DOE/EIS-0387

Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex

February 2011

National Nuclear Security Administration

U.S. Department of Energy
National Nuclear Security Administration
Y-12 Site Office

Summary

COVER SHEET

RESPONSIBLE AGENCY: United States (U.S.) Department of Energy (DOE), National Nuclear Security Administration (NNSA)

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Abstract: NNSA, a separately organized agency within DOE, is responsible for maintaining the safety, reliability, and security of the U.S. nuclear weapons stockpile to meet national security requirements. NNSA manages nuclear weapons programs and facilities, including those at the Y-12 National Security Complex (Y-12) at Oak Ridge, Tennessee. This Final Y-12 SWEIS analyzes the potential environmental impacts of the reasonable alternatives for ongoing and foreseeable future operations and activities at Y-12, including alternatives for changes to site infrastructure and levels of operation (using production capacity as the key metric for comparison).

Five alternatives are analyzed in this Y-12 SWEIS: (1) No Action Alternative (maintain the status quo); (2) Uranium Processing Facility (UPF) Alternative; (3) Upgrade-in-Place Alternative; (4) Capability-sized UPF Alternative; and (5) No Net Production/Capability-sized UPF Alternative. This document assesses the potential environmental impacts of operations and applicable plans on land uses, socioeconomic characteristics and environmental justice, prehistoric and historic cultural resources, visual resources, geology and soils, biological resources, wetlands, water, air quality, noise, traffic and transportation, utilities and energy, waste management, human health and safety, intentional destructive acts, and accidents. The Capability-sized UPF Alternative is NNSA's preferred alternative.

Public Involvement: NNSA distributed the Draft Y-12 SWEIS in October 2009. The public comment period for the Draft Y-12 SWEIS began on October 30, 2009, with publication of the Environmental Protection Agency's Notice of Availability in the *Federal Register* (74 FR 56189). That notice invited public comment on the Draft Y-12 SWEIS through January 4, 2010, and provided for two public hearings to receive comments on the Draft Y-12 SWEIS. During the comment period, two public hearings were held in Oak Ridge, Tennessee, on November 17 and

18, 2009. At the first hearing, NNSA announced an extension of the comment period until January 29, 2010. That announcement was formalized with a notice in the *Federal Register* on December 28, 2009 (74 FR 68599).

All comments received during the comment period were considered during the preparation of the Final Y-12 SWEIS. All late comments were also considered. The Final SWEIS contains revisions and new information based in part on comments received on the Draft SWEIS. Following issuance of the Draft SWEIS, NNSA determined that a Haul Road was needed to support UPF construction. The Final SWEIS also includes information and analysis of a Haul Road extension corridor for the UPF, including a detailed Wetlands Assessment that was prepared in accordance with 10 Code of Federal Regulations (CFR) 1022, "Compliance with Floodplain and Wetlands Environmental Review Requirements" for the purpose of fulfilling NNSA's responsibilities under Executive Order 11990, "Protection of Wetlands." The Wetlands Assessment is contained in Appendix G. The comments received on that assessment, and NNSA's responses to those comments, are contained in Volume II of the Final SWEIS. In accordance with 40 CFR 1502.9(c)(1), NNSA determined, with respect to the Haul Road, that there were no substantial changes in the proposed action that are relevant to environmental concerns, nor significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Consequently, NNSA determined that a Supplemental Draft Y-12 SWEIS was not required.

Vertical change bars in the margins of the Final SWEIS indicate the locations of revisions and new information (in the Summary, small changes are indicated by a double underline). Volume II contains the comments received on the Draft SWEIS and NNSA's responses to the comments. NNSA will use the analysis presented in this Final SWEIS, as well as other information, in preparing the Record(s) of Decision (RODs) regarding Y-12. NNSA will issue one or more RODs no sooner than 30 days after the U.S. Environmental Protection Agency publishes a Notice of Availability of this Final SWEIS in the *Federal Register*. This document and related information are available on the Internet at www.y12sweis.com and DOE's NEPA website at www.nepa.energy.gov/DOE_NEPA_documents.htm.

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Prepared by:

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ACRONYMS AND ABBREVIATIONS

ASER	Annual Site Environmental Report
B&W	Babcock & Wilcox Technical Services Y-12, LLC
Cat I/II	Category I/II
CAUP	Compressed Air Upgrades Project
CCC	Complex Command Center
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	United States Code of Federal Regulations
CMC	Consolidated Manufacturing Complex
CO_2	carbon dioxide
CX	categorical exclusion
D&D	decontamination and decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DoD	United States Department of Defense
DOE	United States Department of Energy
DOE-NE	Department of Energy Office of Nuclear Energy
DOE-SC	Department of Energy Office of Science
DU	depleted uranium
EA	Environmental Assessment
ED	effective dose
EFPC	East Fork Poplar Creek
EIS	Environmental Impact Statement
EM	Environmental Management
EOC	Emergency Operations Center
EPA	United States Environmental Protection Agency
ETTP	East Tennessee Technology Park
EU	enriched uranium
FIRP	Facilities and Infrastructure Recapitalization Program
FONSI	Finding of No Significant Impact
FR	Federal Register
HAP	hazardous air pollutant
HEPA	high efficiency particulate air
HEU	highly enriched uranium
HEUMF	Highly Enriched Uranium Materials Facility
HVAC	heating, ventilation, and air conditioning
IFDP	Integrated Facilities Disposition Program
LCF	latent cancer fatality
LEP	Life Extension Program
LLW	low-level radioactive waste
LOS	Level-of-Service
MAA	Material Access Area
MEI	maximally exposed individual
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act

NFRR	Nuclear Facility Risk Reduction
NNSA	National Nuclear Security Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPR	Nuclear Posture Review
NPT	Nuclear Nonproliferation Treaty
NSP	National Security Program
NWC	Nuclear Weapons Council
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PC	Performance Category
PCB	polychlorinated biphenyls
PEIS	Programmatic Environmental Impact Statement
PIDAS	Perimeter Intrusion Detection and Assessment System
R&D	research and development
ROD	Record of Decision
ROI	region of influence
SEAB	Secretary of Energy Advisory Board
SIP	Security Improvements Project
SMC	Special Materials Complex
SNM	special nuclear material
SRS	Savannah River Site
SSM	Stockpile Stewardship and Management
SPEIS	Supplemental Programmatic Environmental Impact Statement
START	Strategic Arms Reduction Talks
SWEIS	Site-Wide Environmental Impact Statement
TDEC	Tennessee Department of Environment and Conservation
T&E	threatened and endangered
TYSP	Ten-Year Site Plan
UEFPC	Upper East Fork Poplar Creek
UPF	Uranium Processing Facility
U.S.	United States
VRM	Visual Resource Management
Y-12	Y-12 National Security Complex
YSO	Y-12 Site Office

UNITS OF MEASURE AND ABBREVIATIONS

A-weighted decibel	dBA
cubic meters	m^3
cubic meters per year	m^3/yr
cubic yards	yd^3
decibel	dB
gallons per day	gal/day
gallons per year	gal/yr
kilowatt hour	kWh
kilowatt hours per year	kWh/yr
megawatt	MW
million	M
million gallons per day	M gal/day
million gallons per year	M gal/yr
millirem	mrem
millirem per year	mrem/yr
particulate matter of aerodynamic diameter less than or equal to 10 micrometers	PM_{10}
particulate matter of aerodynamic diameter less than or equal to 2.5 micrometers	$PM_{2.5}$
ppm	parts per million
rem per year	rem/yr
square feet/foot	ft^2
tons per year	tons/yr

CONVERSION CHART

TO CONVERT FROM U.S. CUSTOMARY INTO METRIC			TO CONVERT FROM METRIC INTO U.S. CUSTOMARY		
If you know	**Multiply by**	**To get**	**If you know**	**Multiply by**	**To get**
		Length			
inches	2.540	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.03281	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.6214	miles
		Area			
square inches	6.452	square centimeters	square centimeters	0.1550	square inches
square feet	0.09290	square meters	square meters	10.76	square feet
square yards	0.8361	square meters	square meters	1.196	square yards
acres	0.4047	hectares	hectares	2.471	acres
square miles	2.590	square kilometers	square kilometers	0.3861	square miles
		Volume			
fluid ounces	29.57	milliliters	milliliters	0.03381	fluid ounces
gallons	3.785	liters	liters	0.2642	gallons
cubic feet	0.02832	cubic meters	cubic meters	35.31	cubic feet
cubic yards	0.7646	cubic meters	cubic meters	1.308	cubic yards
		Weight			
ounces	28.35	grams	grams	0.03527	ounces
pounds	0.4536	kilograms	kilograms	2.205	pounds
short tons	0.9072	metric tons	metric tons	1.102	short tons
		Temperature			
Fahrenheit (^oF)	subtract 32, then multiply by 5/9	Celsius (^oC)	Celsius (^oC)	multiply by 9/5, then add 32	Fahrenheit (^oF)
Kelvin (K)	subtract 273.15	Celsius (^oC)	Celsius (^oC)	add 273.15	Kelvin (K)

Note: 1 sievert = 100 rem

S.1 INTRODUCTION

The National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), is the Federal agency responsible for maintaining and enhancing the safety, security, reliability, and performance of the U.S. nuclear weapons stockpile. This S*ite-Wide Environmental Impact Statement for the Y-12 National Security Complex* (Y-12 SWEIS) analyzes the potential environmental impacts of ongoing and future operations and activities at the Y-12 National Security Complex (Y-12), including alternatives for changes to site infrastructure and levels of operation (using production capacity as the key metric for comparison). The primary purpose of continuing to operate Y-12 is to provide support for the NNSA's national security missions.

Y-12 is one of three primary installations on the DOE Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee (Figure S.1-1). The other installations are the Oak Ridge National Laboratory (ORNL) and the East Tennessee Technology Park (ETTP) (formerly the Oak Ridge K-25 Site). Construction of Y-12 started in 1943 as part of the World War II Manhattan Project. The early missions of the site included the separation of uranium-235 from natural uranium[1] by the electromagnetic separation process and the manufacture of nuclear weapons components from uranium and lithium. Today, as one of the NNSA production facilities, Y-12 is the primary site for enriched uranium (EU) processing and storage, and one of the primary manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Y-12 is unique in that it is the only source of **secondaries**,[2] **cases**, and other nuclear weapons components within the NNSA nuclear security enterprise.[3] Y-12 also dismantles weapons components, safely and securely stores and manages special nuclear material (SNM),[4] supplies SNM for use in naval and research reactors, and dispositions surplus materials. Y-12 nuclear nonproliferation programs 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.

Secondaries and Cases

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

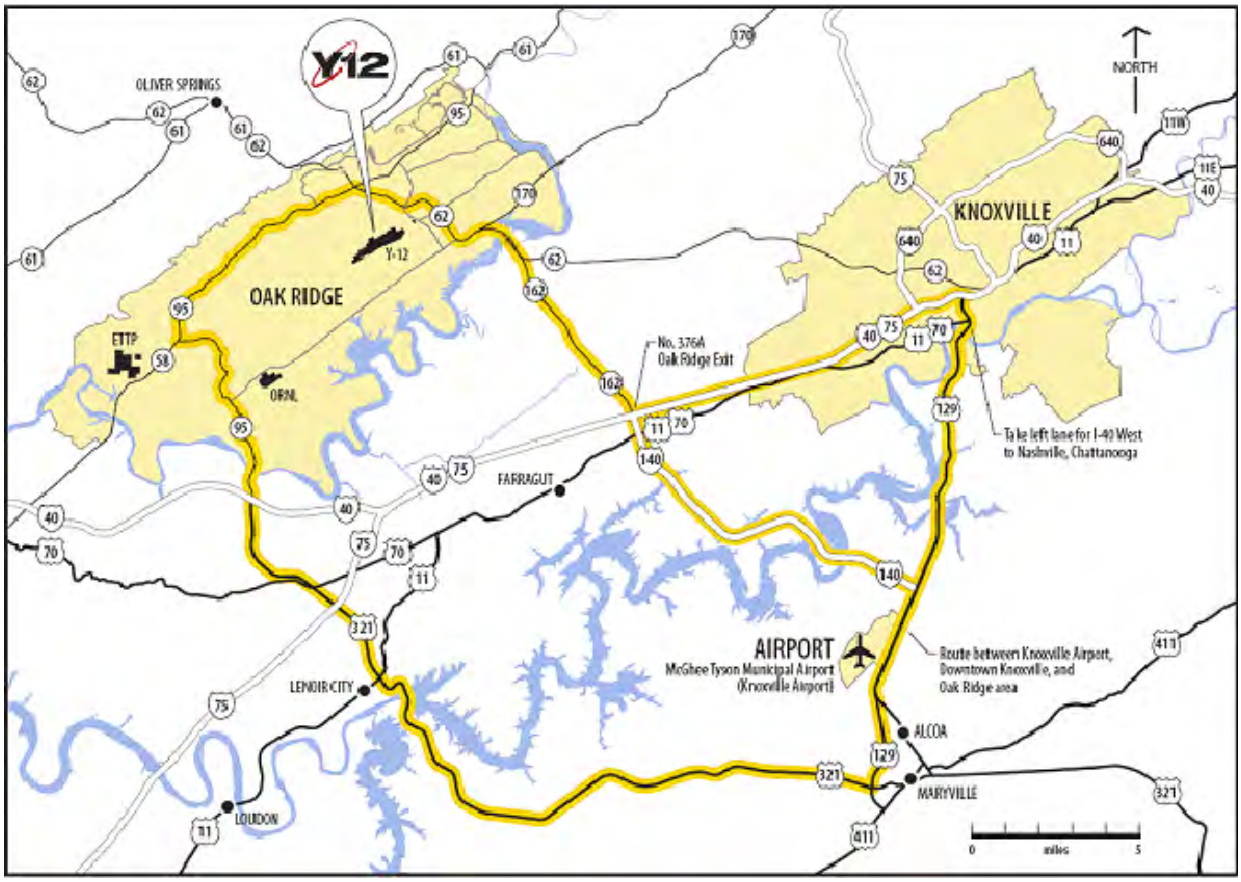
Y-12 conducts and/or supports nondefense-related activities including: environmental monitoring, remediation, and decontamination and decommissioning (D&D) activities of the DOE Environmental Management Program; manages waste materials from past and current operations; supports the production of medical isotopes; and develops highly specialized technologies to support the capabilities of the U.S. industrial base.

[1] Natural uranium is a mixture of uranium-238 (99.2739 percent), uranium-235 (0.7205 percent) and uranium-234 (0.0056 percent).

[2] Text boxes provide additional information on terms that are bold-faced.

[3] "Nuclear security enterprise" is a relatively new term that refers to the NNSA complex in its entirety. In the past, NNSA used the term "nuclear weapons complex." NNSA believes that "nuclear security enterprise" more accurately describes its basic mission as a "nuclear security" organization that addresses a broad range of nuclear security items (the stockpile, nuclear nonproliferation, nuclear counter-terrorism, incident response, emergency management, etc.).

[4] As defined in section 11 of the *Atomic Energy Act of 1954* (Pub. Law 83-703), the term SNM means: (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Nuclear Regulatory Commission determines to be SNM, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.



Source YSO 2010b.

Figure S.1-1. Location of Oak Ridge Reservation, Principal Facilities, and Surrounding Area.

S.1.1 Background

In the mid-1990s, DOE prepared several Programmatic EISs (PEISs) to inform decisionmakers and the public of the potential environmental impacts of alternatives for carrying out its national security missions. DOE then made a number of decisions related to the nuclear security enterprise operations at Y-12 and the long-term storage and disposition of fissile material.[5] Specifically, DOE decided that the mission of Y-12 would not change, (i.e., Y-12 would continue to maintain the capability and capacity to fabricate nuclear weapons secondaries, cases, and limited-life components in support of the nuclear weapons stockpile, and store/process non-surplus, highly enriched uranium (HEU) long-term and surplus HEU pending disposition). (See Section 1.7.1 for a discussion of these previous PEISs).

Following the PEIS decisions, DOE/NNSA prepared the 2001 Y-12 SWEIS (DOE 2001a) to evaluate alternatives for implementing the PEIS decisions (DOE 2001a). The Final Y-12 SWEIS, issued in September 2001, evaluated alternatives related to the operation of Y-12 for an approximate 10-year planning period. One of the primary goals of the 2001 Y-12 SWEIS was to

[5] Fissile materials are plutonium-239, uranium-233, uranium-235, or any material containing any of the foregoing.

provide an overall *National Environmental Policy Act* (NEPA) baseline for all DOE activities at Y-12, including an assessment of a Y-12 Modernization Program consistent with previous programmatic decisions. The purpose of the Modernization Program (see Section S.1.2) is to develop and implement a program to modernize Y-12's facilities to meet future stockpile needs.

In the 2001 Y-12 SWEIS, NNSA recognized and acknowledged that the Modernization Program would be implemented over a number of years so as to not interfere with Y-12 meeting required and planned mission activities. Although many potential modernization projects were identified in the 2001 Y-12 SWEIS, only two projects had reached the stage of development to have been included as proposals in that SWEIS. Alternatives for those two projects, the Highly Enriched Uranium Materials Facility (HEUMF) and the Special Materials Complex (SMC), were analyzed in the 2001 Y-12 SWEIS.

In the 2002 Record of Decision (ROD) for the 2001 Y-12 SWEIS (67 *Federal Register* [FR] 11296, March 13, 2002), NNSA announced its decision to continue operations at Y-12 and to construct and operate two new facilities: (1) the HEUMF and (2) the SMC. Construction of the HEUMF was completed in 2008 and the facility began full-scale operations in 2010. In addition to being a significant contribution to modernization at Y-12, the 110,000 square-foot HEUMF will reduce the current storage footprint (by phasing out excess facilities), while improving security and lowering costs. The SMC was subsequently cancelled due to changing mission requirements and replaced by a smaller, single-function Purification Facility (*Supplement Analysis for Purification Facility, Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, DOE/EIS-0309/SA-1, August 2002 [NNSA 2002]), and the installation of new equipment in existing facilities.

Most recently, NNSA prepared the *Complex Transformation Supplemental PEIS* (SPEIS) (DOE/EIS-0236-S4) (NNSA 2008) to analyze potential environmental impacts of alternatives for transforming the nuclear security enterprise into a smaller, more efficient enterprise. (See Section 1.7.1 for a more detailed discussion of that SPEIS and its relevance to this Y-12 SWEIS.) In the ROD for that SPEIS, NNSA affirmed that manufacturing and research and development (R&D) involving uranium will remain at Y-12 (73 FR 77644, December 19, 2008). NNSA also announced that it will construct and operate a Uranium Processing Facility (UPF) at Y-12 as a replacement for existing facilities that are more than 50 years old and face significant safety and maintenance challenges to their continued operation. The NNSA committed to evaluating the site-specific issues associated with continued production operations at Y-12 in this current SWEIS, including issues related to construction and operation of a UPF, such as its location[6] and size. In this new Y-12 SWEIS, NNSA continues to assess alternatives for the modernization of Y-12, including implementation of the Complex Transformation SPEIS decisions.

[6] As described in Section S.3.1.2.1 and shown in Figure S.3.1.2-2, the proposed UPF would be located adjacent to the HEUMF, at a site just west of the HEUMF. In the 2001 Y-12 SWEIS, DOE evaluated alternative locations for the HEUMF, and in the ROD DOE decided to construct the HEUMF at the Y-12 West Portal Parking Lot Site (67 FR 11296, March 13, 2002). Construction of the HEUMF was initiated in 2005 and completed in 2008. The facility began full-scale operations in 2010. Locating a UPF adjacent to the HEUMF is consistent with the analysis performed in support of the 2001 Y-12 SWEIS, the Complex Transformation SPEIS, RODs based on these documents, and Y-12 modernization plans. Siting a UPF at a location other than adjacent to the HEUMF would not allow for certain operational efficiencies and reduced security footprint.

S.1.2 Y-12 Today and the Vision for Tomorrow

Over the past 10-15 years, Y-12 has been taking steps to modernize and transform its Cold War-era site and facilities into a modern, more cost-effective enterprise. Modernization and transformation envisions the eventual replacement or upgrade of select major production and support facilities with the goal to improve Y-12 capabilities by:

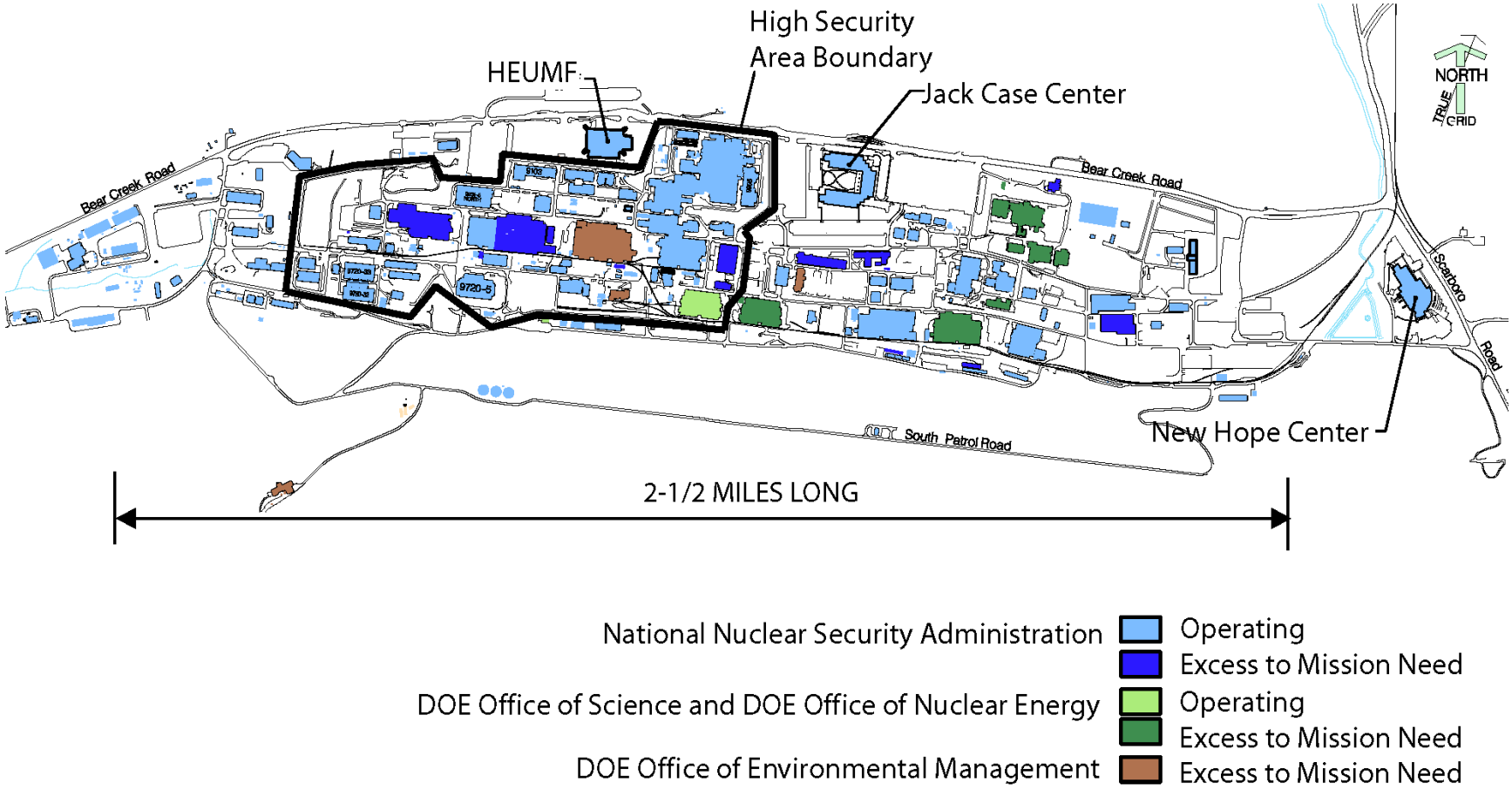
- Improving worker protection through the use of engineered controls;
- Improving safety, environmental, and security compliance through the use of modern facilities and advanced technologies;
- Supporting responsiveness to the science-based Stockpile Stewardship Program through increased flexibility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

To date, the following important actions have been completed:

- Construction of the HEUMF, Y-12's first major enriched uranium (EU) modernization project.
- Construction of two new technical/administrative facilities was completed in 2007. The Jack Case Center and the New Hope Center now house over 1,400 employees from Babcock & Wilcox Technical Services Y-12, LLC (B&W Y-12), the Management and Operating contractor for Y-12, and the NNSA Y-12 Site Office. Construction of these facilities enabled the demolition of a number of excess facilities and the cancellation of several off-site leases.
- Y-12 has continued an aggressive Infrastructure Reduction program. Since 2002, Y-12 has demolished approximately 1.3 million square feet of floor space (NNSA 2008a).

Currently, the Y-12 workforce consists of approximately 6,500 people (DOE employees and multiple contractors and subcontractors) operating approximately 393 facilities with approximately 5.8 million square feet of NNSA-owned space and leased space. This represents 75 percent of the total Y-12 site footprint (NNSA 2008a). Other DOE program offices have ownership of the remaining facilities at Y-12. Figure S.1.2-1 depicts the major operational facilities currently supporting the Y-12 missions, which are described in Chapter 2. As shown in that figure, there are numerous facilities located within an approximate 150-acre, high-security area.

While important modernization 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 goals. The most recent plan, dated August 2008, is referred to as the Ten-Year Site Plan (TYSP) for 2009-2018 (NNSA 2008a). 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 years (see Figure S.1.2-2). That vision presents a layout of the major operational facilities that would be required to



Source: NNSA 2008a.

Figure S.1.2-1. Major Operating Facilities Currently Supporting Y-12 Missions.

Source: NNSA 2008a, modified.

Figure S.1.2-2. The Proposed End State for the Modernization of Y-12.

support future national security missions at Y-12. To fully appreciate the proposed end-state envisioned, comparing Figure S.1.2-1 against Figure S.1.2-2 provides a view of the amount of consolidation and elimination of excess facilities envisioned. As can be seen, Y-12 would look significantly different in the future than it looks today. Y-12 would have significantly fewer facilities and floorspace, and significantly more open space.

From a land-use planning perspective, NNSA envisions a site that would ultimately consist of three functional zones (Production Operations, Technical Support Operations, and Site Support Operations) with significant areas of open space. The three zones are described below. The overall configuration is indicative of a modernization-in-place, or brownfield, approach to redevelopment. The approach must incorporate realistic funding for new facilities and for the D&D of excess facilities that render areas of the plant usable for redevelopment within the zones while at the same time continuing to operate the existing plant. For these reasons, while the facility footprint of Y-12 would decrease, the land area requirement would likely remain in support of safeguards and security requirements (NNSA 2008a).

The vision has incorporated the disposition of all buildings that would no longer be required to support the Y-12 missions. The total site footprint is envisioned to be around 3 million square feet. While the locations of some buildings are shown on Figure S.1.2-2, it should be noted that some future facilities would be subject to change as more detailed master planning matures over time.

Production Operations. This zone would be dominated by the consolidation of all EU operations into HEUMF and the UPF (currently in preliminary design, and analyzed in this SWEIS for siting, construction, and operation). By consolidating all EU into these two facilities, the high security area that now consists of approximately 150 acres could ultimately be reduced to about 15 acres—significantly reducing security costs. With the use of advanced security surveillance systems and a smaller security area, the EU protective force will be reduced by 40 to 60 percent. The first phase of this consolidation is complete with the operation of the HEUMF. The second facility, UPF, is addressed in this SWEIS. The production operations zone would also include a facility to consolidate lithium, depleted uranium (DU), special materials, and general manufacturing operations. Currently, these operations are dispersed in several Manhattan Project–era and/or pre-1960 facilities. While some facility upgrades, minor consolidations, and maintenance of these facilities would continue in the short term, NNSA envisions that a small facility, or possibly a Consolidated Manufacturing Complex (CMC), could be designed and engineered to consolidate these various operations.

Technical Support Operations. This zone is dominated by the Jack Case Center (an office building completed in 2007) and several other existing structures. Today, this zone has over 20 major facilities, many of which are Manhattan Project–era structures not designed for their current use as office buildings. Transformation envisions a zone that will contain the Jack Case Center and retain several of the more permanently constructed buildings such as 9106, 9109, 9115, 9116, 9710-3, and 9733-5. The Jack Case Center, a leased facility, houses over 1,000 people. Ongoing site planning activities are evaluating additional facilities in this zone, possibly through private sector investment. These include an R&D Center, Plant Laboratory, Maintenance Facility, and Warehouse.

Site Support Operations. These zones, located in the eastern and western portions of the existing Y-12 site, would contain various site support functions such as materials management, vehicle maintenance, fire station, and emergency management operations. Also included in this area of the complex is New Hope Center, completed in 2007. This facility contains functions that do not require a higher security level, such as information technology, the Y-12 visitor center, conference and training facilities, light laboratories, and offices. A new steam plant, funded by the Facilities and Infrastructure Recapitalization Program (FIRP), was constructed in this area and became operational in June 2010. Another FIRP-funded project, the Potable Water System Upgrades project, became operational in September 2010. The western site support operations zone also houses several onsite waste management facilities, including the West End Treatment Facility, tank farms, and tanker terminal. This land would continue to be used to support Y-12 operations and cleanup actions.

Approximately 3.1 million square feet of facilities would be eliminated if the proposed end-state is achieved. NNSA has established the following site-specific goals for Y-12 over the next approximately 20 years:

- 90 percent reduction in the high security area;
- 60 percent reduction in the nuclear operations footprint; and
- 50 percent reduction in the total building footprint (an approximate 3.1 million square foot reduction) (NNSA 2008a).

As implied by the site vision, over the next approximately 20 years there would be a significant amount of open space generated as a result of legacy facility and material disposition and site cleanup over time. Although this land area would provide, as some of it does today, potential reuse or reindustrialization opportunities to support future programs, any such changes are currently not reasonably foreseeable.

Because of the long-term nature of modernization and transformation, not all of the facilities/actions envisioned in the TYSP are analyzed within the alternatives considered in this SWEIS because not all of the facilities/actions are ripe for analysis. Some of these buildings are concept facilities with no established funding. Such potential future projects are described in Section 3.3 (Potential Future Y-12 Modernization Projects). These future projects are also considered, based on current information, in the cumulative impacts chapter of this SWEIS (see Chapter 6). Further NEPA review would be required if these facilities are formally proposed and ripe for decision.

Additionally, some actions envisioned by the TYSP are not analyzed as proposals in this SWEIS because they are either addressed by other regulatory actions or have been analyzed in other NEPA documents. The Integrated Facilities Disposition Program (IFDP) is one such example. The IFDP includes both existing excess facilities and newly identified excess (or soon to be

excess) facilities. The IFDP is a strategic program for disposing of legacy materials and facilities at ORNL and Y-12 using an integrated approach that results in risk reduction, eliminates $70 million to $90 million per year in cost of operations, provides surveillance and maintenance of excess facilities, and management of other legacy conditions. Under the IFDP, the D&D of approximately 188 facilities at ORNL, 112 facilities at Y-12, and remediation of soil and groundwater contamination would occur over the next 30-40 years. The IFDP will be conducted as a remedial action under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). Cleanup and D&D activities conducted under CERCLA are reviewed through the CERCLA process. Section S.1.4 discusses the scope of this SWEIS and the alternatives addressed.

S.1.3 Purpose and Need

Purpose and Need

The purpose and need for NNSA action is to support the Stockpile Stewardship Program and to meet the missions assigned to Y-12 in the Complex Transformation SPEIS ROD efficiently and safely.

The continued operation of Y-12 is critical to NNSA's **Stockpile Stewardship Program** and Nuclear Nonproliferation Programs. Y-12 is unique in that it is the only source of secondaries, cases, and other nuclear weapons components within the NNSA nuclear security enterprise. Y-12 also dismantles nuclear weapons components, safely and securely stores and manages SNM, supplies SNM for use in naval and research reactors, and dispositions surplus materials. Y-12's nuclear nonproliferation programs play a critical role in combating the spread of weapons of mass destruction. As explained in Section 1.5 of the SWEIS, the Y-12 missions are consistent with, and supportive of, national security policies and international treaties.

Stockpile Stewardship Program

The Stockpile Stewardship Program is designed to ensure the safety and reliability of the U.S. nuclear weapons stockpile without underground testing by using the appropriate balance of surveillance, experiments, and simulations.

Continued operation of Y-12 is made more difficult by the fact that most of the facilities at Y-12 are old, oversized, and inefficient. Continued long-range reliance on World War II-era facilities designed for enrichment, and on support facilities built to be temporary in some cases, would not meet NNSA's responsive infrastructure objectives, would not provide the level of security and safeguards required for the future, and would become more and more costly to operate. More than 70 percent of all the floor space at Y-12 was constructed prior to 1950 as part of the Manhattan Project. The total operating space estimated to perform the future NNSA missions and functions at Y-12 is significantly less than the current operating space. NNSA estimates that the future NNSA footprint would be approximately 2.2 million square feet of space versus the 5.3 million square feet utilized today.[7] These old and oversized facilities are costly to maintain and have no inherent value for future missions. Modernizing this old, over-sized, and inefficient infrastructure is a key strategic goal of Y-12 and is consistent with NNSA strategic planning initiatives and prior programmatic NEPA documents (NNSA 2007, NNSA 2008, NNSA 2008a).

[7] The 5.3 million square feet figure does not include approximately 550,000 square feet associated with the Jack Case and New Hope Centers which were completed in July 2007 and are leased by Babcock & Wilcox Technical Services Y-12, LLC (B&W). The 2.2 million square feet figure includes the approximately 550,000 square feet associated with the Jack Case and New Hope Centers.

The existing EU operations require significant funding to address security, facility, and process equipment aging and other infrastructure issues. For example, existing EU operations are decentralized in several buildings that are not connected and require many inefficient transports of SNM. The resulting protected area within the **Perimeter Intrusion Detection and Assessment System (PIDAS)** is large, and operating costs are not optimized. Over time, an elaborate system of **administrative controls** has been put in place to adequately manage environmental compliance, worker safety, criticality safety, fire protection, and security. The maintenance of these administrative controls requires an increasingly large number of personnel to ensure compliance in operations. Maintaining an effective safeguards and security posture for materials and processes in this patchwork of facilities is increasingly costly during a time when security threats are increasing (B&W 2007).

Perimeter Intrusion Detection and Assessment System (PIDAS)

A PIDAS is a combination of barriers, clear zones, lighting, and electronic intrusion detection, assessment, and access control systems constituting the perimeter of the protected area and designed to detect, impede, control, or deny access to the protected area.

The current SNM facilities at Y-12 have physical protection challenges with the amount and nature of material and the number and location of storage and operations areas. In addition, the physical infrastructure is a sprawling industrial complex with many facilities located at less than the optimal distance to employee access roads. With SNM facilities dispersed within the site, the existing protected area is large and needlessly encompasses most non-SNM production operations. With the new **graded security protection policy**, existing SNM facilities are very labor intensive to secure (B&W 2007).

Administrative Controls and Engineered Controls

Administrative controls are measures used to reduce potential hazards to workers, including work practices, labeling and warning devices and signs, training, monitoring, housekeeping, maintenance and management.

Engineered controls are systems used to reduce potential hazards by isolating the worker from the hazard or by removing the hazard from the work environment. Methods include substitution, ventilation, isolation, and enclosure. Engineered controls are preferred over administrative controls and personal protective equipment.

In this SWEIS, NNSA is considering alternatives that would support decisions regarding the modernization of Y-12. The goals and objectives of modernizing Y-12 are to accomplish the following:

- Improve the level of security and safeguards;
- Replace/upgrade end-of-life facilities and ensure a reliable EU processing capability to meet the mission of NNSA;
- Improve efficiency of operations and reduce operating costs by consolidating and modernizing equipment and operation;
- Reduce the size of the protected area by 90 percent and reduce the operational cost necessary to meet the security requirements;
- Improve worker protection with an emphasis on incorporating **engineered controls**; and

Graded Security Protection Policy

The elements of a threat postulated for the purpose of establishing requirements for safeguards and security programs, systems, components, equipment, and information.

- Comply with modern building codes and environment, safety, and health standards (B&W 2007).

S.1.4 Scope of this Y-12 SWEIS and Alternatives

This Y-12 SWEIS (DOE/EIS-0387) expands on and updates the analyses in the 2001 Y-12 SWEIS (DOE/EIS-0309)(DOE 2001a), and includes alternatives for proposed new actions and changes since the 2002 Y-12 SWEIS ROD (67 FR 11296) (see Section S.3 for a more detailed discussion of these alternatives). The No Action Alternative for this SWEIS is the continued implementation of the 2002 ROD, as modified by decisions made following analysis in subsequent NEPA reviews.

Four action alternatives are considered in this SWEIS in addition to the No Action Alternative (Alternative 1). The four alternatives differ in that: Alternative 2 involves a new, fully modernized manufacturing facility optimized for safety, security and efficiency; Alternative 3 involves upgrading the existing facilities to attain the highest level of safety, security, and efficiency possible without constructing new facilities; and Alternatives 4 and 5 involve a reduction in the production capacity of Y-12 to support smaller stockpile requirements. Alternatives 2-5 also include the construction and operation of a new Complex Command Center (CCC). A brief description of the alternatives follows. A more detailed description is contained in S.3.1.

S.1.4.1 *Alternative 1 – No Action Alternative*

The No Action Alternative reflects the current nuclear weapons program missions at Y-12. Construction of a UPF and CCC are not part of the No Action Alternative. The No Action Alternative would be capable of supporting a production level of approximately 125 secondaries and cases per year.[8] As part of the No Action Alternative, other construction projects are also underway or planned for the future. Some are refurbishments or upgrades to plant systems, such as those for potable water, which have been analyzed in separate NEPA documentation. Section 1.7.2 of the SWEIS identifies and describes these projects in more detail.

S.1.4.2 *Alternative 2 – Uranium Processing Facility Alternative*

Under this alternative, NNSA would implement all actions in the No Action Alternative, and construct and operate a modern **UPF** (Section S.1.4.2.1) and a new CCC (Section S.1.4.2.2).

[8] In order to provide a consistent analysis of the impacts among alternatives, the analyses presented in the SWEIS were performed using an assumed production level of 125 secondaries and cases per year for each of the Alternatives 1, 2, and 3. It should be noted that the environmental impacts associated with the production of secondaries varies based on the systems being produced or the actual work content of refurbished systems. The 125 production level analyzed in the SWEIS is representative of more difficult systems that have been produced in the past or could be produced in the future. As documented in the Stockpile Stewardship and Management Plan issued in May 2010 (NNSA 2010a), NNSA has also recently evaluated the capacity of the existing production buildings for less difficult systems and has determined that for those systems the maximum capacity is approximately 160 secondaries and cases per year. The environmental impacts associated with the production of these units would be bounded by the analysis for the 125 difficult systems analyzed in the SWEIS.

S.1.4.2.1 Uranium Processing Facility

The UPF would consolidate EU operations into an integrated manufacturing operation sized to provide flexibility in supporting programmatic needs. The UPF is proposed to be sited adjacent to the HEUMF to allow the two facilities to function as one integrated operation. Transition of EU production operations to the UPF (Alternative 2) and transition of EU storage operations into HEUMF (No Action Alternative) would enable the creation of a new high-security area 90 percent smaller than the current high-security protected area. This alternative is referred to as the "UPF Alternative" throughout this SWEIS. The UPF Alternative would be capable of supporting a production level of approximately 125 secondaries and cases per year.

UPF Project

The UPF would improve security and safety, reduce costs, and ensure that Y-12 maintains the capability to meet national security requirements for the foreseeable future.

The UPF Alternative, which would involve a major capital investment, has been developed to continue with modernization efforts to correct the deficiencies described in Section S.1.3. For example, the UPF, if constructed, would consolidate current and future EU operations in approximately 388,000 square feet of floor space and free up approximately 633,000 square feet of space for eventual D&D. The consolidation of all **Category I and II (Cat I/II) SNM** into two facilities (the proposed UPF and the recently constructed HEUMF) would significantly improve physical protection and effectively meet the NNSA's graded security protection policy; optimize material accountability; enhance worker, public, and environmental safety; and consolidate operations to greatly reduce operational costs (B&W 2004a).

Categories of SNM

A designation determined by the quantity and type of SNM. NNSA uses a cost-effective, graded approach to providing SNM safeguards and security. SNM is categorized into security Categories I, II, III, and IV, with Categories I and II requiring the highest safeguards and security.

S.1.4.2.2 Complex Command Center

The CCC is proposed under all action alternatives (Alternatives 2-5). The CCC would comprise a new Emergency Services Complex for Y-12. The new facility would house equipment and personnel for the plant shift superintendent, Fire Department, and Emergency Operations Center (EOC). Approximately 50,000 square feet of enclosed facility space would be required to accommodate operational needs.

S.1.4.3 *Alternative 3 – Upgrade in-Place Alternative*

Under this alternative, NNSA would continue the No Action Alternative and upgrade the existing EU and non-enriched uranium processing facilities to contemporary environmental, safety, and security standards to the extent possible within the limitations of the existing structures and without prolonged interruptions of manufacturing operations. Under this alternative, there would be no UPF and parts of the current high-security area would not be downsized. Although existing production facilities would be modernized, it would not be possible to attain the combined level of safety, security and efficiency made possible by the UPF

Alternative. The CCC, described above, would also be proposed under this alternative. This alternative is referred to as the "Upgrade in-Place Alternative" throughout this SWEIS. The Upgrade in-Place Alternative would be capable of supporting a production level of approximately 125 secondaries and cases per year.

S.1.4.4 *Alternative 4 – Capability-sized UPF Alternative*

As discussed in Section S.1.5.1 and Section S.1.5.2, the U.S. is significantly reducing the size of its nuclear weapons stockpile, while modernizing the physical infrastructure in order to ensure the stockpile remains safe, secure, and effective. The goal of the United States is to maintain a credible nuclear deterrent with the lowest possible number of nuclear warheads consistent with national security needs. NNSA developed Alternatives 4 and 5 to analyze the potential environmental impacts associated with a nuclear security enterprise that would support stockpiles smaller than those currently planned.

Under Alternative 4, NNSA would maintain a basic manufacturing capability to conduct surveillance and produce and dismantle secondaries and cases. To support this alternative, NNSA would build a smaller UPF (350,000 square feet) at Y-12 compared to the UPF described under Alternative 2 (388,000 square feet). A smaller UPF would maintain all capabilities for fabricating secondaries and cases, and capabilities for planned dismantlement, surveillance and uranium work for other NNSA and non-NNSA customers. This UPF would be capable of supporting a production level of approximately 80 secondaries and cases per year (compared to 125 secondaries and cases per year for the UPF Alternative). The CCC, described in Section S.1.4.2.2, would also be proposed under this alternative. This alternative also includes continued operations related to other National Security Programs, such as Nonproliferation, Global Threat Reduction Initiatives, and support to Naval Reactors (see Chapter 2). Additionally, there are many non-NNSA programs at Y-12 that would also continue under this alternative. Chapter 2 describes these programs.

S.1.4.5 *Alternative 5 – No Net Production/Capability-sized UPF Alternative*

Similar to Alternative 4, under a No Net Production/Capability-sized UPF Alternative, NNSA would maintain the capability to conduct surveillance and produce and dismantle secondaries and cases. The No Net Production/Capability-sized UPF Alternative would be capable of supporting a production level of approximately 10 secondaries and cases per year, which would support surveillance and dismantlement operations and a limited Life Extension Program (LEP)[9] workload; however, this alternative would not support adding replacement or increased numbers of secondaries and cases to the stockpile. This alternative would involve an even further reduction of production throughput at Y-12 compared to Alternative 4. For this alternative, NNSA would build a smaller UPF (approximately 350,000 square feet) compared to the UPF described under Alternative 2 (388,000 square feet). The CCC, described in Section S.1.4.2.2,

[9] An LEP is a systematic approach that consists of a coordinated effort by the design laboratories and production facilities to: 1) determine which components will need refurbishing to extend each weapon's life; 2) design and produce the necessary refurbished components; 3) install the components in the weapons; and 4) certify that the changes do not adversely affect the safety and reliability of the weapon. The full range of LEP approaches consists of refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components.

would also be proposed under this alternative. Section S.1.4.6 provides a summary of the differences among the UPF capacity alternatives.

S.1.4.6 *Capacity Alternatives for the Uranium Processing Facility*

This SWEIS assesses three alternative sizes for the UPF:

- A nominal-sized UPF, described under Alternative 2, with a production level of approximately 125 secondaries and cases per year. This alternative is described in Section S.3.1.2.
- A capability-sized UPF, described under Alternative 4, with a production level of approximately 80 secondaries and cases per year. This alternative is described in Section S.3.1.4.
- A no net production/capability-sized UPF, described under Alternative 5, with a production level of approximately 10 secondaries and cases per year. This capacity would support surveillance and dismantlement operations and a limited LEP workload.[10] This alternative is described in Section S.3.1.5.

From a square footage standpoint, any "capability"-sized UPF requires a "minimum" of 350,000 square feet to accommodate production equipment/glove boxes. Section S.3.1.6 provides more information regarding the differences among the UPF throughputs assessed in this SWEIS.

S.1.5 National Security Considerations

This section discusses the national security policy overlays and related treaties that are potentially relevant to this SWEIS. Section S.1.5.1 discusses nonproliferation and treaty compliance and Section S.1.5.2 discusses relevant national security policies and reports, including the recently completed Nuclear Posture Review (NPR).

S.1.5.1 *Nonproliferation and Treaty Compliance*

NNSA's overarching mission is to contribute to U.S. security by providing the Nation with a safe and reliable nuclear weapons stockpile through the Stockpile Stewardship Program. NNSA intends to do this fully consistent with U.S. nuclear weapons policies and current treaty obligations. This mission requires NNSA to maintain, assess, and certify the stockpile regardless of size, including replacements and repairs. The Stockpile Stewardship Program is fully consistent with and supports the U.S. commitment to the Nuclear Nonproliferation Treaty (NPT) and enables the U.S. to continue its 1992 moratorium on underground nuclear testing (DOE 1996a).

The nonproliferation and treaty compliance aspects of the Stockpile Stewardship Program were evaluated in Chapter 2 of the *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS) (DOE/EIS-0236) (DOE 1996a). The SSM PEIS analyzed the nonproliferation aspects of the Stockpile Stewardship Program and concluded that

[10] The term "limited LEP workload" refers to the minimal capacity that would be available to produce any required refurbished or reused secondaries.

implementation of the Stockpile Stewardship Program and maintaining nuclear weapons competencies and capabilities are fully consistent with the NPT (DOE 1996a). This evaluation included the operation of Y-12 and its responsibilities under the Stockpile Stewardship Program. These conclusions remain valid whether or not Y-12 modernization continues.

Article VI of the NPT obligates the parties "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control" (NPT 1970). The NPT does not identify a specific date for achieving nuclear disarmament. U.S. compliance with its commitment under Article VI, however, has been outstanding. In 1995, when the NPT was indefinitely extended, the U.S. reiterated its commitment under Article VI to work toward the ultimate goal of eliminating nuclear weapons, and to general and complete disarmament (DOE 1996a). Over the past 20 years, significant progress has been made in fulfilling this commitment. The U.S. has been reducing its nuclear forces and nuclear weapons stockpile in a consistent fashion through both unilateral and bilateral initiatives, and working cooperatively with allies and partners to further reduce nuclear threats, as evidenced by the following examples:

- The Moscow Treaty, which entered into force in 2003, commits the U.S. and Russia to deep reductions (i.e., to a level of 1,700-2,200 operationally deployed strategic nuclear warheads by 2012). As of May 2009, the United States had cut its number of operationally deployed strategic nuclear warheads to 2,126;
- Under the Strategic Arms Reduction Treaty (START) and the Moscow Treaty, the U.S. will have decommissioned, over the period of two decades, more than three-quarters of its strategic nuclear warheads attributed to its delivery vehicles;
- On December 18, 2007, the White House announced the President's decision to reduce the nuclear weapons stockpile by another 15 percent by 2012. This means the U.S. nuclear stockpile will be less than one-quarter its size at the end of the Cold War—the smallest stockpile in more than 50 years (D'Agostino 2008);
- On April 1, 2009, Presidents Obama and Medvedev agreed in London that American and Russian negotiators would begin work on a new, comprehensive, legally binding agreement on reducing and limiting strategic offensive arms to replace the START Treaty, which expired on December 5, 2009 (White House 2009);
- On April 8, 2010, Presidents Obama and Medvedev signed the New START Treaty to replace the now-expired 1991 START Treaty. The New START Treaty would cut the nuclear weapons that the United States and Russia will deploy, significantly reduces missiles and launchers, puts in place a strong and effective verification regime, and maintains the flexibility needed to protect and advance national security, and to guarantee unwavering commitment to the security of allies. The New START Treaty would reduce deployed warheads to 1,550, which is about 30 percent lower than the upper warhead limit of the Moscow Treaty. The New START Treaty entered into force on February 5, 2011. The treaty allows a full seven years for these reductions to be made and will remain in effect for 10 years (DOS 2010).

S.1.5.2 *National Security Policies and Relevant Reports*

In 2008, Congress directed the Secretary of Defense to conduct a comprehensive review of the nuclear posture of the U.S. for the next 5-10 years. The review, which began in the spring of 2009, was originally scheduled to be submitted to Congress in December 2009, but was delayed until April 2010. The 2010 NPR outlines the Administration's approach to promoting the President's agenda for reducing nuclear dangers and pursuing the goal of a world without nuclear weapons, while simultaneously advancing broader U.S. security interests. While the NPR focuses principally on steps to be taken in the next 5-10 years, it also considers the path ahead for U.S. nuclear strategy and posture over the longer term. The 2010 NPR focuses on five key objectives of U.S. nuclear weapons policies and posture:

1. Preventing nuclear proliferation and nuclear terrorism;
2. Reducing the role of U.S. nuclear weapons in U.S. national security strategy;
3. Maintaining strategic deterrence and stability at reduced nuclear force levels;
4. Strengthening regional deterrence and reassuring U.S. allies and partners; and
5. Sustaining a safe, secure, and effective nuclear arsenal.

Of these objectives, the fifth one is most relevant to the Y-12 SWEIS. Regarding this objective, the 2010 NPR states,

> "The United States is committed to ensuring that its nuclear weapons remain safe, secure, and effective. Since the end of U.S. nuclear testing in 1992, our nuclear warheads have been maintained and certified as safe and reliable through a Stockpile Stewardship Program that has extended the lives of warheads by refurbishing them to nearly original specifications. Looking ahead three decades, the NPR considered how best to extend the lives of existing nuclear warheads consistent with the congressionally mandated Stockpile Management Program and U.S. nonproliferation goals, and reached the following conclusions:
>
> - The United States will not conduct nuclear testing and will pursue ratification and entry into force of the Comprehensive Nuclear Test Ban Treaty.
> - The United States will not develop new nuclear warheads. Life Extension Programs (LEPs) will use only nuclear components based on previously tested designs, and will not support new military missions or provide for new military capabilities.
> - The United States will study options for ensuring the safety, security, and reliability of nuclear warheads on a case-by-case basis, consistent with the congressionally mandated Stockpile Management Program. The full range of LEP approaches will be considered: refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components.
>
> In any decision to proceed to engineering development for warhead LEPs, the United States will give strong preference to options for refurbishment or reuse. Replacement of nuclear components would be undertaken only if critical Stockpile Management Program

> goals could not otherwise be met, and if specifically authorized by the President and approved by Congress.
>
> In order to remain safe, secure, and effective, the U.S. nuclear stockpile must be supported by a modern physical infrastructure – comprised of the national security laboratories and a complex of supporting facilities – and a highly capable workforce with the specialized skills needed to sustain the nuclear deterrent. As the United States reduces the numbers of nuclear weapons, the reliability of the remaining weapons in the stockpile – and the quality of the facilities needed to sustain it – become more important." (NPR 2010)

The NPR concluded that the following key investment was required to sustain a safe, secure, and effective nuclear arsenal: "Developing a new Uranium Processing Facility at the Y-12 Plant in Oak Ridge, Tennessee to come on line for production operations in 2021. Without an ability to produce uranium components, any plan to sustain the stockpile, as well as support for our Navy nuclear propulsion, will come to a halt. This would have a significant impact, not just on the weapons program, but in dealing with nuclear dangers of many kinds." (NPR 2010)

Finally, with respect to the sizing of any new facilities, the NPR states, "New production facilities will be sized to support the requirements of the Stockpile Stewardship Program mandated by Congress and to meet the multiple requirements of dismantling warheads and eliminating material no longer needed for defense purposes, conducting technical surveillance, implementing life extension plans, and supporting naval requirements. Some modest capacity will be put in place to accommodate surge production in the event of significant geopolitical 'surprise'." (NPR 2010)

One additional study relevant to the Y-12 SWEIS is discussed below.

In November 2009, a report entitled "Lifetime Extension Program" (LEP) was released by JASON, an independent group of scientists which advises the NNSA on various issues (JASON 2009). That report evaluated the LEP strategies for maintaining the nuclear deterrent in the absence of underground nuclear testing. One of the major conclusions of that report was that there is no evidence that accumulation of changes incurred from aging and LEPs have increased risk to certification of today's deployed nuclear warheads. According to JASON, "this finding is a direct consequence of the excellent work of the people in the U.S. nuclear weapons complex supported and informed by the tools and methods developed through the Stockpile Stewardship program. Some aging issues have already been resolved. The others that have been identified can be resolved through LEP approaches similar to those employed to date." The JASON report also concluded that, "Lifetimes of today's nuclear warheads could be extended for decades, with no anticipated loss in confidence, by using approaches similar to those employed in LEPs to date." While the JASON report also identifies recommendations which NNSA could adopt to further strengthen the LEP, NNSA believes the JASON report affirms NNSA's overall LEP strategy.

S.1.6 Laws and Regulations and *National Environmental Policy Act* Compliance Strategy

NEPA and the regulations promulgated by the Council on Environmental Quality (CEQ) (40 *Code of Federal Regulations* [CFR] Parts 1500-1508) establish environmental policy, set goals, and provide a means for implementing the policy. The key provision of NEPA requires preparation of an environmental impact statement (EIS) for "major Federal actions significantly affecting the quality of the human environment" (40 CFR 1502.3). NEPA ensures that environmental information is available to public officials and citizens before decisions are made and actions are taken (40 CFR 1500.1[b]). This SWEIS has been prepared in accordance with Section 102(2)(c) of NEPA of 1969, as amended in the United States Code (42 *U.S. Code* [U.S.C.] § 4321), and regulations promulgated by the CEQ (40 CFR Parts 1500-1508) and DOE's regulations implementing NEPA (10 CFR Part 1021).

The purpose of a SWEIS is to (1) provide DOE and its stakeholders with an analysis of the potential individual and cumulative environmental impacts associated with ongoing and reasonably foreseeable new operations and facilities, (2) provide a basis for site-wide decision making, and (3) improve and coordinate agency plans, functions, programs, and resource utilization. Additionally, a SWEIS provides an overall NEPA baseline for a site that is useful as a reference when project-specific NEPA documents are prepared.

S.1.7 Public Involvement

The process of preparing this SWEIS included two opportunities for public involvement: the scoping process and the public comment period for the Draft SWEIS. The scoping process is required by 40 CFR 1501.7 while the public comment period is required by 40 CFR 1503.1. Section S.1.7.1 describes the scoping process. Section S.1.7.2 summarizes the public comment period process for the Draft SWEIS, the major comments raised by the public, and NNSA's responses to those comments.

S.1.7.1 *Scoping Process*

On November 28, 2005, NNSA published a Notice of Intent (NOI) in the *Federal Register* (70 FR 71270), announcing its intent to prepare this Y-12 SWEIS. The public scoping period began on that day and continued through January 31, 2006 (Note: In the NOI, the public scoping comment period was scheduled to end on January 9, 2006; however, in response to public requests, the public scoping comment period was extended until January 31, 2006 [71 FR 927]). The NOI invited interested parties to attend two public scoping meetings on December 15, 2005, in Oak Ridge.

During the Y-12 SWEIS scoping process, NNSA received 340 scoping comment documents from members of the public; interested groups; and Federal, state, and local officials. These included two transcripts from the public scoping meetings held in Oak Ridge, Tennessee. Of the 340 total comment documents received, 290 of the documents were part of a letter writing campaign.[11] Table S.1.7-1 provides a summary of the scoping comment categories and the

[11] A letter writing campaign generally includes letters from many people with substantively similar comments.

number of comments in each category. A total of 3,794 comments were identified in the 340 scoping documents received.

NNSA considered all scoping comments in preparing the Draft Y-12 SWEIS. A Scoping Summary Report for the Y-12 SWEIS was prepared and is part of the Administrative Record for this Y-12 SWEIS (NNSA 2006). The major issues identified during scoping centered on the Nation's nuclear weapon policies, the SWEIS alternatives, water quality, and the health and safety of workers and the public. The Draft SWEIS included a discussion of NNSA's consideration of these scoping comments and described how these affected the SWEIS scope and analysis.

Table S.1.7-1. Category Distribution of Scoping Comments.

Category	No. of Comments
Policy	870
Purpose and Need	290
Alternatives	875
Nonproliferation	580
Environmental Compliance	290
Water Quality	290
Air Quality	2
Land Use	1
Transportation	1
Mitigation Measures	1
Terrorism	290
Cost	290
Cumulative Impacts	3
NEPA Process	2
Y-12 Missions	1
Worker and Public Health and Safety	3
Out of Scope Comments	5
Total	**3,794**

Source: Original.

S.1.7.2 *Public Comment Period*

NNSA distributed the Draft Y-12 SWEIS in October 2009. The public comment period for the Draft Y-12 SWEIS began on October 30, 2009, with publication of the Environmental Protection Agency's Notice of Availability in the *Federal Register* (74 FR 56189). That notice invited public comment on the Draft Y-12 SWEIS through January 4, 2010, and provided the schedule for two public hearings to receive comments on the Draft Y-12 SWEIS. During the comment period, two public hearings were held in Oak Ridge, Tennessee, on November 17 and 18, 2009. At the first hearing, NNSA announced an extension of the comment period until January 29, 2010. That announcement was formalized with a notice in the *Federal Register* on December 28, 2009 (74 FR 68599).

Attendance at each public hearing, together with the number of commentors, is presented in Table S.1.7-2. Attendance numbers are based on the number of participants who completed and returned registration forms and may not include all of those present at the hearings.

Table S.1.7-2. Public Hearing Attendance and Number of Commentors.

Hearing Location	Total Attendance	Commentors
Oak Ridge, TN (November 17)	129	54
Oak Ridge, TN (November 18)	165	54

In addition, the public was encouraged to provide comments via mail, facsimile, or e-mail (y12sweis.comments@tetratech.com). On June 18, 2010, NNSA issued a "Notice of Proposed Wetlands Action" for public comment regarding the construction of roadways (Haul Road extension corridor) and supporting infrastructure.[12] This Wetlands Assessment was prepared in accordance with 10 Code of Federal Regulations (CFR) 1022, "Compliance with Floodplain and Wetlands Environmental Review Requirements" for the purpose of fulfilling NNSA's responsibilities under Executive Order 11990, "Protection of Wetlands." Along with the Notice, which was published in local newspapers, the Wetlands Assessment (Appendix G) was made available through the DOE Information Center in Oak Ridge, TN. Comments on the Wetlands Assessment were due to NNSA by July 9, 2010. Volume II of this Final SWEIS, the Comment Response Document (CRD), contains the comments NNSA received on the Draft Y-12 SWEIS and Wetlands Assessment as well as NNSA's responses to those comments.

Three hundred and fifty-three (353) comment documents (including 151 comment documents as part of 7 e-mail, letter, and postcard campaigns) were received from individuals, interested groups, tribal governments, and Federal, state, and local agencies on the Draft Y-12 SWEIS and Wetlands Assessment. In addition, 115 comment documents were received via e-mail and 108 commentors spoke at the two public hearings. Late comments, submitted after the close of the public comment periods, were also considered by NNSA. The major comments included the following:

- Commentors stated opposition to nuclear weapons, modernization of Y-12, and a new UPF because:
    - The United States is not in compliance with Article VI of the NPT;
    - Nuclear weapons lead to nuclear weapons proliferation;
    - Nuclear weapons are immoral;
    - Nuclear weapon activities make Y-12 and the surrounding community more at risk to accidents and terrorist activities;
    - Nuclear weapons take money away from the clean-up of sites already contaminated;
    - A UPF is not needed;
    - More nuclear weapon activities will produce contamination at Y-12; and/or
    - Nuclear weapon activities result in adverse health and safety impacts in communities surrounding Y-12.

[12] The proposed action includes the development and construction of support facilities located on ORR, specifically, extension of an existing Haul Road, construction of a Site Access and Perimeter Modification Road, development of a Wet Soils Disposal Area, and excess soil placement at the West Borrow Area. In this SWEIS, references to the Haul Road extension corridor generally include both the Haul Road extension and the Site Access and Perimeter Modification Road.

- Commentors stated that the Y-12 SWEIS and any modernization actions should not proceed before a new Nuclear Posture Review is completed in 2010.

- Commentors felt that there are better ways in which taxpayers' money could be spent, such as: feeding the poor, providing better housing for the poor, performing energy efficiency research and development, and cleaning up contaminated sites.
- Commentors expressed support for a new UPF, stating that such a facility would improve safety, security and reduce costs.

- Commentors stated that a sixth alternative should be added to the SWEIS and considered by NNSA. Alternative 6, which was referred to as the Curatorship Alternative, was described by commentors as follows:

  Alternative 6 recognizes a need for a Stockpile Stewardship mission that can be achieved through an upgrade in place to existing facilities. It recognizes the increasing demand for a verifiable safeguarded dismantlement capacity which must be addressed. Current facilities should be analyzed. And if there is a need, [NNSA] can construct a new dismantlement facility. The benefits of such an alternative include workforce retention and the reduction of the high-security area.

In response to comments received on the Draft Y-12 SWEIS, to include data not available at the time of the development of the Draft SWEIS (for example, the Haul Road extension corridor and supporting infrastructure), and to correct errors and omissions, NNSA made changes to the Draft Y-12 SWEIS. The Summary and Volume I of this Final Y-12 SWEIS contain changes, which are indicated by a sidebar in the margin. A summary of the more meaningful changes is provided below.

- NNSA added a discussion of the dismantlement process and dismantlement requirements to the Final SWEIS (Section S.2.1.1.1 and Section 2.1.1.1).
- NNSA updated the discussion of national security considerations, including information on the New START Treaty (Section S.1.5.1 and Section 1.5.1), the JASON report entitled "Lifetime Extension Program" (Section S.1.5.2 and Section 1.5.2) and the 2010 NPR (Section S.1.5.2 and Section 1.5.2).
- NNSA provided additional information regarding the CCC, including additional information regarding siting considerations for that facility (Section S.3.1.2.2 and Section 3.2.2.2).
- NNSA updated the water use requirements for the alternatives (Section 5.7.7).
- NNSA added information and analysis of the Haul Road extension corridor and supporting infrastructure for the UPF, including a detailed Wetlands Assessment (Section 5.1.2, Section 5.8.2, and Appendix G).
- NNSA added a sensitivity analysis of Alternatives 1 and 3 at smaller operational levels (Section 5.17).
- Based on a better understanding of workforce drivers associated with different capacity scenarios, NNSA revised the employment numbers associated with Alternatives 4 and 5 (Section 5.10.4 and 5.10.5).

In accordance with 40 CFR 1502.9(c)(1), NNSA determined that there were no substantial changes in the proposed action that are relevant to environmental concerns, nor significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Consequently, NNSA determined that a Supplemental Draft Y-12 SWEIS was not required.

S.2 OPERATIONS OVERVIEW OF Y-12 NATIONAL SECURITY COMPLEX

The following sections describe the major NNSA missions/work performed at Y-12, as well as complementary work performed for other Federal, state, and local entities, and for private sector companies. A map of the current Y-12 programmatic responsibilities is provided in Figure S.2-1.

S.2.1 National Nuclear Security Administration Activities Supported by Y-12 National Security Complex

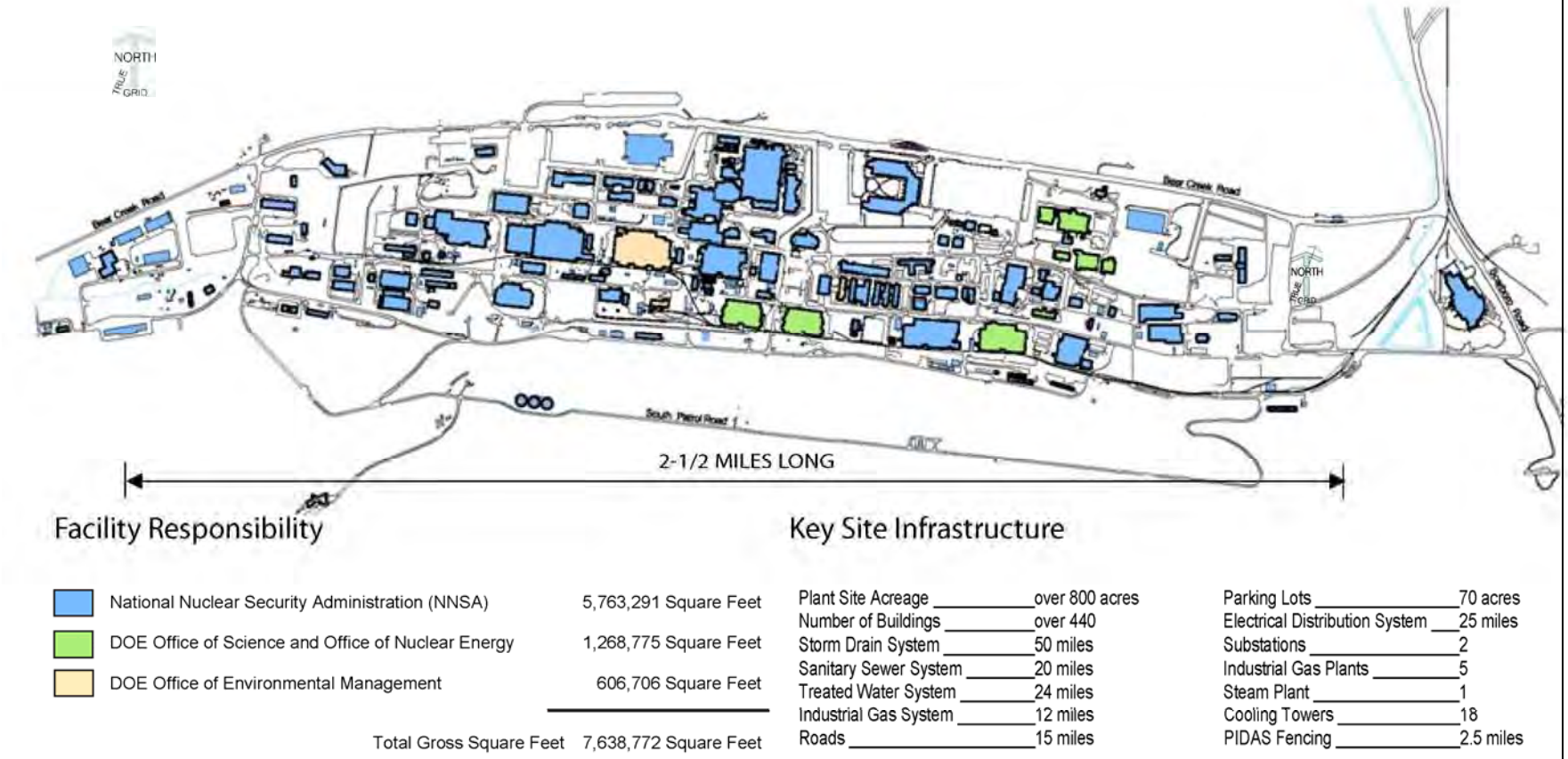
Y-12 plays an important role in U.S. national security and is a one-of-a-kind facility in the NNSA nuclear security enterprise. Y-12's role in support of the nuclear security enterprise includes the following activities:

- Manufacturing, dismantlement, disposition, and assessment of nuclear weapons secondaries, cases, and other nuclear weapons components;
- Safely and securely storing and managing SNM;
- Supplying SNM for use in naval reactors;
- Promoting international nuclear safety and nonproliferation; and
- Reducing global dangers from weapons of mass destruction (NNSA 2008a).

S.2.1.1 *Defense Programs*

The Defense Programs activities performed at Y-12 include maintaining the capability to produce secondaries and cases for nuclear weapons, storing and processing uranium and lithium materials and parts, dismantling nuclear weapons secondaries and cases returned from the stockpile, and providing special production support to NNSA weapons laboratories and to other NNSA programs. To accomplish the storage mission, some processing of SNM is required to recover materials from returned secondaries and cases. In addition, Y-12 performs stockpile surveillance activities on the components it produces. The Defense Programs work structure at Y-12 includes the following missions:

- Weapons Dismantlement and Disposition;
- EU Operations;
- Life Extension Programs;
- Nuclear Materials (and Lithium) Management, Storage and Disposition;
- Quality Control and Surveillance;
- Stockpile Evaluation and Maintenance;
- Materials Recycle and Recovery;
- Nuclear Packaging Systems;



Source: NNSA 2008a.

Figure S.2-1. Programmatic Responsibility for Y-12 Facilities.

- Campaigns;
- Modernization;
- Infrastructure Reduction; and
- Office of Secure Transportation.

Detailed information on these programs can be found in Chapter 2 of the SWEIS. In response to public comments, a discussion of dismantlements at Y-12 is included below.

S.2.1.1.1 Dismantlements

During the public comment process on the Draft Y-12 SWEIS, many commentors requested information on the dismantlement process. In response to those public comments, NNSA has added this section to discuss the dismantlement process and dismantlement throughputs at Y-12.

The Y-12 Dismantlement and Disposition Program receives, dismantles, and dispositions retired weapon components and subassemblies from the stockpile. Dismantling nuclear weapons is a complex process that involves almost all of the sites within the nuclear weapons enterprise. First, NNSA's design labs work with the production facilities to identify and mitigate any hazards that may arise before a particular weapon type is to be dismantled. The labs apply the unique knowledge they gained during the original design process for each weapon in the stockpile.

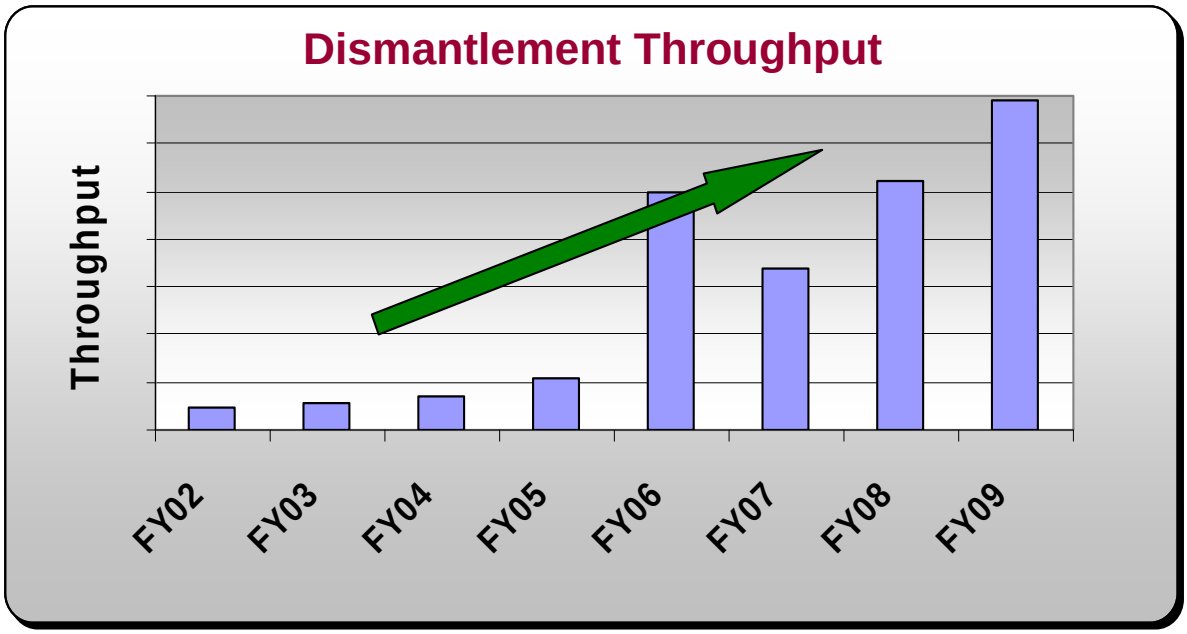
When a weapon is retired, it is transported to NNSA's Pantex Plant, near Amarillo, Texas, where the high explosives are removed from special nuclear material, and the plutonium core is removed from the weapon. The plutonium is placed in highly secure storage at Pantex. Eventually, excess material may be turned into fuel at the Mixed Oxide (MOX) Fuel Fabrication Facility at the Savannah River Site (SRS), near Aiken, South Carolina. Other non-nuclear components are sent to SRS (e.g., gas storage devices) and the Kansas City Plant (e.g., electrical components) for final processing.

Part of the weapon is transported to Y-12 using the NNSA's secure transport system. At Y-12, the uranium components are removed and stored in the newly operational HEUMF. The dismantlement process at Y-12 involves the appropriate separation techniques such as machining and infrared debonding to completely reduce the components to piece parts that are dispositioned. If a UPF is constructed, NNSA would be capable of performing all required dismantlement operations in a modernized facility that is safer and more secure than existing facilities.

Y-12's goal is to identify safe and secure disposition paths for all materials under its control, including uranium. Components retained for reuse are placed into safe and secure storage following dismantlement operations. Legacy components (parts produced for weapons that have been retired or are surplus) are recycled or packaged for burial in secure, licensed landfills at Y-12 or the Nevada Test Site.

Over the past few years, consistent with the President's goal of achieving the smallest stockpile possible consistent with national security needs, NNSA made weapon dismantlements a priority. More efficient processes and techniques have allowed rates to substantially increase. In fact, in

2009, Y-12 achieved the highest nuclear weapon dismantlement throughput level in more than 25 years (YSO 2009). As more retirements are announced, NNSA is able to absorb more weapons into the dismantlement queue, ensuring that the original timeline for dismantling U.S. nuclear weapons is kept. Figure S.2-2 presents an unclassified graph of recent dismantlement throughputs at Y-12.



Source: YSO 2010a.

Figure S.2-2. Dismantlement Throughput at Y-12, 2002-2009.

S.2.1.2 *National Security Programs*

The National Security Program (NSP) is a program management organization that directs and oversees all mission work in support of the Office of Defense Nuclear Nonproliferation; the supply of SNM for use in naval reactors; and all work for other agencies that is complementary to other Y-12 missions, e.g., Homeland Security. Under the NSP, Y-12 focuses on Nonproliferation missions, Global Threat Reduction Initiatives, and supplying EU to Naval Reactors and Foreign Research Reactors. Detailed information on these programs can be found in Chapter 2 of the SWEIS.

S.2.2 Non-NNSA Programs

Several non-NNSA Programs are conducted at Y-12. Among these non-NNSA Programs are the following: Work-for-Others Program, Environmental Management Programs, Nondefense Research and Development Program, and Technology Transfer Program. Detailed information on these programs can be found in Chapter 2 of the SWEIS.

S.2.3 Pollution Prevention, Conservation, and Recycling Programs

Y-12 has a demonstrated record of implementing programs to reduce waste, conserve energy, and clean-up legacy environmental contamination. Part of making Y-12 greener is the multitude of activities undertaken by the Waste Management group. Detailed information on these programs can be found in Chapter 2 of the SWEIS.

S.3 SWEIS ALTERNATIVES

The SWEIS evaluates the proposed action and reasonable alternatives to the proposed action, as well as the No Action Alternative. The term "reasonable" has been interpreted by CEQ to include alternatives that are practical or feasible from a common sense, technical, and economic standpoint (CEQ 1981).

The proposed action and reasonable alternatives for this SWEIS assume that the missions assigned to Y-12, which are described in Chapter 2 of the SWEIS and summarized in the paragraphs above, will continue for the foreseeable future. Alternative 1 is the No Action Alternative, and represents the baseline conditions; i.e., what is currently going on at the site, as well as any actions previously reviewed and approved by the NEPA process. Alternative 2 in the SWEIS is to construct and operate a new UPF. Reasonable alternatives to this proposed action were developed by considering various capital investment scenarios. Alternative 3, the Upgrade in-Place Alternative, would require moderate capital investment and would utilize existing, but upgraded, facilities to accomplish the assigned missions. Alternatives 4 and 5 would involve a reduction in the production capacity of Y-12 to support the requirements of a smaller stockpile. Section S.3.1 describes the alternatives in more detail.

S.3.1 Alternatives

S.3.1.1 *Alternative 1 – No Action Alternative*

The No Action Alternative means no change in current plans, including approved projects. Under the No Action Alternative, operations at Y-12 would continue to support the DOE and NNSA programs as described in Section S.2. Unless noted otherwise, these missions are expected to continue for the foreseeable future. Construction of a UPF is not part of the No Action Alternative.

The No Action Alternative includes the continued implementation of planned modernization actions announced in the 2002 ROD for the 2001 Y-12 SWEIS (67 FR 11296, March 13, 2002) as modified by subsequent actions, as well as new actions subsequent to the 2002 ROD that have undergone separate NEPA review. The following actions announced in the 2002 ROD, modifications to the actions of the 2002 ROD, and actions undertaken since the 2002 ROD are included in the No Action Alternative.

1. **Highly Enriched Uranium Materials Facility.** The new HEUMF (now constructed and operating) stores HEU that is not being used in manufacturing activities. The HEUMF is reducing the current storage footprint, improving security and lowering operating costs.

2. **Special Materials Complex (SMC).** This project was cancelled because it was no longer required by the reduced manufacturing requirements of the smaller stockpile. The project was replaced by a new Purification Facility and installation of new equipment within an existing facility to allow reuse of existing special material parts (*Final Supplement Analysis for Purification Facility, Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, DOE/EIS-0309/SA-1, August 2002) (NNSA 2002). That Supplement Analysis assessed whether the potential environmental impacts of the stand-alone Purification Facility, a component of the SMC analyzed in the Y-12 SWEIS, would require the preparation of a Supplemental SWEIS. The determination was made that proceeding with the Purification Facility would either reduce or be bounded by the environmental impacts of the SMC identified in the Y-12 SWEIS, and therefore, no additional NEPA analysis was required.

3. **Infrastructure Reduction.** A series of individual NNSA-managed projects have been underway to remove excess buildings and infrastructure with the ultimate goal of reducing the active footprint by more than 50 percent. Since 2002, NNSA has demolished approximately 1.3 million square feet of floor space (NNSA 2008a). Each demolition project was reviewed prior to initiation and found to fulfill the requirements of a **Categorical Exclusion** (CX) established by 10 CFR Part 1021 Appendix B1.23 (Demolition and Subsequent Disposal of Buildings, Equipment, and Support Structures).

Categorical Exclusion

A Categorical Exclusion is a NEPA determination applied to an action that DOE has determined does not individually or cumulatively have a significant effect on the human environment

4. **Jack Case Center and New Hope Center.** These facilities are technical, administrative, and engineering facilities built on Y-12 land. The managing and operating contractor of the Y-12 plant will lease these facilities. They were included in an Environmental Assessment (EA) and a subsequent Finding of No Significant Impact (FONSI) completed in January 2005 (*Alternate Financed Facility Modernization EA and FONSI*, DOE/EA-1510) (NNSA 2005d).

5. **Transportation of HEU from Foreign Locations to Y-12.** Subsequent to issuance of the 2002 Record of Decision (ROD) (67 FR 11296, March 13, 2002), the Y-12 site was given the additional mission of securing and storing small quantities of HEU transported from foreign locations to prevent proliferation of nuclear weapons and to minimize or eliminate the use of HEU in civilian reactors. Environmental Assessments were prepared and FONSI's issued for these actions (*Environmental Assessment for the Transportation of Highly Enriched Uranium from the Russian Federation to the Y-12 Security Complex* (DOE/EA-1471, January 2004) (DOE 2004d); and *Environmental Assessment for the Transportation of Unirradiated Uranium in Research Reactor Fuel from Argentina, Belgium, Japan and the Republic of Korea to the Y-12 National Security Complex* (DOE/EA-1529, June 2005) (DOE 2005h). In addition, a supplement analysis was prepared for the air and ocean transport of enriched uranium between foreign nations and the United States (DOE/EIS-0309-SA-2, August 2006) (DOE 2006b).

6. **Upgrade of Y-12 Potable Water System.** NNSA completed an EA to upgrade the potable water system at Y-12. Upgrades to the Y-12 potable water system would allow Y-12 to (1) meet regulatory requirements for safe drinking water by providing backflow protection for known cross connections and ensuring proper chlorine residual maintenance in the system; (2) provide Y-12 control and monitoring of water coming into the Y-12 distribution system to ensure adequate water flow and pressure to support current and future Y-12 operational needs; and (3) address deferred maintenance and ensure continued system reliability by inspecting, evaluating, and repairing or replacing deteriorated cast iron water mains and building feeds and obsolete fire hydrants. Based on the analysis in the EA, a FONSI was issued in March 2006 (DOE 2006a). The upgraded potable water system became operational in September 2010.

7. **Y-12 Steam Plant Replacement Project.** In August 2007, NNSA completed an EA to replace the existing Y-12 steam plant with a new centralized steam plant. The new centralized steam plant uses natural gas boilers to produce steam to support Y-12 operations. Reliable and cost-effective steam generation is vital to the operation of Y-12. It is the primary source of building heat for personnel comfort and it provides freeze protection for critical services that include fire protection systems and heat tracing of exterior above ground water systems. Steam is also necessary to support current production operations. A FONSI was signed on September 6, 2007 (YSO 2007). The new steam plant became operational in June 2010.

8. **Compressed Air Upgrades Categorical Exclusion.** The Compressed Air Upgrades Project (CAUP) corrects deficiencies related to reliability and efficiency by providing new compressed air capability to meet the current and long-range needs of Y-12. The project upgrades the compressed air system by replacing obsolete equipment with state-of-the-art technology equipment and controls. CAUP installed a new instrument/plant air system in reuse facility 9767-13. During the conceptual design phase, NEPA reviews were completed and a determination was made in January 2003 that CAUP work fulfills the requirements of an existing CX.

9. **Security Improvements Project (SIP) Categorical Exclusion.** The purpose of the SIP is to replace the existing Y-12 security system with the NNSA preferred Argus security system, a special purpose, automated information system that will be continuously operating and monitored by Y-12 security personnel. The project would provide a comprehensive and integrated security system that performs the required security functions and meets applicable DOE and DoD requirements. Argus is currently installed (or being implemented) at one DoD site and five DOE sites. The project directly supports the mission by maintaining the security capabilities of Y-12 to protect national security by applying advanced technology to the nation's defense. SIP's scope is limited to installing the Argus technology backbone in the existing Central and Secondary Alarm Stations, install software gateways to existing alarms, and install new Argus components in the HEUMF. During the pre-conceptual design phase, NEPA reviews were completed and a determination was made in May 2007 that the SIP fulfills the requirements of existing CXs.

10. **Nuclear Facility Risk Reduction (NFRR) Project Categorical Exclusion.** The NFRR line item project will directly contribute to the safety and reliability of Building 9212 and Building 9204-2E which are needed to continue NNSA current missions at Y-12. The NFRR Project will reduce risk of failure of infrastructure in these mission-essential Y-12 facilities by implementing practical, capital modifications determined prudent and necessary to ensure continued safe operations at existing levels. The project scope includes improving maintainability and reliability needed to address the risk of failure of selected, high priority, infrastructure utility systems, structures, and components through planned replacement of critical electrical control centers, switchgear, stacks, casting furnace vacuum system, and cooling tower and steam system pipes. Execution of this project will address the 2005 Defense Nuclear Facilities Safety Board (DNFSB) risk review recommendations (except for natural phenomena concerns) and backlogged deferred maintenance by replacing failing and obsolete equipment with new equipment. During the pre-conceptual design phase, NEPA reviews were completed and a determination was made in December 2008 that NFRR work fulfills the requirements of existing CXs.

These projects are discussed in more detail in section 1.7 of the SWEIS. Additionally, as discussed in Section 1.7.3 of the SWEIS, DOE is currently preparing an EIS for long-term management and storage of mercury (74 FR 31723). NNSA will continue to store mercury at Y-12 unless a decision is made to relocate the material.

The environmental conditions described in Chapter 4 of the SWEIS reflect the baseline operational impacts of these missions for the foreseeable future. To provide comprehensive baseline data from which operational levels could be projected, NNSA gathered the best available data for the current level of operation. In most instances, the data supporting the No Action Alternative are reflected by recent monitoring data (2006 and 2007) for the Y-12 Site as reported in the annual site environmental reports (ASER) issued in 2007 (DOE 2007b) and 2008 (DOE 2008); however, data from previous years were used if 2006 and 2007 data were unavailable or if they provided a more conservative analysis. Additionally, data from the 2008 ASER (DOE 2009b), which became publicly available after the Draft SWEIS was published, were also considered in preparing the Final SWEIS.

S.3.1.2 *Alternative 2 – Uranium Processing Facility Alternative*

Under this alternative, NNSA would take all actions in the No Action Alternative, construct and operate a modern UPF sized to support the smaller nuclear stockpile of the future (Section S.3.1.2.1), and construct and operate a new Complex Command Center (CCC) (Section S.3.1.2.2)

S.3.1.2.1 Uranium Processing Facility

The UPF would consolidate EU operations into an integrated manufacturing operation sized to satisfy programmatic needs and would be sited adjacent to the HEUMF to allow the two facilities to function as one integrated operation. Transition of EU production operations to the UPF and transition of EU storage operations into HEUMF (which has already occurred under the

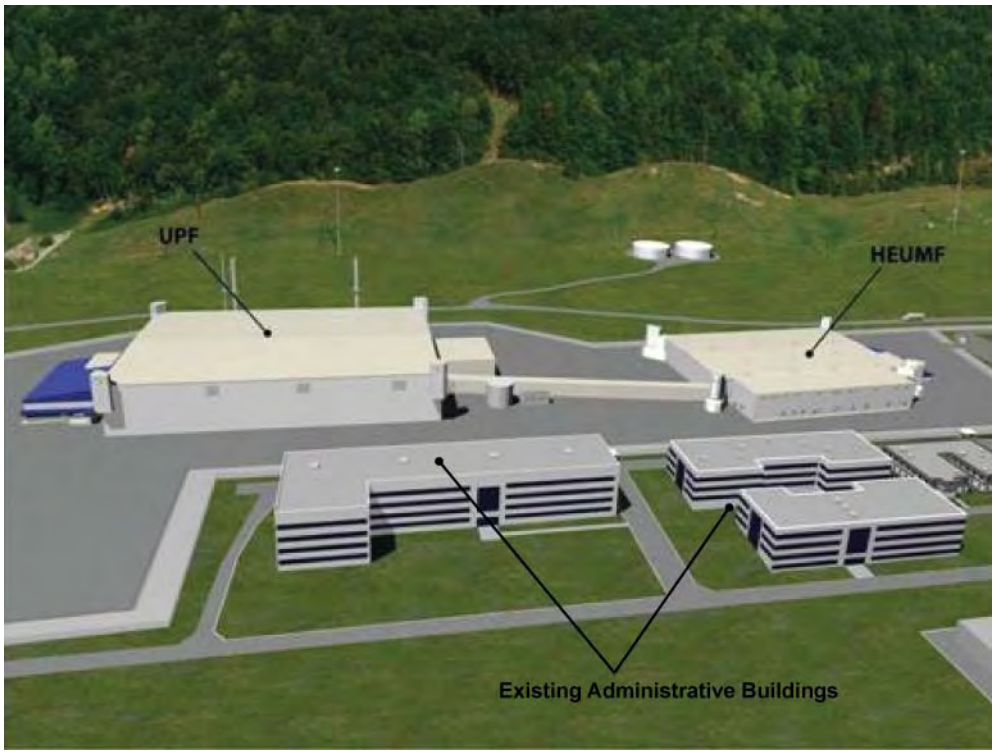
No Action Alternative) would enable the creation of a new high security protected area 90 percent smaller than the current high security protected area.

The UPF Project, which is one of the cornerstones of Y-12's Modernization Program, would replace multiple existing EU and other processing facilities. The current operating and support areas occupy approximately 633,000 square feet in multiple buildings, while the consolidated UPF would result in approximately a 33 percent reduction, to approximately 388,000 square feet in one building. Once the UPF becomes operational, some of those existing facilities could be available for D&D, while other facilities could be used for non-EU processes. Figure S.3.1.2-1 shows an artist's rendering of the proposed UPF.

The proposed UPF would include EU and EU-containing component and subassembly processing and manufacturing operations. The proposed UPF site is west of the HEUMF in the area now used for parking. This site is outside of, but adjacent to, the existing PIDAS. Figure S.3.1.2-2 shows the location of the proposed UPF relative to other buildings at Y-12. The existing parking lots are close to the existing HEU processing complex, which provides cost and operational efficiencies for consolidating EU operations.

Conventional construction techniques would be used to build the UPF. Construction of the UPF would require approximately 35 acres of land, which includes land for a construction laydown area and temporary parking. The UPF Project also includes the construction of a Haul Road extension to link the UPF site construction/excavation activities with supporting infrastructure, i.e., a concrete batch plant, construction storage area, and a Wet Soils Disposal Area and West Borrow Area located west of Y-12 in the Bear Creek corridor (see Figure 2 in Appendix G). The UPF footprint and the alignment of the new PIDAS would require Bear Creek Road to be closed to through traffic and re-routed slightly north of the existing road (this re-routing is referred to as the "Site Access and Perimeter Modification Road"). Approximately 6 acres of land would be disturbed to construct the Haul Road extension and the Site Access and Perimeter Modification Road. The Wet Soils Disposal Area includes approximately 16.6 acres of property previously used for a controlled burn demonstration and pine reforestation project. The West Borrow Area is an 18.3 acre site that previously served as the source of clay for Y-12 landfill cap projects. This site would be utilized, as necessary, for the placement of excess soil from the UPF project with moisture content satisfactory for compaction (B&W 2010).

Once constructed, the UPF facilities would occupy approximately 8 acres. The UPF would incorporate Argus technology for security protection. If a UPF is constructed, the existing non-nuclear processing facilities supporting a UPF would not be upgraded; instead, NNSA would pursue modernization of these facilities in the future if a CMC reaches a stage of development that is ripe for decisionmaking.

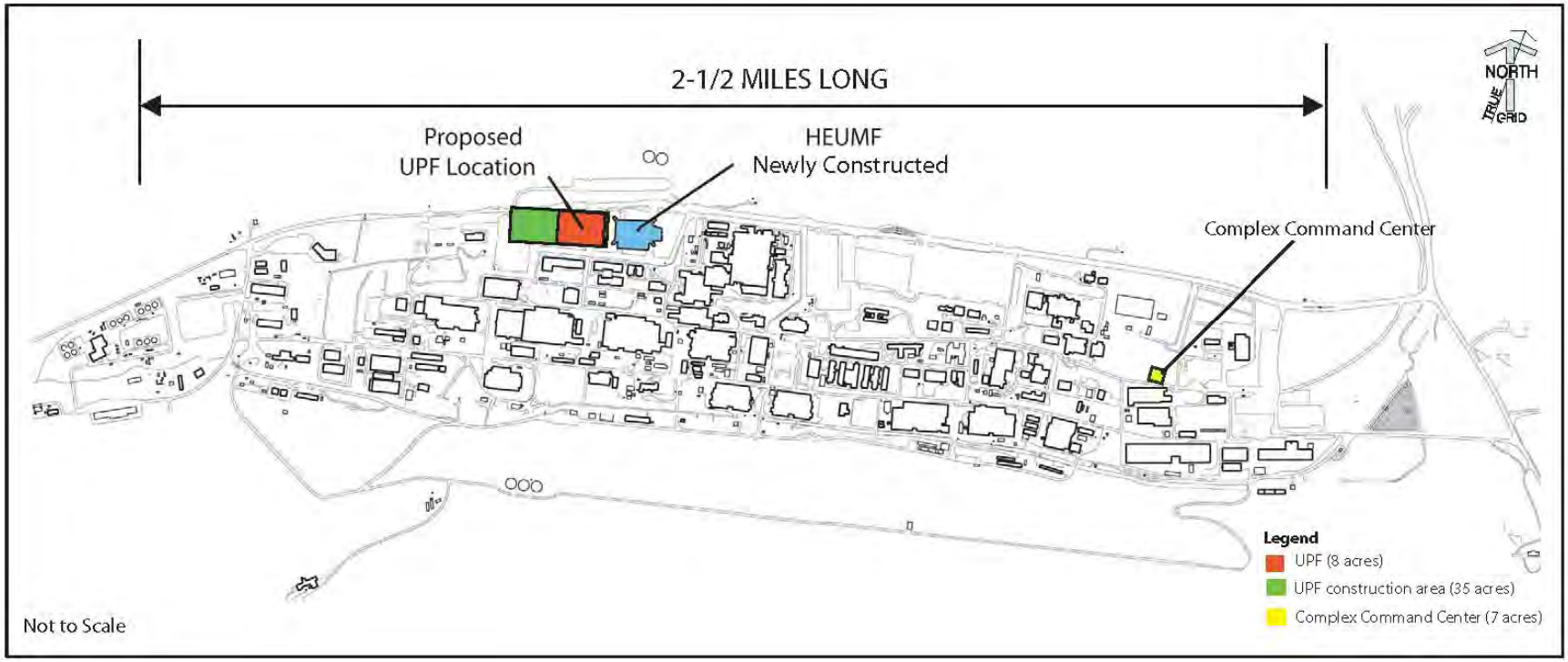


Source: NNSA 2007.

Figure S.3.1.2-1. Artist's Rendering of the Proposed UPF Adjacent to the HEUMF.

S.3.1.2.2 Complex Command Center

An additional action proposed under all of the action alternatives (Alternatives 2-5) is the CCC. The CCC would comprise a new Emergency Services Complex for Y-12. The new facility would house equipment and personnel for the plant shift superintendent, Fire Department, and EOC. Approximately 50,000 square feet of enclosed facility space would be required to accommodate operational needs. The facility would include offices to support Emergency Management personnel and provide habitability to accommodate 50 EOC personnel for a period of 48 hours; 15,000 square feet of pull-through garage space; redundant emergency power supply connections and/or supplemental dedicated emergency generators; records storage and processing areas; modern training and conference facilities; shower and changing facilities; specialized equipment storage; food service areas; janitorial closets; separate mechanical and electrical equipment rooms; and telecommunication rooms. The facility would have a dedicated loading dock with automated dock leveler and electric motor actuated overhead rollup door access to the building, to safely support delivery of supplies, equipment, and material. The facility would be located on the east end of Y-12 as shown on Figure S.3.1.2-2.



Source: NNSA 2007, modified.

Figure S.3.1.2-2. Location of the Proposed UPF and CCC Relative to Other Buildings at Y-12.

The CCC would be a one story structure that would be located in a previously developed area. The proposed site for the CCC is undeveloped with no structures; NNSA has traced the history of the land, has not identified historical or known contamination, and will continue to be characterized prior to start of construction. The proposed location for the CCC was driven by emergency management response times, unencumbered land, absence of known contamination, and other site conditions that favored construction. Of all the sites examined, the one proposed best met the criteria (YSO 2010).

The CCC would be a one story structure that would be located in a previously developed area. Construction of the CCC is expected to employ approximately 300-500 construction workers.[13] The project would require excavation within the Y-12 industrial area for utility/communication lines. Approximately 7 acres of land would be disturbed for the CCC. Once operational, the facility would not increase water use or generate additional wastes at Y-12, as this facility would replace existing facilities that perform these functions.

S.3.1.3 *Alternative 3 – Upgrade in-Place Alternative*

Under this alternative, NNSA would continue the No Action Alternative and upgrade the existing EU and non-enriched uranium processing facilities to contemporary environmental, safety, and security standards to the extent possible within the limitations of the existing structures and without prolonged interruptions of manufacturing operations. Under this alternative there would be no UPF and the current high-security area would not be reduced in size. This alternative would, however, include construction of a new CCC (as discussed in Section S.3.1.2.2). Although an upgrade of existing facilities was not selected in the Complex Transformation SPEIS ROD, the Upgrade in-Place Alternative is included as a reasonable alternative because it would correct some of the facility deficiencies associated with the existing EU and non-enriched uranium processing facilities, and could potentially require smaller upfront capital expenditures than the UPF.

The upgrade projects proposed would be internal modifications to the existing facilities and would improve worker health and safety, enable the conversion of legacy SNM to long-term storage forms, and marginally extend the life of existing facilities. For continued operations in the existing facilities, major investments will be required for roof replacements; structural upgrades; heating, ventilating, and air conditioning (HVAC) replacements; and fire protection system replacement/upgrades. The projects would improve airflow controls between clean, buffer, and contamination zones; upgrade internal electrical distribution systems; and upgrade a number of building structures to comply with current Natural Phenomena criteria (B&W 2004a).

For the purpose of this analysis, it is assumed that the upgrades would be performed over a 10-year construction period, following issuance of the SWEIS ROD. This would enable NNSA to spread out the capital costs associated with the upgrades, and minimize disruption of operations.

[13] The socioeconoimic impact analysis uses the mid-point of this range (400) for the peak construction workforce.

Conventional construction techniques would be used for upgrade projects. Upgrade activities would be performed in a manner that assures protection of the environment during the construction phase. Techniques would be used to minimize the generation of debris that would require disposal. Disposal of debris would be made in accordance with waste management requirements in properly permitted disposal facilities. Throughout the upgrade construction process, stormwater management techniques, such as silt fences and runoff diversion ditches, would be used to prevent erosion and potential water pollutants from being washed from the construction site during rainfall events.

Natural Phenomena: Structural. The current authorization basis for many of the EU buildings has been designated as Performance Category[14] (PC) 2. An assessment of the structural adequacy of the buildings indicates the buildings do not meet current codes and standards related to natural phenomena events (e.g., tornados and earthquakes) required for a PC 2 designation. If the buildings are intended to operate an additional 50 years, they would require structural upgrades to bring the buildings into compliance (B&W 2004a).

Fire Protection. The existing fire protection systems for many of the EU buildings are primarily piping systems operating under the Code of Record in effect at the time of installation. These codes have changed significantly over the years, and if the life of a facility is intended to be extended any significant length of time, the systems may need to be upgraded to meet current codes and standards if exemptions for continued operations are denied. Upgrades would likely require total replacement of sprinkler systems, risers, and underground supply lines (B&W 2004a).

Utilities Replacement/Upgrades: Mechanical Systems. HVAC systems have an expected life in the range of 25-30 years. Many of the systems serving the EU building are beyond or are approaching the end of their useful life and are in need of replacement. The majority of the high efficiency particulate air (HEPA) filters are located in antiquated systems. These systems also do not include test sections that allow the systems to be tested without removal of the prefilters. This arrangement subjects the filter change crews to added exposures compared to currently available filters with test sections. The continued long-term operations of existing facilities would require these filter systems to be replaced (B&W 2004a).

Roofing. A majority of the existing roofs for the EU buildings would need to be replaced (B&W 2004a).

S.3.1.4 *Alternative 4 – Capability-sized UPF Alternative*

The nuclear weapons stockpile and the nuclear security enterprise have undergone profound changes since the end of the Cold War. Since that time, more than 12,000 United States nuclear weapons have been dismantled, no new-design weapons have been produced, three former nuclear weapons plants (Mound, Pinellas, and Rocky Flats) have been closed, nuclear material

[14] Performance Categories (PC) classify the performance goals of a facility in terms of facility's structural ability to withstand natural phenomena hazards (i.e., earthquakes, winds, and floods). In general, facilities that are classified as: PC 0 do not consider safety, mission, or cost considerations; PC 1 must maintain occupant safety; PC 2 must maintain occupant safety and continued operations with minimum interruption; PC 3 must maintain occupant safety, continued operations, and hazard materials confinement; and PC 4 must meet occupant safety, continued operations, and confidence of hazard confinement.

production plants (Hanford, K-25 at ORR, most of SRS, and Fernald) have stopped production and are being decontaminated, and the United States is observing a moratorium on nuclear testing.

The Moscow Treaty will reduce the number of operationally deployed U.S. strategic nuclear weapons to 1,700–2,200 by 2012. On December 18, 2007, the White House announced the President's decision to reduce the nuclear weapons stockpile by another 15 percent by 2012. This means the U.S. nuclear stockpile will be less than one-quarter its size at the end of the Cold War—the smallest stockpile in more than 50 years (D'Agostino 2008). Further, as discussed in Section S.1.5.1, on April 8, 2010, Presidents Obama and Medvedev signed the New START Treaty to replace the now-expired 1991 START Treaty. The New START Treaty would reduce deployed warheads to 1,550 which is about 30 percent lower than the upper warhead limit of the Moscow Treaty. The New START Treaty entered into force on February 5, 2011.

As these actions illustrate, the goal of the United States is to maintain a credible nuclear deterrent with the lowest possible number of nuclear warheads consistent with national security needs. NNSA's analyses in this SWEIS are based on current national policy regarding stockpile size (1,675 operationally deployed strategic nuclear warheads) with flexibility to respond to future Presidential direction to change the size. Maintaining a stockpile requires the ability to detect aging effects in weapons (a surveillance program), the ability to fix identified problems (the stockpile stewardship program), the ability to produce replacement components and reassemble weapons (a fully capable set of production facilities), and the ability to dismantle weapons and disposition excess materials. Currently, there are some elements of the nuclear security enterprise that are unable to reliably perform their assigned production mission (e.g., Building 9212 at Y-12).

NNSA developed Alternatives 4 and 5 to analyze the potential environmental impacts associated with operations at Y-12 that would support stockpiles smaller than those currently planned. In developing these alternatives, NNSA assumed that such a stockpile would be approximately 1,000 operationally deployed strategic nuclear warheads.

Under Alternative 4, NNSA would maintain a basic manufacturing capability to conduct surveillance and produce and dismantle secondaries and cases. NNSA would reduce the operational throughput of facilities to a production level of approximately 80 secondaries and cases per year. To support this alternative, NNSA would build a smaller UPF (approximately 350,000 square feet) at Y-12 compared to the UPF described under Alternative 2 (388,000 square feet). This alternative would also include construction of a new CCC (as discussed in Section S.3.1.2.2).

The reduction in EU production workload that would occur under this scenario would reduce the number of employees, waste generation amounts, infrastructure needs, and the total worker dose. Safeguard and security expenditures would remain at current levels, and other operations conducted at Y-12, such as the storage of HEU and dismantlement of secondaries and cases, would remain at current levels, consistent with the expected levels described in the No Action Alternative in Section S.3.1.1.

S.3.1.5 *Alternative 5 – No Net Production/Capability-sized UPF Alternative*

Similar to Alternative 4, under a No Net Production/Capability-sized UPF Alternative, NNSA would maintain the capability to conduct surveillance and produce and dismantle secondaries and cases. NNSA would reduce the production level of facilities to approximately 10 secondaries and cases per year, which would support surveillance and dismantlement operations and a limited LEP workload; however this alternative would not support adding replacement or increased numbers of secondaries and cases to the stockpile. This alternative would involve an even further reduction of production throughput at Y-12 compared to Alternative 4. To support this alternative, NNSA would build essentially the same UPF described in Alternative 4. This would be a smaller UPF (approximately 350,000 square feet) at Y-12 compared to the UPF described under Alternative 2 (388,000 square feet). Section S.3.1.6 provides a summary of the major differences among the UPF alternatives. This alternative would also include construction of a new CCC (as discussed in Section S.3.1.2.2).

For either Alternative 4 or Alternative 5, although many of the current facilities at Y-12 would be operated at a reduced throughput, NNSA would need to maintain them in a "ready-to-use" state to accommodate surge production in the event of significant geopolitical 'surprise' (NPR 2010). This means unused capacity would be exercised periodically and standard preventative maintenance and minimal corrective maintenance would be performed on all equipment that could be required for future needs. The related effects on other plant operations of this alternative would include a reduction in utility usage and waste generation and a reduction in staffing.

S.3.1.6 *Capacity Alternatives for the Uranium Processing Facility*

Regardless of the ultimate capacity of a UPF, in order to maintain the basic capability to perform the enriched uranium missions, all of the required enriched uranium processes must be included in the facility. In many cases, installing the basic processes in the facility would allow the facility to support multiple units per year. Although the smaller, capability-sized UPFs could be physically smaller than the nominal-sized UPF, an assessment conducted by the UPF Project team at the request of the Nuclear Weapons Council (NWC) Integration Committee in early 2008 identified only 15 pieces of duplicate equipment that could be eliminated by reducing capacity requirements (NNSA 2008). In terms of square footage of the facility constructed, there would only be a reduction of approximately 38,000 square feet compared to the approximately 388,000 square feet proposed for the nominal-sized UPF described under Alternative 2. Consequently, the capability-sized UPF described under Alternatives 4 and Alternative 5 would not be significantly smaller than the UPF described under Alternative 2. As such, construction requirements for the three UPF capacity alternatives would not vary significantly among the alternatives.

However, there would be notable differences among the three UPF capacity alternatives related to operations. Many of the environmental impacts resulting from operations would be directly affected by the number of components assumed to be produced. For example, operating a nominal-sized UPF to produce 125 secondaries and cases per year would require more electricity, water, and employees than a capability-sized UPF that produces 10 or 80 secondaries and cases per year. Similarly, operating a nominal-sized UPF to produce 125 secondaries and cases per year would emit more uranium to the atmosphere, increase the dose to workers, and

produce greater quantities of wastes. However, any UPF option significantly reduces uranium atmospheric discharge, worker dose and waste quantities compared to the No Action or the Upgrade-in-Place Alternatives. Table S.3.1.6-1 depicts the major operational differences among the alternatives. Table S.3.1.6-1 includes data associated with the sensitivity analysis that NNSA prepared for the No Action Alternative and the Upgrade in-Place Alternative at smaller operating levels.

Table S.3.1.6-1. Operational Differences Among Alternatives

Requirements	No Action and Upgrade in-Place [a]	Nominal Sized UPF [a]	Capability-Sized UPF [b]	No Net Production/ Capability-Sized UPF [c]	No Action and Upgrade in-Place for Smaller Operational Levels [b]
Peak Electrical Energy Use (MWe)	36-48	36-48	32-43	32-43	32-43
Site-wide Water Use (million gallons/year)	2,000	1,300	1,200	1,080	1,850
Y-12 Site Employment (workers)	6,500	5,750	5,100 [d]	4,500 [d]	5,750
New Steam Plant Generation (billion pounds)	1.5	1.0	0.9	0.8	1.35
Normal Radiological/Uranium Air Emissions (Curie)	0.01	0.007	0.006	0.005	0.009
Total No. of Y-12 Monitored Workers	2,450	2,050	1,825[d]	1,600 [d]	2,180
Average Individual Worker Dose (mrem)	19.9	10.0	10.0	10.0	19.9
Collective Worker Dose (person-rem)	49.0	20.5	18.2	16.0	43.4
Waste Category					
Low-level Waste					
Liquid (gal)	713	476	428	403	635
Solid (yd^3)	9,405	5,943	5,643	5,314	8,935
Mixed Low-level Waste					
Liquid (gal)	1,096	679	640	619	1,035
Solid (yd^3)	126	81	76	71	118
Hazardous (tons)	12	12	7.2	7.2	7.2
Nonhazardous Sanitary (tons)	10,374	9,337	8,140	7,182	9,177

Source: NNSA 2008, B&W 2009a.
a – Supports a production level of approximately 125 secondaries and cases per year.
b – Supports a production level of approximately 80 secondaries and cases per year.
c – Supports a production level of approximately 10 secondaries and cases per year.
d – In the Draft Y-12 SWEIS, the Y-12 site employment number for Alternatives 4 and 5 were 3,900 and 3,400 workers, respectively, and were taken from the Capability-Based Alternative in the Complex Transformation SPEIS (published in October 2008) which was programmatic in nature and provided bounding estimates based on information available at that time. NNSA has prepared the current site employment estimates for Alternatives 4 and 5 based on better defined UPF information, program requirements, and required capacities that are now available. Therefore, NNSA has estimated that the Y-12 site employment levels for Alternatives 4 and 5 would be 5,100 and 4,500, respectively. No change is required in the total number of Y-12 monitored workers from the Draft SWEIS to the Final SWEIS because that number was originally estimated for the SWEIS and is based on currently available information.

S.3.2 Alternatives Considered but Eliminated from Detailed Consideration

DOE/NNSA is the Federal agency responsible for providing the Nation with nuclear weapons and ensuring that those weapons remain safe, secure, and reliable. To do this, DOE/NNSA must maintain a nuclear weapons production, maintenance, surveillance, and dismantlement capacity consistent with national security requirements. For the SWEIS, the following alternatives were considered but eliminated from detailed study for the reasons stated.

Stop Weapons Activities/Transfer Y-12 Missions to Another Site/Clean-Up Y-12/Fund Social Programs. During the public scoping period for the SWEIS, members of the public stated that NNSA should analyze shutting down all weapons activities at Y-12, transferring Y-12 missions to another site, clean-up the site, and/or use the money saved for other social programs. DOE/NNSA has considered these suggestions in programmatic NEPA documents, specifically the Complex Transformation SPEIS (NNSA 2008), SSM PEIS (DOE 1996a), and the *Storage and Disposition of Weapons-Usable Fissile Material PEIS* (DOE 1996b). NNSA has concluded that there is an essential near-term need to manage and maintain the safety and stability of the existing nuclear materials inventory. In December 2008, NNSA affirmed the decision to maintain the uranium missions at Y-12 in the ROD for the Complex Transformation SPEIS. Until relieved of its mission to support the enduring nuclear weapons stockpile by the President and Congress, NNSA must maintain its national security operations at Y-12. Accordingly, to propose shutting down or transferring the Y-12 nuclear weapons activities within the timeframe of the SWEIS (i.e., next 10 years) would be highly unlikely and an unreasonable alternative. Y-12 has unique capabilities and diverse roles supporting a variety of national programs that could not easily be transferred or replaced.

Alternate Site Locations for the UPF. As described in Section S.3.1.2, and shown on Figure S.3.1.2-2, the proposed UPF would be located adjacent to the HEUMF, at a site just west of the HEUMF. In the 2001 Y-12 SWEIS, DOE evaluated alternative locations for the HEUMF, and in the ROD DOE decided to construct the HEUMF at the Y-12 West Portal Parking Lot Site (67 FR 11296, March 13, 2002). Construction of the HEUMF was initiated in 2005 and completed in 2008. The facility began full-scale operations in 2010. Locating a UPF adjacent to the HEUMF is consistent with the analysis performed in support of the 2001 Y-12 SWEIS, the Complex Transformation SPEIS, RODs based on these documents, and the Y-12 Modernization Plan. Siting a UPF at a location other than adjacent to the HEUMF would not allow for the operational efficiencies and reduced security footprint.

Alternative site locations were explored as part of the planning for the UPF. The main reasons why the UPF, if built, should be collocated with the HEUMF are as follows: (1) collocation maximizes the efficiency and minimizes the costs of feed and product material flows between the two facilities; (2) collocation improves the security posture by reducing the size of the protected area to 10 percent of the existing footprint and reduces the operational cost of the security force required to meet the latest graded security protection policy; and (3) collocation minimizes the number of employees who must enter the protected area, thus improving the productivity of workers assigned to non-SNM activities that are currently located in the protected area. As a result of these significant advantages, alternatives that would not result in the collocation of the proposed UPF and the HEUMF are not considered reasonable site alternatives for the UPF.

Curatorship Alternative. During the comment period on the Draft SWEIS, commentors stated that NNSA should consider an alternative that would involve "curatorship" of the current arsenal which could be achieved through consolidation, downsizing, and upgrading-in-place the current facility. Such an alternative, which commentors referred to as "Alternative 6," would recognize a need for a Stockpile Stewardship mission that could be achieved through an upgrade in place to existing facilities. It would recognize the increasing demand for a verifiable safeguarded dismantlement capacity which must be addressed. And if there is a need, [NNSA] could construct a new dismantlement facility with designed-in safeguards and transparency to process the current backlog and accommodate increased retirement of warheads and the eventual dismantlement of the entire U.S. arsenal. The benefits of such an alternative include workforce retention and the reduction of the high-security area.

NNSA considered the proposed Alternative 6, and believes that many of the elements of a curatorship approach are embodied within existing SWEIS alternatives. For example, the SWEIS currently includes an alternative (Alternative 3, Upgrade in-Place) that would accomplish all required dismantlements (and any required assembly) in existing facilities that would be upgraded. As such, the SWEIS already includes an alternative that recognizes "a need for a Stockpile Stewardship mission that can be achieved through an upgrade in place to existing facilities." The SWEIS also includes an alternative that would provide the minimum assembly/disassembly capacity which NNSA thinks would meet national security requirements. Under this alternative (Alternative 5 – No Net Production/Capability-sized UPF Alternative), NNSA would maintain the capability to conduct surveillance and produce and dismantle secondaries and cases. NNSA would reduce the operational capacity of facilities to no more than 10 secondaries and cases per year, which would support surveillance and dismantlement operations and a limited LEP workload; however, this alternative would not support adding replacement or increased numbers of secondaries and cases to the stockpile.

NNSA has added a discussion of the curatorship alternative proposed by commentors to Section 3.4 of the SWEIS. Although there are elements of the curatorship approach in the SWEIS alternatives, NNSA believes that the curatorship alternative would be unreasonable, as explained in Section 3.4. NNSA has also added a discussion of dismantlement requirements and the dismantlement process to the SWEIS (see Section 2.1.1.1). As that section explains, a facility that would be used specifically for dismantlements would contain essentially the same equipment and have the same inherent capabilities as a facility that would be used for both dismantlements and assembly of weapons.

Consolidate ORNL Special Nuclear Material to Y-12. During the public scoping period for the SWEIS, a suggestion was made that DOE should consolidate all SNM from ORNL to Y-12. SNM from ORNL is not used at Y-12 and NNSA does not have programmatic responsibility for the SNM at ORNL. The scope of the Y-12 SWEIS is limited to alternatives related to operations at Y-12, for which NNSA has programmatic responsibility. There is no need to develop a proposal or assess an alternative to consolidate SNM from ORNL to Y-12. This issue is beyond the scope of this SWEIS.

Comprehensive Land Use Planning for ORR. During the public scoping period for the SWEIS, suggestions were made that DOE should develop a comprehensive land use plan for ORR, and that the SWEIS should include an analysis of land use for ORR, including alternatives

that would transfer lands to the private sector. The scope of the Y-12 SWEIS is limited to alternatives related to operations at Y-12, for which NNSA has programmatic responsibility. The NNSA does not have programmatic responsibility for other areas of ORR and has no need to develop a proposal or assess any alternatives related to ORR land use planning or land transfers. These issues are beyond the scope of this SWEIS. With respect to lands associated with Y-12 specifically, as discussed in this SWEIS, the land requirements at Y-12 will generally remain unchanged. While some changes to land use will occur as a result of modernization projects, Y-12 will continue to require security and emergency response buffers that preclude release of any real estate for public use. Chapter 6 of the SWEIS addresses land use cumulative impacts.

Other Miscellaneous Suggestions. During the public scoping period for the SWEIS, various suggestions were made regarding alternatives and analyses that NNSA has determined were beyond the scope of the Y-12 SWEIS. Some of the suggested alternatives included replacing Y-12 with an auto plant, storing equipment for the Tennessee Valley Authority at Y-12, and replacing weapons with the Reliable Replacement Warhead. NNSA determined that these suggested alternatives would not meet the purpose and need for action and were beyond the scope of the Y-12 SWEIS. The public suggested that the SWEIS include an assessment of intentional destructive acts. NNSA has prepared a classified appendix to this SWEIS which analyzes intentional destructive acts.

S.3.3 Comparison of Potential Environmental Impacts

This comparison of potential environmental impacts is based on the information in Chapter 4, Affected Environment, and analyses in Chapter 5, Environmental Consequences, of the SWEIS. Its purpose is to present the impacts of the alternatives in comparative form. Table S.3.3-1 (located at the end of this section) presents the comparison summary of the environmental impacts for construction and operation associated with the No Action Alternative and the action alternatives evaluated in the SWEIS. The following sections summarize the potential impacts by resource area.

S.3.3.1 *Land Use*

Construction. With the exception of land disturbance associated with projects that have been addressed in previous NEPA documents (e.g., *Alternate Financed Facility EA*, *Potable Water Supply Upgrade EA* [NNSA 2005d]), no new facilities or major upgrades to existing facilities would occur under the No Action Alternative and no new land disturbance would result. Construction of the UPF and CCC under the UPF Alternative would affect approximately 42 acres of previously disturbed land (35 acres for the UPF and 7 acres for the CCC). In addition, the Haul Road extension and Site Access and Perimeter Modification Road would disturb a maximum of approximately 6 acres of land. The majority of the Haul Road extension, which would follow an existing power line corridor, would require widening the existing corridor by approximately 12-15 feet. A minimal number of trees would be affected by this widening. The Wet Soils Disposal Area includes approximately 16.6 acres of property previously used for a controlled burn demonstration and pine reforestation project. The West Borrow Area is an 18.3 acre site that previously served as the source of clay for Y-12 landfill cap projects. This site

would be utilized, as necessary, for the placement of excess soil from the UPF project with moisture content satisfactory for compaction (B&W 2010).

The Upgrade in-Place Alternative would consist of internal modifications to existing facilities and 7 acres for the CCC. Under both the Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives, construction of the UPF and CCC would affect about 39 acres of previously disturbed land (32 acres for the UPF and 7 acres for the CCC), as well as approximately 41 acres for the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area.

Operation. While specific land usage within Y-12 may change, the overall industrial use classification would likely remain the same for all alternatives. Under the UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives, about 8 acres of previously disturbed land would be used for the UPF and 7 acres for the CCC. For the Upgrade in-Place Alternative, 7 acres would be used for the CCC. Because Y-12 would continue to require security and emergency response buffers, real estate associated with eliminating excess facilities would likely not be released for public use and there would be no local land use benefits. All of the alternatives would be consistent with current land use plans, classifications, and policies. Impacts on land use adjacent to Y-12 are not expected.

S.3.3.2 *Visual Resources*

Construction. 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 (VRM) Class IV, which is used to describe a highly developed area. Construction of the UPF (Alternatives 2, 4, and 5) and CCC (Alternatives 2, 3, 4, and 5) 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. The construction lay-down area, temporary parking, and temporary construction office trailers would also be typical for an industrial site. The Upgrade in-Place Alternative would consist mainly of internal modifications to existing facilities and construction of the CCC and would create short-term visual impacts, but would not be out of character for an industrial site such as Y-12.

Operation. Under all alternatives, Y-12 would remain a highly developed area with an industrial appearance, and no change to the VRM classification would be expected. All of the alternatives that include a UPF would allow the protected area at Y-12 to be reduced from approximately 150 acres to about 15 acres and would result in some reduction in industrial density.

S.3.3.3 *Site Infrastructure*

Construction. Construction activities under the No Action Alternative would cause minimal changes to the energy use and other infrastructure requirements (i.e., steam, industrial gases, etc) at the site. As Y-12 continues to downsize and become more efficient, trends indicate that energy usage and most other infrastructure requirements are decreasing by approximately 2 to 5 percent per year. This is expected to continue. During construction, any of the UPF Alternatives would require a peak of approximately 2.2 megawatts (MW) per month of electric power, which is less

than five percent of the current electrical energy usage at Y-12, and less than one percent of available capacity. Water requirements would be less than 1 percent of current site usage. Construction of either the Capability-sized UPF or No Net Production/Capability-sized UPF would require about 90 percent of the electrical power as construction of the full UPF. The peak electrical energy requirement is estimated to be 1.9 MW per month and water usage 3.6 million gallons. These would be less than 1 percent of current site usage. Construction activities associated with the Upgrade in-Place Alternative would have negligible energy and infrastructure requirements.

Operation. Under the No Action Alternative, Y-12 energy usage and other infrastructure requirements (i.e., steam, industrial gases, etc) should continue to decrease as Y-12 continues to downsize and become more efficient. During operation, the UPF would require approximately 14,000 megawatt hour (MWh) per month of electric power, which is less than 5 percent of available capacity. Compared to the No Action Alternative, the UPF would decrease water demands by more efficient water usage. Steam usage would be reduced by 10 percent as inefficient facilities are closed. Operation of the CCC under any of the action alternatives would not increase water use. Operations associated with the Upgrade in-Place Alternative would not significantly change infrastructure demands beyond the demands of the No Action Alternative, although efficiency improvements associated with the upgrades should lead to some minor decreases in demand, albeit not on the same order as those that could be achieved with new construction. Under the Capability-sized UPF Alternative and No Net Production/Capability-sized UPF Alternative, electricity usage would be about 90 percent of present usage (10 percent reduction) due to the reduced operations (relative to current) and smaller physical size of the facility. Under the Capability-sized UPF Alternative and No Net Production/Capability-sized UPF Alternative, water usage would be reduced about 7 percent and 17 percent, respectively, compared to the UPF Alternative. The reductions associated with the smaller-sized UPF would be in addition to the decreasing energy use and infrastructure demands at Y-12 under the No Action Alternative. The existing EU operations account for less than 5 percent of the energy and infrastructure usage at Y-12.

S.3.3.4 *Traffic and Transportation*

Construction. Construction activities under the No Action Alternative would not cause any significant change to the current workforce of approximately 6,500 workers. The Level-of-Service (LOS) on area roads would not change under the No Action Alternative. Under the UPF Alternative, construction-related traffic would add a maximum of 950 worker vehicles per day to support construction of the UPF and CCC during the peak year of construction. This increase would be similar to the increase that was experienced during construction of the HEUMF, which did not change the LOS on area roads. The Upgrade in-Place Alternative would add a maximum of 300 worker vehicles per day and would not change the LOS on area roads. Construction of either the Capability-sized UPF Alternative or the No Net Production/Capability-sized UPF Alternative would add a maximum of 850 worker vehicles per day to support construction during the peak year of construction. This increase would be less than the increase that resulted from the HEUMF construction, which did not change the LOS on area roads. There would be no radiological transportation impacts related to construction for any of the alternatives.

Operation. Under the No Action Alternative and the Upgrade in-Place Alternative, the Y-12 workforce is expected to remain relatively stable at approximately 6,500 workers. Consequently, the LOS on area roads would not change under the No Action Alternative. Operation of the UPF would result in a small decrease in workforce (approximately 11 percent) due to more efficient operations, and would not affect the LOS on area roads. Operation of the CCC, which is part of all of the action alternatives, would not add any new workers to the site and would not affect traffic or transportation. The Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives would reduce traffic at Y-12 by approximately 20 to 30 percent based on potential reductions in the workforce. This reduction would have a minimally beneficial impact on traffic and transportation. During operations under all alternatives, transportation of radiological materials (EU, transuranic waste and low-level waste [LLW]) would occur, resulting in radiological impacts on transportation workers and the public. For all alternatives, the radiological impacts and potential risks of transportation would be small, e.g., less than one latent cancer fatality per year. Radiological materials and waste transportation impacts would include routine and accidental doses of radioactivity. The one-time relocation of HEU to a new UPF would result in less than one fatality. The Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives would reduce radiological impacts associated with transportation of materials by about 25 percent and 95 percent, respectively.

S.3.3.5 *Geology and Soils*

Construction. With the exception of land disturbance associated with projects that have been addressed in previous NEPA documents, no new facilities or major upgrades to existing facilities would occur under the No Action Alternative. No new land disturbance or impact to geology and soils would result. Potential land disturbance associated with the construction of the UPF and CCC would be approximately 42 acres of previously disturbed land. The Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives would result in disturbance of about 39 acres of previously disturbed land. In addition, the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area would disturb approximately 41 acres of land. Construction of the new facilities would result in a potential increase in soil erosion from the lay-down area and new parking lot. 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 are expected. The Upgrade in-Place Alternative would consist of internal modifications to existing facilities and would only affect previously disturbed geological resources or soils for construction of the CCC.

Operation. Under all alternatives, minor soil erosion impacts are expected, but detention basins, runoff control ditches, and cell design components would minimize impacts. Neither a UPF, under Alternatives 2, 4 and 5, nor the CCC, under any of the action alternatives would impact geology or soils during operation because of site design and engineered control measures.

S.3.3.6 *Air Quality and Noise*

S.3.3.6.1 Air Quality

Construction. Under the No Action Alternative, there would be no significant new construction and no changes in air quality or noise are expected. All criteria pollutant concentrations are expected to remain below the national and Tennessee Department of Environment and Conservation (TDEC) standards, with the exception of the 8-hour ozone levels and fine particulate matter ($PM_{2.5}$), which exceed standards throughout the region. Construction of a UPF and CCC would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. Exhaust emissions from these sources would result in releases of sulfur dioxide, nitrogen oxide, particulate matter, total suspended particulates, diesel particulate emissions, carbon monoxide and greenhouse gases such as carbon dioxide. Additionally, construction of a UPF and CCC would result in small fugitive dust impacts in the construction area. Effective control measures commonly used to reduce fugitive dust emissions include wet suppression, wind speed reduction using barriers, reduced vehicle speed, and chemical stabilization. The temporary increases in pollutant emissions due to construction activities are too small to result in exceeding the National Ambient Air Quality Standards (NAAQS) or TDEC standards beyond the Y-12 boundary. Therefore, air quality impacts resulting from construction under the UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives would be small. The Upgrade in-Place Alternative, which would involve internal upgrades to existing facilities and construction of the CCC, would have minimal impact on air quality at Y-12. Temporary increases in impact on air quality from construction equipment, trucks, and employee vehicles would be much less than the UPF, Capability-sized UPF, or No Net Production/Capability-sized UPF Alternatives, presented above, due to the significantly smaller workforce required for the Upgrades. There would be no radiological air impacts associated with construction under any of the action alternatives.

Operation. Under the No Action Alternative, emissions associated with the new steam plant are expected to be significantly lower for total particulate matter, sulfur dioxide, and nitrogen oxides. All criteria pollutant concentrations are expected to remain below the national and TDEC standards, with the exception of the 8-hour ozone levels and $PM_{2.5}$, which exceed standards throughout the region. For the UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives, no significant new quantities of criteria or toxic pollutants would be generated from the new facilities (UPF and CCC). The heating requirements for any of the UPF Alternatives would reduce the level of emissions compared to the No Action or Upgrade in-Place Alternatives. Any releases of nitrogen and argon, that are used to maintain inert atmospheres for glovebox operations, would be less than current releases from existing operations. No new hazardous air emissions would result under any of the UPF Alternatives. For the Upgrade in-Place Alternative, no change to air quality impacts beyond those presented for the No Action Alternative would result because there would be no significant change in the operating requirements of the facilities. For the Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives, operations would be reduced compared to the other alternatives, as would emissions from the Y-12 steam plant, but likely not significantly enough to have a meaningful positive effect on air quality, which would remain well within NAAQS for all criteria pollutants, with the exception of the 8-hour ozone levels and $PM_{2.5}$, which exceed

standards throughout the region. Reduction in EU operations are also expected to result in the reduction of carcinogenic Hazardous Air Pollutants (HAPs); however, the maximum concentrations of these HAPs are small and do not have significant impacts.

With respect to greenhouse gas emissions, because of the reduced level of operations and reduction in size of the operational footprint at Y-12, the Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives would have significantly lower carbon dioxide (CO_2) emissions than the No Action, UPF, and Upgrade in-Place Alternatives. However, even the highest levels of CO_2 emissions (No Action and Upgrade in-Place Alternatives) would be relatively small (much less than one percent) compared to the state-wide CO_2 emissions in Tennessee.

Radiological air impacts under the No Action Alternative are expected to remain at or about current levels, i.e., 0.15 millirem per year to the maximally exposed individual (MEI), which is well below the annual dose limit of 10 millirem per year under the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61 Subpart H). Statistically, an annual dose of 0.15 mrem would result in a latent cancer fatality (LCF) risk of 9.0×10^{-8}. Radiological air impacts from Y-12 would result in a dose of 1.5 person-rem to the population living within 50 miles of Y-12, which would result in 0.0009 LCFs annually. Under normal operations, radiological airborne emissions under the Upgrade in-Place Alternative would be no greater than radiological airborne emissions from the existing EU facilities, and would likely be less due to the incorporation of newer technology into the facility design; however, because of the unavailability of design data, they are assumed to be the same as those from the No Action Alternative.

NNSA has estimated that uranium emissions from the UPF would be reduced by approximately 30 percent compared to the No Action Alternative. Under the Capability-sized UPF Alternative and the No Net Production/Capability-sized UPF Alternative, activities that release radiological emissions would be reduced, resulting in lower emission levels relative to the No Action Alternative. NNSA estimates that uranium emissions would decrease by approximately 40 percent for the Capability-sized UPF Alternative and approximately 50 percent for the No Net Production/Capability-sized UPF Alternative.

S.3.3.6.2 Noise

Construction. Under the No Action Alternative, no significant construction would result and no change in noise impacts would be expected. For the UPF, Capability-sized UPF, No Net Production/Capability-sized UPF Alternatives, the onsite and offsite acoustical environments at Y-12 may be impacted during construction. Construction activities would generate noise produced by heavy construction equipment, trucks, power tools, and percussion from pile drivers, hammers, and dropped objects. In addition, traffic and construction noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site. The levels of noise would be representative of levels at large-scale building sites. The proposed site for a UPF is approximately 1,700 feet from the Y-12 boundary, and peak attenuated noise levels from construction would be below background noise levels at off-site locations within the city of Oak

Ridge. For the Upgrade in-Place Alternative, construction activities would cause less noise impacts than the UPF Alternatives because construction would take place at the CCC site and within existing facilities, and the proposed CCC site and existing facilities are slightly farther from the site boundary than the proposed UPF site.

Operation. Major noise emission sources within Y-12 include various industrial facilities, equipment and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Most Y-12 industrial facilities are at a sufficient distance from the site boundary so noise levels at the boundary from these sources would not be distinguishable from background noise levels. Implementation of any alternative would not change these operational noise impacts.

S.3.3.7 *Water Resources*

S.3.3.7.1 Surface Water and Wetlands

Construction. Under the No Action Alternative, annual surface water usage at Y-12 would remain within the current range (about 2 billion gallons). A number of contaminants are present and monitored in East Fork Poplar Creek (EFPC). Levels of mercury do remain above ambient water quality criteria in the EFPC. Nickel levels were well below the Tennessee General Water Quality Criteria. The Upper East Fork Poplar Creek (UEFPC) contains most of the known and potential sources of surface water contamination. Surface water contaminants in UEFPC include metals (particularly mercury and uranium), organics, and radionuclides (especially uranium isotopes). Environmental restoration activities would continue to address surface water contamination sources and, over time, would be expected to improve the quality of water in both EFPC and Bear Creek, the two surface water bodies most directly impacted by activities at Y-12. Y-12 surface water withdrawals and discharges would not increase substantially during construction under any of the action alternatives. Construction water requirements are very small and would not substantially raise the average daily water use for Y-12. During construction, stormwater control and erosion control measures would be implemented to minimize soil erosion and transport to EFPC. Contaminated wastewater would be collected and disposed of in accordance with applicable regulations. The proposed UPF and CCC sites and the existing Uranium Facilities are not located within either the 100-year or 500-year floodplains.

For Alternatives 2, 4, and 5, which would construct a new UPF, a Haul Road extension would be constructed to link UPF site construction/excavation activities with supporting infrastructure located west of the proposed UPF site in the Bear Creek corridor. The road extension would accommodate the number and size of construction vehicles needed on site, as well as safely provide transportation away from occupied roadways. The designed alignment for the Haul Road extension follows the existing power line corridor and thus avoids forest habitat found to the north and south of the power line. The Haul Road would necessarily cross some headwater areas of small unnamed tributaries to Bear Creek, some of which contain wetlands. The Site Access and Perimeter Modification Road would disturb mowed areas, wetlands, limited early successional old field, and some forest. The greatest acreage potentially affected would be mowed turf grasses. It is anticipated that the Haul Road extension and the Site Access and Perimeter Modification Road would result in the loss of one acre of wetlands, and place two

small stream segments (approximately 300 feet [total] of unnamed tributaries to Bear Creek) within culverts. A total of approximately three acres of wetland would be created as part of the proposed construction project. The mitigation wetlands would include expansion of some existing wetlands "upstream" and adjacent to the new Haul Road, as well as creating additional wetlands in the Bear Creek watershed. Appendix G contains a detailed wetland assessment that has been prepared in accordance with 10 Code of Federal Regulations (CFR) 1022, "Compliance with Floodplain and Wetlands Environmental Review Requirements" for the purpose of fulfilling NNSA's responsibilities under Executive Order 11990, "Protection of Wetlands."

Operation. Under the No Action and Upgrade in-Place Alternatives, surface water usage at Y-12 would remain at approximately 2 billion gallons per year. The UPF Alternative would reduce water demands at the site to 1.3 billion gallons per year because EU operations would be phased out in the inefficient existing facilities once the UPF becomes operational and the CCC (under all of the action alternatives) would consolidate ongoing functions from numerous separate facilities. It is not anticipated that operations under the UPF or Upgrade in-Place Alternatives would impact surface water quality beyond impacts described for the No Action Alternative. The reduced operations associated with the Capability-sized UPF Alternative would reduce water use at Y-12 to approximately 1.2 billion gallons per year. The reduced operations associated with the No Net Production/Capability-sized UPF Alternative would reduce water use at Y-12 to approximately 1.08 billion gallons per year.

Under the Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives, reduction of EU operations would reduce releases of uranium and other contaminants to surface waters. Under all alternatives, routine operations would be expected to result in no adverse impacts on surface water resources or surface water quality because all discharges would be maintained to comply with National Pollutant Discharge Elimination System (NPDES) permit limits and minimized by appropriate mitigation measures.

S.3.3.7.2 Groundwater

Construction. Water for all of the alternatives would be taken from the Clinch River, with no plans for withdrawal from groundwater resources. All process, utility, and sanitary wastewater would be treated prior to discharge in accordance with applicable permits. All water for construction of the UPF, Upgrade in-Place, Capability-sized UPF, or No Net Production/ Capability-sized UPF Alternatives would be taken from the Clinch River as part of the normal water uses at Y-12. Some groundwater may be extracted during construction activities at the CCC and a UPF site to remove water from excavations. Appropriate construction techniques would be implemented to minimize the seepage of groundwater into excavation sites. No impact on groundwater (direction or flow rate) would be expected from constructing a UPF or the CCC. Based on the results of constructing the HEUMF, groundwater extracted from excavations at a UPF or the CCC site is not expected to be contaminated. Minimal impacts on groundwater quality are expected because extracted groundwater would be collected and treated to meet the discharge limits of the NPDES permit prior to release to surface water.

Operation. Under all of the alternatives, water for Y-12 operations would be taken from the Clinch River. All process, utility, and sanitary wastewater would be treated prior to discharge in

accordance with applicable permits. No groundwater would be used for operations of facilities. No plans exist for routine withdrawal from groundwater resources.

S.3.3.8 *Ecological Resources*

Ecological resources at Y-12 include terrestrial and aquatic resources, threatened and endangered (T&E) species and other special status species, and floodplains and wetlands.

Construction. Under the No Action Alternative, no impacts on ecological resources are expected because any construction activities would occur in areas where site clearing and past construction have occurred. Construction of a UPF under Alternatives 2, 4, or 5 would not impact ecological resources because a UPF would be sited on land that is currently used as a parking lot. However, the Haul Road extension that would be constructed to link UPF site construction/excavation activities with supporting infrastructure would necessarily cross some headwater areas of small unnamed tributaries to Bear Creek, some of which contain wetlands (see Appendix G for details regarding these wetlands). Construction of the CCC would not affect ecological resources because the proposed site is in a previously disturbed industrial area.

Mercury and polychlorinated biphenyls (PCB) levels in EFPC fish have historically been elevated relative to those fish in uncontaminated reference streams. Fish are monitored regularly in EFPC for these contaminants. Appropriate stormwater management techniques would be used during construction activities under all of the action alternatives to prevent pollutants from entering local waterways. No impacts on ecological resources from the Upgrade in-Place Alternative are expected because modifications would be internal to existing facilities. Moreover, all areas associated with the Upgrade in-Place Alternative have been previously disturbed and do not contain habitat sufficient to support ecological resources.

Operation. Under the No Action Alternative, continued minor impacts on terrestrial resources are expected due to operation noise and human activities. Operation under the UPF, Upgrade in-Place, Capability-sized UPF, or No Net Production/Capability-sized UPF Alternatives would continue to have minor impacts on biological resources due to operation noise and human activities. Although the Capability-sized UPF and No Net Production/Capability-sized UPF Alternatives would reduce EU operations, Y-12 would continue to operate, the site would remain heavily industrialized, and no change to ecological resources would be expected. Although the gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*), two Federally-listed endangered animal species, have been recorded on the ORR, no critical habitat for threatened or endangered species is known to exist at Y-12. NNSA will consult with the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act to ensure proposed actions would not impact Federally-listed threatened or endangered species.

S.3.3.9 *Cultural Resources*

Y-12 currently has no buildings in the National Register of Historic Places but does have a proposed historic district of buildings associated with the Manhattan Project. 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.

S.3.3.10 *Socioeconomics*

Construction. There would be no appreciable changes in the Region of Influence (ROI) socioeconomic characteristics over the 10-year planning period under the No Action Alternative. The construction of the UPF under Alternative 2 or a smaller UPF under the Capability-sized UPF or No Net Production/Capability-sized UPF Alternatives would have a similar impact on the socioeconomic characteristics of Y-12 and the ROI as the recently-completed HEUMF construction. The UPF (under Alternative 2) and CCC would require approximately 1,350 workers during the peak year of construction. A total of 5,670 additional jobs (1,350 direct and 4,320 indirect) would be created in the ROI during the peak year of construction. The Capability-sized UPF Alternative or No Net Production/Capability-sized UPF Alternative (including the CCC) would require approximately 1,250 workers during the peak year of construction. A total of 5,250 jobs (1,250 direct and 4,000 indirect) would be created in the ROI during the peak year of construction. The total new jobs would represent an increase of less than 1 percent in ROI employment. The number of direct jobs at Y-12 could increase by approximately 20 percent during the peak year of construction. Overall, these changes would be temporary, lasting only through the construction periods for the CCC and UPF. The Upgrade in-Place Alternative would have a peak construction workforce of 700 workers and generate a total of 2,940 jobs (700 direct and 2,240 indirect) in the ROI. The existing ROI labor force is sufficient to accommodate the labor requirements and no change to the level of community services provided in the ROI is expected.

Operation. Under the No Action Alternative and Upgrade in-Place Alternative, the operational workforce at Y-12 is expected to remain stable. Upon completion of the UPF construction, the operational workforce for the UPF would be expected to be smaller than the existing EU workforce due to efficiencies associated with the new facility. NNSA estimates that the total workforce reduction could be approximately 750 workers, which is approximately 11 percent of the total Y-12 workforce. These reductions are expected to be met through normal attrition/retirements, as about 50 percent of the work force at Y-12 is eligible to retire within the next 5 years. The change from baseline Y-12 employment would be minor and no noticeable impacts on ROI employment, income, population, housing, or community services would be expected. Under the Upgrade in-Place Alternative, operation of facilities would not result in any change in workforce requirements since existing workers would staff the facilities. Under the Capability-sized Alternative, the workforce at Y-12 could decrease to approximately 5,100 jobs, a reduction of approximately 20 percent compared to the No Action Alternative baseline. Combined with the indirect jobs that would be lost, under the Capability-sized UPF Alternative the ROI employment could be reduced by about 5,880 jobs, or about 1.9 percent. Under the No Net Production/Capability-sized UPF Alternative, NNSA estimates that the site employment could decrease to approximately 4,500 workers. This would represent a decrease of approximately 2,000 jobs; a reduction of approximately 30 percent compared to the No Action Alternative baseline. Combined with the indirect jobs that would be lost, the ROI employment could be reduced by about 8,400 jobs, or about 2.7 percent. Under Alternatives 4 and 5, although some EU operations would be reduced, the NNSA would continue to maintain the safety and

security for nuclear materials or other hazardous materials. The reduction in the workforce would likely be met through normal attrition/retirements.

S.3.3.11 *Environmental Justice*

Construction. The short-term socioeconomic impacts during any construction activities would be positive and not result in any disproportionately high and adverse effects on minority populations, low-income, or American Indian populations. With respect to human health, occupational impacts during construction would be expected (see Health and Safety, Section 5.12 of the SWEIS), but would not be significant. Therefore, no disproportionately high and adverse effects on minority populations, low-income, or American Indian populations would be expected.

Operation. None of the proposed alternatives would pose significant health risks to the public, and radiological emissions would remain below the annual dose limit of 10 mrem (the maximum MEI dose is 0.4 mrem per year). Results from ORR ambient air monitoring program show that the hypothetical effective dose (ED) 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.

S.3.3.12 *Health and Safety*

Construction. There are occupational hazards associated with any construction activity. During construction, the UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives would have the highest potential for occupational injuries due to the fact that construction of a UPF would require the largest construction workforce. Statistically, approximately 70 recordable cases of injuries per year may be expected during the peak years of construction. The Upgrade in-Place Alternative would be expected to result in 37 recordable cases of injuries during the construction period. No radiological impacts are expected from construction activities for any of the alternatives.

Operation. During normal operations, radiological impacts on workers and the public would occur. Under the No Action Alternative, impacts are expected to be similar to the impacts that are currently occurring. All radiation doses from normal operations would be well below regulatory standards and would have no statistically significant impact on the health and safety of either workers or the public. Statistically, for all alternatives, radiological impacts would be expected to cause less than one LCF to the 50-mile population surrounding Y-12. The No Net Production/Capability-sized UPF Alternative would result in the lowest uranium releases to the environment, which would translate into the lowest dose to the public.

Under the No Action Alternative, worker dose would not change significantly. The Y-12 total worker dose in 2009 was approximately 49 person-rem, which equates to an average dose of 19.9 mrem for all Y-12 employees. This dose is well below regulatory limits and limits imposed by DOE Orders. For the UPF Alternative, the dose to workers would be reduced by about

60 percent to 20.5 person-rem. Under the Capability-sized Alternative, worker dose would be reduced to approximately 18.2 person-rem and under the No Net Production/Capability-sized UPF Alternative worker dose would be reduced to approximately 16.0 person-rem. Under all alternatives, less than one LCF to the workforce would be expected annually.

S.3.3.13 *Waste Management*

Under all alternatives, Y-12 would continue to generate and manage wastes, including low-level radioactive waste (LLW), mixed LLW, hazardous waste, and sanitary/industrial (nonhazardous) waste. During construction, the action alternatives would each result in small quantities of wastes being generated. These amounts of additional waste would be well within the capability of the existing Y-12 waste management processes and facilities to handle. Waste generation under the Upgrade in-Place Alternative would be the same as the No Action Alternative. The UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives would result in progressively lower generation of the volume of all classes of waste at Y-12. Under any of the alternatives, the waste management treatment and disposal capabilities at Y-12 would be adequate to handle wastes generated by operations.

S.3.3.14 *Facility Accidents*

Radiological. Potential impacts from accidents were estimated using computer modeling for a variety of initiating events, including fires, explosions, and earthquakes. For all alternatives, the accident with the highest potential consequences to the offsite population is the aircraft crash into the EU facilities. Approximately 0.4 LCFs in the offsite population could result from such an accident in the absence of mitigation. An MEI would receive a maximum dose of 0.3 rem. Statistically, this MEI would have a 2×10^{-4} chance of developing a LCF, or about 1 in 5,000. This accident has a probability of occurring approximately once every 100,000 years. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be 4.4×10^{-7}, or about 1 in 2.3 million. For the population, the LCF risk would be 4×10^{-4}, or about 1 in 2,500.

The UPF, Capability-sized UPF, and No Net Production/Capability-sized UPF Alternatives would decrease the overall Y-12 facility accident risks discussed above. This is because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into a UPF, reducing the accident risks associated with those older facilities. However, detailed design descriptions for a UPF are not available. Without these detailed descriptions, the reduction in accident risks cannot be quantified. New facilities such as the UPF would be constructed to current building standards and would be designed and built to withstand anticipated seismic accelerations and thus would prevent any significant earthquake damage. These new facilities would not experience significant damage from earthquakes and other external initiators. Also, controls would be incorporated into the design of new Y-12 facilities to reduce the frequency and consequence of internally initiated accidents. Therefore, the risks presented above for the current Y-12 facilities (both individually and additive) would be conservative for a UPF.

Nonradiological. The impacts associated with the potential release of the most hazardous chemicals used at Y-12 were modeled to determine whether any impacts could extend beyond

the site boundaries. Based upon those modeling results, it was determined that no chemical impacts would cause adverse health impacts beyond the site boundary. In any event, emergency preparedness procedures would be employed to minimize potential impacts.

Most of the accidents analyzed in this SWEIS do not vary by alternative because the same facilities are potentially involved in the accidents and subsequent consequences. However, the construction and use of a UPF under Alternatives 2, 4, or 5 would replace existing facilities that were originally designed for other purposes with facilities that incorporate modern features to prevent the occurrence of accidents, as well as mitigate any accident consequences. Due to the design and facility construction, a UPF is expected to reduce the likelihood and severity of many accidents associated with the EU mission; however, the decreased risk cannot be quantified until specific safety analysis documents are prepared. Such documents would be prepared during detailed design activities, if the decision is made to proceed with any one of the alternatives that include a UPF.

The Y-12 Emergency Management Program incorporates all the planning, preparedness, response, recovery, and readiness assurance elements necessary to protect onsite personnel, the public, the environment, and property in case of credible emergencies involving Y-12 facilities, activities, or operations. Provisions are in place for Y-12 personnel to interface and coordinate with Federal, state, and local agencies and with those organizations responsible for off-site emergency response. In the event of an emergency at Y-12, a number of resources are available for mitigation, re-entry, and recovery activities associated with the response.

S.3.3.15 *Intentional Destructive Acts*

NNSA has prepared a classified appendix to this SWEIS that evaluates the potential impacts of malevolent, terrorist, or intentional destructive acts. Substantive details of terrorist attack scenarios, security countermeasures, and potential impacts are not released to the public because disclosure of this information could be exploited by terrorists to plan attacks. Appendix E (Section E.2.14) discusses the methodology used to evaluate potential impacts associated with a terrorist threat and the methodology by which NNSA assesses the vulnerability of its sites to terrorist threats and then designs its response systems. As discussed in that section, NNSA's strategy for the mitigation of environmental impacts resulting from extreme events, including intentional destructive acts, has three distinct components: (1) prevent or deter successful attacks; (2) plan and provide timely and adequate response to emergency situations; and (3) progressive recovery through long-term response in the form of monitoring, remediation, and support for affected communities and their environment.

The classified appendix evaluates several scenarios involving intentional destructive acts for alternatives at Y-12 and calculates consequences to the noninvolved worker, maximally exposed individual, and population in terms of physical injuries, radiation doses, and LCFs. 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.

S.3.4 Preferred Alternative

The CEQ regulations require an agency to identify its preferred alternative to fulfill its statutory mission, if one or more exists, in a Draft EIS (40 CFR Part 1502.14[e]). In the Draft SWEIS, NNSA identified Alternative 4, the Capability-sized UPF Alternative, as the preferred alternative. In this Final SWEIS, NNSA affirms Alternative 4, the Capability-sized UPF Alternative, as the preferred alternative.

The benefits of executing the Capability-sized UPF project include reliable, long-term, consolidated EU processing capability for the nuclear security enterprise with modern technologies and facilities; improved security posture for SNM; improved health and safety for workers; and a highly attractive return on investment. While operational today, the reliability of the existing facilities will continue to erode because of aging facilities and equipment. The UPF would replace multiple aging facilities with a modern facility that would be synergistic with the new HEUMF to provide a robust SNM capability and improve responsiveness, agility, and efficiency of operations (B&W 2007).

With the consolidation of SNM operations, incorporation of integral security systems, and the 90 percent reduction of the protected area, the security posture would be greatly improved under the Capability-sized UPF Alternative. The use of engineered controls to reduce reliance on administrative controls and personal protection equipment to protect workers would improve worker health and safety. In addition, use of new technologies and processes may eliminate the need for some hazardous materials, reduce emissions, and minimize wastes. Cost savings and cost avoidance as a result of building the Capability-sized UPF would include the following[15]:

- Savings from consolidation related to right-sizing of facilities/footprint, more efficient operations, and simplification of SNM movement;
- Operating and maintenance cost reductions of approximately 33 percent from current operations;
- Reducing the number of workers required to access the protected area, which would improve the productivity of workers assigned to non-SNM activities that are currently located in the protected area. By reducing the size of the PIDAS, it is forecast that approximately 600 employees would not have to enter the PIDAS. It is conceivable that a 20 percent efficiency in non-SNM operations could be realized by not being encumbered with access requirements and restrictions of the PIDAS. Projects that support non-SNM operations would be less expensive because of improved productivity; and
- Reducing the footprint of the PIDAS protected area by 90 percent (from 150 acres to about 15 acres), which would allow better concentration of the protective force over a smaller area (B&W 2007).

[15] The projections of cost savings and cost avoidance in this SWEIS are a snapshot in time of what NNSA expects to achieve, given a specific set of requirements over a given period of years. At this early stage in the process of estimating costs, it should be acknowledged that cost savings and avoidances would be reconsidered on an ongoing basis as the design matures and as more information is known about costs. As planning for the modernization of Y-12 proceeds, NNSA would continue to review all appropriate options to achieve savings and efficiencies in the construction and operation of these facilities (White House 2010).

Significant improvements in cost and operational efficiency would be expected from a new Capability-sized UPF. These improvements would include the expectation that new, reliable equipment would be installed, greatly reducing the need for major corrective maintenance (e.g., less than half of the existing casting furnaces are normally available because of reliability problems). In addition, security improvements would be an integral part of the new facility, reducing the number of redundant personnel (e.g., two-person rule) currently required and improving the mass limitation on the items worked in an area. New facilities built within the Material Access Areas (MAAs) such as break rooms and rest rooms, are expected to greatly increase efficiencies over the current practice of multiple entries and exits daily into the MAAs. It is also expected that the inventory cycle would be greatly reduced because of more effective means of real-time inventory controls. A more efficient facility layout is expected to decrease material handling steps, including structurally, physically, and operationally integrated material lock-up facilities (B&W 2007).

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative.

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Land Use	Land uses at Y-12 would be compatible with surrounding areas and with land use plans. No change to existing land uses or total acreage of Y-12.	Potential land disturbance of approximately 42 acres of previously disturbed land during construction of the CCC and a UPF. In addition, the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area would disturb approximately 41 acres of land. Land uses at Y-12 would remain compatible with surrounding areas and with the land use plans. No impacts on off-site land use.	Upgrading existing EU facilities and construction of the CCC would not alter existing land uses at Y-12 nor affect off-site land use.	Potential land disturbance of approximately 39 acres of previously disturbed land during construction of the CCC and a UPF, and approximately 41 acres for the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area. Land uses at Y-12 would remain compatible with surrounding areas and with the land use plans. No impacts on off-site land use.
Visual Resources	Y-12 would remain a highly developed area with an industrial appearance, with no change to VRM classification.	Cranes would create short-term visual impacts during construction of the CCC and the UPF. UPF would reduce protected area from 150 acres to about 15 acres, resulting in minor industrial density reduction, but no change to VRM classification.	Construction of the CCC would result in temporary visual impacts due to use of cranes. Otherwise, the visual impacts would be the same as No Action Alternative.	Cranes would create short-term visual impacts during construction of the CCC and a UPF. UPF would reduce protected area from 150 acres to about 15 acres, resulting in minor industrial density reduction, but no change to VRM classification.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Site Infrastructure	As Y-12 continues to downsize, trends indicate that energy usage and most other infrastructure requirements will reduce by 2-5% per year.	No increased demand on site infrastructure. Would use less than 5% of available electrical capacity and less than 1% of current site water usage. Reduces steam usage by at least 10% as inefficient facilities are closed.	Same as No Action Alternative.	Under Alternative 4, water usage would decrease by about 7% and electricity usage would decrease by about 10% compared to the UPF Alternative. Under Alternative 5, water usage would decrease by about 17% and electricity usage would decrease by about 10% compared to the UPF Alternative.
Traffic and Transportation	No significant change to the current workforce of approximately 6,500 workers, therefore, Level-of-Service (LOS) on area roads would not change. The impacts associated with radiological transportation would be insignificant (i.e., much less than one latent cancer fatality [LCF] annually).	Construction-related traffic would add maximum of 950 worker vehicles per day. Increased traffic would be similar to the HEUMF construction, which has not changed LOS on area roads. Operational impact on Y-12 traffic would be a minor reduction but would not affect LOS on area roads. The impacts associated with radiological transportation would be insignificant (i.e., much less than one latent cancer fatality [LCF] annually).	Construction-related traffic would add maximum of 300 worker vehicles per day. Increased traffic would be less than HEUMF construction, which has not changed LOS on area roads. Operational impacts on Y-12 traffic would be the same as the No Action Alternative. The impacts associated with radiological transportation would be insignificant (i.e., much less than one latent cancer fatality [LCF] annually).	Construction-related traffic would add maximum of 850 worker vehicles per day. Increased traffic would be similar to the HEUMF construction, which has not changed LOS on area roads. Reduction of operational workforce by approximately 1,400-2,000 workers would not change LOS on area roads under either alternative. Impacts from transportation of radiological materials under the Capability-sized Alternative would be approximately one-fourth as much as the impacts from the No Action Alternative; and for the No Net Production/Capability-sized Alternative approximately one-twentieth as much.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Geology and Soils	No significant disturbance or impact to geology and soils.	Construction of the UPF and CCC would disturb approximately 42 acres of previously disturbed land. In addition, the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area would disturb approximately 41 acres of land. Appropriate mitigation measures would minimize soil erosion and impacts.	Construction of the CCC would disturb about 7 acres of previously disturbed land. Appropriate mitigation measures would minimize soil erosion and impacts.	Construction of the CCC and a UPF would disturb about 39 acres of previously disturbed land. In addition, the Haul Road extension, Site Access and Perimeter Modification Road, Wet Soils Disposal Area, and West Borrow Area would disturb approximately 41 acres of land. Appropriate mitigation measures would minimize soil erosion and impacts.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Air Quality and Noise	All criteria pollutant concentrations would remain below national and TDEC standards, except 8-hour ozone and $PM_{2.5}$, which exceed standards throughout the region. Greenhouse gases would be less than 0.12 percent of the statewide CO_2 emissions in Tennessee. Radiological air impacts from Y-12 emissions are expected to remain at or about current levels, i.e., 0.15 millirem per year (mrem/yr) to the maximally exposed individual (MEI), which is well below the annual dose limit of 10 mrem/yr under the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61 Subpart H). The dose to the population living within 50 miles of Y-12 would be 1.5 person-rem. **Noise:** Most Y-12 facilities at sufficient distance from the Site boundary so noise levels are not distinguishable from background noise levels.	Temporary increases in pollutants would result from construction equipment, trucks, and employee vehicles; emissions would be less than one-half of regulatory thresholds for all criteria pollutants. Reduces toxic pollutants generated during operations. Greenhouse gases would be less than 0.12 percent of the statewide CO_2 emissions in Tennessee. Reduces radiological air impacts compared to the No Action Alternative as follows: MEI: 0.1 mrem/yr; Population: 1.0 person-rem. **Noise:** Construction activities and additional traffic would generate temporary increase in noise; noise levels would be representative of large-scale building sites. Noise levels would be below background noise levels at off-site locations within the city of Oak Ridge.	During construction of the CCC, there would be some temporary increases in pollutants but these would be much less than similar emissions under the UPF Alternative. Operational emissions would be the same as the No Action Alternative. Greenhouse gases would be less than 0.12 percent of the statewide CO_2 emissions in Tennessee. Radiological air impacts are expected to be the same as the No Action Alternative. **Noise:** Minor additional noise impacts because construction would take place at the CCC site and within facilities that are slightly farther from site boundary than UPF site.	Temporary increases in pollutants would result from construction equipment, trucks, and employee vehicles; emissions would be less than one-half of regulatory thresholds for all criteria pollutants. No significant new quantities of criteria or toxic pollutants would be generated during operations. Greenhouse gases would be less than 0.07 percent of the statewide CO_2 emissions in Tennessee. Reduces radiological air impacts compared to the No Action Alternative as follows: MEI: 0.08-0.09 mrem/yr; Population: 0.8-1.0 person-rem. **Noise:** Construction activities and additional traffic associated with a UPF and the CCC would generate temporary increase in noise; noise levels would be representative of large-scale building sites. Noise levels would be below background noise levels at off-site locations within the city of Oak Ridge.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Water Resources	Water usage: 2 billion gallons/year. Discharges within NPDES requirements. Ongoing stormwater runoff and erosion control management. No impact to groundwater.	Increased water usage of approximately 4 million gallons per year during construction of the UPF. Once operational, water usage would decrease from 2 billion gallons/year to 1.3 billion gallons/year. Haul Road extension activities would result in the loss of one acre of wetlands. A total of approximately three acres of wetland would be created as mitigation.	Water requirements during construction would not raise the average annual water use for Y-12 or cause any appreciable water resource impacts or changes beyond those described for the No Action Alternative. Operations impacts would be the same as No Action Alternative.	Increased water usage of approximately 3.6 million gallons during construction of the Capability-sized UPF and CCC. Operational water use for the Y-12 Site is expected to be reduced to approximately 1.2 billion gallons per year under the Capability-sized UPF Alternative. Haul Road extension activities would result in the loss of one acre of wetlands. A total of approximately three acres of wetland would be created as mitigation. Increased water usage of approximately 3.6 million gallons during construction of the No Net Production/Capability-sized UPF and the CCC. Operational water use for the Y-12 Site is expected to be reduced to approximately 1.08 billion gallons per year under the No Net Production/ Capability-sized UPF Alternative. Haul Road extension activities would result in the loss of one acre of wetlands. A total of approximately three acres of wetland would be created as mitigation.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Ecological Resources	Site is highly developed, consisting mainly of disturbed habitat. Wildlife diversity is low (mostly species associated with areas of human development. Continued minor impacts on terrestrial resources due to operations and human activities. No federally-listed or state-listed threatened or endangered species are known to be present at Y-12 Site, although the gray bat has been sighted on ORR and the Indiana bat may also be present in the vicinity of Y-12.	Construction of the UPF and CCC would not impact ecological resources because new facilities would be sited on previously disturbed land. The Haul Road extension activities would result in the loss of one acre of wetlands; mitigation would create approximately three acres of wetlands. Continued minor impacts on terrestrial resources due to operations and human activities. No federally-listed or state-listed threatened or endangered species are known to be present at Y-12 Site, although the gray bat has been sighted on ORR and the Indiana bat may also be present in the vicinity of Y-12.	No impacts on ecological resources because construction activities would consist mostly of internal building modifications and the CCC in areas previously disturbed that do not contain habitat sufficient to support ecological resources. Continued minor impacts on terrestrial resources due to operations and human activities. No federally-listed or state-listed threatened or endangered species are known to be present at Y-12 Site, although the gray bat has been sighted on ORR and the Indiana bat may also be present in the vicinity of Y-12.	Construction of a UPF and the CCC would not impact ecological resources because new facilities would be sited on previously disturbed land. The Haul Road extension activities would result in the loss of 1.0 acre of wetlands; mitigation would create approximately 3.0 acres of wetlands. Continued minor impacts on terrestrial resources due to operations and human activities. No federally-listed or state-listed threatened or endangered species are known to be present at Y-12 Site, although the gray bat has been sighted on ORR and the Indiana bat may also be present in the vicinity of Y-12.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Cultural Resources	Y-12 currently has a proposed National Register Historic District of historic buildings associated with the Manhattan Project that are eligible for listing in the National Register of Historic Places. 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.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Socioeconomics	Operational workforce at Y-12 expected to remain stable with no significant increase or decreases. No appreciable changes in the regional socioeconomic characteristics over the 10-year planning period.	1,350 workers would be employed during the peak year of construction. This would result in a total of 5,670 jobs (1,350 direct and 4,320 indirect) created in the ROI, which would increase employment less than 3%. There would be an expected 11% decrease in operational workforce due to more efficient operations in UPF and reduced security area. These decreases in employment are not expected to change the regional socioeconomic characteristics.	700 workers would be employed during the peak year of construction. Total of 2,940 jobs (700 direct and 2,240 indirect) would be created in the ROI, which would increase employment less than 2%. Impact of operations would be the same as No Action.	About 1,250 construction workers during peak year of construction of a UPF and the CCC. About 4,000 indirect jobs would be created. Operation of the Capability-sized UPF would result in a decrease of approximately 1,400 jobs (about 20% of current). About 5,880 total jobs in the ROI would be lost, representing a 1.9% total job loss for the ROI. Operation of the No Net Production/Capability-sized UPF would result in a decrease of about 2,000 workers (30% of current workforce). ROI total employment would decrease by about 8,400, resulting in a 2.7% decrease in jobs in the ROI. These decreases in employment are not expected to change the regional socioeconomic characteristics.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Environmental Justice	No significant health risks to the public. Radiological dose to the MEI would remain well below the annual dose limit of 10 mrem. Results from the monitoring program and modeling show that the maximum exposed individual would not be located in a minority or low-income population area. No special circumstances that would result in greater impact on minority, low-income, or American Indian populations than population as a whole.	Reduced impacts compared to No Action. Accident risks would decrease compared to No Action because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into the UPF, reducing the accident risks associated with those older facilities.	Same as No Action Alternative.	Reduced impacts compared to No Action. Accident risks would decrease compared to No Action because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into the UPF, reducing the accident risks associated with those older facilities.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Health and Safety	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. Dose from air emissions: MEI: 0.15 mrem/yr (9.0×10^{-8} LCFs). Population: 1.5 person-rem/yr (0.0009 LCFs). Dose from liquid effluents: MEI: 0.006 mrem per year (4.0×10^{-9}LCFs) Population: 6.3 person-rem/yr (0.004 LCFs). Dose to Workers : 49.0 person-rem/yr (0.03 LCFs).	All radiation doses from normal operations would be below regulatory standards with no statistically significant impact on the health and safety of workers or public. Dose from air emissions: MEI: 0.1 mrem/yr (6.0×10^{-8} LCFs). Population: 1.0 person-rem/yr (0.0006 LCFs). Dose from liquid effluents would be same as No Action Alternative. Dose to Workers : 20.5 person-rem/yr (0.013 LCFs).	Same as No Action Alternative.	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. **Capability-sized UPF** Dose from air emissions: MEI: 0.09 mrem/yr (5.0×10^{-8} LCFs). Population: 1.0 person-rem/yr (0.0005 LCFs). Dose to Workers : 18.2 person-rem/yr (0.01 LCFs). **No Net Production/Capability-sized UPF** Dose from air emissions: MEI: 0.08 mrem/yr (4.0×10^{-8} LCFs). Population: 0.8 person-rem/yr (0.0005 LCFs). Dose to Workers : 16.0 person-rem/yr (0.009 LCFs) For both the Capability-sized UPF and the No Net Production/Capability-sized UPF, the dose from liquid effluents would be same as No Action Alternative.

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Waste Management (Operational Waste Volumes)	Expected volume of waste generation: LLW liquid: 713gal LLW solid: 9,405 yd^3 Mixed LLW liquid: 1,096 gal Mixed LLW solid: 126 yd^3 Hazardous: 12 tons Nonhazardous: 10,374 tons	Expected volume of waste generation: LLW liquid: 476 gal LLW solid: 5,943 yd^3 Mixed LLW liquid: 679 gal Mixed LLW solid: 81 yd^3 Hazardous: 12 tons Nonhazardous: 9,337 tons	Expected volume of waste generation: LLW liquid: 713 gal LLW solid: 9,405 yd^3 Mixed LLW liquid: 1,096 gal Mixed LLW solid: 126 yd^3 Hazardous: 12 tons Nonhazardous: 10,374 tons	Expected volume of waste generation: **Capability-sized UPF**: LLW liquid: 428 gal LLW solid: 5,643 yd^3 Mixed LLW liquid: 640 gal Mixed LLW solid: 76 yd^3 Hazardous: 7.2 tons Nonhazardous: 8,140 tons **No Net Production/Capability-sized UPF**: LLW liquid: 403 gal LLW solid: 5,314 yd^3 Mixed LLW liquid: 619 gal Mixed LLW solid: 71 yd^3 Hazardous: 7.2 tons Nonhazardous: 7,182 tons

Table S.3.3-1. Comparison of Environmental Impacts and Parameters Among No Action Alternative, UPF Alternative, Upgrade in-Place Alternative, Capability-sized UPF Alternative, and No Net Production/Capability-sized UPF Alternative (*continued*).

Site / Environmental Component	No Action Alternative	UPF Alternative	Upgrade in-Place Alternative	Capability-sized and No Net Production/Capability-sized UPF Alternatives
Facility Accidents	The, bounding accident with the most severe consequences would be an aircraft crash into the EU facilities. Approximately 0.4 LCFs in the offsite population could result. MEI dose: 0.3 rem MEI LCF risk: $2x10^{-4}$ chance of developing a LCF, or about 1 in 5,000. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be $4.4x10^{-7}$, or about 1 in 2.3 million. For the population, the LCF risk would be $4x10^{-4}$, or about 1 in 2,500.	No greater impacts than the No Action Alternative. Accident risks would decrease compared to No Action because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into the UPF, reducing the accident risks associated with those older facilities.	No greater impacts than the No Action Alternative. Accident risks would likely decrease compared to No Action because the existing EU facilities would be upgraded to contemporary environmental, safety, and security standards to the extent possible.	Accident risks would decrease compared to No Action because many of the operations and materials in the existing Y-12 nuclear facilities would be consolidated into the UPF, reducing the accident risks associated with those older facilities.

Note: The dose-to-LCF conversion factor is based on 6×10^{-4} LCFs per person-rem.

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