirements for both the new facilities (MEB, SAB, MPB, and support facilities) and the upgrades to existing EU facilities.
Note 2: The overall square footage of the single-structure Capability-sized UPF design was increased to approximately 651,000 square feet (from 350,000 square feet) primarily by increasing the height of the UPF structure to accommodate a third story.
Note 3: The 525,000 square feet of new floor space for the UPF consists of the MEB (67,000 square feet), SAB (134,000 square feet), MPB (240,000 square feet), and various process support facilities (84,000 square feet).
Note 4: Water requirements for construction of the Capability-sized UPF were estimated at 3.6 million gallons per year. For the Upgrade in-Place Alternative, the SWEIS stated that, "Water requirements during construction would not raise the average annual water use for Y-12." Based on a reevaluation of water requirements for construction of the Capability-sized UPF and the Upgrade in-Place Alternative, NNSA has estimated the construction requirements for the proposed action (new construction plus facility upgrades) to be about 300,000 gallons per day (NNSA 2015d).
Note 5: Approximately 5.4 acres for new UPF facilities. In addition, 2.2 acres would be required for electrical substation. Additionally, approximately 40 acres of land would be disturbed for transmission line construction; those transmission lines would support UPF, Y-12, and other TVA customers.
Note 6: Total construction period is estimated at 9 years, consisting of 3 years for roadwork, construction support, and civil work, and 6 years for the construction of new UPF facilities and upgrades to existing facilities.

3.4.3 UPGRADE OF EXISTING FACILITIES

The NNSA Production Office has been upgrading existing facilities to maintain capabilities and to meet mission requirements in advance of any new facilities it might ultimately construct. For example, the NFRR Project, which was considered in the 2011 SWEIS as part of the No Action Alternative (see

Section 3.2.1 of the SWEIS), included upgrades to mechanical, electrical, and heating, ventilation, and air conditioning (HVAC) systems for EU operations in Buildings 9212 and 9204-2E. The NFRR Project was completed in January 2015. However, because the NFRR only supported limited life extensions, additional upgrades would be required to support operations beyond about 25 years. For example, Buildings 9215 and additional portions of 9204-2E would require upgrades, especially of the HVAC and electrical systems, as well as structural improvements. Both facilities would also need replacement of fire suppression sprinkler heads that are nearing 50 years old. For the proposed action considered in this SA, these additional upgrades are needed to support the capabilities in Table 3-1 listed under Capabilities in Existing Upgraded Facilities.

The upgrades for the proposed action would consist of internal modifications to the existing facilities that would improve worker health and safety and extend the life of these facilities. The upgrades would consist of (1) facility electrical upgrades, (2) ventilation and exhaust upgrades, (3) fire suppression upgrades, and (4) process and laboratory equipment upgrades or replacement. These upgrades would be consistent with those in the Y-12 SWEIS for the Upgrade in-Place Alternative (see Section 3.2.3 of the SWEIS).

NNSA is continuing to develop and refine more specific information about the upgrades that would be necessary. For example, specific electrical upgrades were identified as a result of a May 2012 infrastructure risk assessment for Buildings 9215 and 9204-2E (NNSA 2015d). Similarly, fire suppression upgrades in Buildings 9212, 9215, and 9204-2E, which would consist of a systematic replacement of sprinkler heads in existing facilities, would be made to meet the 50-year life code requirements. Other specific upgrades proposed are as follows:

- Machine tools and controllers are in need of upgrades in enduring facilities. Upgrading machine tools is a Y-12 site-wide initiative, and upgrades in Building 9215 have been specifically identified (NNSA 2016a).

- A strategy for addressing aged, obsolescent, and limited laboratory operations in Building 9995 encompasses equipment replacements as well as alternative methods to perform various analytical services. These upgrades are required to ensure analytical chemistry operations are able to support uranium mission activities for current and future operations (NNSA 2016a).

- The power systems in need of upgrade provide electricity to essential safety systems such as breathing air, dehumidification, and the emergency notification systems in Buildings 9995, 9215, and 9204-2E (NNSA 2016a).

- Production process humidity control requirements drive the need to sustain and replace environmental control systems. Many of these systems, as well as numerous other HVAC units, have failed or require high levels of maintenance that are expensive and predictive of near-term failures. Reinvestments are needed to minimize mission disruptions due to intermittent loss of environmental control, most acutely in Building 9995. Additional proposed upgrades include Stack 4 upgrades (Building 9215), five major air-handling units for Building 9204-2E, lathes for Building 9215, and dehumidification system work in Building 9204-2E (NNSA 2016a).

- In varying levels of severity, Buildings 9204-2E, 9212, and 9215 face ceiling, wall, and exterior facade degradation due to chemical corrosion and water intrusion. Administrative controls such as limiting access or requiring the use of hard hats have been established for specific areas. Broader evaluations, as well as funding for remediation or mission relocation, must be pursued to support current operations and the strategy.

- With regard to seismic hazards, it would be prohibitively expensive to upgrade 50+ year old facilities to current seismic standards. As such, the plan is not to bring the long-range Y-12 EU facilities to current seismic standards, but to improve worker safety and reduce mission risk.

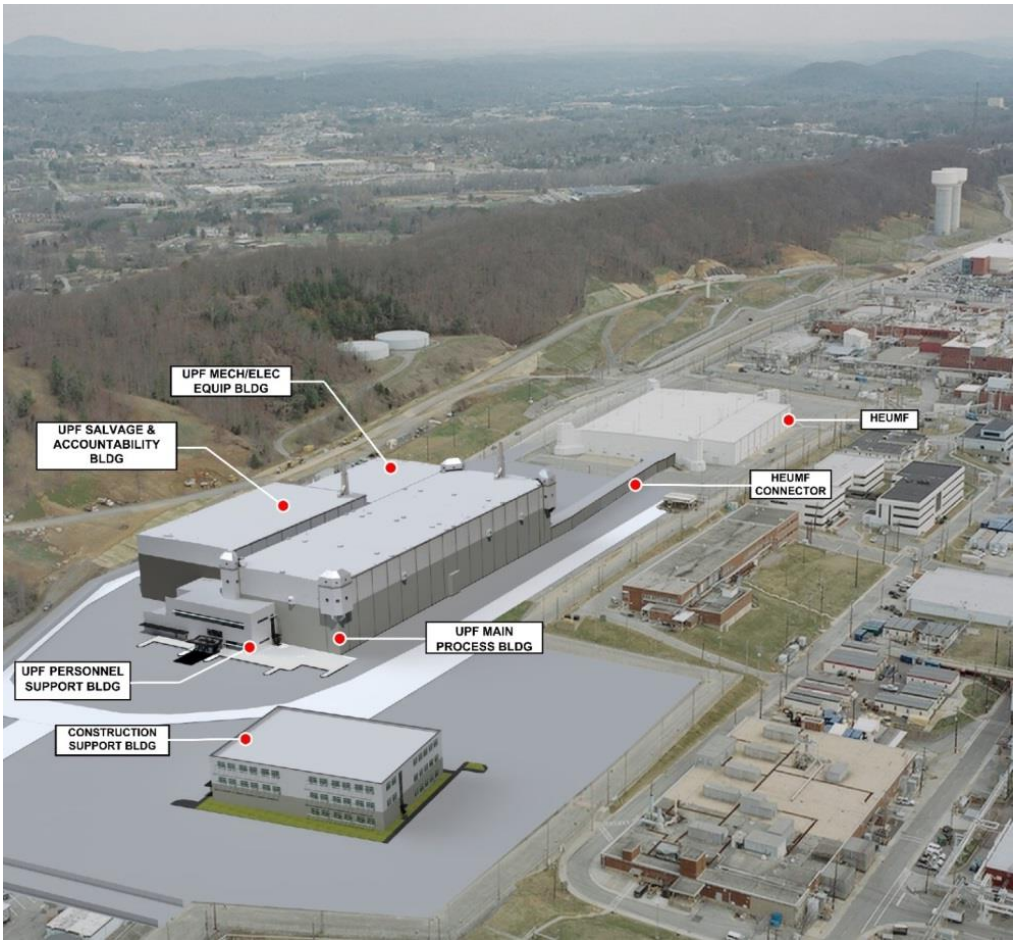
Construction activities for upgrading existing facilities would occur over about 6 years, from FY 2017 to FY 2022. The construction resource requirements, construction worker requirements, and estimated waste generation for the upgrade of existing facilities are included in the data in Table 3-4 in the Proposed Action column.

Construction activities for the proposed action would take place within the proposed historic district. As discussed in Section 2.1.8, Buildings 9212 and 9215 are historic facilities eligible for inclusion in the *National Register of Historic Places*. Any construction activities involving these facilities would be reviewed and evaluated to satisfy the Section 106 requirements outlined in the Programmatic Agreement discussed in Section 2.1.8 of this SA.

3.5 Operation

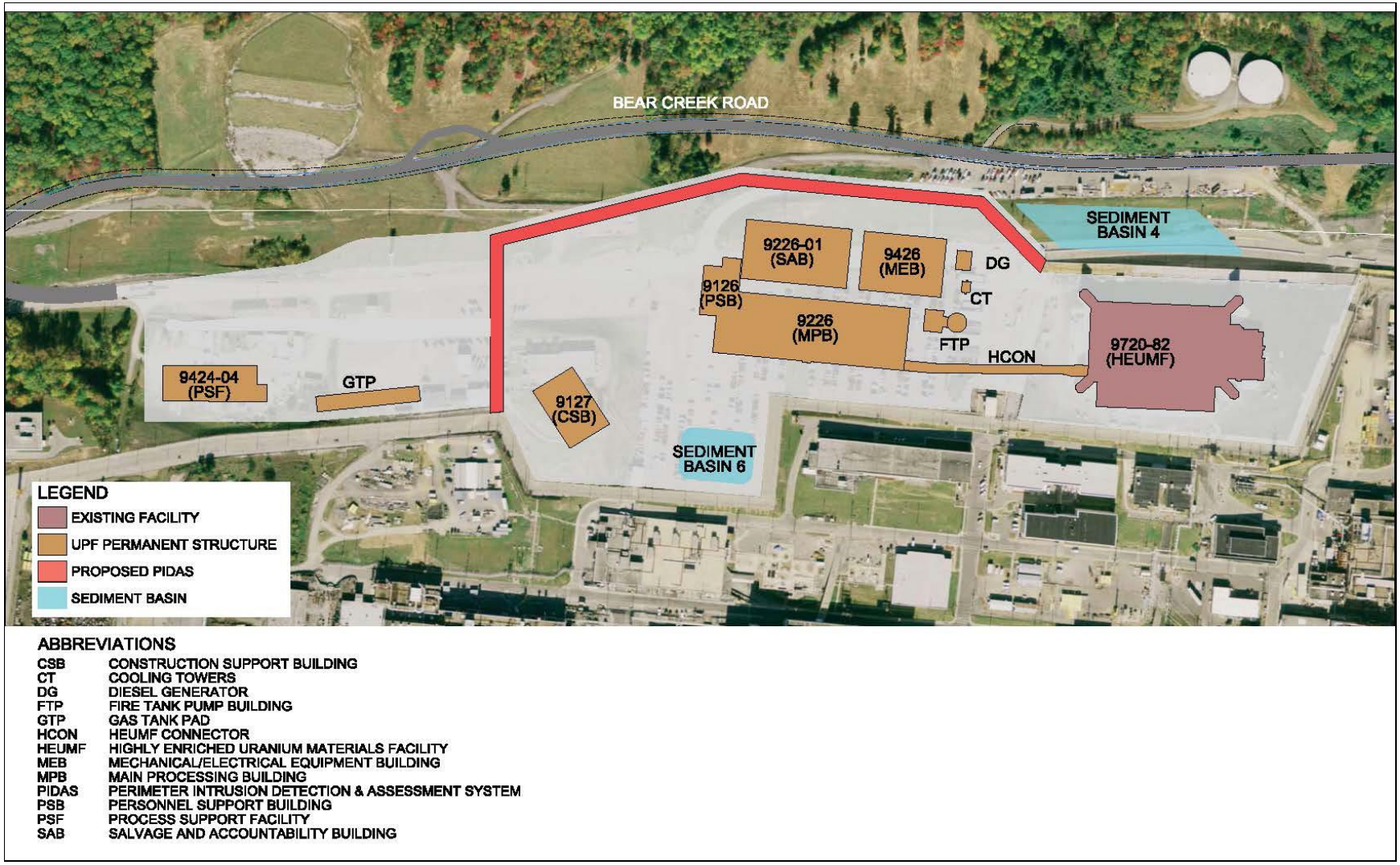
NNSA continues to operate the existing EU facilities, and such operations would be conducted in parallel with construction activities for the proposed action. Current and near-term changes in EU operations (such as implementation of new technologies and changes in facility MAR), which are intended to improve safety and security, would continue to occur. Chapter 4 of this SA considers these changes and provides a comparative analysis against the impacts in the 2011 Y-12 SWEIS.

After construction activities, NNSA would conduct startup and testing activities and some of the facilities associated with the proposed action would become operational before 2025. In calendar year 2025, all upgraded and new facilities (UPF) are expected to be operational. Figure 3-5 shows the new facilities next to the existing HEUMF. Figure 3-6 presents a plan view and layout of the new facilities. Table 3-5 lists the operations requirements including number of operations workers, and the expected waste generation for the proposed action. The data in Table 3-5 include contributions from both new facilities and upgraded facilities.



Source: NNSA 2015d.

Figure 3-5. UPF and the HEUMF.



Source: NNSA 2015d.

Figure 3-6. Layout of the UPF.

Table 3-5. Proposed Action Operations Requirements.

Requirement	Data from 2011 SWEIS		Proposed Action (Note 1)
	Capability-sized UPF	Upgrade Alternative	
Site-Wide Annual Electricity Use (megawatt-hours/year)	168,000 (Note 2)	350,000	270,000
Site-Wide Peak electricity use (megawatts)	32-43 (Note 3)	36–48	52
EU Facilities Water Use (million gallons/year)	105 (Note 4)	Not presented (Note 4)	105 (Note 4)
Site-Wide Water Use (million gallons/year)	1,300	2,000	1,400
Uranium Air Emissions (curies)	0.006	0.01	0.006
Average Individual Worker Dose (millirem)	10.0	19.9	18.3
Collective Worker Dose (person-rem)	18.2	49.0	33.4
Facility Footprint (acres)	8	0	5.4 (Note 5)
UPF or EU Workers	1,825	2,450	1,825
Y-12 Site Employment	5,100	5,750	5,100
LLW			
Liquid (gal)	476	713	500
Solid (yd^3)	5,943	9,405	6,100
Mixed LLW			
Liquid (gal)	679	1,096	710
Solid (yd^3)	81	126	93
Hazardous Waste (tons)	12	12	12
Nonhazardous (Sanitary) Waste (tons)	9,337	10,374	6,000

Source: NNSA 2011, NNSA 2015d.

Note 1: Data includes operation of both the new facilities (MEB, SAB, MPB, and support/ancillary facilities) and existing (upgraded) EU facilities.

Note 2: After to publication of the Final Y-12 SWEIS and ROD, this estimate was revised upward to 330,000 megawatt-hours per year (NNSA 2015d).

Note 3: Subsequent to publication of the Final Y-12 SWEIS and ROD, this estimate was revised upward to 60 megawatts (NNSA 2015d).

Note 4: Operational water use of EU facilities was not specifically presented in the Y-12 SWEIS. In addition, water use data has not been adjusted for discontinued flow augmentation, as discussed in Section 2.1.5.

Note 5: The UPF facility footprint area has been revised down to 5.4 acres due to the relocation of the 2.2-acre substation to a remote location near the Haul Road. Additionally, approximately 40 acres of land would be disturbed for transmission line construction; those transmission lines would support UPF, Y-12, and other TVA customers.

4.0 COMPARISON OF IMPACTS

Figure 4-1 illustrates the impact assessment process NNSA used in this SA. As this figure indicates, NNSA conducted an initial screening review to determine if there are new circumstances or information relevant to environmental concerns or impacts that indicate if the analysis in the SWEIS is sufficient to support implementation of the proposed action or if additional NEPA documentation is necessary. This review was intended to identify if associated levels of activity or potential for impact on a particular resource area, either individually or collectively, warranted additional analysis. As a result of that initial screening, NNSA decided to perform an analysis of all resources the Y-12 SWEIS analyzed.

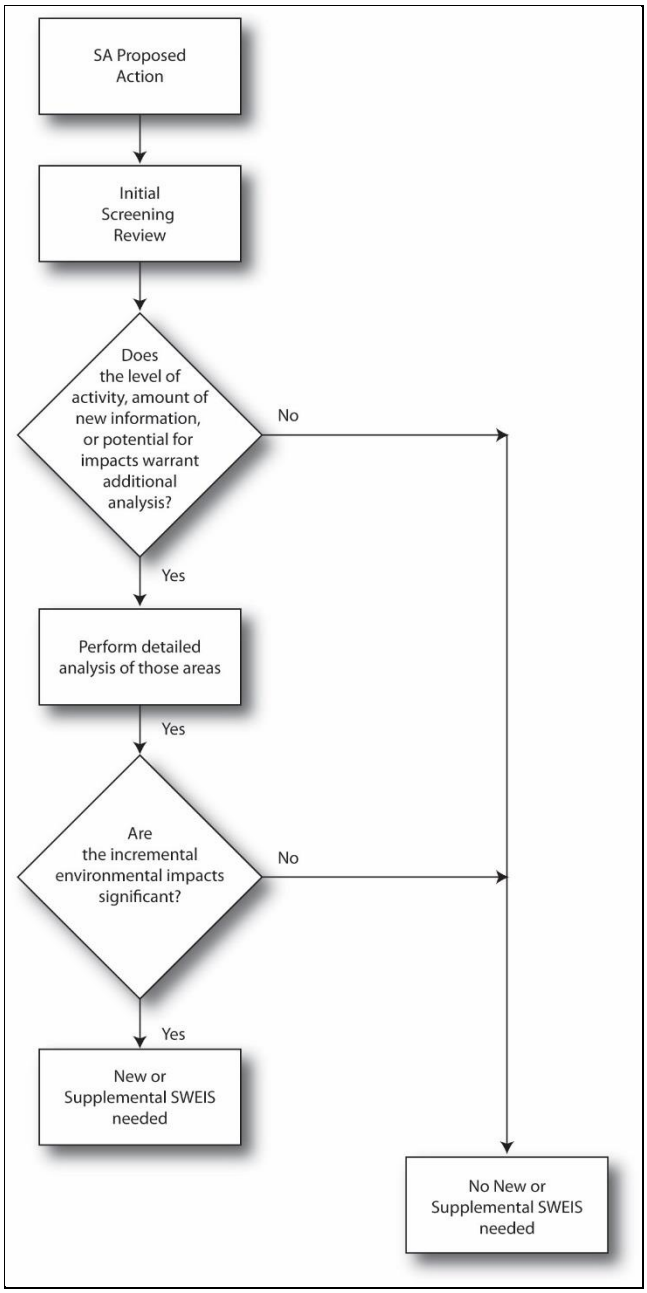


Figure 4-1. Assessment Process Used in this Supplement Analysis.

The purpose of the analysis (results in Table 4-1) is to determine (1) if the potential impacts exceeded those in the SWEIS and (2), if so, if the impacts would be considered significant in the context of NEPA (40 CFR 1508.27), which would require preparation of a new NEPA document. Per DOE 2005, NNSA used the "sliding-scale" approach, so the analysis for each resource area was proportional to the potential significance of the impacts.

4.1 Key Factors in Analysis

The SWEIS analyzed alternatives in which all construction and operations would be associated with either existing (upgraded) facilities or a new UPF and compared these to a No Action Alternative. None of the alternatives in the SWEIS specifically analyzed a hybrid approach in which construction and operations would be conducted in a combination of existing (upgraded) facilities and new facilities, which is the proposed action in this SA. In determining if the analysis in the SWEIS is sufficient to support implementation of the proposed action, it is necessary to: (1) understand the factors of both the proposed construction and operation of new and upgraded EU facilities that give rise to potential environmental impacts; and (2) understand if these factors and the potential impacts they drive have changed as a result of the proposed action. This section presents a top-level analysis of the factors that give rise to potential environmental impacts and discusses if these factors are seen as contributing to significant changes in potential impacts. Section 4.2 provides the resource-specific analyses.

Range of Operations. The SWEIS analyzed the following range of operations for both a new UPF and for upgraded existing facilities:

- Assembly of canned subassemblies from refurbished and new components;
- Disassembly or dismantlement of returned weapons canned subassemblies resulting in recycle, refurbishment, surplus generation, and disposal of components;
- Product certification through dimensional inspection, physical testing, and radiography;
- Quality evaluation (specially designed tests and inspections to collect data and determine the condition of units and components to assess the future reliability of the weapons systems in the stockpile);
- Metallurgical operations, including EU metal casting, rolling, forming, and machining;
- Chemical processing streams would be provided to process high-enrichment and special EU materials.

The range of operations for the proposed action would be the same as above. Because the range of operations has not changed, no change in the potential environmental impacts from this factor would result and it does not require further consideration in the resource-specific analysis.

Concurrent Operation of New and Upgraded Facilities. The SWEIS analyzed alternatives in which all operations would be conducted either in existing (upgraded) facilities or in a new UPF. None of the alternatives in the SWEIS specifically analyzed a hybrid approach in which operations would be conducted in existing (upgraded) facilities and new UPF facilities. As a result, operations associated with the proposed action would be different from those analyzed in the SWEIS, which could result in potential differences in environmental impacts that must be considered in this SA. Therefore, this factor requires further consideration in the resource-specific analysis, and Table 4-1 presents a comparative analysis of this factor. The source of data supporting the analysis in Table 4-1 comes from Table 3-5, which

accounts for the operational requirements for the proposed action. Table 4-1 compares the operational requirements for the proposed action with the analysis in the SWEIS.

Production Level. The SWEIS analyzed three different production levels: 125 secondaries and cases per year (Alternatives 2 and 3), 80 secondaries and cases per year (Alternative 4, the Capability-sized UPF), and 10 secondaries and cases per year (Alternative 5, the No Net Production/Capability-sized UPF). The proposed action would support a production level of 80 secondaries and cases per year, which is the same as was analyzed in the SWEIS (and selected in the ROD) for the Capability-sized UPF Alternative. Because the production level has not changed, no change in the potential environmental impacts from this factor would result and it does not require further consideration in the resource-specific analysis.

Amount of New Facility Construction. The SWEIS analyzed construction of a 388,000-square-foot UPF and a 350,000-square-foot UPF (the Capability-sized UPF). The overall square footage of the single-structure Capability-sized UPF design was later increased to approximately 651,000 square feet (from 350,000 square feet) primarily by increasing the height of the UPF structure to accommodate a third story. As presented in Table 3-4, the proposed action would consist of approximately 525,000 square feet of floor space on a 213,000-square-foot footprint within a 5.4-acre site. However, only 240,000 square feet of floor space would be constructed to nuclear standards commensurate with processed materials and operations. The analysis in the SWEIS was based on a UPF design in which the entire facility (350,000 square feet for the Capability-sized UPF) would be constructed to nuclear standards. Separating new facilities that are not required to be designed and constructed to the same nuclear standards more easily allows tailoring of safety and security requirements for each new space. As documented in Table 3-4, because there have been no significant changes in the resource requirements associated with construction (such as peak electrical energy, concrete, steel, fuel and oil, water, aggregate, and land disturbed), there would be no significant changes in the potential environmental impacts, and this factor does not require further consideration in the resource-specific analysis.

Construction Schedule (Duration). The SWEIS analyzed an 8- to 9-year construction period for the UPF and a 10-year construction period for upgrades. The overall construction activities for the proposed action would occur over about 8 years (from FY 2015 through FY 2022) including the roadwork, construction support, and civil work. Because the construction durations have not notably changed, no change in the potential environmental impacts from this factor would result and it does not require further consideration in the resource-specific analysis.

Location of New Facilities. Figure 3-1 shows the proposed location for new UPF facilities. The proposed location is the same as that in the SWEIS. Because the proposed location of new facilities has not changed, no change in the potential environmental impacts from this factor would result and it does not require further consideration in the resource-specific analysis.

Site Readiness and Supporting Infrastructure Activities for New Facilities. Sections 3.4.1 and 3.4.2 identify site readiness and supporting infrastructure activities that would need to occur to support new facility construction. Those activities include the following:

- Construction Support. Establishment of temporary utilities, a concrete batch plant, warehousing, a west borrow area, and a wet soils disposal area.

- Civil Work. The building of the Construction Support Building, development of sedimentation basins, demolition of Building 9107, site excavation and fill, site grading and concrete fill, and installation of permanent utilities (potable water, storm and sanitary sewer, electrical substation and transmission lines).

There are no significant changes to the site readiness and supporting infrastructure activities in comparison with those in the SWEIS (see Section 3.2.2.1.1 of the SWEIS). Because these activities have not changed, no change in the potential environmental impacts from this factor would result and it does not require further consideration in the resource-specific analysis.

In relation to security, the proposed site for any new process facilities is the same as was analyzed in the Y-12 SWEIS. Because this location is outside of, but adjacent to, the existing PIDAS**,** the PIDAS would be extended to encompass any new process facilities following construction. This is no different than was analyzed in the Y-12 SWEIS for the Capability-sized UPF Alternative. Additionally, under the Capability-sized UPF Alternative, the Y-12 SWEIS included an action to reduce the PIDAS footprint by 90 percent at the Y-12 site. That action would not occur under the proposed action because some existing (upgraded) EU facilities would continue to be utilized during operations.

Concurrent Construction of New and Upgraded Facilities. The SWEIS analyzed the construction activities and impacts associated with upgrading existing facilities or building a new UPF. None of the alternatives in the SWEIS specifically analyzed a hybrid approach of upgrading existing facilities and building new UPF facilities. Therefore, this factor requires further consideration in the resource-specific analysis, and Table 4-1 presents a comparative analysis of this factor. The source of data supporting the analysis in Table 4-1 comes from Table 3-4, which accounts for the construction requirements for both new facilities and upgraded existing facilities (i.e., the proposed action). Table 4-1 compares the construction requirements for both new facilities and upgraded existing facilities with the analysis in the SWEIS.

New Technology. The SWEIS used proven technology as a baseline for analyzing the potential environmental impacts from operation of the UPF and upgraded facilities. (See Appendix A of the 2011 SWEIS for a description of EU processing at Y-12 and the baseline technologies). No credit was taken for new technology improvements that had the potential to reduce environmental impacts. This SA identifies and qualitatively discusses the potential advantages of new technologies that could be incorporated into upgraded and new facilities (such as the Electrorefining Project and Calciner Project discussed in Section 1.4). For example, the calciner in Building 9212 would improve material processing and production operations, which in turn would lead to a significant reduction in the MAR in Building 9212. Similarly, the use of electrorefining in Building 9215 would enable metal purification and production operations to be shut down, further supporting MAR reductions in Building 9215 (NNSA 2016a). New technologies such as calciners and electrorefining would also support MAR reductions for the proposed action compared to past operations. As other technologies mature and a benefit is determined, the technology will advance from development into proposed capability replacements. This SA does not quantify the potential advantages that could result from new technologies because such information has not been determined. Because this SA uses the same conservative approach as the SWEIS (e.g., no credit for new technology improvements), this factor does not require further consideration in the resource-specific analysis.

Changes Associated with Transmission Lines and Electrical Substation. As discussed in Section 1.4, NNSA has issued a categorical exclusion for the construction and operation of a 161 kV substation (Pine Ridge) and two transmission lines right-of-way corridors. Providing electrical power to the UPF is discussed in sections 3.2.2.1.1 and 3.2.2.1.2 of the SWEIS, and the potential environmental impacts of providing such power are presented throughout Chapter 5 of the SWEIS. When the SWEIS was prepared, however, NNSA proposed to utilize underground construction for transmission lines and provide power only to UPF. The current proposal would utilize aboveground construction for the transmission lines and updated power supply to the balance of the Y-12 site. Additionally, the substation that would provide power to the UPF was originally expected to be located further east, adjacent to the UPF facility. Because the substation has been moved farther west, away from the UPF, the transmission lines serving the UPF

would no longer be entirely underground. However, the aboveground transmission lines from the substation to the UPF would follow an existing right-of-way, so no additional clearing will be required for them. NNSA has determined that the potential environmental impacts of constructing and operating the transmission lines and the substation are not significant (NNSA 2016b). However, as these actions are implemented, NNSA will continue to coordinate with regulatory authorities to ensure that appropriate mitigating measures will be implemented to ensure that the proposed changes would not result in any significant environmental impacts.

4.2 Environmental Impacts

This section presents (1) a summary of the environmental impacts from the SWEIS, (2) the estimate of impacts for the proposed action, and (3) a resource-specific analysis of the estimate of impacts for the proposed action in which NNSA has determined that there might be potentially significant new circumstances or information relevant to environmental concerns. Table 4-1 presents this information in a comparative fashion for each resource area. The middle column presents the impacts in the SWEIS; the column on the right presents the estimate of impacts for the proposed action. Below these columns, for each analyzed resource, is a brief narrative comparison. Table 4-1 documents the results of the impact assessment process (Figure 4-1). Appendix E of the 2011 SWEIS describes the environmental resource impact methodologies that have been utilized.

With regard to intentional destructive acts, NNSA prepared a classified appendix to the 2011 SWEIS that evaluates the potential impacts of malevolent, terrorist, or intentional destructive acts. That analysis considers both existing facilities and new facilities such as the UPF. In general, the potential consequences of intentional destructive acts are highly dependent upon distance to the site boundary and size of the surrounding population—the closer and higher the surrounding population, the higher the consequences. In addition, it is generally easier and more cost-effective to protect new facilities, as new security features can be incorporated into their design. In other words, protection forces needed to defend new facilities may be smaller due to the inherent security features of a new facility. New facilities can, as a result of design features, better prevent attacks and reduce the impacts of attacks.

Impacts from intentional destructive acts are largely based on the amount of material that could be released (i.e., the MAR) in the event of such an act. The planned reduction in the MAR limit for existing EU facilities would reduce the consequences from intentional destructive acts in comparison with those in the classified appendix to the SWEIS. Further, the MAR in facilities associated with the proposed action would not exceed the MAR as analyzed in the SWEIS. Therefore, the analysis and conclusions about malevolent, terrorist, or intentional destructive acts for the proposed action in this SA would be expected to be bounded by the analysis for the Y-12 SWEIS. NNSA would consider the need for further analysis of intentional destructive acts as the proposed action design matures. The design of the proposed action continues to include key facility hardening and security features originally planned for the Capability-sized UPF Alternative analyzed in the SWEIS.

Table 4-1. Comparative Analysis of Environmental Impacts.

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Land Resources	Construction of the Capability-sized UPF would affect about 32 acres of previously disturbed land. In addition, the Haul Road extension and Site Access and Perimeter Modification Road would disturb a maximum of about 6 acres of land. The Wet Soils Disposal Area includes about 16.6 acres of property previously used for a controlled burn demonstration and pine reforestation project. The West Borrow Area is an 18.3-acre site that previously served as the source of clay for Y-12 landfill cap projects. This site would be utilized, as necessary, for the placement of excess soil from the UPF Project with moisture content satisfactory for compaction. The Upgrade in-Place Alternative would consist of internal modifications to existing facilities. Once operational, the overall industrial use classification of Y-12 would remain the same.	Construction of the UPF would have a slightly smaller footprint (about 7.6 acres) than the 8 acres estimated for the Capability-sized UPF analyzed in the SWEIS. Upgrades associated with the proposed action would consist of internal modifications to existing facilities that are consistent with the Upgrade in-Place Alternative. With regard to aboveground transmission line construction, clearing of the right-of-way corridors would include timber harvesting and tree removal within a width of approximately 50 feet on each side of the centerline along most of each transmission line route. Approximately 40 acres could be disturbed. Overall, the impacts to land resources would be greater than those in the SWEIS due to this transmission line construction. Once operational, the overall industrial use classification of Y-12 would remain the same as that presented in the SWEIS.
Comparison to the SWEIS: The impacts to land resources from the proposed action would be greater than those in the SWEIS for the Capability-sized UPF Alternative and the Upgrade in-Place Alternative due to transmission line construction. The difference in land disturbance (35 acres in the SWEIS versus approximately 75 acres now) would be insignificant, as less than 1 percent of Y-12's undisturbed land would be disturbed for the proposed action.		
Visual Resources	Construction of the Capability-sized UPF or Upgrade in-Place Alternative would use cranes that would create short-term visual impacts, but would not be out of character for an industrial site such as Y-12. Under all alternatives, although there would be some reduction in the density of industrial facilities, Y-12 would still remain a highly developed area with an industrial appearance, and there would be no change to the Visual Resource Management Class IV, which is used to describe a highly developed area.	Construction associated with the proposed action would create greater visual impacts than those presented in the SWEIS due to the aboveground transmission lines. However, Y-12 would remain a highly developed area with an industrial appearance, and there would be no change to the Visual Resource Management classification.
Comparison to the SWEIS: The impacts from the proposed action would be greater than those in the SWEIS for the Capability-sized UPF Alternative and the Upgrade in-Place Alternative due to the use of aboveground transmission lines compared to underground transmission lines. However, because Y-12 is, and would remain, a heavily industrialized site regardless of whether the transmission lines are underground or aboveground, the Visual Resource Management classification for the site would not change. Consequently, this changed approach would not result in substantial changes in environmental impacts compared to the impacts presented in the SWEIS.		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Noise	Major noise sources within Y-12 include various industrial facilities, equipment and machines (e.g., cooling systems, steam vents, paging systems, construction and materials-handling equipment, and vehicles). There would be a potential for minor temporary increases in noise due to additional traffic and construction activities for both the Capability-sized UPF Alternative and the Upgrade in-Place Alternative, but noise levels would be below background noise levels at offsite locations in the city of Oak Ridge. Implementation of any alternative would not change these operational noise impacts.	The major noise sources and potential noise impacts associated with the proposed action would be essentially the same as those in the SWEIS.
Comparison to the SWEIS: The impacts from the proposed action would be similar to those in the SWEIS for the Capability-sized UPF Alternative and the Upgrade in-Place Alternative.		
Air Quality (non-radiological)	Construction activities would result in releases of criteria pollutants but would not exceed any NAAQS or TDEC standards beyond the Y-12 boundary. No significant new quantities of criteria or toxic pollutants would be generated during operations. Impacts would remain well within NAAQS for all criteria pollutants, with the exception of the 8-hour ozone levels and $PM_{2.5}$, which exceed standards throughout the region.	The duration and amount of construction activities associated with the proposed action would be similar to that in the SWEIS. Similar types and quantities of air emissions would occur with similar impacts. Operations in a hybrid of new and upgraded facilities would be expected to produce smaller emissions than the Upgrade in-Place Alternative, but potentially more emissions than the Capability-sized UPF.
Comparison to the SWEIS: Similar construction requirements and activities associated with the proposed action would produce similar impacts to air as those in the SWEIS. Operational impacts of the proposed action would be bounded by the impacts for the Upgrade in-Place Alternative, which resulted in no efficiency gains (e.g., square footage reductions and improved operations).		
Greenhouse Gases	The SWEIS analyzed the impacts of the three main contributors to GHG emissions at the site: (1) steam plant emissions, (2) electricity generation emissions, and (3) worker vehicle emissions. The analysis in the SWEIS showed that the highest GHG emissions (for the Upgrade in-Place Alternative) would be relatively small (much less than one percent) in comparison with the state-wide GHG emissions in Tennessee.	Under the proposed action, operations with a combination of new and upgraded facilities would be expected to produce less GHG emissions than the Upgrade in-Place Alternative, but potentially more GHG emissions than the Capability-sized UPF Alternative.
Comparison to the SWEIS: The impacts of the proposed action would be bounded by the impacts for the Upgrade in-Place Alternative in the SWEIS, which showed that GHG emissions would be relatively small (much less than one percent) in comparison with the state-wide GHG emissions in Tennessee (Section 2.1.4 of this SA).		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Air Quality (radiological)	Radiological air emissions under the Upgrade in-Place Alternative were estimated at 0.01 curie of uranium per year. The radiological air emissions associated with the Capability-sized UPF were estimated to be reduced by about 40 percent (to 0.006 curies) in comparison with the Upgrade in-Place Alternative.	As documented in Table 3-5, operation of the proposed action would result in uranium emissions of 0.006 curie per year due to the cessation of EU programmatic operations in Building 9212. As a result of this cessation, the estimated radiological emissions associated with the proposed action would be the same as those for the Capability-sized UPF in the SWEIS.
Comparison to the SWEIS: The radiological emissions associated with the proposed action would be the same as those in the SWEIS for the Capability-sized UPF Alternative. See the Human Health section of this table for potential impacts to workers and the public from radiological doses.		
Water Resources	Construction water requirements would not substantially raise the average daily water use for Y-12. The proposed UPF sites and the existing Uranium Facilities are not located within either the 100- or 500-year floodplains. Operational water requirements were estimated at about 105 million gallons per year for the Capability-sized UPF and between 1,300 and 2,000 million gallons per year for the entire Y-12.	Water requirements for construction associated with the proposed action (300,000 gallons per day) would represent less than 10 percent of water use at Y-12 and would be within the bounds of historical water use at the site. Operational water requirements for the proposed action would be 105 million gallons per year and 1,400 million gallons per year for the entire Y-12.
Comparison to the SWEIS: There would be higher water use for construction associated with the proposed action in comparison with the analysis in the SWEIS. However, the additional water use would be temporary and represent less than a 10 percent increase in the daily water use for Y-12. Operational impacts to water resources would not change in comparison with the impacts in the SWEIS for the Capability-sized UPF Alternative or Upgrade in-Place Alternative.		
Wetlands	The Haul Road extension and the Site Access and Perimeter Modification Road were estimated to result in the loss of one acre of wetlands, and place two small stream segments (about 300 feet [total] of unnamed tributaries to Bear Creek) within culverts. A total of about three acres of wetland were estimated to be created as part of the proposed construction project. The mitigation wetlands would include expansion of some existing wetlands "upstream" and adjacent to the new Haul Road, as well as creating additional wetlands in the Bear Creek watershed.	The proposed action would require the same Haul Road extension and the Site Access and Perimeter Modification Road as were addressed in the SWEIS. Based on the existing state of design for the proposed action, there are no known significant impacts to wetlands. Consequently, the potential impacts to wetlands would be the same as those presented in the SWEIS.
Comparison to the SWEIS: The wetland impacts associated with the proposed action would be the same as those in the SWEIS for the Capability-sized UPF. Although additional impacts to wetlands are not expected, if, during the course of implementing this action, additional, unexpected potential environmental impacts were identified, additional analyses and appropriate mitigation would be pursued and coordinated with the cognizant regulatory authorities such that the overall impact remains the same.		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Geology and Soils	Construction activities would result in a potential increase in soil erosion. Appropriate mitigation, including detention basins, runoff control ditches, silt fences, and protection of stockpiled soils would minimize soil erosion and impacts. No impacts on undisturbed geological resources would be expected. All facilities would be designed and constructed to meet applicable code requirements related to geological hazards. Potential seismic hazard impacts from geology are addressed under "Facility Accidents."	Potential impacts to geology and soil that would result from facility construction for the proposed action would be the same as those in the SWEIS for the Capability-sized UPF. Potential impacts associated with the new USGS estimate of new seismic hazards at Y-12 are addressed under "Facility Accidents."
Comparison to the SWEIS: The potential impacts to geology and soil associated with the proposed action would be similar to those in the SWEIS for the Capability-sized UPF.		
Ecological Resources	Construction activities for a UPF would not impact ecological resources because the facility would be sited on land that is currently used as a parking lot. No impacts on ecological resources from the Upgrade in-Place Alternative would be expected because modifications would be internal to existing facilities. Operations would continue to have minor impacts on biological resources due to operation noise and human activities. The site would remain heavily industrialized and no change to ecological resources would be expected. Although the gray bat (*Myotis grisescens*), a Federally listed endangered animal species is known to occur at ORR, no critical habitat for threatened or endangered species is known to exist at Y-12. The SWEIS also identified the Indiana bat (*Myotis sodalis*) as endangered, but noted that the only record of an Indiana bat on ORR occurred in the 1950s.	Potential impacts of construction and operation of the proposed action would be similar to those presented in the SWEIS. As discussed below, the listing of the northern long-eared bat (*Myotis septentrionalis*) as threatened by the USFWS does not change this conclusion.
Comparison to the SWEIS: The potential impacts to ecological resources associated with the proposed action would be similar to those in the SWEIS. With regard to aboveground transmission line construction, clearing of the ROW corridors would include timber harvesting and tree removal within a width of approximately 50 feet on each side of the centerline along most of each transmission line route. Although the northern long-eared bat (*Myotis septentrionalis*) has been listed as threatened by the USFWS, and the Y-12 Site falls within the range for this species (USFWS 2015), NNSA does not anticipate any additional adverse effects to this special status species because the activities associated with the proposed action would occur on an existing highly industrial site. As discussed in Section 2.1.7, NNSA does not believe that the proposed action described in this SA would change the conclusion that was presented in the SWEIS Biological Assessment, especially given that the northern long-eared bat habitat overlaps with that of the Indiana bat and gray bat. Consequently, NNSA has concluded that the proposed action is not likely to impact any threatened or endangered species. The USFWS has concurred with NNSA's conclusion (USFWS 2016). NNSA also notes that ORR conducts surveys for bats (including gray bats, Indiana bats, and northern long-eared bats) and reports to the USFWS under Section 7 of the *Endangered Species Act* standard consultation procedures. Trees would not be cut within the current window for roosting and swarming bats established by the USFWS (March 31st - November 15th).		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Cultural Resources	Y-12 currently has no buildings in the National Register of Historic Places but does have a proposed historic district of buildings associated with the Manhattan Project. Construction activities for the UPF would take place in areas outside of the proposed historic district and there would be no cultural resource impacts. Preservation of cultural resources at Y-12, including the buildings in this proposed historic district, would continue under all alternatives. None of the alternatives would impact significant cultural resources at Y-12.	Construction activities associated with the proposed action would take place within the proposed historic district. Buildings 9212 and 9215 are historic facilities eligible for inclusion in the *National Register of Historic Places*. Any construction activities involving these facilities would be reviewed and evaluated to satisfy the Section 106 requirements outlined in the Programmatic Agreement.
Comparison to the SWEIS: Potential impacts to cultural resources would be similar to those in the SWEIS, and any activity with the potential to impact historic structures would be reviewed and evaluated to ensure compliance with Section 106 requirements.		
Socioeconomics	About 300 and 950 direct jobs would result during the peak year of construction for the Upgrade in-Place and Capability-sized UPF, respectively (note that these numbers do not include 400 construction workers associated with the CCC). The total new jobs would represent an increase of less than 1 percent in ROI employment. During operations, the site workforce would be expected to remain unchanged for the Upgrade in-Place Alternative, and would be reduced by about 20 percent (to a total of 5,100 employees) for the Capability-sized UPF.	Approximately 1,050 direct jobs would be required during the peak year of construction for the proposed action. During operations, the site workforce would be reduced by about 20 percent (to a total of 5,100 employees).
Comparison to the SWEIS: A peak construction workforce of 1,050 for the proposed action (in comparison with 950 in the SWEIS) would not result in any significant difference in impacts to socioeconomic resources in comparison with those in the SWEIS. Estimated operational impacts would be the same as those for the Capability-sized UPF Alternative.		
Environmental Justice	Based on 2000 Census data: • Minority population: 7.4 percent. • Below poverty level: 13 percent. No significant health risks to the public; radiological dose would remain below the annual dose limit of 10 millirem. Results from ORR ambient air monitoring program show that the hypothetical effective dose received within the Scarboro Community (an urban minority community that is the closest community to an ORR boundary) is typically similar to, or lower than, other monitoring stations of Y-12. There are no special circumstances that would result in any greater impact on minority or low-income populations than the population as a whole.	Based on 2010 Census data: • Minority population: 9.3 percent. • Below poverty level: 16.4 percent. No significant health risks to the public; radiological dose would remain below the annual dose limit of 10 millirem. There are no special circumstances that would result in any greater impact on minority or low-income populations than the population as a whole.
Comparison to the SWEIS: Since the issuance of the SWEIS, the percentage of minority and low-income populations in the Y-12 area has increased. However, the projected human health risks from normal operations and facility accidents would not be substantially different as a result of the proposed action in comparison with the analyses in the SWEIS (see the Health and Safety portion of this table below). Implementation of the proposed action would not result in disproportionately high and adverse human health or environmental effects to minority or low-income populations.		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Utilities	Construction activities associated with the Upgrade in-Place Alternative would have negligible energy and infrastructure requirements. Construction activities associated with the Capability-sized UPF would require a peak electrical energy requirement of 1.9 megawatts of electricity per month and water usage of 3.6 million gallons annually. These would be less than 1 percent of current site usage. Operations associated with the Upgrade in-Place Alternative would not significantly change infrastructure demands. During operations, the Capability-sized UPF would require about 12,600 megawatt-hours per month of electric power, which is less than 5 percent of available capacity. The Capability-sized UPF Alternative would use about 100 million gallons per year in comparison with a site-wide use of more than 1 billion gallons per year.	The proposed action would require similar quantities of electricity and water for construction activities as were estimated in the SWEIS for the Capability-sized UPF (see Table 3-4 of this SA). Utility requirements during operations would be bounded by the utility usage requirements presented for the Upgrade in-Place Alternative. The relocation of the electrical sub-station to a more northern location than was identified in the SWEIS would not result in any significant differences in impacts compared to those identified in the SWEIS.
Comparison to the SWEIS: The utility requirements of the proposed action would be similar to those estimated in the SWEIS.		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Health and Safety – Normal Operations	All radiation doses from normal operations would be below regulatory standards with no statistically significant impact on the health and safety of workers or public. <u>Capability-sized UPF</u> Dose from air emissions: • Maximally exposed individual (MEI): 0.09 millirem per year (5.0×10^{-8} latent cancer fatality [LCF]) • Population: 1.0 person-rem per year (0.0005 LCF) Dose from liquid effluents: • MEI: 0.006 millirem per year (4.0×10^{-9} LCF) • Population: 6.3 person-rem per year (0.004 LCF) Dose to workers: 18.2 person-rem per year (0.01 LCFs) <u>Upgrade in-Place Alternative</u> Dose from air emissions: • Maximally exposed individual (MEI): 0.15 millirem per year (9.0 × 10-8 LCF) • Population: 1.5 person-rem per year (0.0009 LCF) Dose from liquid effluents: • MEI: 0.006 millirem per year (4.0×10^{-9} LCF) • Population:6.3 person-rem per year (0.004 LCF) Dose to Workers: 49.0 person-rem per year (0.03 LCFs)	All radiation doses from normal operations would be below regulatory standards with no statistically significant impact on the health and safety of workers or public. <u>Proposed Action</u> Dose from air emissions: • MEI: 0.09 millirem per year (5.0×10^{-8} LCF) • Population: 1.0 person-rem per year (0.0005 LCF) Dose from liquid effluents: • MEI: 0.006 millirem per year (4.0×10^{-9} LCF) • Population: 6.3 person-rem per year (0.004 LCF). Dose to workers: 33.4 person-rem per year (0.01 LCF) Note: the analysis of health and safety impacts uses the same methodology as the SWEIS (see Section D.2 of the SWEIS).
Comparison to the SWEIS: Although the design for a UPF was not completed, the SWEIS anticipated that implementation of the Capability-sized UPF would reduce the airborne emissions concentrations by 40 percent in comparison with those under the Upgrade in-Place Alternative. The proposed action would operate with a mix of upgraded and new facilities, and the potential radiological impacts to the public from operation would be expected to be the same as those for the Capability-sized UPF in the SWEIS (note that the cessation of EU programmatic operations in Building 9212 is the reason for the 40 percent reduction). The annual dose to workers would be 33.4 person-rem. This is within the range in the SWEIS (e.g., 18.2 person-rem for the Capability-sized UPF and 49 person-rem for the Upgrade in-Place Alternative). In all cases, all radiation doses from normal operations would be below regulatory standards with no statistically significant impact on the health and safety of workers or public.		

Resource Area	Impacts in SWEIS	Impacts for Proposed Action
Health and Safety – Facility Accidents	As presented in detail in Appendix D of the SWEIS, NNSA performed an analysis of the potential impacts associated with accidents for all alternatives analyzed. Section D.9 of the SWEIS includes a discussion of the methodology used to estimate the potential impacts associated with accidents. Because detailed design descriptions for the action alternatives were not available, the accident analysis presented in the SWEIS was a conservative analysis that did not take into account any design features or improved safety features that are expected to be in-place in the future. Potential impacts from accidents were estimated using computer modeling for a variety of initiating events, including fires, explosions, and earthquakes. For all alternatives, the accident with the highest potential consequences to the offsite population is the aircraft crash into the EU facilities. About 0.4 LCF in the offsite population could result from such an accident in the absence of mitigation. An MEI would receive a maximum dose of 0.3 rem. Statistically, this MEI would have a 2×10^{-4} chance of developing a LCF, or about 1 in 5,000. This accident has a probability of occurring about once every 100,000 years. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be 4.4×10^{-7}, or about 1 in 2.3 million. For the population, the LCF risk would be 4×10^{-4}, or about 1 in 2,500.	The potential for impacts from accidents for the proposed action would not change compared to those impacts presented in the SWEIS. As discussed in Appendix D.9.3 of the SWEIS, seismic hazards are bounded by other accidents for all facilities associated with EU operations. That conclusion has not changed as a result of the new USGS seismic hazard map for the eastern Tennessee area, because the seismic accidents at Y-12 are based on site-specific data, presented in safety-basis documents, which has not changed. NNSA has and will continue to take steps to reduce the MAR administrative limits in existing facilities (NNSA 2014f). For example, in 2014, NNSA reduced the MAR limit in Building 9212 by 40.6 percent. A MAR limit reduction for Building 9215 (which would be the only existing EU facility with significant quantities of nuclear materials) is expected to be more significant than that in Building 9212 (NNSA 2014f). A reduction in the MAR limit has the potential to reduce the accident consequences from that facility by a comparable percentage.
Comparison to the SWEIS: The analysis in the SWEIS acknowledged that the Capability-sized UPF would decrease the overall Y-12 facility accident risks in the middle column above. This is because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into a UPF, reducing the accident risks associated with those older facilities. However, because detailed design descriptions for a UPF were not available, the reduction in accident risks could not be quantified and the conservative nature of the analysis in the SWEIS did not take credit for improvements in design or operating controls. New facilities such as the UPF would be constructed to current building standards and would be designed and built to withstand anticipated seismic accelerations and would therefore prevent any significant damage from design-basis earthquakes in accordance with DOE Standard 1020-2012, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (DOE 2012). These new facilities would not experience significant damage from design-basis earthquakes and other credible external initiators. In addition, the SWEIS acknowledged that the Upgrade in-Place Alternative would also decrease the overall Y-12 facility accident risks. This is because the existing enriched uranium and nonnuclear processing facilities would be upgraded to contemporary environmental, safety, and security standards to the extent possible. The accidents with the highest potential impacts to the offsite population would remain the aircraft crash into the EU facilities (when probabilities are not taken into account) and the design-basis fire for HEU storage (when probabilities are taken into account), and there would be no significant change in impacts as a result of the proposed action. The reduction in the MAR limit planned for Building 9215 would further reduce the consequences and risks from accidents in comparison with those in the Y-12 SWEIS. Construction of a general aviation airport at the ETTP Heritage Center (see Section 5.2) would not change the potential consequences from an aircraft crash, as those aircraft are already considered in the existing analysis. Additionally, because risks (which take into account the probability of an accident) from a general aviation aircraft crash are bounded by design-basis fires, there would also be no change in the bounding accident. Therefore, the risks and consequences from facility accidents for the proposed action would be bounded by the risks and consequences in the SWEIS.		

<table>
<tr><th>Resource Area</th><th>Impacts in SWEIS</th><th>Impacts for
Proposed Action</th></tr>
<tr><td>Waste Management</td><td>Annual Wastes
<u>Capability-sized UPF</u> <u>Upgrade in-Place Alternative</u>
LLW liquid: 428 gallons 713 gallons
LLW solid: 5,643 cubic yards 9,405 cubic yards
Mixed LLW liquid: 640 gallons 1,096 gallons
Mixed LLW solid: 76 cubic yards 126 cubic yards
Hazardous: 7.2 tons 12 tons
Nonhazardous: 8,140 tons 10,374 tons</td><td>Annual Wastes
<u>Proposed Action</u>
LLW liquid: 500 gallons
LLW solid: 6,100 cubic yards
Mixed LLW liquid: 710 gallons
Mixed LLW solid: 93 cubic yards
Hazardous: 12 tons
Nonhazardous: 6,000 tons</td></tr>
<tr><td colspan="3">Comparison to the SWEIS: As shown above, the amounts of all wastes that would be generated by the proposed action would be similar to the amounts the SWEIS estimated for the Capability-sized UPF; they would be less than or equal to those for the Upgrade in-Place Alternative. Therefore, the potential impacts associated with waste management would be similar to the impacts in the SWEIS.</td></tr>
<tr><td>Transportation and Traffic</td><td>Under the Upgrade in-Place Alternative, the Y-12 workforce was estimated to be approximately 5,750 workers (in comparison with the No Action Alternative workforce of 6,500 workers) and the level of service on area roads was not expected to change notably. The Capability-sized UPF would reduce the site workforce to about 5,100. This reduction could have a minimally beneficial impact on traffic and transportation. During operations under all alternatives, transportation of radiological materials (EU and LLW [including mixed LLW]) would occur, resulting in radiological impacts to transportation workers and the public. The SWEIS evaluated the potential impacts associated with the transport of up to 24,000 cubic yards of radiological waste from Y-12 to the Nevada National Security Site. For all alternatives, the radiological impacts and potential risks of transportation would be small, e.g., less than 1 latent cancer fatality per year.</td><td>The workforce associated with the proposed action is expected to be the same as the Capability-sized UPF Alternative. The Y-12 workforce would be about 5,100, and no significant change to traffic and transportation would be expected. During operations, less than 1 latent cancer fatality per year would be expected to member of the public and workers.</td></tr>
<tr><td colspan="3">Comparison to the SWEIS: Because the proposed action would operate with a mix of upgraded and new facilities, the potential workforce (and associated traffic impacts) would be no more than that for the Upgrade in-Place Alternative in the SWEIS. The impacts associated with the transportation of radiological materials would be bounded by the conservative analysis in the SWEIS for both the Upgrade in-Place Alternative and Capability-sized UPF Alternative, as the amounts to be transported would be similar to those in the SWEIS. Less than 1 latent cancer fatality per year would be expected to member of the public and workers.</td></tr>
</table>

5.0 CUMULATIVE IMPACTS

Council on Environmental Quality regulations (40 CFR 1508.7) define cumulative impacts as "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Section 4.2 of this SA documents the potential impacts associated with the proposed action. That section demonstrates that the potential impacts are not notably different and are within the bounds of the impacts presented in the SWEIS. Consequently, the contribution to cumulative impacts from the proposed action would be within the bounds presented in the SWEIS. This section reviews and updates the cumulative impacts from other actions that were identified in Chapter 6 of the SWEIS (see Section 5.1 below), as well as from additional other actions that have become known since publication of the ROD (see Section 5.2 below). Any potential cumulative impacts from other actions would apply to all alternatives that were assessed in the 2011 SWEIS, including the No Action Alternative.

5.1 Actions Previously Considered in the Y-12 SWEIS

Future Modernization Projects at Y-12. As discussed in Section 6.2.1 of the 2011 SWEIS, no significant changes are proposed, with the exception of changes associated with the proposed action, which remains the cornerstone of reasonably foreseeable modernization activities at Y-12. Consequently, no significant changes to cumulative impacts are expected.

Surplus Highly Enriched Uranium Disposition Activities. Section 6.2.4 of the 2011 SWEIS discussed these activities. To date, over 187 metric tons of HEU has been slated for down-blending as it becomes available. Of this amount, more than 146 metric tons has been down-blended to low-enriched uranium (LEU) or delivered for down-blending in the near term. Down-blending actions that have occurred since publication of the SWEIS are:

- Of 48 metric tons of off-specification[1] surplus HEU allocated for down-blending and use as fuel in TVA reactors, around 45 metric tons has been completed,
- Of 22 metric tons of surplus HEU allocated for down-blending to produce LEU research reactor fuel, nearly 5 metric tons has been already down-blended,
- 17 metric tons of HEU has been down-blended (completed in December 2012) to create the American Assured Fuel Supply (formerly called the Reliable Fuel Supply), and
- 17 metric tons HEU has been down-blended for the mixed-oxide LEU Backup Inventory Reserve, and another 3 metric tons HEU is being delivered in FY 2015.

Because the program is continuing to operate as envisioned, no significant changes to cumulative impacts are expected.

Oak Ridge Integrated Facility Disposition Project (IFDP). As discussed in Section 6.2.5 of the 2011 SWEIS, the IFDP continues to be conducted as a remedial action under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (42 U.S.C. § 9601 et seq.) as

1. Off-specification refers to material that, when down-blended to LEU, would not meet the American Society for Testing and Materials specification for normal commercial nuclear fuel.

discussed in Section 6.2.5 of the SWEIS. The scope planned under the IFDP at Y-12 is projected to increase in the early 2020s around the time when the ETTP cleanup is planned to be complete. The current focus at Y-12 in the near term is the construction of a water treatment facility to reduce mercury levels in surface water leaving the site, and to help prepare for future decontamination and decommissioning. To that end, Y-12 has proposed and completed the conceptual design for a surface-water treatment facility, the Outfall 200 Mercury Treatment Facility, to be located near Outfall 200. This facility will provide effective reduction of mercury in water discharged to the Upper EFPC. In terms of future operation, this facility will provide the capability to remove mercury from surface waters generated during major, planned source removal actions such as building demolition (DOE 2013). Any wastes are expected to be disposed of in the Y-12 Landfill or an approved offsite treatment, storage, and disposal facility. Because the IFDP is continuing to operate as envisioned, no significant changes to cumulative impacts are expected.

Tennessee Valley Authority Power Plants and Projects. Section 6.2.7 of the 2011 SWEIS discussed TVA activities. The status of the TVA power plants within 50 miles of Oak Ridge (see Section 6.2.7.1 of the SWEIS) has not changed. However, TVA is completing construction of Watts Bar Nuclear Plant Unit 2 in Spring City. This second reactor will add more than 1,100 megawatts of generating capacity when it comes online (expected in 2015). On October 22, 2015, the Nuclear Regulatory Commission issued a full power facility operating license for Watts Bar 2 to TVA. The potential cumulative impacts from the operation of Watts Bar 2 in the region would be minor (NNSA 2014g).

Tennessee State Recreation Plan. Section 6.2.7 of the 2011 SWEIS discussed this Plan. Since publication of the SWEIS, TDEC has prepared *Tennessee 2020*, which is a 10-year plan for the future of Tennessee's parks, people, and landscape (TDEC 2015). There are no specific proposals in *Tennessee 2020* that lend themselves to a cumulative impact analysis in relation to the proposed action. None of the actions associated with the proposed action would be inconsistent with the objectives or proposals that are identified in *Tennessee 2020*.

5.2 Cumulative Impacts of New Actions Considered in this SA

General Aviation Airport at the ETTP Heritage Center. In February 2016, DOE prepared an environmental assessment and issued a finding of no significant impact to evaluate title transfer of DOE property located at the ETTP Heritage Center to the Metropolitan Knoxville Airport Authority for the purpose of constructing and operating a general aviation airport (DOE 2016). The proposed airport would occupy 170 acres parallel to Highway 58, just west of ORNL, on land DOE currently owns. Although a general aviation airport would produce direct and indirect impacts to many of the resource areas considered in this SA, no significant cumulative impacts associated with that project were documented in the environmental assessment for that project (DOE 2016) and DOE does not expect any significant cumulative impacts (See Table 4-1 for a discussion of the potential impacts of a general aviation aircraft crash on the potential accident consequences associated with the proposed action evaluated in this SA).

Mercury Storage. In September 2013, DOE completed the *Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (DOE 2015b), which evaluates alternative sites for the long-term storage of this mercury, as well as elemental mercury from other sources in the country. Neither Y-12 nor ORR is being considered as a long-term storage site for elemental mercury (DOE 2015b). DOE has not yet issued a ROD for that Supplemental EIS. If a new long-term storage site for mercury is established, the current inventory of mercury at Y-12 (about 1,200 metric tons) would be transported to that facility within about 2 years of the beginning of operations. One-time transportation impacts would result. DOE has estimated that the potential impacts associated with transporting mercury to the new long-term storage site would be less than 1 fatality each year (DOE 2015b). This small impact would not result in a significant cumulative impact.

Environmental Management Disposal Facility (EMDF). DOE is considering whether to construct and operate a new landfill on ORR for cleanup wastes. The current facility, known as the Environmental Management Waste Management Facility (EMWMF), is expected to run out of disposal capacity around 2023. The proposed EMDF, which would be built on Bear Creek Road west of Y-12 in the same area as the existing EMWMF, would have a capacity to dispose of about 2.4 million cubic yards of hazardous waste and LLW. Construction could begin in 2019, and the first disposal cells could open in about 2022 (DOE 2014b). The facility would be on a 92-acre tract just east of the existing facility, with about 70 acres of the site dedicated to actual waste disposal. The potential impacts of disposal would be similar to those currently occurring from existing EMWMF operations (DOE 2014b) and DOE does not expect any significant change in cumulative impacts compared to existing operations.

Decontamination and Decommissioning of Building 9212. After construction of the UPF, EU programmatic operations in Building 9212 would cease and certain portions of Building 9212 would undergo decontamination and decommissioning under a future project. While a future project-specific NEPA document would support this action, Section 5.16 of the Y-12 SWEIS evaluated the potential environmental impacts of decontamination and decommissioning. That analysis included the impacts of decontamination and decommissioning of all existing EU facilities as well as new facilities associated with the UPF Alternatives.

Emergency Operations Center Project. In October 2015, NNSA issued the *Final Environmental Assessment of the Emergency Operations Center Project* (DOE/EA-2014) to construct a new emergency response facility that will more effectively and efficiently support Y-12 missions (NNSA 2015a). The new emergency response facility would be similar to portions of the CCC analyzed in the 2011 Y-12 SWEIS, but would be smaller and would not include a fire station, which is expected to be pursued as a standalone separate project. The CCC analyzed in the Y-12 SWEIS would have been up to 80,000 square feet in size, while the Emergency Operations Center Project is estimated at about 50,000 square feet (NNSA 2015a). The proposed location of the CCC would have been on the east end of Y-12 in a previously developed area. The location of the Emergency Operations Center Project is also proposed on the east end of Y-12, over a demolished building slab (9711-1) that has since been developed into a surface parking lot. Given the similarities between the CCC and the Emergency Operations Center Project, the potential impacts associated with the Emergency Operations Center Project would be similar to those in the Y-12 SWEIS for the CCC, and no significant cumulative impacts are expected.

Uranium Lease and Take-Back (ULTB) Program. DOE's purpose and need for the ULTB Program is based on the American Medical Isotopes Production Act of 2012 (AMIPA), included within the National Defense Authorization Act for FY 2013 (PL 112-239, Section 3173(c)). AMIPA addresses the anticipated domestic supply challenges for molybdenum-99 and directs DOE to implement a technology-neutral program to make LEU available, through lease contracts, for the domestic production of molybdenum-99 for medical uses. AMIPA further requires that DOE: (1) retain title to and be responsible for the final disposition of the spent nuclear fuel created by the irradiation, processing, or purification of the leased LEU; and (2) take title to and be responsible for the radioactive waste created by the irradiation, processing or purification of the leased LEU for which DOE determines the producer does not have access to a disposal path. The ULTB Program would support domestic production of molybdenum-99 for medical use without the use of HEU. DOE has prepared an SA for the ULTB Program, which evaluates the sufficiency of existing NEPA documents related to the sites involved in the ULTB program. No significant cumulative impacts are expected.

Clinch River Small Modular Reactors. TVA is exploring the construction and operation of two or more small modular reactor nuclear plants, to be located at TVA's 1,364-acre land parcel adjacent to the Clinch River in Roane County, Tennessee, inside the city limits of Oak Ridge, Tennessee. That site is approximately 12 miles from Y-12. TVA intends to submit an Early Site Permit Application for two or

more small modular reactor modules to the NRC for review in 2016. Any reactors would be licensed by the NRC and be required to meet NRC licensing requirements, which are intended to protect the environment and the health and safety of workers and the public. Until such a proposal is specifically developed, it would be speculative to predict any potential cumulative impacts from this action.

6.0 CONCLUSION AND DETERMINATION

The SWEIS evaluated the potential impacts of the reasonable range of alternatives for the UPF at Y-12. The SWEIS supports the ROD NNSA issued for the subsequent implementation of the Capability-sized UPF at Y-12. As discussed in this SA, the proposed action would be different from the Capability-sized UPF NNSA selected in the ROD.

NNSA prepared this SA in accordance with DOE NEPA regulations (10 CFR 1021.314(c)) to determine if a supplemental or new EIS should be prepared. This SA provides an analysis of the proposed action in relation to the analysis in the SWEIS to determine if there are substantial changes in environmental impacts or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

The analysis in this SA indicates that the identified and projected environmental impacts of the proposed action would not be significantly different from those in the SWEIS. As presented in Table 4-1, noise impacts, air quality impacts, utility requirements, socioeconomic impacts, and waste amounts would be bounded by the analysis in the SWEIS. Potential impacts to human health, from either normal operations or accidents, would also be bounded by the analysis in the SWEIS. Although land disturbance and visual impacts would be slightly greater than the analysis in the SWEIS (due to transmission line construction), those impacts would not be significant, as documented in the categorical exclusion. On the basis of the comparative analysis of the proposed action in relation to the analysis in the SWEIS, NNSA has determined that there are no currently identified significant new circumstances or information relevant to environmental concerns that warrant preparation of a supplemental or new EIS. Based on the analysis in this SA, no further NEPA documentation is required, and NNSA may amend the existing ROD.

Based on my review of the information in this SA about the proposed action, as the Head of Field Organization (as required by DOE Order 451.1B Chg 3), I have determined, with the concurrence of NPO Counsel, that neither a supplement to the SWEIS nor a new EIS is required.

/s/ April 20, 2016
Terri L. Slack Date
NPO Y-12 Counsel

/s/ April 20, 2016
Dale Christenson Date
Federal Project Director, UPF Project Office

/s/ April 20, 2016
Geoffrey Beausoleil Date
Manager, NNSA Production Office

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