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SUPPLEMENT ANALYSIS FOR THE SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT FOR THE Y-12 NATIONAL SECURITY COMPLEX (DOE/EIS-0387-SA-02)

[May 2018]

U.S. Department of Energy
National Nuclear Security Administration
NNSA Production Office

SUMMARY

The Y-12 National Security Complex (Y-12) is the primary site for enriched uranium (EU) operations and includes manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Activities at Y-12 also include dismantlement of nuclear weapons components, depleted uranium (DU) parts manufacturing, safe and secure storage and management of special nuclear material (SNM) and waste from operations, the supply of SNM for use in naval and research reactors, and the disposition of surplus materials. Nuclear nonproliferation programs at Y-12 play a critical role in securing our nation and the globe and combating the spread of weapons of mass destruction by removing, securing, and dispositioning SNM, and down-blending weapons-grade materials to non-weapons forms suitable for use in commercial reactors. Nondefense-related activities performed include: site sustainability and stewardship activities; support for the production of medical isotopes; development of highly specialized technologies to support the capabilities of the U.S. industrial base; and environmental monitoring, remediation, and decontamination and decommissioning (D&D) activities for the U.S. Department of Energy (DOE) Environmental Management Program, including managing legacy waste materials, legacy facilities, and waste from past operations.

On March 4, 2011, the National Nuclear Security Administration (NNSA), a separately organized agency within DOE, issued the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (hereafter, referred to as the 2011 SWEIS). The 2011 SWEIS analyzed the potential environmental impacts of ongoing and future operations and activities at Y-12. Five alternatives were analyzed in the 2011 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 were more than 50 years old. With regard to other missions at Y-12, NNSA decided to continue those missions in existing facilities with no changes.

DOE's *National Environmental Policy Act* (NEPA) implementing regulations at Title 10 Code of Federal Regulations (CFR) 1021.314(c) requires evaluation of a SWEIS through preparation of a supplement analysis (SA) when it is unclear whether or not a supplemental or new EIS is required. DOE has prepared this SA in accordance with these requirements. This SA compares the information presented in the 2011 SWEIS with continued operations at Y-12, including any changes in programs, operations, and impacts for the 2018-2023 period and other new information that was not available when the 2011 SWEIS was prepared. The purpose of this SA is to determine whether continued operations at Y-12 (including any changes and new information) constitute a substantial change that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 that were analyzed in the 2011 SWEIS. Based on the SA, NNSA will determine whether the existing 2011 SWEIS remains adequate, if a new SWEIS is warranted, or if the existing 2011 SWEIS should be supplemented.

The analysis in this SA indicates that the identified and projected environmental effects from continued operations at Y-12, including changes that would occur through approximately 2023, would be similar in nature and would not be expected to differ significantly from those NNSA identified and analyzed in the 2011 SWEIS. After comparing the analysis of impacts associated with the changes identified in this SA with the impacts analyzed in the 2011 SWEIS, NNSA has preliminarily determined that there are no significant new circumstances or information relevant to environmental concerns that warrant preparation of a supplemental or new environmental impact statement (EIS). Based on the analysis in this SA, it is proposed that continued operations at Y-12 are adequately supported by the existing 2011 SWEIS and other existing NEPA documentation, and no further supplementing documentation is required. Stand-alone NEPA documents for future project would be prepared as needed and tiered to the 2011 SWEIS.

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ACRONYMS AND ABBREVIATIONS

AMIPA	American Medical Isotopes Production Act of 2012
ASCE	American Society of Civil Engineers
CCC	Complex Command Center
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	*Code of Federal Regulations*
CNS	Consolidated Nuclear Security, LLC
COLEX	column exchange
CROET	Community Reuse Organization of East Tennessee
D&D	decontamination and decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE-EM	U.S. Department of Energy Office of Environmental Management
DSA	Documented Safety Analyses
DU	depleted uranium
EIS	Environmental Impact Statement
EFPC	East Fork Poplar Creek
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
EA	Environmental Assessment
ECM	energy conservation measures
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESPC	energy savings performance contracts
ESS	Evaluations of the Safety of the Situation
ETTP	East Tennessee Technology Park
EU	enriched uranium
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FSS	fire suppression system
FY	fiscal year
GHG	greenhouse gas
HEU	highly enriched uranium
HEUMF	Highly Enriched Uranium Materials Facility
IBC	International Building Code
IFDP	Integrated Facility Disposition Project
IG	DOE Office of Inspector General
JCO	Justifications for Continued Operations
JTA	Joint Test Assembly
LEU	low-enriched uranium
LLW	low-level radioactive waste
LPC	Lithium Production Capability
MAA	Material Access Area
MAC	Material Acquisition and Control
MAR	material-at-risk
MGD	million gallons per day
MOA	Memorandum of Agreement
MPB	Main Process Building
MWe	mega-watt electrical
NAAQS	National Ambient Air Quality Standards

NEPA	*National Environmental Policy Act of 1969*
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFRR	Nuclear Facilities Risk Reduction
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NPH	natural phenomena hazards
NPO	NNSA Production Office
NPS	National Park Service
NRC	Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PDSA	Preliminary Documented Safety Analyses
PIDAS	Perimeter Intrusion, Detection, and Assessment System
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PSF	Process Support Facilities
R&D	research and development
RCRA	*Resource Conservation and Recovery Act*
ROD	Record of Decision
ROI	region of influence
SA	Supplement Analysis
SAB	Salvage and Accountability Building
SNM	special nuclear material
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
TSR	Technical Safety Requirements
TVA	Tennessee Valley Authority
TYSP	Ten-Year Site Plan
UEFPC	Upper East Fork Poplar Creek
ULTB	Uranium Lease and Take-Back
UPF	Uranium Processing Facility
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEPAR	West End Protected Area Reduction
Y-12	Y-12 National Security Complex

CONVERSION FACTORS

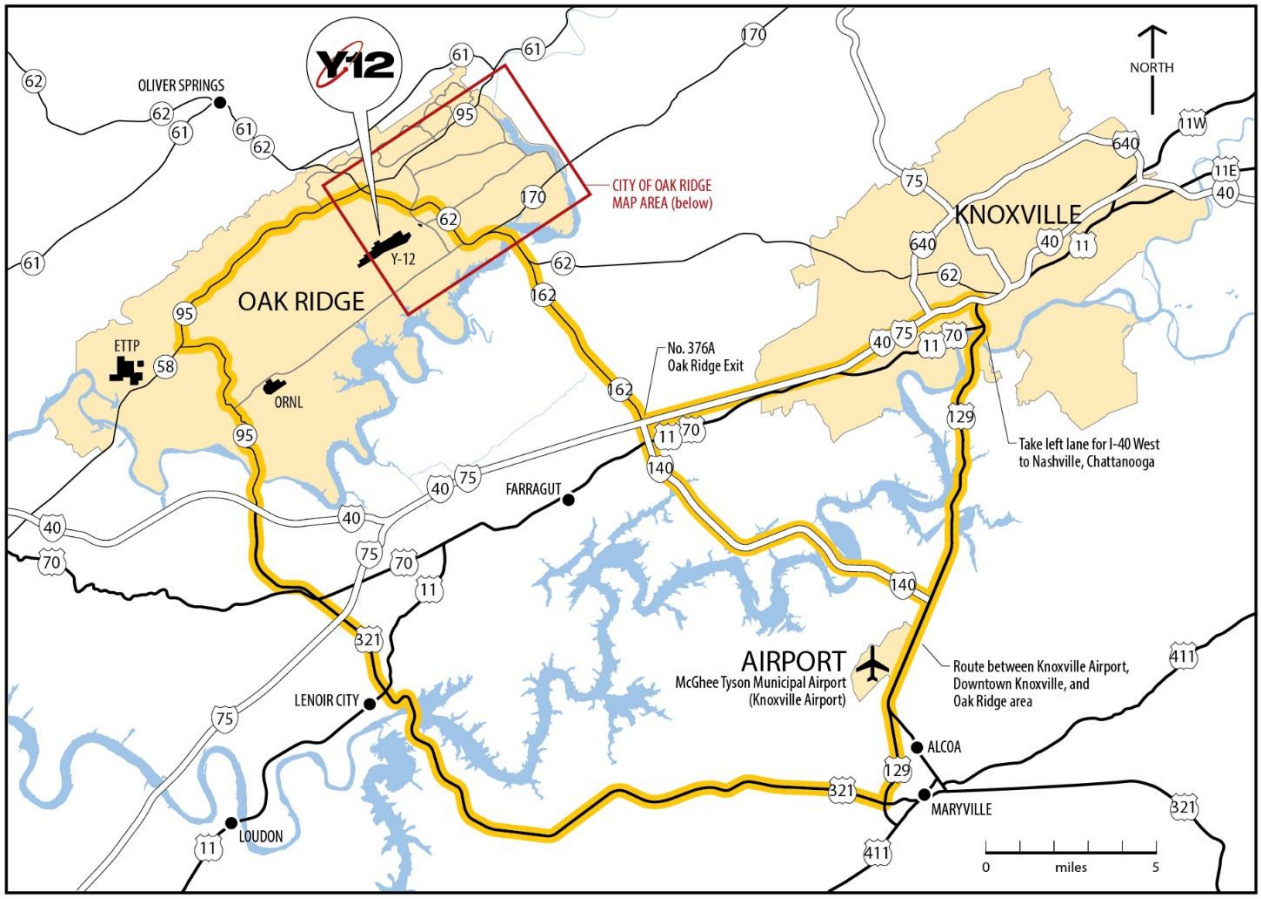
English to Metric		
Multiply	**By**	**To get**
Acres	0.4046873	Hectares
Square feet	0.092903	Square meters
Miles	1.6093	Kilometers
Feet	0.3048	Meters
Inches	2.54	Centimeters
Tons (short)	0.90718	Metric tons
Pounds	0.45359	Kilograms
Gallons	3.78533	Liters
Cubic yards	0.76456	Cubic meters

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 enriched uranium (EU) operations and includes manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Activities at Y-12 also include dismantlement of nuclear weapons components, depleted uranium (DU) parts manufacturing, safe and secure storage and management of special nuclear material (SNM) and waste from operations, the supply of SNM for use in naval and research reactors, and the disposition of surplus materials. Nuclear nonproliferation programs at Y-12 play a critical role in securing our nation and the globe and combating the spread of weapons of mass destruction by removing, securing, and dispositioning SNM, and down-blending weapons-grade materials to non-weapons forms suitable for use in commercial reactors. Nondefense-related activities performed include: site sustainability and stewardship activities; support for the production of medical isotopes; development of highly specialized technologies to support the capabilities of the U.S. industrial base; and environmental monitoring, remediation, and decontamination and decommissioning (D&D) activities for the U.S. Department of Energy Environmental Management (DOE-EM) Program, including managing legacy waste materials, legacy facilities, and waste from past operations. Figure 1-1 shows the location of Y-12.



Source: NNSA 2011.

Figure 1-1. Location of Y-12.

Figure 1-2 depicts the major operational facilities currently supporting the Y-12 missions. Over the past 15-20 years, the National Nuclear Security Administration (NNSA), has been taking steps to downsize, modernize, and transform the Y-12 Cold War-era site and facilities into a modern, more cost-effective enterprise. Modernization/transformation envisions the eventual replacement or upgrade of select major production and support facilities with the goal to improve Y-12 capabilities by:

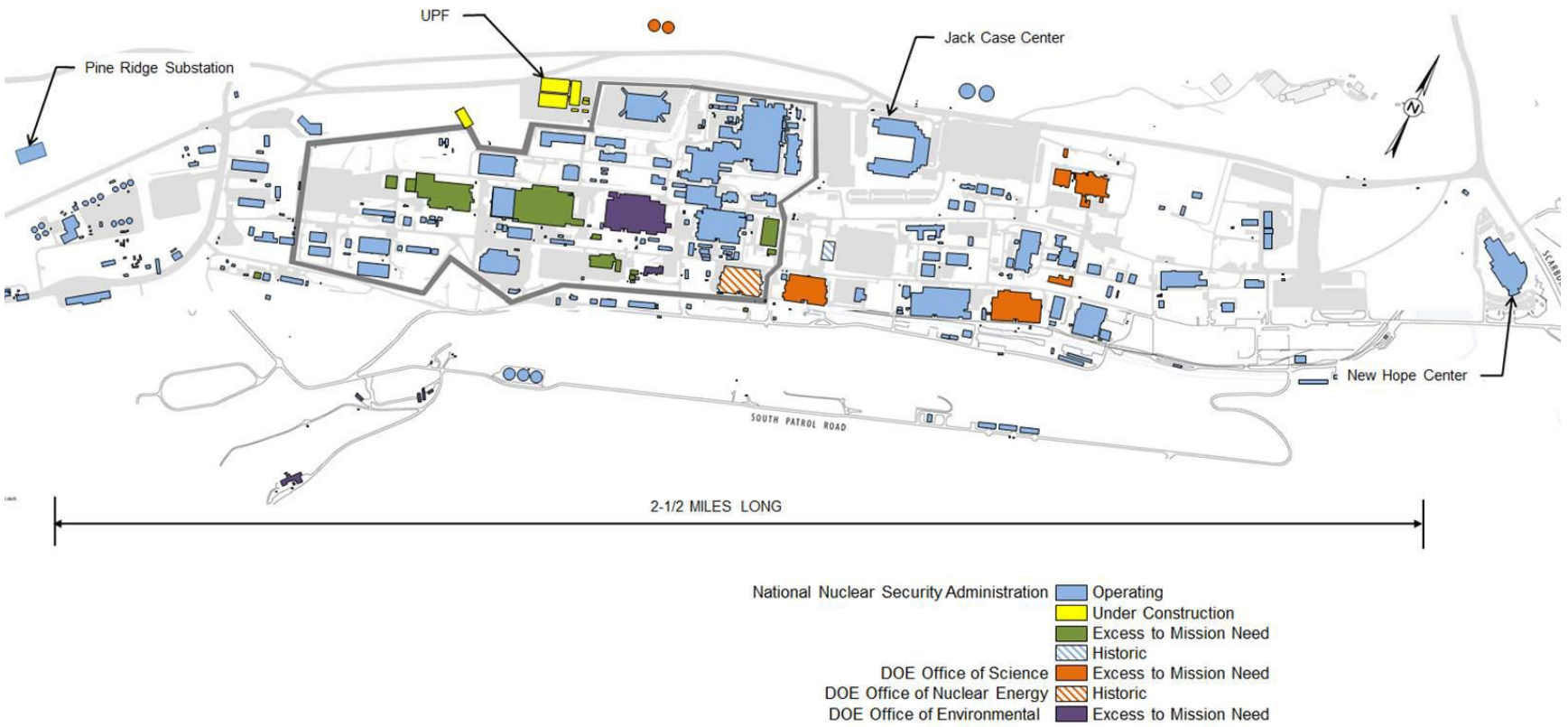
- Improving worker protection through the use of engineered controls;
- Improving safety, environmental, and security compliance through the use of modern facilities and advanced technologies;
- Supporting responsiveness to the science-based Stockpile Stewardship Program through increased flexibility and use of advanced technologies; and
- Reducing costs and improving operating efficiencies.

While important modernization/transformation activities have already been accomplished, the overall vision will continue to be a work in progress. The NNSA has developed a long-range plan, updated periodically, that reflects the Y-12 modernization/transformation goals. The most recent plan, dated April 30, 2015, is referred to as the Ten-Year Site Plan (TYSP) for the Pantex Plant and Y-12 National Security Complex for Fiscal Years 2016–2025 (Consolidated Nuclear Security, LLC [CNS] 2015a). The TYSP describes the missions, workload, technology, workforce, and corresponding facilities and infrastructure investment and management practices for Y-12. The TYSP also includes a long-term vision of proposed infrastructure changes at Y-12 over the next 20 to 40 years. That vision presents a layout of the major operational facilities that would be required to support future national security missions at Y-12 (see Figure 1-3). Based on comparisons of Figures 1-2 and 1-3, once modernization/transformation goals are achieved, Y-12 will look significantly different in the future. Y-12 would have significantly fewer facilities and floor space, and significantly more open space.

A major step in the modernization/transformation process for Y-12 occurred on March 4, 2011, when NNSA issued the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (2011 SWEIS). The 2011 SWEIS analyzed the potential environmental impacts of ongoing and future operations and activities at Y-12, including modernization/transformation proposed actions, for a period extending approximately 10 years after issuance of the Record of Decision (ROD). As was explained in Section 1.2 of the 2011 SWEIS, because of the long-term nature of modernization/transformation, not all of the facilities/actions envisioned in the TYSP were analyzed within the alternatives considered in the 2011 SWEIS. This was due to the fact that not all of the potential facilities/actions were ripe for analysis. Some of these potential facilities/actions were concept facilities with no established funding. Such potential future projects were described in Section 3.3 of the 2011 SWEIS.

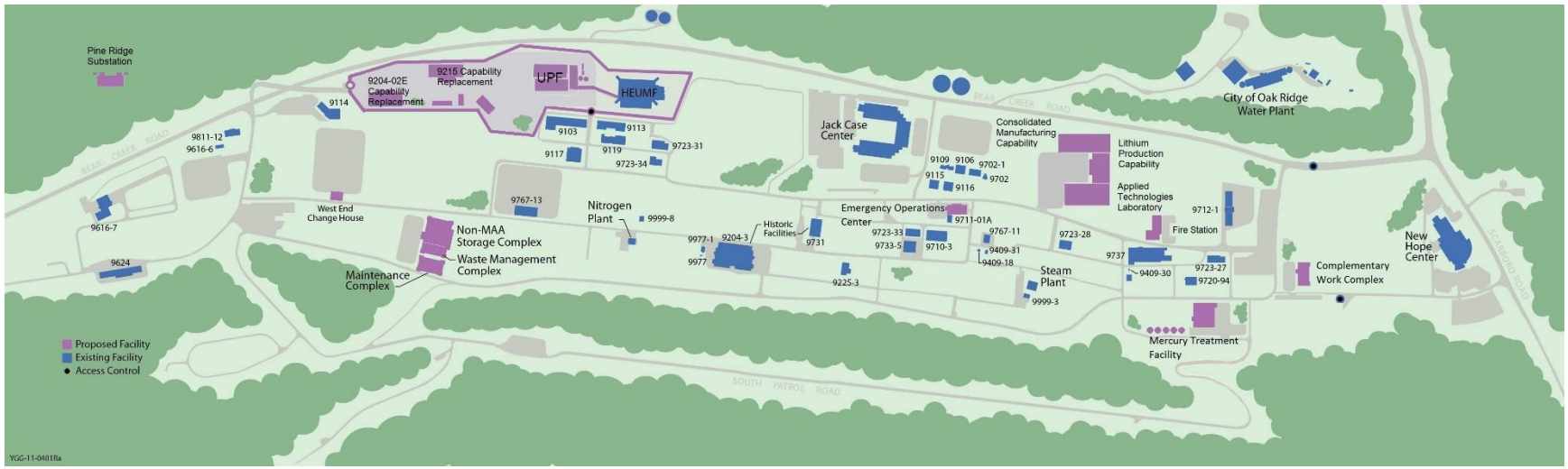
As part of the scope of the 2011 SWEIS, five alternatives related to modernizing/transforming EU operations were analyzed in the 2011 SWEIS: (1) No Action Alternative (maintain the status quo), (2) Uranium Processing Facility (UPF) Alternative, (3) Upgrade in-Place Alternative (4) Capability-sized UPF Alternative, and (5) No Net Production/Capability-sized UPF Alternative. All of the alternatives included continued operations of non-EU programs in existing facilities with no changes. In the ROD issued on July 20, 2011 (2011 ROD) (76 *Federal Register* [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 operations were conducted that were then more than 50 years old. With regard to non-EU programs at Y-12, NNSA decided to continue operations in existing facilities with no changes.

In 2016, as a result of concerns about UPF cost and schedule growth, NNSA prepared a Supplement Analysis (SA) (NNSA 2016a) to evaluate a proposed action to meet EU requirements using a hybrid approach of upgrading existing EU facilities and constructing multiple new buildings (e.g., UPF facility).



Source: CNS 2018.

Figure 1-2. Major Operating Facilities Currently Supporting Y-12 Missions (2017).



Source: CNS 2018.

Figure 1-3. The Proposed End State for the Modernization/Transformation of Y-12 (2040).

That proposed action was different from the Capability-sized UPF Alternative selected in the 2011 SWEIS ROD, which only included a new facility. In relation to the UPF specifically, NNSA proposed to separate the single structure UPF concept into multiple buildings (collectively the "Revised Concept UPF"), to be constructed at the same site location as the single structure UPF analyzed in the 2011 SWEIS, with each building constructed to safety and security requirements appropriate to the building's function. In addition, the proposed action in the 2016 SA included upgrading the existing EU facilities. The analysis in the 2016 SA indicated that the identified and projected environmental impacts of the proposed action would not be significantly different from those in the 2011 SWEIS, and on July 12, 2016, NNSA issued an amended ROD to implement the proposed action evaluated in the 2016 SA (81 FR 45138).

While the EU programs/operations and their environmental concerns and impacts were assessed in the 2016 SA (NNSA 2016a) and found to be adequate to continue supporting those operations, there has not been a site-wide examination of the remainder of activities at Y-12. Consequently, this SA is needed to assess continued operations at Y-12, with a focus on the changes and new information gathered that have occurred at Y-12 since publication of the 2011 SWEIS, or are expected to occur within the next five years. The analysis also includes changes in the environment that have occurred since publication of the 2011 SWEIS. This SA evaluates the projected impacts through approximately 2023. Section 1.3 of this SA discusses the scope of this SA and Sections 2.1-2.3 describe the changes that have occurred at Y-12 since publication of the 2011 SWEIS, or are expected to occur within the next five years (through approximately 2023).[1]

1.2 Purpose and Need for this Supplement Analysis

A 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 continued operations at Y-12 is the same as that in the 2011 SWEIS: to support the Stockpile Stewardship Program, Nuclear Nonproliferation Programs, and to efficiently and safely meet the missions assigned to Y-12 in the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* ROD. This SA accomplishes that requirement by comparing the information presented in the 2011 SWEIS with changes and proposed changes, through 2023, in the environment and Y-12 missions, activities, programs, impacts, and other new information. 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

As discussed in Section 1.1, this SA focuses on and analyzes continued operations at Y-12, and potential changes associated with the programs/operations from those described in the 2011 SWEIS, as well as the potential changes resulting from the ROD supported by the 2016 SA for EU activities, and other new information. The descriptions of the Y-12 current missions, operations, and activities are contained in Chapter 3 of the 2011 SWEIS and the 2016 SA. They include the following:

Defense Programs

- EU programs;
- Weapons dismantlement and disposition;
- Life Extension Program (stockpile stewardship);
- Nuclear materials management, storage and disposition;

[1] This SA does not reanalyze any previous changes related to EU programs/operations compared to those that were analyzed in the 2016 SA, but does consider new information not previously considered in the 2016 SA. The environmental impacts of the EU programs/operations are included in the analysis in this SA within the context of site-wide environmental impacts of continued operations.

- Lithium production;
- Quality control and surveillance;
- Stockpile evaluation and maintenance;
- Materials recycle and recovery;
- Nuclear packaging systems;
- Campaigns;
- Modernization;
- Infrastructure reduction; and
- Secure transportation;

National Security Programs

- Nuclear Nonproliferation;
- Global Threat Reduction Initiatives;
- Naval Reactors;
- Domestic Research Reactors and Other DOE Material Supply Program;
- Foreign Research Reactors Program; and
- Uranium Lease and Take-Back (ULTB) Program

Non-NNSA Programs

- Environmental Management programs;
- Nondefense research and development programs; and
- Broader National Security Program (formerly the Complementary Work), the Strategic Partnership Projects Program (formerly the Work for Others Program) and the Technology Transfer Program.

In general, the descriptions of the missions, operations, and activities presented in the 2011 SWEIS and the 2016 SA are still accurate and are not repeated in this SA. However, any relevant changes are described in Appendix A of this SA. Those changes do not have any significant bearing on environmental impacts. The scope of this SA includes modernization projects that were not ripe for decision in 2011, but which have been implemented between 2011 and now. Section 2.1 of this SA identifies changes relevant to the programs/operations and modernization projects that may give rise to changes in environmental impacts in comparison to those presented in the 2011 SWEIS as well as those described in the 2016 SA for EU operations. Section 2.2 identifies changes in the environmental baseline at Y-12.

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) operations/activities at Y-12. The documents are presented chronologically.

***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 replace the existing 50-year old facilities. The 2011 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.

***Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE/EIS-0387; NNSA 2011)**. The 2011 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 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 2011 ROD, NNSA decided to construct and operate a Capability-sized UPF at Y-12 next to the Highly Enriched Uranium Materials Facility (HEUMF). Section 3.2.4 of the 2011 SWEIS describes the Capability-sized UPF Alternative. The 2011 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 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 (EA), and the Potable Water Systems Upgrade Project EA related to the operation of Y-12. Those NEPA documents are not repeated in this section, but are incorporated by reference to the 2011 SWEIS.

***Final Environmental Assessment: Transfer of Land and Facilities with the East Tennessee Technology Park and Surrounding Area, Oak Ridge, Tennessee* (DOE/EA-1640) (DOE 2011).** In October 2011, DOE prepared an EA for the conveyance (lease, easement, and/or title transfer) of DOE property located at the East Tennessee Technology Park (ETTP) and the surrounding area for mixed use economic development. Leases, easements, and/or title transfers could be entered into with the Community Reuse Organization of East Tennessee (CROET), City of Oak Ridge, other agencies, or private entities. Leasing and title transfers for economic development are allowed under 10 CFR 770, *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*. Also, 10 CFR 770 gives DOE the discretion to lease or sell (title transfer) property at less than fair market value if the property requires considerable infrastructure improvements to make it economically viable, or if conveyance at less than market value would, in the DOE's judgment, further the public policy objectives of the laws governing the downsizing of defense nuclear facilities. A Finding of No Significant Impact (FONSI) was signed on October 5, 2011 (DOE 2011).

***Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (DOE/EIS-0423-S1; DOE 2013b)**. 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 2013b). 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 impacts section of this SA (Section 4.0).

***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 Building 9212 wet chemistry process that is capable of converting low equity liquids into storable solids. The purpose of the calciner is to support cleanup operations in Building 9212. The Building 9212 calciner equipment will not be reused once Building 9212 deactivation activities are completed. The UPF will eventually contain this technology. This SA assumes that the Calciner Project will be operational and part of the operational baseline at Y-12.

***Building 9204-2E Canning Project Categorical Exclusion* (NNSA 2014a)**. 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 at Y-12.

Final Environmental Assessment of the Emergency Operations Center Project **(DOE/EA-2014; (NNSA 2015a)**. In October 2015, NNSA completed an EA and issued a FONSI related to the potential environmental impacts of constructing a new emergency response facility (similar to the Complex Command Center (CCC) analyzed in the 2011 SWEIS) that would more effectively and efficiently support Y-12 missions. This facility will consolidate the Plant Shift Superintendent's Office, the Emergency Command Center, the Technical Support Center, and the Fire Department Alarm Room from their present locations to a survivable facility. The potential impacts of the new emergency operations center are analyzed in the EA and considered as part of the operational baseline at Y-12.

Electrorefining Project Categorical Exclusion **(NNSA 2015b)**. In 2015, a categorical exclusion was issued for the Electrorefining Project. The purpose of this project is to install and turnover to operations a process that provides an electrochemical means of uranium metal purification. The Electrorefining process is a metal to metal purification process that will support Y-12's Process Technology Development program. This process will replace the current metal purification operations 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 the 9215 Complex 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 at Y-12.

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. The Fire Station is considered as part of the operational baseline at Y-12.

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 2016a)**. In February 2016, DOE prepared an EA and issued a FONSI to evaluate title transfer of DOE property at the 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 EA and considered in the cumulative impact section of this SA (Section 4.0).

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 Tennessee Valley Authority (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. The substation and transmission lines are considered as part of the operational baseline at Y-12 and considered in the cumulative impacts section of this SA (Section 4.0).

***Supplement Analysis for the Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE/EIS-0387-SA-01, NNSA 2016a)**. The purpose of the 2016 SA was to evaluate a proposed action to meet EU requirements using a hybrid approach of upgrading existing EU facilities and constructing multiple new buildings (Revised Concept UPF). The analysis in the 2016 SA indicated that the identified and projected environmental impacts of the proposed action would not be significantly different from those in the 2011 SWEIS, and on July 12, 2016, NNSA issued an amended ROD to implement the proposed action evaluated in that SA (81 FR 45138). This SA assumes that Y-12 constructs and operates the EU facilities consistent with the amended ROD, and are part of the operational baseline at Y-12.

Extended Life Program Environmental Evaluations (primarily categorical exclusions). During 2016, approximately 67 proposed actions related to the Extended Life Program were determined to be covered by categorical exclusions, as listed in Appendix B for facility operations to Subpart D of 10 CFR 1021. The majority of proposed actions involved the sustainment of enduring facilities and bridging strategies for facilities identified with an out-year replacement. Because many facilities are approaching end of design life, substantial investment is required to ensure they remain viable for the near future. The following projects were evaluated for the Extended Life Program: the Nuclear Facility Electrical Maintenance Project (electrical improvements to the 9215 Complex and Building 9204-2E), Fire Suppression upgrades (wet pipe sprinkler head replacements), Roof Asset Management Program, other humidity control improvements, and multiple machining tool and controller equipment upgrades, and/or, replacements (ORR 2017, CNS 2017a). The potential impacts of the Extended Life Program are considered as part of the operational baseline at Y-12.

Supplement Analysis for the Uranium Lease and Take-Back Program for Irradiation for Production of Molybdenum-99 for Medical Use (DOE/EIS-0279-SA-05, DOE/EIS-0387-SA-02; NNSA 2016c). In 2016, NNSA prepared this SA to evaluate a proposed action to implement a technology-neutral program to make LEU available, through lease contracts, for the domestic production of Molybdenum-99 (Mo-99) for medical uses. Specifically, DOE would produce LEU at Y-12 and lease it to the Mo-99 producers. DOE would receive eligible material from Mo-99 producers at Y-12. The activities anticipated in support of the ULTB Program are compatible with ongoing processes at Y-12, and do not require any changes to site infrastructure or processes. Health and safety impacts and impacts to waste management and transportation associated with the ULTB Program are minor with respect to potential impacts assessed in these other NEPA analyses. The analyses considered in the SA support DOE's determination that the implementation of the ULTB Program represent neither substantial changes to the actions evaluated in previous NEPA analyses, nor represent significant new circumstances or information relevant to environmental concerns (NNSA 2016c)

2.0 CHANGES SINCE PREPARATION OF THE 2011 SWEIS

2.1 Y-12 Site Mission, Programmatic, and Operational Changes

The primary mission for Y-12 has not changed and is consistent with the mission identified in Chapter 1 of the 2011 SWEIS. In developing this SA, NNSA reviewed policy documents related to national security requirements, including the 2010 Nuclear Posture Review (DOD 2010), the 2018 Nuclear Posture Review (DOD 2018), the Fiscal Year 2017 Stockpile Stewardship and Management Plan (NNSA 2015d), and the most recent TYSP for Y-12 (CNS 2015a). The TYSP is particularly relevant as it presents the current facility and infrastructure plans to maintain progress in achieving the overall modernization/transformation vision for Y-12. This SA reflects, and is consistent with, these national security policy documents and the TYSP.

NNSA's planning for the next five years is based on the requirements established in the aforementioned national security policy documents and assumptions concerning mission deliverables, capabilities, capacity, and infrastructure. The following assumptions concern Y-12's future workload:

- Life Extension Program (stockpile stewardship) production will remain steady at current levels and consistent with levels analyzed in the 2011 SWEIS.
- The production of Joint Test Assembly (JTA) units will be sustained at current levels and consistent with levels analyzed in the 2011 SWEIS.
- Quality evaluation (surveillance) rates will remain steady at current levels and consistent with levels analyzed in the 2011 SWEIS.
- Dismantlement will sustain the high-throughput levels established in recent years and consistent with levels analyzed in the 2011 SWEIS.
- Naval Reactors work will remain steady and consistent with levels analyzed in the 2011 SWEIS.
- Work associated with global security and interagency initiatives and NNSA's nonproliferation mission will increase.
- Highly enriched uranium (HEU) disposition work will remain steady over the next five years and decrease thereafter as the surplus inventory is dispositioned.
- Research reactor supply of low-enriched uranium downblended from HEU will increase to a steady state (CNS 2015a, CNS 2017a).

The planning, project, facility and infrastructure assumptions are as follows:

- Land requirements will generally remain stable. Y-12 will continue to require security and emergency response buffers that preclude release of any real estate for public use.
- Consistent with the NNSA Uranium Mission Strategy, UPF will be completed by 2025 and will support the transition of enriched uranium operations from Building 9212. Transition of operations from the 9215 Complex and Building 9204-02E is being deferred as addressed in the 2016 SA.
- New budget line-item starts are the Emergency Operations Center (EOC), the Fire Hall, and the Lithium Production Capability (LPC) Project.
- DOE-EM will provide for the demolition of more than 3.8 million square feet of excess facilities. This includes the Biology Complex, and other support structures, by 2021.
- A transition to a smaller, more-responsive Y-12 will require most mission critical facilities to be operated and maintained beyond design life. This will require facility upgrades to systems related to electrical, ventilation, structural, and safety (CNS 2015a).
- The initiative to remove 70 acres from the Y-12 Protected Area could be accomplished as a result of the proposed West End Protected Area Reduction (WEPAR) Project.

There are no major changes in primary missions at Y-12 planned for the next five years. The primary missions of Y-12 described in the TYSP (CNS 2015a) are consistent with those identified in Section 1.3 of this SA and described in more detail in Chapter 2 of the 2011 SWEIS as well as the 2016 SA.

2.1.1 Projects Previously Proposed and Analyzed in the 2011 SWEIS

Two projects were at a sufficient stage of development to be included in the 2011 SWEIS analysis: (1) the UPF; and (2) the Complex Command Center (CCC). As discussed in Section 1.1 of this SA, changes to the UPF project were analyzed in the 2016 SA (NNSA 2016a) which led to a determination that the identified and projected environmental impacts of those project changes would not be significantly different from those presented in the 2011 SWEIS. Therefore, on July 12, 2016, NNSA issued an amended ROD, to implement the proposed action as evaluated in the 2016 SA (81 FR 45138). 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 2011 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 a FONSI to construct a new emergency response facility (containing the same functions planned for the CCC, with the exception of the new Fire Station) that will more effectively and efficiently support Y-12 missions (NNSA 2015a).

2.1.2 Projects Initiated Since Publication of the 2011 SWEIS

Table 2-1 identifies projects (including changes to projects that were originally analyzed in the 2011 SWEIS) that have been, or are expected to be initiated during the time period considered in this SA. Table 2-1 does not include routine projects involving replacement of similar equipment, such as electrical or fire safety system upgrades, or minor modifications to existing facilities or infrastructure. These plant infrastructure improvement projects are routinely implemented and normally do not result in significant environmental impacts. Such projects may be initiated after completion of a NEPA review in accordance with DOE NEPA implementing procedures at 10 CFR 1021.410.

As shown in Table 2-1, NEPA analyses and compliance documentation has been completed for most of the projects. Updates for two ongoing projects (the Revised Concept UPF and the Extended Life Program) are provided in Section 2.1.4 of this SA. With respect to other projects identified in Table 2-1, the following two project scopes are expected to be initiated, but have not yet had NEPA determinations applied: (1) the WEPAR Project, and (2) the LPC Project. These two are further discussed below. In addition, two other projects (the Mercury Treatment Facility and the Landfill IV New Phase Construction) are planned, but no additional NEPA documentation is required (as explained at the end of this section). All of these projects are considered in the cumulative impacts analysis (Chapter 4) in this SA.

Table 2-1. Projects Initiated, or Expected to be Initiated, Since Publication of the 2011 SWEIS.

Project	Summary Description	NEPA Compliance Status
Revised Concept UPF[a, b, c]	Upgrade existing EU facilities and construct multiple new buildings (e.g., UPF facility) to meet EU requirements.	Completed
Extended Life Program[a]	Sustainment of enduring facilities and bridging strategies for facilities identified with an out-year replacement. Because many facilities are approaching end of design life, substantial investment is required to ensure they remain viable for the near future.	Completed and continuing
Building 9204-2E Canning Project[a]	Install a double seamer canning machine to be used to can components from weapons tear down activities.	Completed
Electrorefining Project[a]	Electrorefining converts impure uranium metals into purified uranium metal and is safer and simpler than the current purification processes in Building 9212.	Completed
Calciner Project[a]	This Project 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 the calciner is to support cleanup operations in Building 9212.	Completed
EOC [a, c]	New emergency response facility would more effectively and efficiently support Y-12 missions.	Completed
Y-12 Fire Station[a, c]	Construct a new Fire Station located north of Building 9737 on the east end of Y-12.	Completed
Material Acquisition and Control (MAC) Facilities	CNS manages three warehouses at ETTP (one is dedicated to UPF) that were previously utilized by DOE-EM. These buildings were transferred to NNSA in March 2018.	Completed[d]
WEPAR Project	Remove 70 acres from the Y-12 Protected Area.	Analyzed in this SA in Chapter 3.
LPC Project	Process the nation's purified lithium and provide purified lithium parts for end users. NNSA is developing the LPC to provide a smaller, safer, less expensive, and more agile replacement capability.	EA for the LPC expected to be prepared in 2019 (see explanation in Section 2.1)
Excess Facility Disposition Program	This program disposes of legacy materials and facilities at Oak Ridge National Laboratory (ORNL) and Y-12 using an integrated approach that results in risk reduction and a reduction of costs.	Remedial action performed by DOE-EM under CERCLA. No additional NEPA is required; impacts are included in this SA as cumulative impacts.
Biology Complex Demolition	As part of the Excess Facility Disposition Program characterization of building components has begun. Demolition of the Biology Complex Buildings 9210, 9207, 9207A and 9401-01 is expected by 2021.	Remedial action performed by DOE-EM under CERCLA. No additional NEPA is required; impacts are included in this SA as cumulative impacts.
Mercury Treatment Facility	The Mercury Treatment Facility will capture the discharge from Outfall 200 to remove mercury prior to discharge into UEFPC.	Remedial action performed by DOE-EM under CERCLA. No additional NEPA is required; impacts are included in this SA as cumulative impacts.
Landfill IV New Phase Construction	Construction of a new phase of the Industrial Landfill IV within the landfill footprint analyzed in the original NEPA documentation. Consequently, no additional NEPA analysis is required.	Completed. Impacts are included in this SA as cumulative impacts; construction is performed by DOE-EM

[a] Section 1.4 discusses the NEPA compliance strategy and status in more detail.

[b] UPF was originally analyzed in 2011 SWEIS; the Revised Concept UPF was analyzed in NNSA 2016a. No further changes are proposed.

[c] EOC and Fire Station were analyzed in 2011 SWEIS as part of the CCC. Following the 2011 SWEIS ROD, NNSA prepared additional NEPA documentation (see Section 1.4).

[d] Activities such as MAC were addressed in DOE/EA-1640 (DOE 2011).

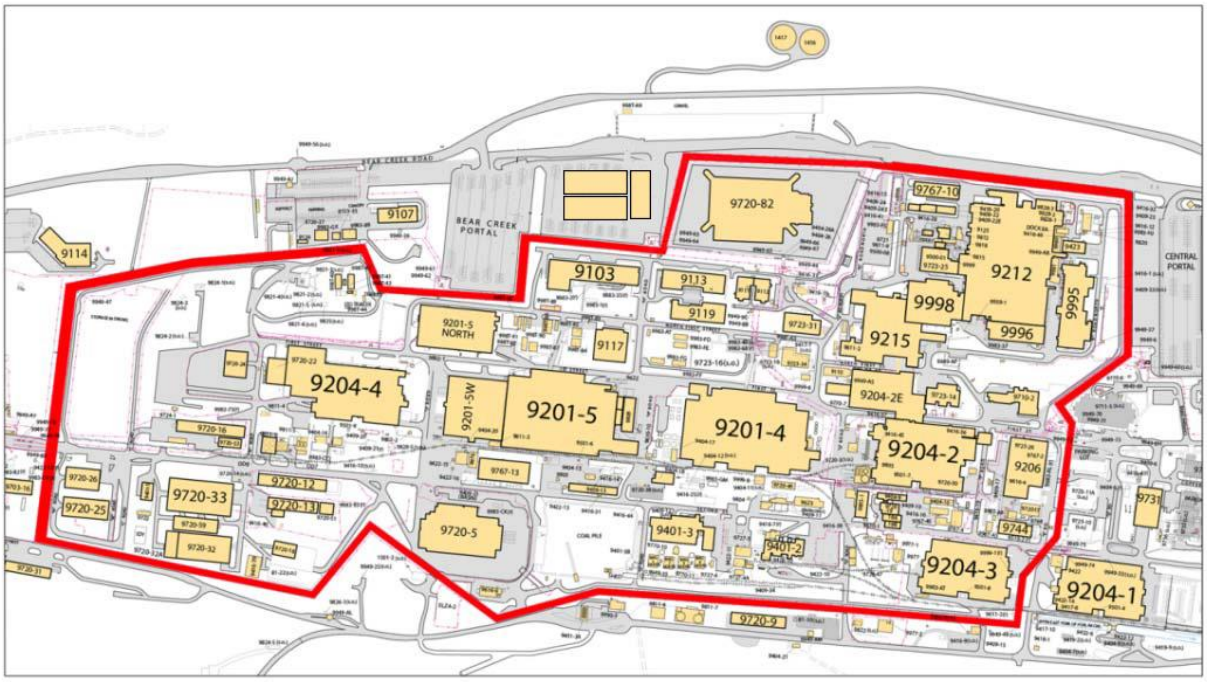
West End Protected Area Reduction Project. Reducing the size of the protected perimeter was one of the benefits of building a new UPF that was considered in the 2011 SWEIS. The 2011 SWEIS analyzed the reduction of the Y-12 Perimeter Intrusion, Detection, and Assessment System (PIDAS) from 150 acres to approximately 15 acres as part of the UPF alternatives. Because the Revised Concept UPF will not replace all legacy facilities, the amount of the perimeter fenced area that can be reduced is smaller than it would have been had a single UPF been built. The WEPAR Project would install a new PIDAS section to reduce the Protected Area by approximately 50 percent; effectively and efficiently ensure the protection of vital NNSA assets, thus continuing NNSA's nuclear security mission; facilitate cost-effective D&D of process-contaminated facilities; facilitate construction of the LPC close to related operations at much reduced cost; and reduce costs for operations outside the smaller Protected Area (NNSA 2016d). Figures 2-1 and 2-2 illustrate the current PIDAS and the post-WEPAR Project PIDAS, respectively. The WEPAR Project mission need was approved on August 28, 2017 (NNSA 2017). Construction is expected to begin in 2020, and the WEPAR Project is scheduled to be operational in 2023 (NNSA 2016d). That operational timeframe is consistent with the analysis in the 2011 SWEIS, which did not expect the reduction of the PIDAS to occur until after the 8-9 year construction period for the UPF.

Once implemented, the benefits associated with a reduced PIDAS would be an increased security posture, and reduced costs for maintenance, site operations, and final disposition of hazardous legacy facilities. A reduced PIDAS would have no effect on DOE-EM's cleanup schedule as those schedules are developed in conjunction with DOE-EM's regulators, DOE Headquarters, and other stakeholders, and are based upon priorities driven by potential offsite environmental risk. Although the presence of a secure perimeter makes it potentially more expensive for DOE-EM to complete its cleanup operations, it would not prevent those operations from being completed. DOE-EM frequently completes cleanup operations in secure areas. Chapter 3 of this SA analyzes the WEPAR Project to determine if that Project would result in substantial changes in environmental impacts, or significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 or its impacts since NNSA issued the 2011 SWEIS.

Lithium Production Capability Project. The purpose of the lithium production at Y-12 is to process the nation's purified lithium and provide purified lithium parts for the Department of Defense, DOE's Office of Science, the Department of Homeland Security and allied nations overseas. Lithium operations are primarily conducted in Building 9204-2, which was built in 1943. Building 9204-2 is oversized for today's mission, is not built in accordance with current codes and standards, is costly to operate, has deteriorated infrastructure, and has exceeded its expected life (CNS 2017a). NNSA issued its *Lithium Strategy* in December 2016, stating that lithium is an essential element for the refurbishment and modernization of the nuclear weapons stockpile. NNSA has established plans for a smaller, safer, less expensive, and more agile replacement capability (identified as the LPC), and plans were approved for Critical Decision-0 (Approve Mission Need) (CNS 2017a).

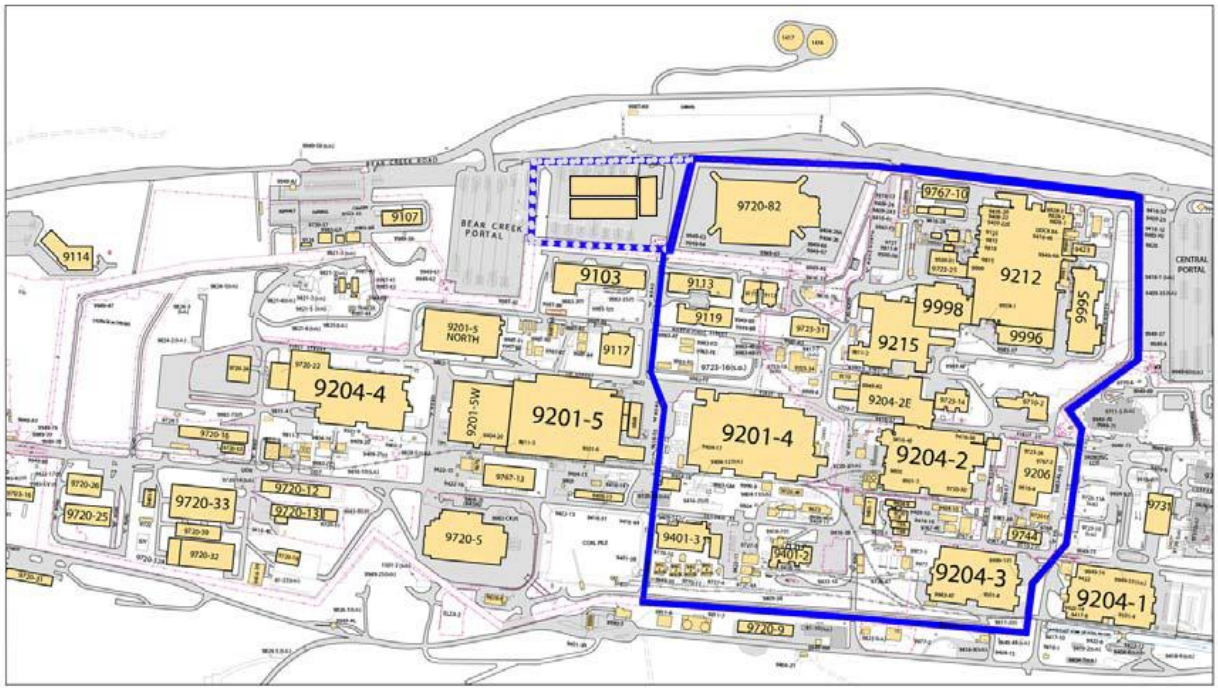
The LPC project would design, install, and test all equipment, processes, and systems required for the recovery/purification of lithium materials, production of lithium components, and salvage of lithium waste streams. NNSA's proposed location for the LPC is at the Biology Complex. Construction is dependent on DOE-EM demolition of all of the Biology Complex buildings, removing building floor slabs and/or footings; remediating contaminated soil; and disposition of all associated demolition waste. State regulatory concurrence of "no further action" pursuant to CERCLA will be required to address any soil contamination, prior to NNSA proceeding with construction inside the footprint (CNS 2018).

The 2011 SWEIS analyzed the continuation of lithium activities within the context of the No-Action Alternative, but no changes were proposed. Additionally, in Section 3.3 of the 2011 SWEIS, NNSA identified future modernization projects that might become ripe for proposal and analysis during subsequent



Source: NNSA 2016d.

Figure 2-1. Existing PIDAS.



Source: NNSA 2016d.
Note: The dashed line is intended to illustrate the PIDAS that will surround the UPF after completion of construction.

Figure 2-2. PIDAS After WEPAR Project Implementation.

phases of transformation/modernization. One of those projects was referred to as the Consolidated Manufacturing Complex, and lithium production was envisioned to be a part of that facility (see Table 3.3-1 of the 2011 SWEIS). Consequently, the modernization of lithium production is considered part of the natural evolution of transformation/modernization for this program and is consistent with the future actions envisioned in the 2011 SWEIS.

On March 13, 2018, NNSA determined that it would prepare an EA for the LPC (NNSA 2018). That EA, which is expected to be prepared in 2019, will evaluate the environmental impacts of the LPC and determine whether there would be any significant impacts. This SA acknowledges that modernization of lithium production is considered part of the evolution of transformation/modernization activities at Y-12 and would be consistent with future developmental activities at the site. Given that it is likely that a modern, smaller LPC designed to meet current regulatory requirements will not have greater impacts than the current facilities, the potential impacts of the modernized lithium facilities are expected to be within the impacts analyzed in the 2011 SWEIS; however, the EA will contain the analysis to provide NNSA with the ability to make such a determination with certainty.

Excess Facility Disposition Program. The Y-12 facilities that were included in the DOE Environmental Management Integrated Facilities Disposition Program, approved in 2008, have been added to the Federal Facilities Agreement, which governs cleanup actions at the site. Appendix J of the Federal Facilities Agreement indicates that DOE-EM anticipates starting D&D of Y-12 facilities in 2023, which is beyond the planning horizon of this SA. NNSA is planning work to prepare (e.g., removing legacy materials, draining equipment fluids) certain buildings (including Building 9201-5 and 9204-4) for transfer to DOE-EM prior to the 2023 D&D start date.

Building 9201-5 (known as "Alpha 5") was discussed in a 2015 DOE Office of Inspector General (IG) report (DOE 2015a). That report concluded that "the combination of the large facility size, rapidly deteriorating conditions and vast quantity of items requiring disposition made this facility one of the greatest liabilities in the Department's complex." The Alpha 5 facility was built in 1944 and supported a number of missions that used materials such as uranium, mercury, and beryllium. Since it ceased operations in 2005, this highly contaminated facility has experienced significant degradation. As a result of the IG report, DOE is actively evaluating alternatives for the disposition of facilities such as Alpha 5 (DOE 2015a). As shown on Figure 2-2, the Alpha 5 facility would be outside the PIDAS once the WEPAR Project is implemented.

DOE-EM has also initiated work to D&D the outside column exchange (COLEX) support infrastructure at Building 9201-4 (CNS 2017a). This SA addresses the potential impacts of the Excess Facility Disposition Program in the cumulative impacts analysis (see Section 4.0).

Biology Complex Demolition. As part of the Excess Facility Disposition Program, DOE-EM is currently performing characterization on the remaining buildings in the Biology Complex (including building 9401-1) in preparation for eventual demolition (CNS 2017a). This SA addresses the potential impacts of the Biology Complex in the cumulative impacts analysis (see Section 4.0).

Mercury Treatment Facility. DOE-EM has initiated a new project to reduce mercury releases to the Upper East Fork Poplar Creek (UEFPC) since 2012. The Mercury Treatment Facility will divert up to 40,000 gallons per minute discharge from Outfall 200 and treat nominally 3,000 gallons per minute to reduce mercury prior to discharge into UEFPC. Construction of the headworks, a two million gallon storm water storage tank, and the treatment facility started in 2018. The Mercury Treatment Facility is scheduled to be operational in 2024 (CNS 2018). Construction and operation of this facility is being undertaken as a remedial action under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (42 U.S.C. § 9601 et seq.) (CERCLA) and no additional NEPA analysis is required. This SA

addresses the potential impacts of the Mercury Treatment Facility in the cumulative impacts analysis (see Section 4.0).

Landfill IV New Phase Construction. DOE-EM is planning to construct a new phase of the Industrial Landfill IV. That landfill is used for disposal of classified, non-hazardous industrial waste, construction/demolition waste, and approved special waste. It has a footprint of about four acres and operates as an approved Class II landfill in accordance with the Tennessee Department of Environment and Conservation (TDEC) permit number IDL-01-103-0075 (CNS 2017a). Construction of the new phase would occur within the landfill footprint analyzed in the original NEPA documentation. This SA addresses the potential impacts of the Landfill IV New Phase construction in the cumulative impacts analysis (see Section 4.0).

2.1.3 Future Projects Expected to be Initiated after the Time Period Considered in this SA

As explained in Section 1.1 of this SA, because of the long-term nature of modernization/transformation, there are expected to be additional projects in the future that would become proposed actions after approximately 2023, which is the planning horizon for this SA. This SA does not analyze these projects, as they are not ripe for analysis. Potential future projects, all of which are identified on Figure 1-3, are expected to be as follows:

- West End Change House;
- Applied Technology Laboratory;
- Consolidated Manufacturing Complex (not including lithium production, which has been separated from the Consolidated Manufacturing Complex, as discussed above);
- Maintenance Complex;
- Non-Material Access Area (MAA) Storage Complex;
- Warehouse/Shipping and Receiving Complex;
- Waste Management Complex;
- EU Fabrication Replacement Facility; and
- Assembly/Disassembly/Surveillance/Certification Replacement Facility.

Pursuant to NEPA, NNSA would prepare appropriate NEPA documentation for these projects at the appropriate time.

2.1.4 The Revised Concept UPF, the Extended Life Program, and Recent Relevant Information that Could Affect Y-12 Operations

Because of their importance to EU operations at Y-12, in this section, NNSA is providing an update regarding the status of the Revised Concept UPF and the Extended Life Program. This section identifies and discusses other recent relevant reports that could affect the UPF, the Extended Life Program, and operations at Y-12.

Since publication of the 2011 SWEIS, NNSA has altered its plan for replacing the existing uranium processing facilities at Y-12. Originally, all uranium processing was proposed for consolidation into a single new facility ("the UPF"). The environmental effects of that proposal were examined in the 2011 SWEIS. In 2016, NNSA modified its plan for the UPF. In place of the planned single new facility, several smaller new facilities were proposed to be built, replacing most, but not all, of the existing facilities while several existing facilities (Building 9204-2E and the 9215 Complex) will be renovated as part of the Extended Life Program. The environmental impacts of the proposed change (to build several smaller new facilities and renovate some of the existing facilities) were presented in the 2016 SA (NNSA 2016a). Since

the publication of that SA, several concerns about the environmental impacts of using some of the legacy or "enduring" facilities rather than replacing them all with a single new UPF have been raised to the NNSA. These concerns are dealt with in several sections throughout the document but are also addressed specifically below.

Status of the Revised Concept UPF. In February 2018, NNSA completed the Site Infrastructure and Services subproject, which included demolition, utility work, site grading, and the Construction Support Building. NNSA also reconfigured the concrete batch plant, which has already produced more than 130,000 cubic yards of concrete, so it will be ready for UPF's structural placements (foundations and walls) (CNS 2018). On March 23, 2018, NNSA announced that it would proceed with construction of three primary UPF facilities, including the Main Process Building (MPB), Salvage and Accountability Building (SAB), and Process Support Facilities (PSF), and construction activities are being conducted in accordance with the 2016 SA (NNSA 2016a). Field preparation work has begun for UPF's first nuclear building, the SAB, and work will begin on the other nuclear facility, the MPB, in early May.

Status of the Extended Life Program. In response to NNSA's decision to reduce the scope of the UPF and continue certain EU operations in existing facilities, the Extended Life Program was established to ensure sustainment of Building 9204-2E and the 9215 Complex. The Extended Life Program is a comprehensive process that enables life extension of these facilities beyond their designed life to ensure continuous, safe, and secure EU mission capabilities. NNSA has approved a safety strategy for the Extended Life Program to reduce, mitigate, and accept safety risk associated with long-term operation of these facilities and to avoid unforeseen future changes that could have significant impacts. The safety strategy includes key activities to: (1) minimize quantity of hazardous materials; (2) reevaluate gaps between existing configuration and modern safety and design requirements; and (3) address identified gaps through physical upgrades, documented safety basis report changes, and/or risk acceptance (CNS 2018).

Documented Safety Basis Reports

Documented safety basis reports include Preliminary Documented Safety Analyses (PDSAs), Documented Safety Analyses (DSAs), and Technical Safety Requirements (TSRs). For new facilities and major modifications, DOE/NNSA prepares a "Safety Design Strategy," which provides a roadmap for strategizing how important safety issues will be addressed in the design and in the tailoring in the development of key safety basis documentation. For new information relating to operating facilities, other safety basis documents include Justifications for Continued Operations (JCOs) and Evaluations of the Safety of the Situation (ESSs). In general, these documents: (1) describe the hazards of a facility during its design, construction, operation, and eventual cleanup; and (2) identify the proposed controls that will be employed to assure that operations can be conducted safely.

The Management and Operating contractor submits a documented safety basis report to the authorizing official within DOE/NNSA for review and approval. This document becomes the "safety basis" that is used as the primary input for DOE to determine whether operations can be authorized, much like the NRC authorizes operation of a commercial nuclear facility. Documented safety basis reports are "living documents," meaning they are updated as new information becomes available that may affect the safe operation of a DOE/NNSA facility.

The keystone to implementing an effective Extended Life Program is an effort to complete material-at-risk (MAR) reduction activities, which focuses on relocating hazardous materials to safe long-term storage in HEUMF, processing materials into safer material forms, and properly dispositioning additional materials. Building 9204-2E and the 9215 Complex MAR reduction effort will be completed in early 2020s. Thus, the risk to the public is substantially reduced through MAR reduction (CNS 2018). As an example, in 2014, NNSA reduced the MAR limit in Building 9212 by 40.6 percent. A MAR limit reduction for the 9215 Complex is expected to be more significant than that in Building 9212 (NNSA 2016a). In general, a

reduction in the MAR limit has the potential to reduce the potential accident risks and consequences from that facility by a comparable percentage, based on the fact that the source term (e.g., the amount of radiological material released in the event of an accident) is directly related to the MAR limit. A reduction in the MAR limit would also reduce the potential accident risks and consequences from that facility compared to the impacts presented in the 2011 SWEIS.

Physical upgrades, which are described in Section 3.4.3 of the 2016 SA, include replacement or refurbishment of electrical equipment, sprinkler head replacement, elevator refurbishment, ventilation system refurbishment or replacement, wall and ceiling repairs, potable water lateral replacements, and process equipment refurbishment or replacement. Several pieces of high-fire risk electrical equipment have been repaired or replaced in these facilities since 2016. This effort, which is still underway and continues to replace high risk electrical equipment, is expected to be completed by 2021. Additional electrical equipment refurbishments and replacements are also planned for the next several years. Most of the sprinkler system replacements in these facilities have been completed and all will finish by 2020. In addition, as discussed below, NNSA is also evaluating the existing facilities in terms of natural phenomena analyses, structural analyses, criticality vulnerability studies, and targeted upgrades (CNS 2018).

Relevant Recent Reports. Several reports recently published are relevant to the UPF, the Extended Life Program, and operations at Y-12. These are discussed below.

1. 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). Based on the new seismic hazard map for the eastern Tennessee area, 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).[2] 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).

   Sections 2.2.6 and 3.2 of this SA provide the most current information regarding the relevance of the new seismic hazard maps to Y-12 operations and discusses the steps NNSA is taking to address this issue. A summary of the key points from those sections is as follows:

   a. NNSA acknowledges that the documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect updated seismic hazard information from both the 2014 USGS report/maps and seismic studies currently being prepared by the Nuclear Regulatory Commission (NRC), DOE, and the Electric Power Research Institute (EPRI). (Section 2.2.6 identifies the types of information that will be contained in the EPRI/NRC/DOE seismic studies). Once the EPRI/NRC/DOE seismic studies are completed in 2019, NNSA would integrate those results with information from the 2014 USGS report/maps to develop the design ground motions used for the range of DOE facilities (nuclear and non-nuclear) at the Y-12 site. Once those ground motions are developed, NNSA would update the documented safety basis reports for Y-12 facilities (CNS 2018). Until that time, it would be speculative to estimate any specific changes to the accident consequences and risks from continued operations. However, as a general matter, it appears that those risks and consequences are lower than those projected in the 2011 SWEIS and bounded by the accident analysis in that document.

[2] Peak ground acceleration refers to the maximum ground acceleration that occurs during earthquake shaking at a location. Peak ground acceleration is normally expressed as either a decimal or percentage of 'g' (the acceleration due to Earth's gravity). A peak ground acceleration of 0.3g equates to an acceleration of 0.3 x 9.81 meters/sec^2. An increase of the peak ground acceleration from 0.2g to 0.3g represents a 50 percent increase.

b. Any new facilities (such as the UPF) are being designed and constructed in accordance with all applicable requirements, including DOE standards related to natural phenomena hazards (NPH) (see Section 2.2.6 for a more detailed explanation of NPH).
c. With respect to any potential seismic upgrades at Extended Life Program facilities such as Building 9204-2E and the 9215 Complex, Consolidated Nuclear Security, LLC (CNS, the Management and Operating contractor at Y-12) recently enlisted a panel of structural engineering experts to walk down these facilities and provide recommendations for future analyses and upgrades. The expert panel recommended reanalysis of both Building 9204-2E and the 9215 Complex and suggested that it may be possible to upgrade both facilities to meet the appropriate seismic design requirements. The Defense Nuclear Facilities Safety Board (DNFSB) suggested CNS add discussion of the reanalysis and potential upgrades to the next safety strategy revision (DNFSB 2017a). In response, CNS has added such a discussion to the latest safety strategy for the Extended Life Program (CNS 2018). Any seismic upgrades would reduce the accident risks and consequences reviewed for these facilities in the 2011 SWEIS and 2016 SA.

Defense Facilities Nuclear Safety Board

NNSA facilities are subject to independent oversight from the DNFSB. In accordance with 42 USC 2286, the DNFSB provides independent analysis, advice, and recommendations to the Secretary of Energy regarding adequate protection of public health and safety at DOE defense nuclear facilities.

Congress provided the DNFSB with a variety of powers to carry out its oversight mission, chief among them, the power to issue formal recommendations to the Secretary of Energy--recommendations that the Secretary is not required to accept, but is required to answer. Before issuing formal recommendations, the DNFSB evaluates input from resident inspectors, staff reviews, field visits, project status briefings, and DNFSB hearings to identify safety items for consideration by NNSA as part of its regular and on-going process for refining and improving facility safety features. Safety items are preliminary in nature and may provide the basis for a formal DNFSB recommendation if DNFSB concludes after consultation with NNSA that a particular safety item merits a formal answer from DOE. Commensurate with the type of safety item, the DNFSB provides timely and formal communications to NNSA/DOE so that the DNFSB's independent advice, analysis, and recommendations may be factored into the normal DOE decision-making process to the maximum extent possible. Depending on the results of the DOE decision-making process in response to safety items identified by DNFSB in staff level reports and other communications, DNFSB typically finds it unnecessary to issue formal recommendations requiring a formal answer from DOE.

Section 3.2 of this SA provides an assessment of whether the new seismic hazard maps constitute a substantial change that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 that were analyzed in the 2011 SWEIS.

2. On November 14, 2014, the DNFSB issued a staff report entitled, "Structural Evaluations of the 9215 Complex and Building 9204-2E at the Y-12 National Security Complex" (DNFSB 2014). This report documents a review by DNFSB staff of structural calculations for NPH at the 9215 Complex and Building 9204-2E, which NNSA intends to utilize to support transition out of Building 9212, which is the highest hazard nuclear facility at Y-12 and is in poorer condition than Building 9204-2E or the 9215 Complex (DNFSB 2014). Among other things, the DNFSB noted the following:

a. The designs of the 9215 Complex and Building 9204-2E do not include the ductile design concepts that are used in modern structural design, and thus lack seismic margin to collapse compared to a contemporary structure designed to the same demands.
b. The current evaluations of the 9215 Complex and Building 9204-2E do not consider the large extension of their operational lifespans and fail to explicitly acknowledge the impact of the lack of structural ductility on each building's design margin, particularly for the 9215 Complex.
c. NNSA should consider performing an updated structural analysis using more accurate modeling techniques while applying the requirements of DOE's standard for NPH analysis and design criteria for DOE facilities (DNFSB 2014).

Section 2.2.6 of this SA provides the most current information regarding the relevance of this report to Y-12 operations and discusses the steps NNSA is taking to manage this issue. In addition to the steps discussed above (see "a-c" under number 1), NNSA has actively taken steps to operate the enduring facilities in the safest manner possible while still meeting mission requirements. For example, NNSA has and will continue to take steps to reduce the MAR administrative limits in existing facilities (NNSA 2016a). As an example, in 2014, NNSA reduced the MAR limit in Building 9212 by 40.6 percent. A MAR limit reduction for the 9215 Complex is expected to be more significant than that in Building 9212 (NNSA 2016a). As previously explained in this section, a reduction in the MAR limit has the potential to reduce the accident consequences and risks from that facility by a comparable percentage. NNSA believes that it can continue to operate the enduring facilities in a safe manner for the foreseeable future.

Section 3.2 of this SA provides an assessment of whether the issues raised in this report constitute a substantial change that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 that were analyzed in the 2011 SWEIS.

3. On March 16, 2017, the DNFSB issued a report entitled, "Y-12 National Security Complex Extended Life Program Safety Strategy" (DNFSB 2017a). This report documents a review by DNFSB staff of the safety strategy which CNS had prepared for the purpose of the Extended Life Program for Building 9204-2E and the 9215 Complex. Among other things, the DNFSB noted the following:

   a. The 9215 Complex facility structure cannot withstand certain design-basis events (e.g., a postulated accident that a nuclear facility must be designed and built to withstand without loss to the systems, structures, and components necessary to ensure public health and safety) commensurate with its safety significant designation as discussed in the safety strategy. This is contrary to DOE Order 420.1C as well as DOE Order 420.1B which requires safety controls "be designed to perform their safety functions when called upon."
   b. CNS personnel indicated that following the planned structural evaluations that are part of the Extended Life Program, CNS analysts will use the updated quantitative analyses to determine specific criticality safety vulnerabilities and identify potential compensatory measures. These criticality safety analyses are anticipated to begin in the 2020 timeframe. The safety strategy indicates that nuclear criticality safety analyses are unable to demonstrate that processes remain subcritical (e.g., no self-sustaining nuclear fission chain reaction occurs, meaning that a criticality accident would not occur) following certain design-basis events in both the 9215 Complex and Building 9204-2E.
   c. Overall the DNFSB staff agrees with the approach proposed by CNS: short of de-inventorying the facilities, the direct path toward improving the post-design-basis

criticality safety of Building 9204-2E and the 9215 Complex will involve pursuing natural phenomena analyses, structural analyses, criticality vulnerability studies, and targeted upgrades.

d. The DNFSB noted that initiatives taken by CNS and NNSA in documenting key safety basis-related assumptions decisions and scheduled activities are a positive step. The report discusses the positive practices Y-12 has instituted over the years to address the aging EU infrastructure and processes, culminating with the safety strategy for the Extended Life Program. The report largely endorses the Extended Life Program effort, and encourages progress on the approved plan. Additional details of these efforts were noted in the DNFSB Chairman testimony given to the House Armed Services Committee in March 2017. (CNS 2018).

Section 3.2 of this SA provides an assessment of whether the issues raised in this report constitute a substantial change that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 that were analyzed in the 2011 SWEIS.

4. On June 26, 2017, the DNFSB sent a letter to the NNSA describing "opportunities for improvement related to the UPF safety strategy for fire protection" (DNFSB 2017b) in response to a Board staff concern regarding perceived weaknesses in the revised fire safety strategy resulting from the elimination of thermal barriers and deficiencies in compliance with industry codes and standards. The DNFSB identified the following three opportunities for improvement: (1) it would be prudent to designate the fire suppression system (FSS) as "safety significant" given its increased contribution to the safety posture of the facility; (2) testing the FSS pumps to limit state 'D' as suggested by UPF project personnel would improve confidence in their ability to perform their safety function; and (3) either using a non-combustible window material for gloveboxes, or demonstrating that the material selected by the UPF project provides equivalent performance, would improve the reliability of the facility's primary confinement for MAR (DNFSB 2017b).

Section 2.2.12 of this SA discusses the steps NNSA has taken to manage this issue. Section 3.2 of this SA provides an assessment of whether the issues raised in this report constitute a substantial change that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 that were analyzed in the 2011 SWEIS.

2.2 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 2011 SWEIS. Environmental changes are based on information in the *Oak Ridge Reservation Annual Site Environmental Report 2016* (ORR 2017), *Oak Ridge Reservation Annual Site Environmental Report 2015* (ORR 2016), other publicly available information (e.g. regulatory permits), and other information NNSA generated during the preparation of this SA (CNS 2017a). The analysis demonstrates that the baseline natural environment as depicted in the 2011 SWEIS has not changed appreciably. The following sections describe notable changes, if any.

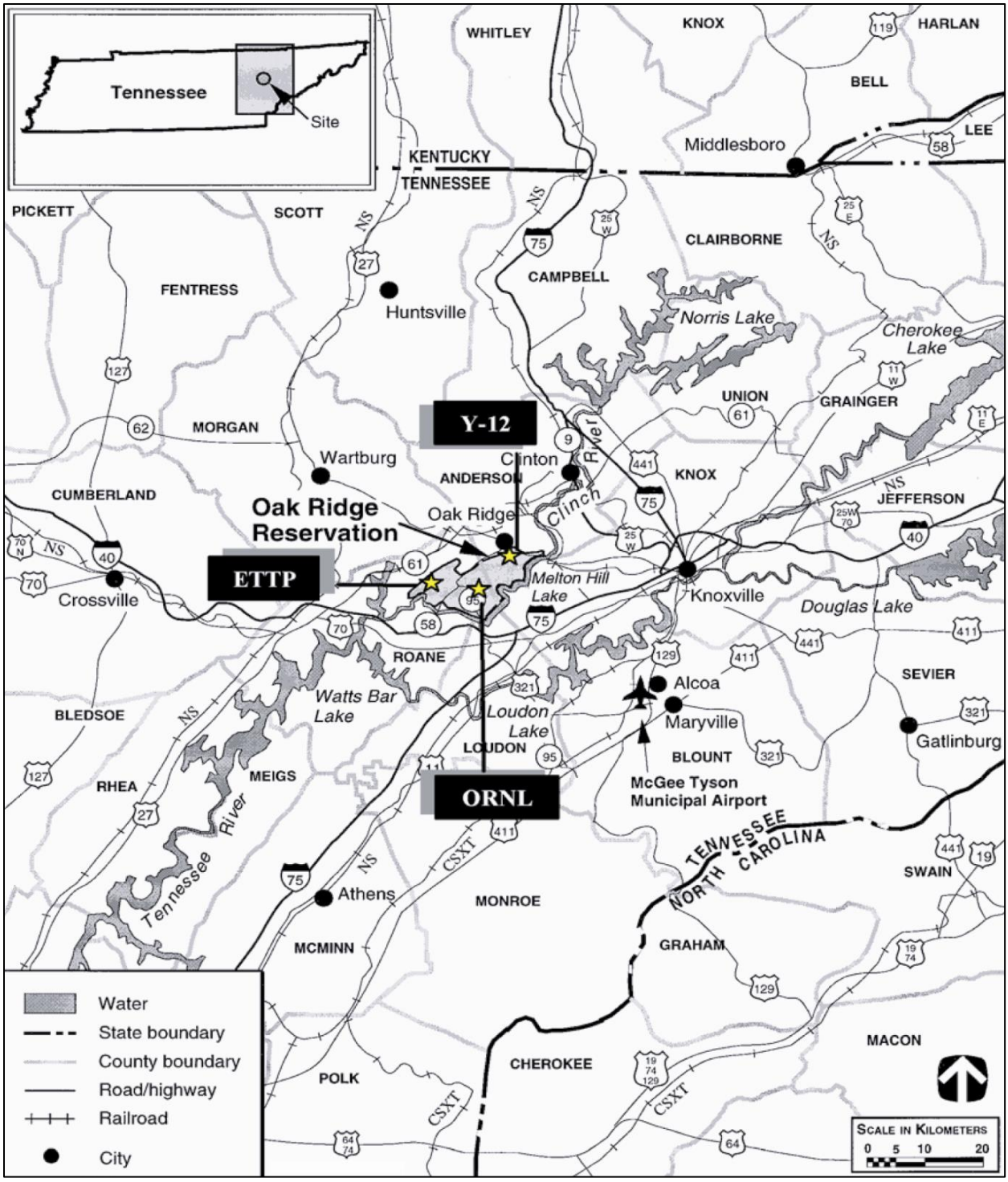
2.2.1 Land Resources

Y-12 is one of three primary installations on the ORR in Oak Ridge, Tennessee (Figure 2-3). Figure 2-4 shows general land uses at the ORR (including Y-12) and its vicinity. The site is classified as an industrial

area. As discussed in Section 2.2.6, there is a possibility that contamination may be encountered during construction activities on the site. In that event, NNSA has procedures in place to protect the health and safety of workers and manage the cleanup (see Sections 2.2.12 and 2.2.13). The only potential change in the classification or management of land resources at Y-12 since the issuance of the 2011 SWEIS is related to the establishment of the Manhattan Project National Historical Park, which was created by Federal legislation signed into law on December 19, 2014. The National Park Service (NPS) is establishing 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 required 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). Both buildings have been nominated for National Historic Landmark status consideration by the National Park Service (CNS 2017b).

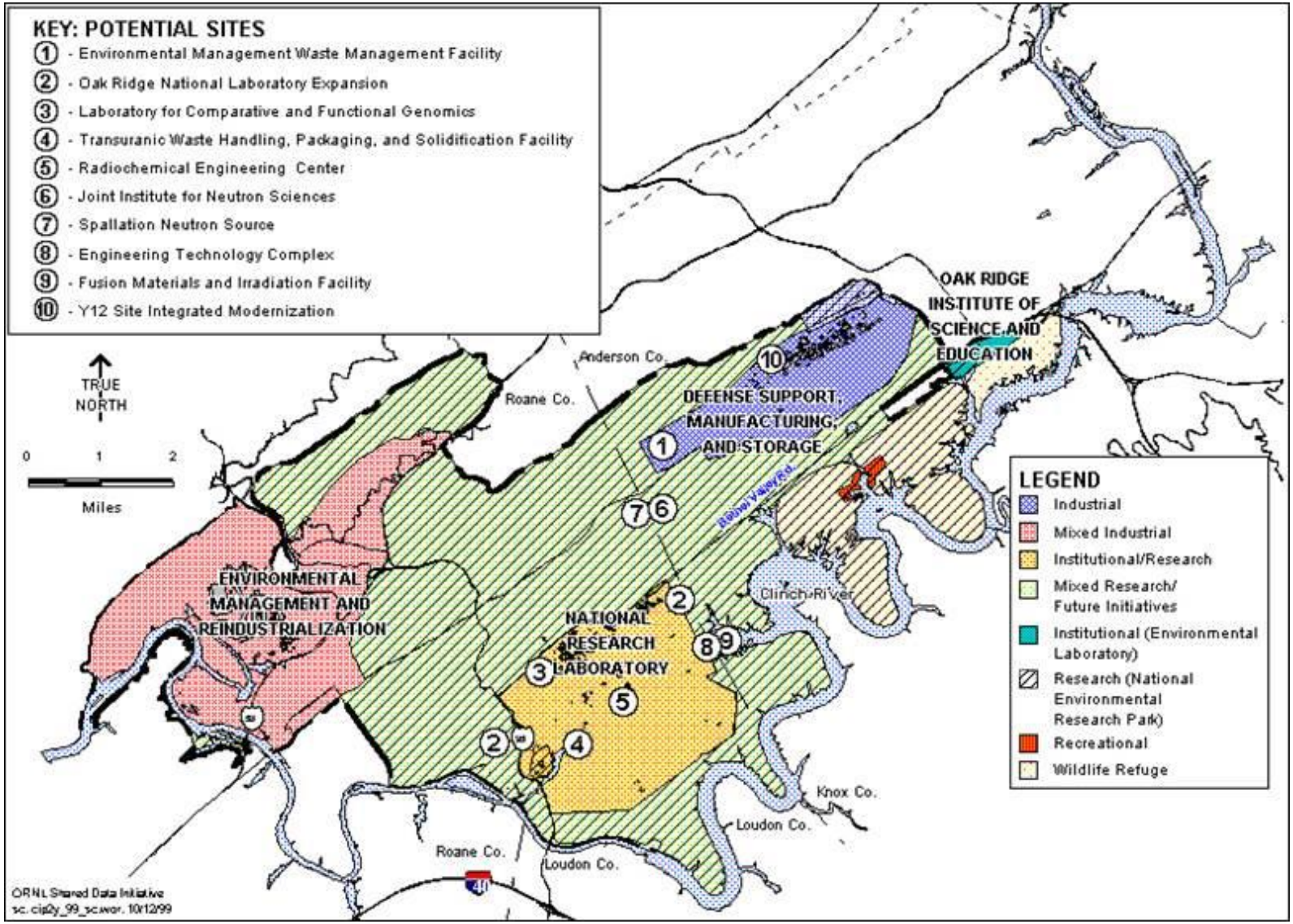
There is a Visitor Center in the center of Oak Ridge at the American Museum of Science and Energy. On November 12, 2015, during the celebration for the opening of the Park, 12 busloads of visitors were given tours of both the Y-12 facilities included in the park. Building 9731 is presently open for public tours once per year during the local Secret City Festival normally held in June. Building 9204-3 is located in the Protected Area of Y-12 and requires substantial security support for tours to be provided. Thus, a virtual tour is being developed for placing online for public viewing until the buildings can be accessed routinely, which may well be several years in the future (CNS 2017b).

The transfer of DOE property located at ETTP and the surrounding area for mixed use economic development did not affect land use at Y-12 and was determined to not have any significant impacts on land use in the area (DOE 2011). In addition, in February 2016, DOE prepared an EA and issued a FONSI 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 2016a). Section 4.2 of this SA discusses those projects.



Source: NNSA 2011.

Figure 2-3. Installations on the Oak Ridge Reservation.



Source: NNSA 2011.

Figure 2-4. Land Use on the Oak Ridge Reservation.

2.2.2 Visual Resources

Modernization/transformation activities have reduced the footprint of operating facilities; however, Y-12 remains a highly developed area. Although there have been changes to visual resources at Y-12 since the 2011 SWEIS (such as from the UPF and transmission lines analyzed in the 2016 SA), there has been no change in Y-12's visual resource contrast Class IV rating (a Class IV rating is used to describe a highly developed area).

2.2.3 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.

2.2.4 Air Quality

The only major change in the air quality at the Y-12 Site since the 2011 SWEIS was issued relates to ozone. As described in the 2011 SWEIS, the U.S. Environmental Protection Agency (EPA) had 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. However, since 2015, Anderson County has been in attainment for the 8-hour basic ozone standard (ORR 2016). As was the case when the 2011 SWEIS was issued, 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. EPA also designated the portion of Roane County surrounding the Kingston Steam Plant as a nonattainment area for $PM_{2.5}$ (ORR 2017). Currently, 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 2017, ORR 2016).

Airborne discharges from Y-12, both radioactive and nonradioactive, are subject to regulation by EPA and the TDEC Division of Air Pollution Control. All reporting requirements were met during 2015, and there were no permit violations or exceedances during the report period (ORR 2016).

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 total GHG emissions by 41 percent (in 2015) and 45 percent (in 2016) (ORR 2016, CNS 2016). The decrease in emissions is primarily associated with the fact that coal is no longer burned since the natural-gas-fired steam plant came on line. Table 2-2 lists the total GHG emissions from Y-12 in 2008, 2015, and 2016.

Table 2-2. Total Greenhouse Gas Emissions from Y-12.

Year	Greenhouse Gas Emissions (metric tons of carbon dioxide equivalent [CO_2e])
2008	369,537
2015	229,514
2016	184,849

Source: ORR 2016, CNS 2016.

About 0.0052 curies of uranium (approximately 1,432 grams of enriched and depleted uranium) were released into the atmosphere in 2016 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 2016 was 0.04 millirem. This dose is well below the National

Emissions Standards for Hazardous Air Pollutants (NESHAP) standard of 10 millirem and is less than 0.02 percent of the roughly 300 millirem that the average individual receives from natural sources of radiation (ORR 2017). Table 2-3 presents the total curies of uranium Y-12 discharged to the atmosphere from 2011 to 2016. During 2016, there were no unplanned radiological air emission releases from Y-12 (ORR 2017).

Table 2-3. Uranium Discharges from Y-12 to Air.

Year	Curies of Uranium
2011	0.0085
2012	0.0067
2013	0.0075
2014	0.0113
2015	0.0125
2016	0.0052

Source: ORR 2017, ORR 2016.

2.2.5 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 (for potable 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 (MGD). In an effort to reduce mobilization of mercury in stream sediments, this creek flow augmentation program was discontinued in 2014 at the direction of TDEC (CNS 2017a, DOE 2015b, DOE 2013a). Flow in the EFPC currently averages 1.0 to 1.5 MGD and is more susceptible to impacts from industrial discharges. Cooling tower improvements at Building 9212, and elsewhere, have reduced impacts on non-storm water contribution to the EFPC, and progress made on management of dike water has helped to reduce the significance of the impacts on storm and surface water (CNS 2017a).

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. Requirements of the NPDES permit for 2016 were satisfied and monitoring of outfalls and instream locations indicated excellent compliance. Data obtained as part of the NPDES program along with other events and observations are provided in a monthly discharge monitoring report to TDEC. The percentage of compliance with permit discharge limits for 2016 was almost 100 percent. About 2,300 data points were obtained from sampling required by the NPDES permit; no noncompliances were reported (ORR 2017). The existing NPDES permit (permit number TN0002968) was set to expire on November 30, 2016, and the required permit application was submitted 180 days prior to the permit expiration; however, due to regulatory negotiations for the new permit, the current permit remains in effect until such time that the TDEC issues the new permit. The new NPDES permit is expected to be issued in 2018 (CNS 2018).

During 2016 there was one reportable release from Y-12. On December 28, 2016, there was a slight oil sheen observed at Outfall 200 of East Fork Poplar Creek. The oil sheen was no longer present on December

29, 2016, and there were no observed impacts to aquatic life. The source of the oily substance could not be determined (ORR 2017).

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 2016, the total curies of uranium released from Y-12 at the easternmost monitoring station (Station 17 on UEFPC) was 0.045 curie (ORR 2017). Table 2-4 presents the total curies of uranium discharged from Y-12 to the offsite environment as a liquid effluent from 2011 to 2016. A worst-case analysis of exposures to waterborne radionuclides for all pathways combined would result in a maximum possible individual effective dose of about 1 millirem. DOE Order 458.1, *Radiation Protection of the Public and the Environment*, limits the effective dose that an individual may receive from all exposure pathways from all radionuclides released from the site during one year to no more than 100 millirem (ORR 2017).

Table 2-4. Uranium Discharges from Y-12 as Liquid Effluent.

Year	Curies of Uranium
2011	0.104
2012	0.039
2013	0.055
2014	0.061
2015	0.068
2016	0.045

Source: ORR 2017.

Groundwater monitoring in 2016 was performed to comply with DOE orders and regulations as part of the Y-12 Groundwater Protection Program, DOE-EM's Water Resources Restoration Program, and other projects. Compliance requirements were met by monitoring 201 wells and 50 surface water locations and springs. 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 year-to-year or are stable after remedial actions (ORR 2017).

2.2.6 Geology and Soils

As was documented in the 2011 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 2011 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 2011 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. Given the industrial nature of the site, the potential exists that contaminated debris would be discovered over portions of the site where cleanup has not occurred. Section 2.2.12 of this SA discusses how worker health is protected in the event contaminated materials are discovered. Section 2.2.13 of this SA discusses how these wastes were managed and how any future discoveries would be handled.

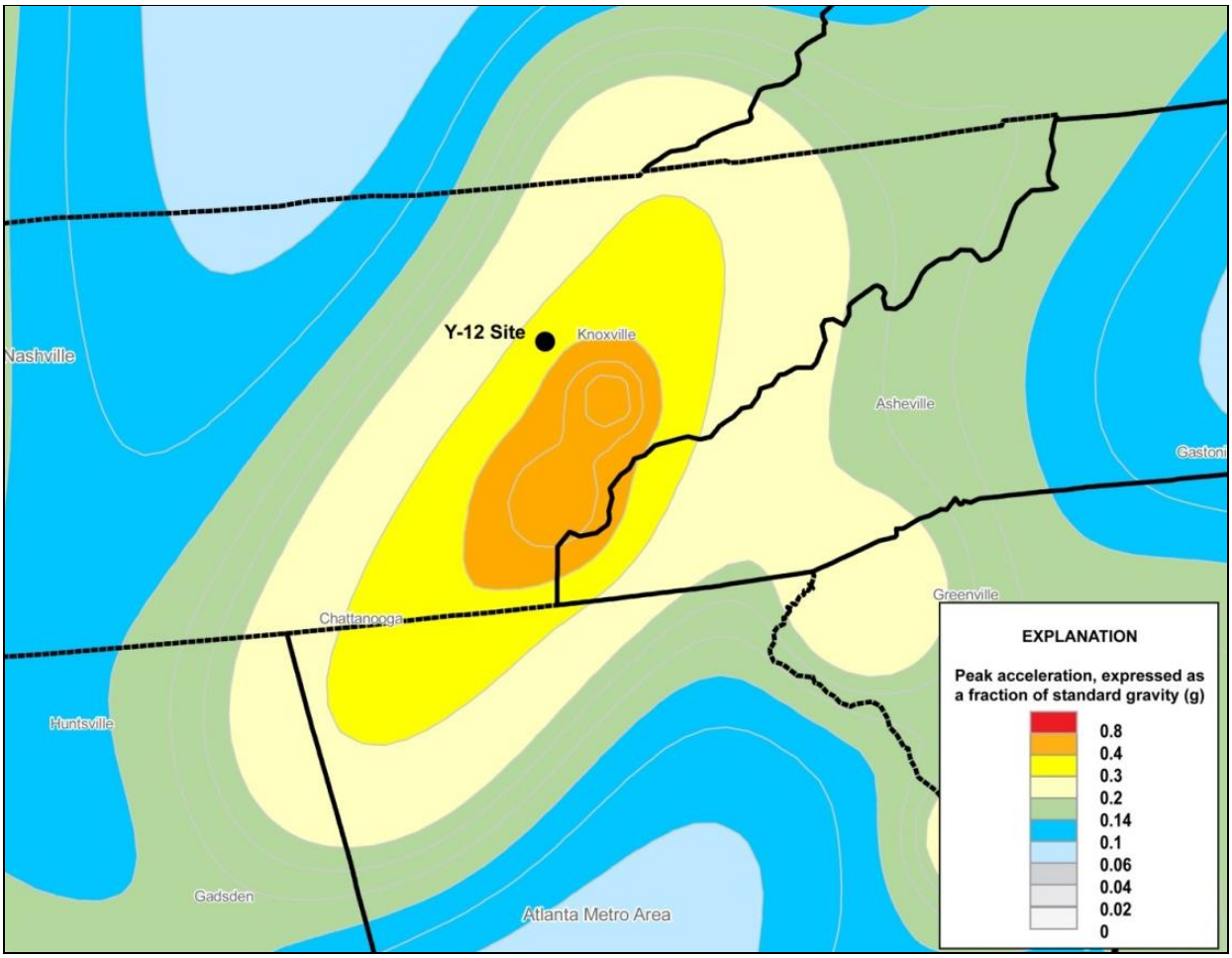
Section 4.5.3 of the 2011 SWEIS contains a detailed discussion of the seismic conditions in the region and at the site. That information remains valid and relevant and is not repeated in this SA. With regard to more recent information regarding seismicity, in 2014 the USGS released a report with updated 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 2-5 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 existing accident analyses associated with continued operation of existing nuclear facilities at Y-12 is based on using the Y-12 site specific seismic hazard developed by the USGS in 2003 assuming a short remaining life of all of the existing facilities, except for the HEUMF which was designed as a new facility using the 2003 seismic hazard results. In accordance with DOE requirements, the seismic hazard input is permitted to be reduced for the analyses of existing facilities with a short remaining life.

NNSA acknowledges that the documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect updated seismic hazard information from both the 2014 USGS report/maps and seismic studies[3] currently being prepared by the NRC, DOE, and the EPRI. Once the EPRI/NRC/DOE seismic studies are completed in 2019, NNSA would integrate those results with information from the 2014 USGS report/maps to develop the design ground motions used for the range of DOE facilities (nuclear and non-nuclear) at the Y-12 site. Once those ground motions are developed, NNSA would update the documented safety basis reports for Y-12 facilities (CNS 2018). However, as discussed in Section 3.2, it is not expected that this new seismic information will increase the accident consequences or risks associated with the continued operation of existing facilities, as reviewed in the 2011 SWEIS and 2016 SA.

New facilities will be designed and constructed in accordance with DOE requirements and referenced industry standards that are applicable at the time each project is approved to begin. For the UPF specifically, the seismic forces used for the design are based upon values developed prior to the 2014 USGS maps being accepted into industry codes. The design of the UPF is conservative, in that the design accounts for earthquakes as if they had magnitudes greater than what the codes had defined at the time. The earthquake forces utilized in the UPF design are not significantly different than the 2014 USGS map data. Coupling this with other conservative aspects of the structural design, there is high confidence that the 2014 USGS results do not pose an issue for the UPF (CNS 2018).

[3] The seismic studies being prepared include the following: updating earthquake sources (faults/zones), maximum earthquake magnitudes, frequency of earthquake occurrences, historical earthquake data bases, ground motion attenuation relationships that relate magnitudes with accelerations, and uncertainty parameters associated with all of the data (CNS 2018).



Source: USGS 2014.

Figure 2-5. 2014 Seismic Hazard Map of Eastern Tennessee.

With respect to any potential seismic upgrades at Extended Life Program facilities such as Building 9204-2E and the 9215 Complex, CNS recently enlisted a panel of structural engineering experts to walk down these facilities and provide recommendations for future analyses and upgrades. The expert panel recommended reanalysis of both Building 9204-2E and the 9215 Complex and suggested that it may be possible to upgrade both facilities to meet the appropriate seismic design requirements. The DNFSB suggested CNS add discussion of the reanalysis and potential upgrades to the next safety strategy revision (DNFSB 2017a). In response, CNS has added such a discussion to the latest safety strategy for the Extended Life Program (CNS 2018),

2.2.7 Ecological Resources

The 2011 SWEIS noted only one Federally listed threatened or endangered species on or near ORR: the gray bat (*Myotis grisescens*), and the gray bat continues to remain endangered. The 2011 SWEIS also identified the Indiana bat (*Myotis sodalis*) as endangered, but that bat was not known to occur on ORR. Ecological resources have not changed in any significant ways at Y-12 since issuance of the 2011 SWEIS with the following exceptions: (1) since publication of the 2011 SWEIS, the northern long-eared bat (*Myotis septentrionalis*) has been listed as threatened by the U.S. Fish and Wildlife Service (USFWS), and Y-12 falls within the range for this species (USFWS 2015); and (2) 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).

As part of the 2011 SWEIS process, NNSA prepared a Biological Assessment to determine if any of the 2011 SWEIS activities would be likely to affect either the gray bat or Indiana bat (see Appendix C of the 2011 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 2011 SWEIS with the 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.

NNSA notes that these survey results are reported to the USFWS under Section 7 of the *Endangered Species Act* standard consultation procedures. NNSA conducted informal consultation with the USFWS for both the 2011 SWEIS and the 2016 SA, and determined that there will be no effect to threatened or endangered species beyond that described and mitigated for in the 2011 SWEIS (NNSA 2011, NNSA 2016e). The USFWS concurred with that determination (NNSA 2011, USFWS 2016). Because there are no notable changes in any activities that could affect threatened or endangered species, NNSA has concluded that continued operations at Y-12 are not likely to impact any threatened or endangered species and no further consultation is needed for this SA.

The 2011 SWEIS included a detailed Wetlands Assessment (see Appendix G of the 2011 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 is progressing and advancing in in accordance with U.S. Army Corp of Engineers concurrence (DOA 2015) and is scheduled to be completed by the end of UPF construction. There have been no other changes in wetlands impacts since the 2011 SWEIS.

2.2.8 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. No Native American 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).

As discussed in Section 2.1.1 of this SA, the Manhattan Project National Historical Park was established in 2015. According to the MOA establishing that Park, 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.

Buildings 9731 and 9204-3 were eligible for listing on the National Register of Historic Places, and both are generally unavailable for regular public access. Irregular public access to both facilities has occurred as recently as November 12, 2015, when DOE facilitated public tours to both buildings in celebration of the establishment of the Manhattan Project National Historical Park. Enhancing safe access while protecting DOE's mission capabilities is part of DOE's objectives moving forward in implementing the Manhattan Project National Historical Park (ORR 2017).

2.2.9 Socioeconomics

This SA uses the same region of influence (ROI) for socioeconomic analysis as the 2011 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 2011 SWEIS used 2000 Census data in its analysis. As would be expected, socioeconomic conditions in the ROI have changed since then. This SA uses current population estimates from the U.S. Census Bureau. Table 2-5 lists relevant socioeconomic information for the ROI from both the 2011 SWEIS and based on most current data available.

Table 2-5. Socioeconomic Data for the ROI.

Parameter	2011 SWEIS Value	Current Value
ROI Population	596,192	636,423
ROI Labor Force	312,211	312,616
ROI Unemployment Rate	Low: 7.0 percent in Knox County; High: 8.8 percent in Anderson County	Low: 4.1 percent in Knox County; High: 5.6 percent in Roane County

Source: NNSA 2011; USCB 2017a; BLS 2017.

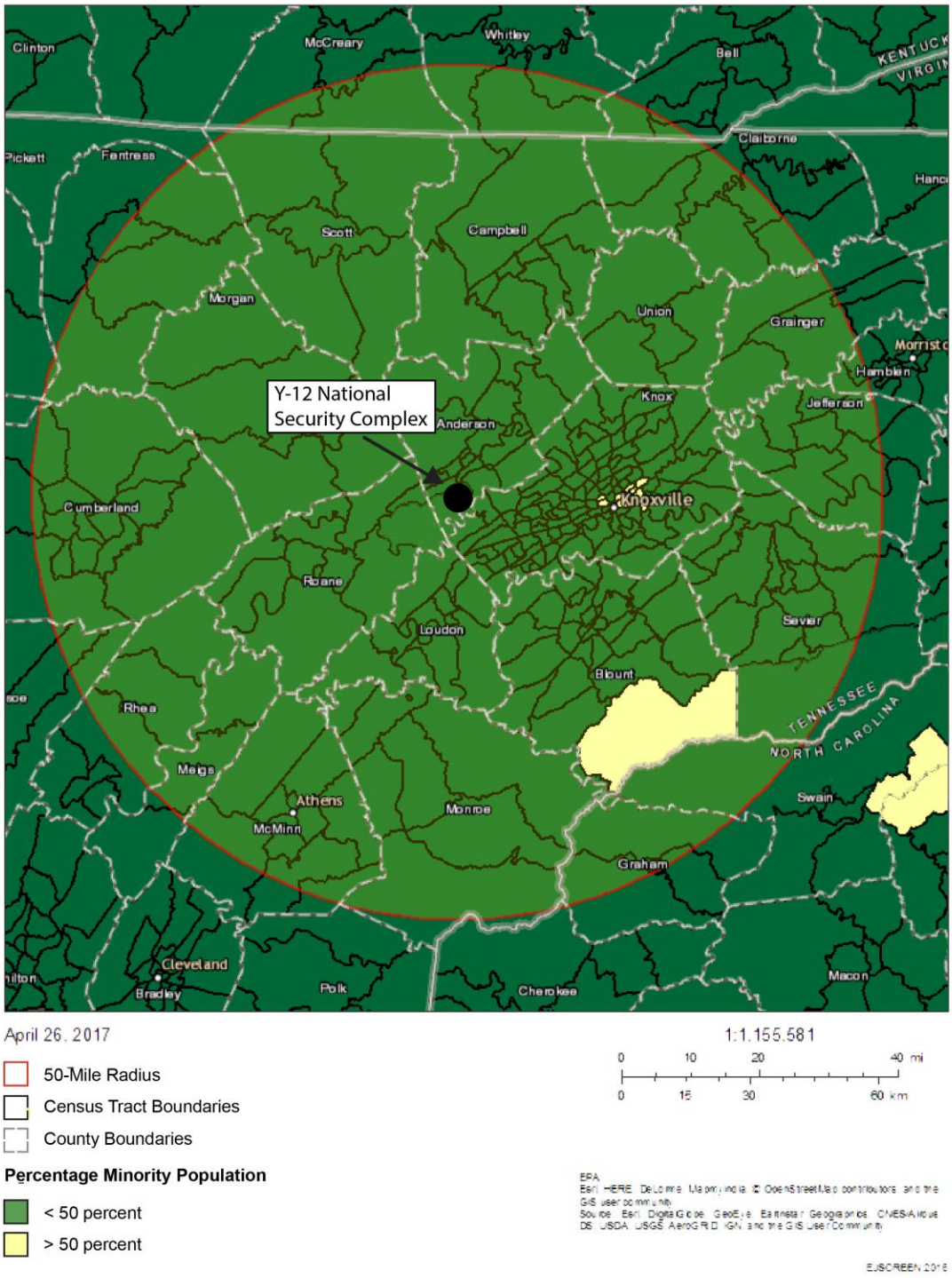
2.2.10 Environmental Justice

The 2011 SWEIS used data from the 2000 Census to determine the percentage of minority and low-income populations within the 50-mile radius of Y-12. This SA updates the percentage of minority and low-income populations in the ROI for environmental justice analysis using current data from the U.S. Census Bureau. Table 2-6 lists the percentages of minority and low-income populations from the 2011 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 2011 SWEIS. Figures 2-6 and 2-7 show the geographic distribution of minority and low-income populations near Y-12.

Table 2-6. Minority and Low-Income Populations for Y-12.

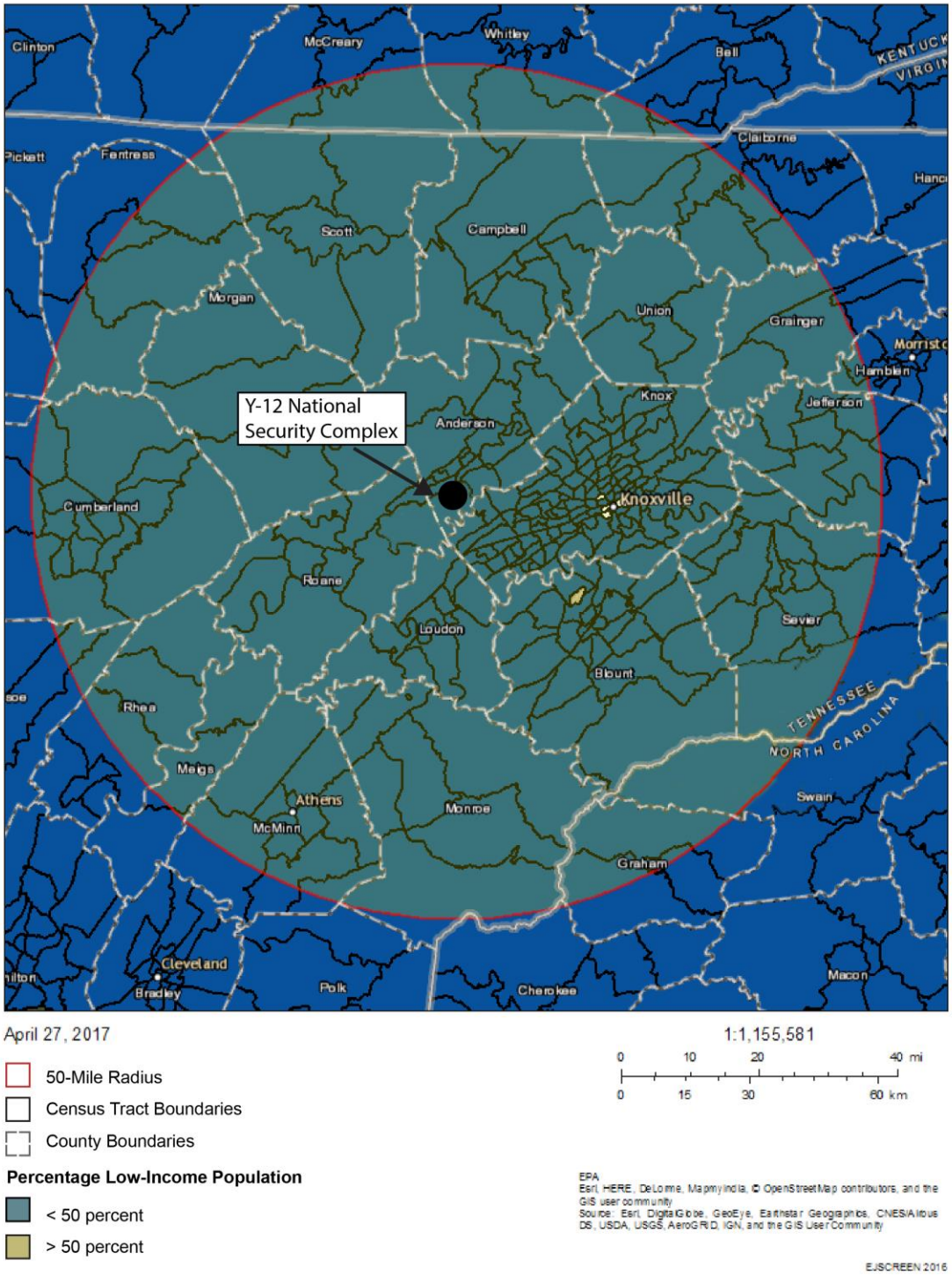
Population	Estimate in 2011 SWEIS (%)	Current Actual Data (%)
Minority Population	7.4	10.7
Low-Income Population	13.0	17.7

Source: NNSA 2011; USCB 2017b; USCB 2017c.



Source: EJSCREEN 2017.

Figure 2-6. Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of Y-12.



Source: EJSCREEN 2017.

Figure 2-7. Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of Y-12.

2.2.11 Infrastructure

Table 2-7 lists the infrastructure data from the 2011 SWEIS along with more current data. The 2011 SWEIS analyzed several readiness activities associated with the Capability-sized UPF Alternative that have been conducted since publication of the 2011 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 installed, tied in, and are now delivering water to the Y-12 site.

As shown in Table 2-7, there have been notable reductions in both peak electrical usage and treated water usage at Y-12 since publication of the 2011 SWEIS. These reductions have been achieved through modernization/transformation activities (by reducing the number and size of operating facilities), improved energy efficiency projects, and conservation measures (CNS 2016). Details regarding these efforts can be found in the *Consolidated Nuclear Security (Pantex/Y-12) FY-2017 Site Sustainability Plan* (CNS 2016). DOE energy savings performance contracts (ESPC) help Federal agencies meet energy efficiency, renewable energy, water conservation, and emissions reduction goals by streamlining contract funding for energy management projects. ESPC is a financial mechanism used to pay for today's facility upgrades with tomorrow's energy savings**.** Y-12 has taken advantage of these energy saving opportunities and has five energy conservation measures (ECM) contracts:

- ECM 1.1 Steam Decentralization
- ECM 2.1 Chiller Plant Upgrades
- ECM 5.1 Lighting Upgrade
- ECM 7.1 Steam System Improvements
- ECM 16.1 Air Compressor Upgrades

ESPC activities and facility modernization/consolidation have reduced electricity and steam (heating) requirements, therefore reducing Y-12 GHG emissions (by more than 40 percent compared to the 2008 baseline; see Table 2-2). The TYSP (CNS 2015a) provides more detailed information on estimated annual energy savings.

Table 2-7. Electricity and Treated Water Usage at Y-12.

Usage	Data Presented in 2011 SWEIS	Current Data (FY 2016)
Peak Monthly Electricity Usage (mega-watt electrical [MWe])	30-40	15-18
Treated Water Usage (million gallons/day)	4.2	1.5

Source: NNSA 2011; CNS 2017a.

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 4.0 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 continued operations at Y-12.

In 2016, the Y-12 potable water system received a sanitary survey score of 98 out of a possible 100 points and thus retained its approved status for potable water with TDEC. All total coliform samples collected during 2016 were analyzed by the State of Tennessee laboratory, and the results were negative (ORR 2017).

2.2.12 Health and Safety

The 2011 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 72.8 person-rem per year (DOE 2017) and the total population dose is about 6.4 person-rem per year (ORR 2017). Table 2-8 lists the potential doses to workers and to members of the public (within 50-miles of Y-12) from the 2011 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 2011 SWEIS.

Table 2-8. Radiological Doses at Y-12.

Dose	Data Presented in 2011 SWEIS	Current Actual Data
Total Collective Dose to All Workers at Y-12 (person-rem per year)	49 (Note 1)	72.8(Note 2)
Total Collective Dose to All Persons within 50 miles of Y-12 (person-rem per year)	7.8(Note 3)	6.4(Note 4)

Sources: NNSA 2011; DOE 2017; ORR 2017.
Note 1. This dose was based on a worker population of 2,450 workers, which was the number of workers with a measured dose. The average worker dose was 20 millirem, which is 0.4 percent of the 5 rem limit for occupational exposure per 10 CFR 835.
Note 2. This dose was based on a worker population of 1,460 workers, which was the number of workers with a measured dose. The average worker dose was 50 millirem, which is 1.0 percent of the 5 rem limit for occupational exposure per 10 CFR 835.
Note 3. This dose was based on a population of 1,040,041 people living within a 50-mile radius of Y-12 (NNSA 2011). The average dose to a member of the 50-mile population was 0.007 millirem, which is 0.007 percent of the 100 millirem limit for exposure in DOE Order 458.1, *Radiation Protection of the Public and the Environment*.
Note 4. The current dose is based on a population of 1,172,530 people living within a 50-mile radius of Y-12 (ORR 2016). The average dose to a member of the 50-mile population was 0.005 millirem, which is 0.005 percent of the 100 millirem limit for exposure in DOE Order 458.1, *Radiation Protection of the Public and the Environment*.

With regard to worker protection related to contaminated materials or radiological hazards, NNSA conducts its operations in accordance with all regulatory requirements and in accordance with the DOE Standard for Radiological Control (DOE-STD-1098-2017, January 2017). Per those requirements, workers are properly trained, hazards are thoroughly assessed, and operations are conducted in a manner that controls the spread of radioactive materials and reduces exposure to the workforce and the general public and that utilizes a process that seeks exposure levels as low as reasonably achievable.

With respect to safety, NNSA manages its facilities in accordance with all regulatory requirements and incorporates safety measures into the design and operation of facilities "to ensure that an adequate level of safety commensurate with the identified hazards is achieved" (DOE Order 420.1C). NNSA facilities are also subject to independent oversight from the DNFSB. In accordance with 42 USC 2286a(a), the mission of the DNFSB is to "provide independent analysis, advice, and recommendations to the Secretary of Energy to inform the Secretary, in the role of the Secretary as operator and regulator of the defense nuclear facilities of the Department of Energy, in providing adequate protection of public health and safety at such defense nuclear facilities." The DNFSB also is required to "review the design of a new DOE defense nuclear facility before construction of such facility begins and shall recommend to the Secretary of Energy, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety" (42 USC 2286a(b)(4)). As discussed in Section 2.1.4, preliminary staff reports identifying safety items do not rise to the level of a formal recommendation from the Board and are typically addressed through on-going briefings, discussions, and technical exchanges with NNSA and may result in refinements to facility design or operations.

Consistent with its mission, staff from the DNFSB have conducted a review of the safety strategy for the Y-12 Extended Life Program for Building 92042E and the 9215 Complex (DNFSB 2017a), as well as the

design of the UPF (including the FSS), and in particular the safety strategies being employed (DNFSB 2017b). NNSA has been working with the DNFSB, and will continue to do so in the future, to ensure the requirements of DOE Order 420.1C are met through on-going design refinements and facility upgrades, as necessary.

With regard to the DNFSB letter to the NNSA describing "opportunities for improvement related to the UPF safety strategy for fire protection" (DNFSB 2017b), NNSA provides the following information: Because DOE requirements were found to be met in the UPF design, these opportunities for improvement (which related to fire pumps, glovebox windows, and fire suppression system safety classification) were not identified as "safety or environmental issues or concerns." Nonetheless, during the UPF design process, NNSA considered the merit of these opportunities for improvement, responded to the DNFSB, and decided the following:

- NNSA finalized the testing plan for seismic qualification of the fire pumps.
- NNSA documented the equivalency for use of Lexan® glovebox windows.
- Based upon the hazards analysis results, NNSA determined that designating the fire suppression system as "safety-significant" was not required (CNS 2018).

2.2.13 Waste Management

Table 2-9 lists the radioactive and hazardous waste management data from the 2011 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. At Y-12, unneeded materials and chemicals are not automatically assumed to be wastes requiring disposal. Y-12 uses a systematic disposition evaluation process. The first step in the disposition process is to determine if the items can be reused at Y-12. Items that cannot be used at Y-12 are evaluated for use at other DOE facilities or government agencies. Items are then evaluated for potential sale, recycle, or, as a last resort, disposal as waste.

Table 2-9. Waste Generation at Y-12.

Waste Type	Data from 2011 SWEIS (Fiscal Year [FY] 2007)	Current Data (FY 2017)
LLW (Liquid) (gallons)	713	174.4
LLW (Solid) (cubic yards)	9,405	5,539
Mixed LLW (Liquid) (gallons)	1,096	5,112
Mixed LLW (Solid) (cubic yards)	126	209
Hazardous Waste (metric tons)	11.6	6.53

Source: NNSA 2011; CNS 2018.

With regard to the wastes that were encountered during excavation of an underpass for the UPF Site Readiness Haul Road, those impacts were addressed in the 2016 SA (NNSA 2016a). As discussed in that document, 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 (NNSA 2016a). The 72.8 person-rem dose presented in Table 2-8 accounts for any dose that workers may have received during the cleanup and management of these wastes. If similar discoveries should occur in the future at Y-12, NNSA would manage any materials in accordance with all applicable regulatory requirements.

Y-12's modernization efforts have already significantly changed the face of Y-12. The Pollution Prevention Program has been integrated into construction and D&D activities to ensure all materials are recycled or reused where possible. The Pollution Prevention Program reviews project waste management plans, statement/scope of works, and NEPA checklists to ensure pollution prevention techniques, such as reuse/recycling and sustainable acquisition, are incorporated into each project (CNS 2017a).

There have been significant success stories demonstrating measurable results in pollution prevention. Notable results include: utilities transferring over 3,000 gallons of excess brine offsite for reuse to prevent the brine from being disposed of as a waste in FY2016; reducing water usage by 65 percent from the baseline of FY 2007 through modernization activities; reusing more than 8,690 pounds of materials internally in 2017; diverting more than 47.6 percent of non-hazardous solid waste from the sanitary landfill; diverting more than 89.5 percent of construction and demolition materials and debris from the landfill; and reducing petroleum fuel consumption by 26 percent in FY 2017. In FY 2017, Y-12 implemented 101 pollution prevention initiatives with a reduction of more than 32.8 million pounds of waste with a cost saving of more than $1.5 million. Since FY 1993, Y-12 has completed more than 1,706 pollution prevention projects including on-going recycling projects that have resulted in the elimination of more than 2.88 billion pounds of waste at an estimated cost saving of more than $84 million (CNS 2018).

2.3 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 2011 SWEIS. Although the current version of the DOE NEPA implementing regulations (10 CFR Part 1021) became effective November 14, 2011, which was after the 2011 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.

In August 2016, the Council on Environmental Quality (CEQ) provided final guidance on the ways in which Federal agencies can improve their consideration of the effects of GHG emissions and climate change in evaluating proposals for Federal actions under NEPA (CEQ 2016). In that guidance, CEQ stated that, "when addressing climate change agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions (e.g., to include, where applicable, carbon sequestration); and, (2) The effects of climate change on a proposed action and its environmental impacts." On April 5, 2017, that final guidance was withdrawn (82 FR 16576). Nonetheless, this SA includes an analysis of the effects of GHG emissions. As discussed in Section 2.2.4, since the 2008 baseline year, the site has reduced total GHG emissions by 41 percent (in 2015) and 45 percent (in 2016) (ORR 2016, CNS 2016). The decrease in emissions is primarily associated with the fact that coal is no longer burned since the natural-gas-fired steam plant came on line.

3.0 COMPARISON OF IMPACTS

3.1 Introduction

Figure 3-1 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 2011 SWEIS is sufficient to support continued operations at Y-12 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 2011 SWEIS analyzed.

The purpose of the analysis 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.

3.2 Environmental Impacts

This section presents (1) a summary of the environmental impacts from the 2011 SWEIS, (2) the estimate of impacts for this SA, and (3) a resource-specific analysis of the estimate of impacts in which NNSA has determined that there might be potentially significant new circumstances or information relevant to environmental concerns. Table 3-1 presents this information in a comparative fashion for each resource area. The middle column presents the impacts in the 2011 SWEIS; the column on the right presents the estimate of impacts for the SA. Below these columns, for each analyzed resource, is a brief narrative comparison. Table 3-1 documents the results of the impact assessment process (Figure 3-1). Appendix E of the 2011 SWEIS describes the environmental resource impact methodologies that have been utilized. In addition to the information presented in Table 3-1, a more detailed discussion of the WEPAR Project and the reports identified in Section 2.1 of this SA (e.g., DNFSB 2014, DNFSB 2017a, and DNFSB 2017b) is presented below.

With regard to the WEPAR Project, the 2011 SWEIS analyzed the reduction of the Y-12 PIDAS from 150 acres to approximately 15 acres as part of the UPF alternatives. The 2011 SWEIS concluded that reducing the number of workers required to access the Protected Area would: (1) improve the productivity of workers assigned to non-SNM activities that are currently located in the Protected Area; and (2) would allow better concentration of the protective force over a smaller area (NNSA 2011). The 2011 SWEIS did not disclose any notable environmental impacts associated with the reduction of the PIDAS. In and of itself, a reduction in the PIDAS would not affect land use at Y-12, as the site would still remain highly industrial. From a visual standpoint, the PIDAS, regardless of size, is consistent with an industrial use. The size of the PIDAS would have no notable affect on the following: air quality and noise; water resources; geology and soils; ecological resources; cultural resources; socioeconomics and environmental justice; health and safety; and waste management. Additionally, the reduction in the PIDAS would have no effect on DOE-EM's cleanup schedule, nor prevent those operations from being completed, as DOE-EM frequently completes cleanup operations in secure areas. Consequently, NNSA does not think the WEPAR Project would result in substantial changes in environmental impacts, or significant new circumstances or information relevant to environmental concerns and bearing on continued operations at Y-12 or its impacts since NNSA issued the 2011 SWEIS.

With respect to the reports identified in Section 2.1 of this SA (e.g., DNFSB 2014, DNFSB 2017a, and DNFSB 2017b), and the issues raised in those reports, as well as the latest seismic information for the site (described in Section 2.2.6 of this SA), one of the most important issues for this SA is to analyze whether The accident impacts presented in the 2011 SWEIS have significantly changed. That issue is discussed below.

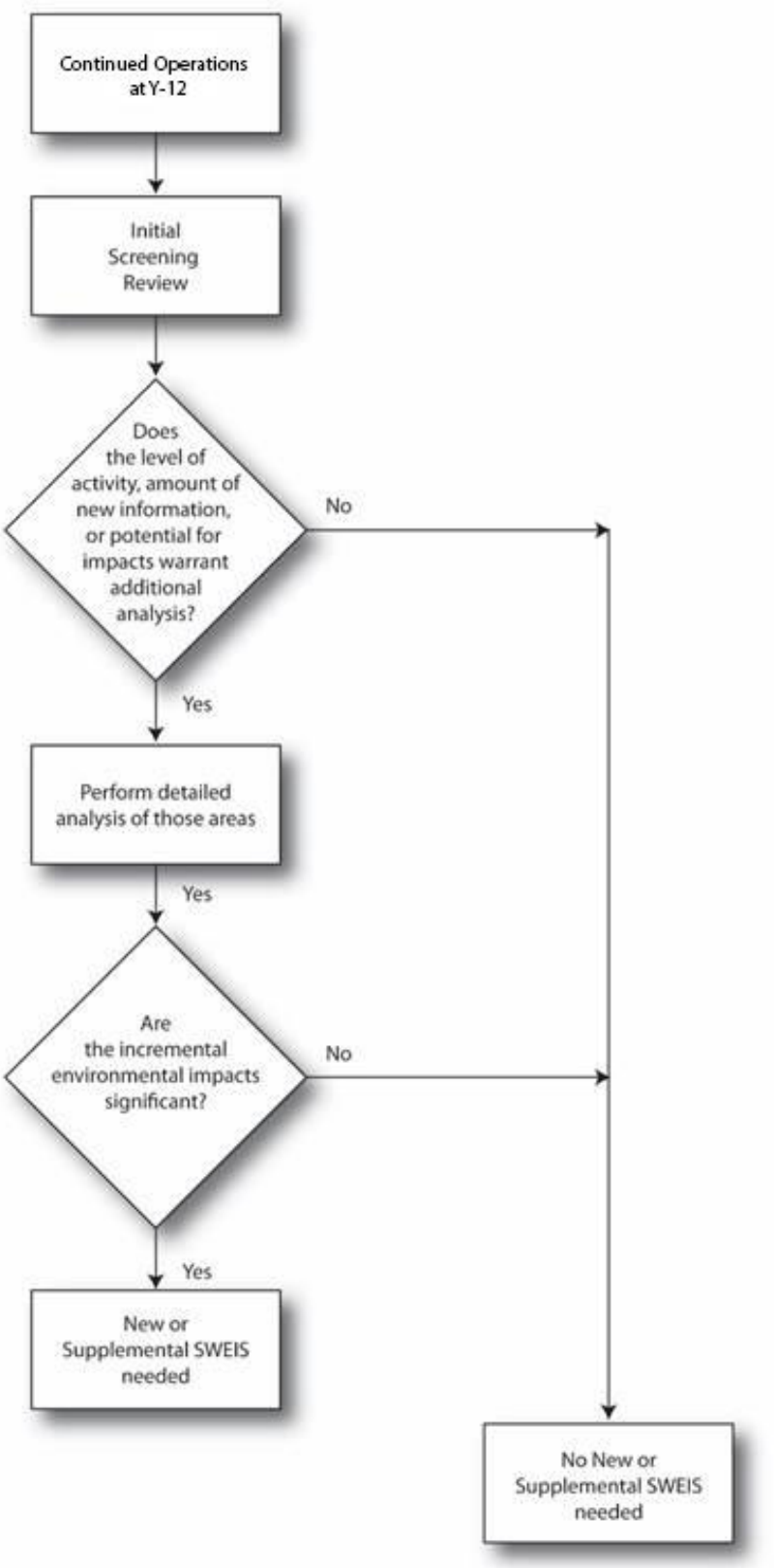


Figure 3-1. Assessment Process Used in this Supplement Analysis.

To better understand the accident analysis presented in the 2011 SWEIS, it is necessary to understand the concepts of "risk" and "consequence." For all accidents analyzed in the 2011 SWEIS, NNSA presented the potential impacts in terms of both risk and consequence. The term "consequence" refers to the results of an accident without consideration of the probability of the accident. "Risk" takes into account the probability of the accident and is calculated by multiplying the probability of occurrence times the consequence.

The analysis in the 2011 SWEIS acknowledged that the UPF would decrease the overall Y-12 facility accident risks and consequences. This is because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into a UPF, reducing the potential accident impacts associated with those older facilities. New facilities such as the UPF would be constructed to current building standards and would not experience significant damage from design-basis earthquakes and other credible external initiators. However, because detailed design descriptions for a UPF were not available when the 2011 SWEIS was prepared, the reduction in accident impacts could not be quantified, and the analysis in the 2011 SWEIS did not take credit for improvements in design or operating controls. In addition, the 2011 SWEIS acknowledged that the Upgrade in-Place Alternative (which includes the 9215 Complex and Building 9204-2E) would also decrease the overall Y-12 facility accident impacts because the existing EU and non-nuclear processing facilities would be upgraded to contemporary environmental, safety, and security standards to the extent possible. Consequently, the potential accident impacts were conservatively estimated in the 2011 SWEIS.

As discussed in Sections 1.4.2 and 2.2.6, NNSA acknowledges that the documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect updated seismic hazard information from both the 2014 USGS studies/maps and the seismic studies currently being prepared by NRC, DOE, and the EPRI. Until those documented safety basis reports are updated, it would be speculative to estimate any specific change in the accident analysis in the 2011 SWEIS. However, some general conclusions can be made:

1. In the 2011 SWEIS, NNSA concluded that the accident *consequences* associated with earthquakes are bounded by the accident consequences from other types of facility accidents (e.g., aircraft crashes, criticalities, and fires as shown in Table D.9.3.1 of the 2011 SWEIS). This is due to the fact that the source term (e.g., the amount of radiological material released in an accident) for an earthquake is bounded by these other types of accidents. Because the 2011 SWEIS conservatively assumed that an earthquake would result in a loss of containment, the source term associated with such an earthquake would not be expected to increase, even if the seismic hazard increases. More importantly, the actual source term is likely to be much smaller than was estimated in the 2011 SWEIS because NNSA has taken positive steps to reduce the amount of MAR in older facilities such as the 9215 Complex and Building 9204-2E (see NNSA 2016a, which identifies specific MAR reductions). Given these MAR reductions, the actual consequences from an earthquake are likely to be less than estimated in the 2011 SWEIS. Perhaps most importantly, as presented in the 2011 SWEIS, the consequences associated with all accidents at Y-12 are very small. The accident with the highest potential consequences to the offsite population living within 50 miles of Y-12 is the aircraft crash into the EU facilities. Assuming such an accident occurred, and without any mitigation, approximately 0.4 latent cancer fatalities in the offsite population could result. An offsite maximally exposed individual would receive a maximum dose of 0.3 rem. As a result of that dose, this person would have a 2×10^{-4} chance of developing a latent cancer fatality, or about 1 in 5,000. This accident has a probability of occurring approximately once every 100,000 years. For all accidents analyzed in the 2011 SWEIS, a worker would receive a maximum dose of 17.4 rem. As a result of that dose, this worker would have a 0.01 chance of developing a latent cancer fatality, or about 1 in 100.

2. Accident *risks* associated with earthquakes presented in the 2011 SWEIS could change proportionately to the change in the probability of an earthquake occurring. However, this change would be reduced by the MAR reductions discussed above (because risks are also directly affected by consequences, given that risk is determined by multiplying the probability of occurrence times the consequence). Without knowing the specific change in the earthquake probability, it would be speculative to estimate which of these factors (increased probability of an earthquake versus MAR reduction) would have the bigger effect on the risk conclusion. Perhaps most importantly, as presented in the 2011 SWEIS, the risks associated with all accidents at Y-12 are very small. For example, in the 2011 SWEIS, NNSA determined that the accident with the highest risk is the design-basis fire for HEU storage. For this accident, which has a probability of occurring approximately once every 1,000 years, the latent cancer fatality risk to the maximally exposed individual is estimated at 4.4×10^{-7}. This means the maximally exposed individual would have about a 1 chance in 2 million of dying from a latent cancer as a result of this accident (NNSA 2011). The risk of a latent cancer fatality to any other person living within 50 miles of Y-12 would be less than the maximally exposed individual. The latent cancer fatality risk to the entire population within 50 miles of Y-12 is estimated at 4.0×10^{-4}. This means that one latent cancer fatality in the entire 50-mile population could be expected every 2,500 years. For all accidents analyzed in the 2011 SWEIS, the worker risk is estimated at less than 1.0×10^{-6}. This means a worker would have about a 1 chance in 1 million of dying from a latent cancer (NNSA 2011).

Based on the discussion above, as well as the best information available, NNSA believes that the accidents with the highest potential consequences to the offsite population would remain the aircraft crash into the EU facilities (when probabilities are not taken into account), and the accident with the highest risk would be the design-basis fire for HEU storage (when probabilities are taken into account). Consequently, NNSA does not believe there would be a significant change in bounding impacts as a result of the reports identified in this SA, or any new information that has become available since publication of the 2011 SWEIS.

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. NNSA also acknowledges that upgraded facilities would also 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. As explained in the 2016 SA (NNSA 2016a), 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 2011 SWEIS. Further, the MAR in facilities associated with that proposed action would not exceed the MAR as analyzed in the 2011 SWEIS. With respect to non-EU programs/operations, there have been no significant increases to the MAR in any existing or new facility at Y-12 in the past five years, and no increases are expected in the next five years (CNS 2017a). Therefore, the analysis and conclusions about malevolent, terrorist, or intentional destructive acts for continued operations at Y-12 in this SA would be bounded by the analysis for the 2011 SWEIS. As documented in the 2011 SWEIS, the potential accident impacts associated with non-EU programs/operations at Y-12 are bounded by those from EU programs/operations (see Appendix D of NNSA 2011).

Table 3-1. Comparative Analysis of Environmental Impacts.

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
Land Resources	Land uses at Y-12 would be compatible with surrounding areas and with land use plans. Construction activities (UPF and CCC) would affect about 80 acres of land. Upgrades to existing facilities would not change land use. The Protected Area would be reduced from approximately 150 acres to 15 acres. As excess facilities are dispositioned, there would be fewer facilities and floor space, and significantly more open space; however, the overall industrial use classification of Y-12 would remain the same. There would be no impacts on offsite land use.	Land uses at Y-12 would continue to be compatible with surrounding areas and with land use plans. The initiative to remove 70 acres from the Y-12 Protected Area as a result of the proposed WEPAR Project would be consistent with the 2011 SWEIS. Continued disposition of excess facilities would reduce the number of facilities and floor space and there would be more open space at Y-12 as shown on Figure 1-3; however, the overall industrial use classification of Y-12 would remain the same. There would be no impacts on offsite land use.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
Visual Resources	Construction activities (UPF and CCC) 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.	There are no major changes in primary missions at Y-12 planned for the next five years, and workload requirements are expected to be consistent with the 2011 SWEIS projections. Consequently, no notable visual resource impacts are expected. The new transmission lines described in Section 1.4 were determined to not cause a significant visual impact. Any additional construction associated with continued operations at Y-12 would create visual impacts consistent with those presented in the 2011 SWEIS. 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 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
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, 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 continued operations at Y-12 would be essentially the same as those in the 2011 SWEIS. As Y-12 transitions to a smaller footprint, noise impacts would likely be reduced.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
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 $PM_{2.5}$, which exceed standards throughout the region. As was the case when the 2011 SWEIS was issued, the EPA has designated Anderson, Knox, and Blount counties as a nonattainment area for that air quality standard.	No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. Given this, the types and quantities of air emissions would not notably change. Modernization/transformation activities, along with conservation and energy efficiency initiatives are expected to continue to reduce infrastructure demands and the resulting non-radiological air emissions compared to 2011. Impacts would remain well within NAAQS for all criteria pollutants, with the exception of $PM_{2.5}$, which exceed standards throughout the region.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
Air Quality (radiological)	Radiological air emissions were estimated at 0.006 - 0.01 curie of uranium per year.	No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. Consistent with that, continued operations at Y-12 would not change radiological emissions at Y-12. These emissions are generally a function of EU activities, which have been previously addressed in NNSA 2016a.
Comparison to the 2011 SWEIS: No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. The continued operations at Y-12 would not change the radiological emissions compared to those presented in the 2011 SWEIS. See the Health and Safety section of this table for potential impacts to workers and the public from radiological doses.		
Water Resources	Construction and operational water requirements would not substantially raise the average daily water use for Y-12. None of the Y-12 facilities are located within either the 100- or 500-year floodplains. Treated water usage at Y-12 Would be approximately 4.2 million gallons per day. None of the Y-12 facilities are located within either the 100- or 500-year floodplains.	No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. Given this, water requirements would not notably change. Modernization/transformation activities, along with conservation and energy efficiency initiatives are expected to continue to reduce infrastructure demands and the resulting water usage compared to 2011. The headworks of the Mercury Treatment Facility would be located within the 100- and 500-year floodplains.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
Wetlands	A total of about three acres of wetland were estimated to be created as part of the proposed UPF construction activities. 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 continued operations at Y-12 would not impact wetlands.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
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 would be consistent with those presented in the 2011 SWEIS. Potential impacts associated with seismic hazards at Y-12 are addressed under "Facility Accidents."
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
Ecological Resources	Construction activities would not impact ecological resources because the facility would be sited on land that is currently used as a parking lot. 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 2011 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.	No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. Given this, potential impacts of continued operations at Y-12 would be similar to those presented in the 2011 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 2011 SWEIS: The potential impacts to ecological resources associated with continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS. 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 continued operations at Y-12 would occur on an existing highly industrial site. As discussed in Section 2.1.7, NNSA does not believe continued operations at Y-12 would change the conclusion that was presented in the 2011 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 continued operations at Y-12 is not likely to impact any threatened or endangered species. 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.		

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
Cultural Resources	Buildings 9731 and 9204-3 have been nominated for National Historic Landmark status consideration by the National Park Service as part of the Manhattan Project National Historical Park. Construction activities would take place in areas outside of the Manhattan Project National Historical Park 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.	No construction activities would take place within the Manhattan Project National Historical Park. Although no impacts to cultural resources are expected, all activities associated with continued operations at Y-12 would be reviewed and evaluated to satisfy the Section 106 requirements outlined in the Programmatic Agreement.
Comparison to the 2011 SWEIS: Potential impacts to cultural resources would be consistent with, and bounded by those presented in the 2011 SWEIS. 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.	Because there would be no major changes in the primary missions at Y-12 over the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections, socioeconomic impacts are not expected to change significantly. Potential reductions in workforce, which the 2011 SWEIS projected to be met through normal attrition/retirements, have been offset by construction employment increases associated with the UPF. Construction activities associated with the Fire Station and/or EOC were determined to have insignificant socioeconomic impacts (NNSA 2015a, NNSA 2015c). Potential impacts from LPC activities would be addressed in project-specific NEPA documentation. Cumulative impacts from D&D activities are addressed in Section 4.1 of this SA.
Comparison to the 2011 SWEIS: Potential impacts to socioeconomic resources would be consistent with, and bounded by those presented in the 2011 SWEIS.		

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
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 2016 Census data: • Minority population: 10.7 percent. • Below poverty level: 17.7 percent. Although the minority population and low-income populations surrounding Y-12 have increased since 2011, no significant health risks to the public are expected and 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 2011 SWEIS: Since the issuance of the 2011 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 continued operations at Y-12 in comparison with the analyses in the 2011 SWEIS (see the Health and Safety portion of this table below). Continued operations at Y-12 would not result in disproportionately high and adverse human health or environmental effects to minority or low-income populations.		
Utilities	Construction activities would have negligible utility requirements and would be less than 1 percent of current site usage. Operations would not significantly change infrastructure demands. During operations, peak monthly electrical usage would be 30-40 MWe and treated water usage would be 4.2 million gallons per day.	Utility requirements would be bounded by the utility usage requirements presented in the 2011 SWEIS. Modernization/transformation activities, along with conservation and energy efficiency initiatives have significantly decreased utility demands compared to 2011. During operations going forward, peak monthly electrical usage would be 15-18 MWe and treated water usage would be 1.5 million gallons per day.
Comparison to the 2011 SWEIS: The utility requirements of continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		
Health and Safety – Normal Operations	As documented in the 2011 SWEIS, the potential human health impacts associated with non-EU programs/operations at Y-12 are bounded by those from EU programs/operations (see Appendix D of NNSA 2011). 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.	No major changes in the primary missions at Y-12 are planned for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections. The continued operations at Y-12 would not change radiological doses to workers or the public. 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.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS.		

<table>
<tr><th>Resource Area</th><th>Impacts in 2011 SWEIS</th><th>Impacts in this SA for
Continued Operations at Y-12</th></tr>
<tr><td>Health and Safety – Facility Accidents</td><td>As presented in detail in Appendix D of the 2011 SWEIS, NNSA performed an analysis of the potential impacts associated with accidents for all alternatives analyzed. Section D.9 of the 2011 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 2011 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. The highest consequence from any accident was less than one latent cancer fatality.</td><td>As documented in the 2011 SWEIS and the 2016 SA, the potential accident impacts associated with non-EU programs/operations at Y-12 are bounded by those from EU programs/operations (see Appendix D of NNSA 2011). For continued operations at Y-12, the potential for impacts from accidents would not be expected to significantly change compared to those impacts presented in the 2011 SWEIS and the 2016 SA. As discussed in Appendix D.9.3 of the 2011 SWEIS, seismic hazards are bounded by other accidents for all facilities associated with EU operations. NNSA has and will continue to take steps to reduce the MAR administrative limits in existing facilities (NNSA 2014b), which would reduce the potential accident consequences from Y-12 facilities (see also the discussion in Section 3.2 for more detailed information).</td></tr>
<tr><td colspan="3">Comparison to the 2011 SWEIS: As discussed in Section 3.2 of this SA, the analysis in the 2011 SWEIS acknowledged that new facilities (such as the UPF) would decrease the overall Y-12 facility accident impacts. However, because detailed design descriptions for new facilities such as the UPF were not available, the reduction in accident impacts could not be quantified and the conservative nature of the analysis in the 2011 SWEIS did not take credit for improvements in design or operating controls. New facilities such as the UPF are being designed and constructed in accordance with all applicable requirements, including DOE standards related to NPH, and would therefore prevent any significant damage from design-basis earthquakes and other credible external initiators. In addition, the Extended Life Program and potential seismic upgrades would likely reduce consequences and risks from accidents compared to those presented in the 2011 SWEIS. As discussed in Sections 1.4.2 and 2.2.6 of this SA, NNSA acknowledges that the documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect updated seismic hazard information. Based on the best information available, NNSA continues to believe that 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 continued operations at Y-12.</td></tr>
<tr><td>Waste Management</td><td>The 2011 SWEIS projected the following waste quantities would be generated at Y-12 annually from operations:

LLW liquid: 428-713 gallons
LLW solid: 5,643-9,405 cubic yards
Mixed LLW liquid: 640-1,096 gallons
Mixed LLW solid: 76-126 cubic yards
Hazardous: 7.2-12 tons</td><td>The most current projections of waste quantities generated at Y-12 annually from operations are as follows:

LLW liquid: 174.4 gallons
LLW solid: 5,539 cubic yards
Mixed LLW liquid: 5,112 gallons
Mixed LLW solid: 209 cubic yards
Hazardous: 6.53 tons</td></tr>
<tr><td colspan="3">Comparison to the 2011 SWEIS: As shown above, the amounts of all wastes that would be generated by continued operations at Y-12 would be similar to the amounts estimated in the 2011 SWEIS. Although there are differences, all wastes would be managed in accordance with applicable regulations, with no significant impacts.</td></tr>
</table>

Resource Area	Impacts in 2011 SWEIS	Impacts in this SA for Continued Operations at Y-12
Transportation and Traffic	With regard to non-nuclear transportation, the 2011 SWEIS projected that there would be no significant impacts associated with traffic and transportation for workers at the site. 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 2011 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.	The workforce associated with continued operations at Y-12 is expected to be similar to the workforce described in the 2011 SWEIS and no significant change to traffic and transportation would be expected. Because there would be no major changes in the primary missions at Y-12 for the next five years, and workload requirements are expected to be consistent with 2011 SWEIS projections, radiological transportation impacts would be expected to remain at less than 1 latent cancer fatality per year to members of the public and workers.
Comparison to the 2011 SWEIS: The impacts from continued operations at Y-12 would be consistent with, and bounded by those presented in the 2011 SWEIS. The impacts associated with the transportation of radiological materials would be bounded by the 2011 SWEIS, as the amounts to be transported would not change compared to those in the 2011 SWEIS. Less than 1 latent cancer fatality per year would be expected to member of the public and workers.		

4.0 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 3.2 of this SA documents the potential impacts associated with continued operations at Y-12. That section demonstrates that the potential impacts are not notably different and are within the bounds of the impacts presented in the 2011 SWEIS. Consequently, the contribution to cumulative impacts from continued operations at Y-12 would be within the bounds presented in the 2011 SWEIS. This section reviews and updates the cumulative impacts from other actions that were identified in Chapter 6 of the 2011 SWEIS (see Section 4.1 below), as well as from additional other actions that have become known or reasonably foreseeable since publication of the 2011 ROD (see Section 4.2 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.

4.1 Actions Previously Considered in the 2011 SWEIS

Future Modernization Projects at Y-12. As discussed in Section 6.2.1 of the 2011 SWEIS, no significant modernization projects are currently proposed; however, NNSA is in the process of developing a proposal for the Lithium Production Program. As part of that development, NNSA would prepare the appropriate NEPA documentation. This SA acknowledges that the Lithium Production Program is considered part of the evolution of transformation/modernization activities at Y-12 and is consistent with future developmental activities at the site. Through modernization, NNSA expects that the environmental impacts of continued lithium operations would result in reduced environmental impacts compared to those impacts presented in the 2011 SWEIS.

Surplus Highly Enriched Uranium (HEU) Disposition Activities. Section 6.2.4 of the 2011 SWEIS discussed these activities. Because of the huge amount of recoverable energy stored in the HEU and its great economic value, DOE plans to convert a majority of the surplus HEU to commercial or research reactor fuel. If future declarations of excess HEU occur, a similar approach is expected to be taken. A substantial quantity of the HEU has already been converted to LEU reactor fuel. The remainder is expected to be converted before 2035. DOE down-blending programs include:

- 14 metric tons of uranium in the form of highly enriched UF6 and approximately 47 tons of HEU metal and oxides as required by the *United States Enrichment Corporation Privatization Act*. Down-blending of this material was completed in the summer of 2006.
- 48 metric tons of off-specification material, not suitable for sale on the open market, has been transferred to TVA for use in reactors. Down-blending of all but three metric tons of this has been completed.
- 17 metric tons of surplus HEU has been down-blended in their Reliable Fuel Supply project that supports the U.S. Government's initiative to establish an American Assured Fuel Supply.
- 20 metric tons of HEU has been down-blended under the MOX Low-Enriched Uranium (LEU) Backup inventory program.
- Over 10 metric tons of HEU is being down-blended under the Repurposed Excess Uranium program to provide LEU feedstock for tritium production.
- Planning is underway for an additional non-surplus down-blending offering for LEU feedstock for tritium production. This down-blending effort is expected to complete by 2030.

Over 20 metric tons of HEU has been reserved for use as low enriched uranium fuel in foreign or domestic research and medical isotope production reactors. The surplus HEU will be down blended to low enriched uranium fuel and sold or transferred through NNSA contracts for use as fuel. The HEU Disposition Program will continue to develop disposition pathways for the remaining material which can be down blended and used as fuel in power or research reactors. The remaining surplus HEU that is not usable for commercial-grade fuel will be disposed of as waste at a high-level geologic waste repository or a low-level waste facility. DOE is preparing detailed plans for the disposal of the remaining surplus HEU. Only a small portion of this material is stored at Y-12. Because the program is continuing to operate as envisioned, no significant changes to cumulative impacts are expected.

Oak Ridge Integrated Facility Disposition Project (IFDP) (now referred to as the Excess Facility Disposition Program). As discussed in Section 6.2.5 of the 2011 SWEIS, this program 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 discussed in Section 6.2.5 of the 2011 SWEIS. The scope of work planned at Y-12 is projected to increase in the early 2020s around the time when the ETTP cleanup is expected to be complete. Currently, DOE has initiated work to D&D the outside COLEX support infrastructure at Building 9201-4. DOE is also currently performing characterization on the remaining buildings in the Biology Complex in preparation for eventual D&D (CNS 2017a). All demolition would be consistent with the Excess Facility Disposition Program. Because this program is continuing to operate as envisioned, no significant changes to cumulative impacts are expected. DOE-EM is responsible for the disposition activities and conducts these operations in accordance with the Federal Facilities Agreement, (see Appendix A, Section 2.2.2.3). Funding requirements and schedules for these activities are not determined by NNSA.

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 2011 SWEIS) has not changed. On October 22, 2015, the NRC issued a full power facility operating license for Watts Bar 2 to TVA. This second reactor at the Spring City, Tennessee site began commercial operations in October 2016 and added more than 1,100 megawatts of generating capacity. The potential cumulative impacts from the operation of Watts Bar 2 in the region would be minor (NNSA 2014c).

Tennessee State Recreation Plan. Section 6.2.7 of the 2011 SWEIS discussed this Plan. Since publication of the 2011 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 continued operations at Y-12. None of the actions associated with continued operations at Y-12 would be inconsistent with the objectives or proposals that are identified in *Tennessee 2020*.

4.2 Cumulative Impacts of New Actions Analyzed in this SA

General Aviation Airport at the ETTP Heritage Center and the ETTP Land Transfer Action. In February 2016, DOE prepared an EA and issued a FONSI 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 2016a). 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 EA for that project (DOE 2016a) and DOE does not expect any significant cumulative impacts (See Table 3-1 for a discussion of the potential impacts of a general aviation aircraft crash on the potential accident consequences associated with continued operations at Y-12 evaluated in this SA). In addition, in 2011, DOE prepared an EA and issued a FONSI to evaluate conveying DOE property located at the ETTP to

CROET, the City of Oak Ridge, other agencies, or private entities. DOE determined that future land uses would be consistent with zoning requirements and there would be no significant impacts or cumulative impacts (DOE 2011).

Mercury Storage. In September 2013, DOE completed the *Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (DOE 2013b), 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 2013b). 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 2013b). This small impact would not result in a significant cumulative impact.

Environmental Management Waste 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 in the mid-2020s. The proposed EMDF, which would be built on Bear Creek Road in Central Bear Creek Valley, would have a capacity to dispose of about 2.42 million cubic yards of hazardous waste and LLW. Construction of site preparation activities could begin in 2019, and the first disposal cells could open in about 2024 (CNS 2018). The facility would have 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 2014) and DOE does not expect any significant change in cumulative impacts compared to existing operations. Construction and operation of this facility is being undertaken as a remedial action under CERCLA and no additional NEPA analysis is required.

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 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 2011 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 (see Figure 1-3). 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 2011 SWEIS for the CCC, and no significant cumulative impacts are expected.

Uranium Lease and Take-Back 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 (NNSA 2016c), which evaluates the sufficiency of existing NEPA documents related to the sites involved in the ULTB program. The analyses considered in the SA support DOE's determination that the implementation of the ULTB Program represent neither substantial changes to the actions evaluated in previous NEPA analyses, nor represent significant new circumstances or information relevant to environmental concerns (NNSA 2016c). Consequently, 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 submitted an application for an early site permit for two or more small modular reactor modules (up to 800 MWe) at the Clinch River Nuclear site on May 12, 2016. NRC accepted the application for docketing and detailed technical review on December 30, 2016 (NRC 2017). 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.

Mercury Treatment Facility. DOE-EM is pursuing 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, DOE has proposed and completed the 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 UEFPC. In terms of future operation, this facility will provide the capability to reduce mercury from surface waters generated during major, planned source removal actions such as building demolition (DOE 2015b, DOE 2013a). Any wastes are expected to be disposed of in the Y-12 Landfill or an approved offsite treatment, storage, and disposal facility. The Mercury Treatment Facility is expected to have a beneficial impact to UEFPC and would not have any adverse cumulative impacts. Construction and operation of this facility is being undertaken as a remedial action under CERCLA and no additional NEPA analysis is required.

Landfill IV New Phase Construction. DOE's Environmental Management Program is planning to construct a new phase of the Industrial Landfill IV. That landfill is used for disposal of classified, non-hazardous industrial waste, construction/demolition waste, and approved special waste. It has a footprint of about four acres and operates as an approved Class II landfill in accordance with TDEC permit number IDL-01-103-0075 (CNS 2017a). Construction of the new phase would occur within the landfill footprint analyzed in the original NEPA documentation. Activities would be conducted in a previously disturbed area and would not adversely affect environmentally sensitive resources such as archeological or historical sites, endangered species, critical habitats, floodplains, and wetlands and no significant impacts are expected (DOE 2016b). As a result of the expansion of this existing landfill, DOE does not expect any significant change in cumulative impacts compared to existing operations.

5.0 PROPOSED CONCLUSION AND DETERMINATION

The 2011 SWEIS evaluated the potential impacts of the reasonable range of alternatives for continued operations at Y-12. 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 examines changes to Y-12 site-wide operations and new information gathered since the preparation of the 2011 SWEIS and the 2016 SA to determine whether the site-wide analysis contained in the 2011 SWEIS remains adequate or whether significant new circumstances or information relevant to the environmental concerns and bearing on Y-12 activities and their impacts exist that would require the preparation of a new or supplemental EIS.

The analysis in this SA indicates that the identified and projected environmental impacts of continued operations at Y-12 would not be significantly different from those in the 2011 SWEIS. As presented in Table 3-1, the potential impacts of continued operations at Y-12 would be consistent with, and bounded by the analysis in the 2011 SWEIS. On the basis of the comparative analysis in this SA in relation to the analysis in the 2011 SWEIS, and other existing NEPA documentation, 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.

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Based on my review of the information and analysis in this SA regarding continued operations at Y-12, as the Head of Field Organization, I have determined, with the concurrence of NPO Counsel, that neither a supplement to the 2011 SWEIS nor a new EIS is required.

_____ _____

Terri L. Slack Date
Field Counsel, NNSA Production Office

_____ _____

Geoffrey Beausoleil Date
Manager, NNSA Production Office

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Appendix A

Relevant Changes in Missions, Operations, and Activities at Y-12

A.1 Relevant Changes in Missions, Operations, and Activities at Y-12

As discussed in Section 1.3 of this SA, in general, the descriptions of the missions, operations, and activities presented in the 2011 SWEIS and the 2016 SA are still accurate and are not repeated in this SA. Any relevant changes since publication of those two documents are described below. Note that any numbering of sections refers to the section numbers that were used in the 2011 SWEIS.

Defense Programs

Section 2.1.1.1 (Weapons Dismantlement and Disposition)

Since 2011, some dismantlement programs have been completed while others have been initiated; however, details about these dismantlement programs are classified. For the Life Extension Program, a current production program will end and an upcoming production program will begin. With the completion of a current production program, a facility (which cannot be disclosed for classification reasons) and related material stream will be shut down. For an upcoming production program, work will shift to other facilities and related material streams (CNS 2017a).

Section 2.1.1.7 (Materials Recycle and Recovery)

It should be noted that this program is also responsible for the sustainment of the high-purity depleted uranium feedstock supply (CNS 2017a).

Non-NNSA Work

Section 2.2.2.1 (Waste Management)

Waste Management Program activities at Y-12 include the following:

- Waste identification and planning;
- Waste segregation and characterization;
- Waste packaging and labeling;
- Waste accumulation and staging;
- Preparation of disposal requests;
- Waste certification and transfer;
- On-site waste processing/treatment and disposal; and
- Off-site shipment, treatment, and disposal (CNS 2017a).

Section 2.2.2.3 (referred to as "Integrated Facility Disposition Program" in the 2011 SWEIS; now referred to as "Excess Facility Disposition")

The Y-12 facilities that were included in the DOE Environmental Management Integrated Facilities Disposition Program, approved in 2008, have been added to the Federal Facilities Agreement, which governs cleanup actions at the site. Appendix J of the Federal Facilities Agreement indicates DOE-EM anticipates starting D&D of Y-12 facilities in 2023. NNSA is planning work to prepare certain buildings (e.g., removing legacy materials, draining equipment fluids) for transfer to DOE-EM prior to the 2023 D&D start date. DOE-EM is currently performing characterization on the remaining buildings in the Biology Complex in preparation for eventual D&D. DOE-EM has also initiated work to D&D the outside support infrastructure at Building 9201-4 (CNS 2017a).

Section 2.2.2.4 (referred to as "American Recovery and Reinvestment Act" in the 2011 SWEIS, but that work has been completed. A current title for that section is now "Mercury Treatment Facility")

DOE-EM has been working on a new project to reduce mercury loading to UEFPC since 2012. The Outfall 200 Mercury Treatment Facility will capture the discharge from Outfall 200 to remove mercury prior to discharge into UEFPC. Construction of the headworks, a two million gallon storm water storage tank, and the treatment facility started in 2018. The Mercury Treatment Facility is scheduled to be operational in 2024 (CNS 2018).

Section 2.2.7 (Pollution Prevention, Conservation, and Recycling Programs)

Y-12 has a demonstrated record of implementing programs to reduce waste, conserve energy, and cleanup legacy environmental contamination. Part of making Y-12 greener is the multitude of activities undertaken by Facilities and Sustainability. Acting as an umbrella that encompasses recycling, pollution prevention, and source reduction, the Sustainability and Stewardship Program also aids environmental compliance by allowing for a successful Environmental Management System (CNS 2017a).

The Pollution Prevention Program housed under the Sustainability and Stewardship Program provides technical assistance to employees and organizations at Y-12. This assistance includes identifying ways to eliminate waste streams; changing waste generator processes to reduce the volume or toxicity of waste streams; and segregating waste streams to allow for efficient reuse, recycle, or treatment for storage or disposal. The Pollution Prevention Program conducts Pollution Prevention Operational Assessments to evaluate site processes and operations for potential opportunities to apply pollution prevention techniques to implement sustainable practices, conserve resources, and reduce waste generation (CNS 2017a).

Y-12's Clean Sweep Program provides turnkey services to material generators, including segregation, staging, and pickup of materials for excess, recycle, and disposal. Sustain areas have been established across the site to improve housekeeping through efficient material disposition. Customers place unneeded items into the transition portion of each Sustain Area and Clean Sweep personnel take care of the rest. In 2015, the Clean Sweep Program was expanded to address ongoing housekeeping concerns including general outdoor housekeeping. In fiscal year (FY) 2016, there were more than 200 pickups of materials from sustain areas each month. Clean Sweep dispositioned over 200,000 cubic feet of materials in 2016 with approximately 76 percent of the materials recycled or reused in support of landfill diversion goals. The Clean Sweep Program has recycled unneeded resources, reduced environmental risks, and created a safer, cleaner site. Y-12 also has a strong record of procuring sustainable acquisition products, including materials with recycled-content and energy efficient products (CNS 2017a).

During 2016, a multifunctional team comprised of members from Waste Management, Generator Services, Environmental Compliance, and Waste Certification completed a comparison of absorbent materials commonly used at Y-12 with new proposed absorbents. As a result of this evaluation, an absorbent material that is made from an organic renewable resource was approved for use on oil, fuel, solvents, paints, food products, chemicals, mild corrosives, etc. The historically-approved absorbents are comprised of clay minerals and superabsorbent polymers. The approval of this renewable resource helps to promote the overall sustainability goals. In FY 2017, Y-12 procured materials with recycled-content valued at more than $14.1 million for use at the site (CNS 2018).

Y-12's modernization efforts have already significantly changed the face of the Y-12 Complex. The Pollution Prevention Program has been integrated into construction and D&D activities to ensure all materials are recycled or reused where possible. The Pollution Prevention Program reviews project waste management plans and NEPA checklists to ensure pollution prevention techniques, such as reuse/recycling and sustainable acquisition, are incorporated into each project (CNS 2017a).

There are significant success stories demonstrating measurable results in pollution prevention. Notable results include: utilities transferring over 3,000 gallons of excess brine offsite for reuse to prevent the brine from being disposed of as a waste in FY 2016; reducing water intensity by 65 percent from the baseline of FY 2007 through modernization activities; reusing more than 8,690 pounds of materials internally in FY 2017; diverting more than 47.6 percent of non-hazardous solid waste from the sanitary landfill; diverting more than 89.5 percent of construction and demolition materials and debris from the landfill; and reducing petroleum fuel consumption by 26 percent in 2017. In FY 2017, Y-12 implemented 101 pollution prevention initiatives with a reduction of more than 32.8 million pounds of waste with a cost saving of more than $1.5 million. Since FY 1993, Y-12 has completed more than 1,706 pollution prevention projects including on-going recycling projects that have resulted in the elimination of more than 2.88 billion pounds of waste at an estimated cost saving of more than $84 million (CNS 2018).