

# Draft Site-Wide Environmental Impact Statement for the Oak Ridge Y-12 Plant

*December 2000*

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Statement for the Oak Ridge Y-12 Plant**

Summary

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U.S.  
Department  
of  
Energy



U.S. Department of Energy  
Oak Ridge Operations Office

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**United States Department of Energy**

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## ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CRMP	Cultural Resource Management Plan
D&D	decontamination and decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DoD	Department Of Defense
DOE	U.S. Department of Energy
DP	Defense Programs
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
ES&H	environment, safety and health
ETTP	East Tennessee Technology Park
FR	<i>Federal Register</i>
FY	Fiscal Year
ha	hectare
HEU	highly enriched uranium
LCF	latent cancer fatality
LLW	low-level waste
LMES	Lockheed Martin Energy Systems, Inc.
LOS	Level-of-Service
MEI	maximally exposed individual
NAAQS	National Ambient Air Quality Standard
NABIR	Natural and Accelerated Bioremediation Research
NEPA	<i>National Environmental Policy Act</i>
NN	Nuclear Nonproliferation and National Security
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NOI	Notice of Intent
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ORO	Oak Ridge Operations
PCB	polychlorinated biphenyl
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
S&D	Storage and Disposition
S-HEU	surplus highly enriched uranium
SHPO	State Historic Preservation Officer
SR	State Route
SSM	Stockpile Stewardship and Management
SWEIS	Site-Wide Environmental Impact Statement
TDEC	Tennessee Department of Environment and Conservation
TLV	Threshold Limit Value

UEFPC      Upper East Fork Poplar Creek  
Y-12        Oak Ridge Y-12 Plant  
Y-SIM       Y-12 Site Integrated Modernization

## CHEMICALS AND UNITS OF MEASURE

AHF	anhydrous hydrogen fluoride
BTEX	benzene, toluene, ethylbenzene, and xylenes
Bq	Becquerel
C	Celsius
Ci	curie
CCl <sub>4</sub>	carbon tetrachloride
cm	centimeters
CFC	chlorofluorocarbons
CO	carbon monoxide
dB	decibel
dBA	decibel A-weighted
DCE	1, 2-dichloroethylene
F	Fahrenheit
ft	feet
ft <sup>2</sup>	square feet
ft <sup>3</sup>	cubic feet
ft <sup>3</sup> /s	cubic feet per second
g	grams
G	acceleration due to gravity
gal	gallons
GPD	gallons per day
gpm	gallons per minute
GPY	gallons per year
ha	hectares
hr	hour
in	inches
kg	kilograms
km	kilometers
km <sup>2</sup>	square kilometers
KOH	potassium hydroxide
kV	kilovolts
kVA	kilovolt-ampere
kW	kilowatts
kWh	kilowatt hours
L	liters
lb	pounds
Li	lithium
LiD	lithium deuteride
LiH	lithium hydride
LiO	lithium oxide
m	meters
m <sup>2</sup>	square meters
m <sup>3</sup>	cubic meters
m/s	meters per second
Mbps	million bits per second
Mbtu	million British thermal unit
mCi	millicuries (one-thousandth of a curie)
mCi/mL	millicuries per milliliter

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mg	milligram (one-thousandth of a gram)
mg/L	milligrams per liter
MGD	million gallons per day
MGY	million gallons per year
MLY	million liters per year
mi	miles
mi <sup>2</sup>	square miles
MLD	million liters per day
MLY	million liters per year
mph	miles per hour
mrem	millirem (one-thousandth of a rem)
Mscf	million standard cubic feet
MVA	megavolt-ampere
MW	megawatt
MWe	megawatt electric
MWh	megawatt hour
MWt	megawatt thermal
NaK	sodium potassium
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
nCi	nanocurie (one-billionth of a curie)
nCi/g	nanocuries per gram
NO <sub>2</sub>	nitrogen dioxide
NOX	nitrogen oxides
O <sub>3</sub>	ozone
Pb	lead
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
pCi	picocurie (one-trillionth of a curie)
pCi/L	picocuries per liter
PM <sub>10</sub>	particulate matter (less than 10 microns in diameter)
ppb	parts per billion
ppm	parts per million
psig	pounds per square gage
Ra	radium
rem	roentgen equivalent man
s	seconds
scf	standard cubic feet
scfd	standard cubic feet per day
scfm	standard cubic feet per minute
SO <sub>2</sub>	sulfur dioxide
SR	State Route
Sv	Sievert
t	metric tons
TATB	triaminotrinitrobenzene
TC	technetium
TCA	1, 1, 1-trichloroethane
TCE	trichloroethylene
Th	thorium
TNT	trinitrotoluene

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UF <sub>4</sub>	uranu mtetraflouride
UF <sub>6</sub>	uranium hexaflouride
VOC	volitile organic compound
yd <sup>3</sup>	cubic yards
yr	year
μCi	microcurie (one-millionth of a curie)
μCi/g	microcuries per gram
μg	microgram (one-millionth of a gram)
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
μg/m <sup>3</sup>	micrograms per cubic meter
μ	micron or micrometer (one-millionth of a meter)

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**CONVERSION CHART**


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To Convert Into Metric			To Convert Into English		
If You Know	Multiply By	To Get	If You Know	Multiply By	To Get
<b>Length</b>					
inch	2.54	centimeter	centimeter	0.3937	inch
feet	30.48	centimeter	centimeter	0.0328	feet
feet	0.3048	meter	meter	3.281	feet
yard	0.9144	meter	meter	1.0936	yard
mile	1.60934	kilometer	kilometer	0.62414	mile (Statute)
<b>Area</b>					
square inch	6.4516	square centimeter	square centimeter	0.155	square inch
square feet	0.092903	square meter	square meter	10.7639	square feet
square yard	0.8361	square meter	square meter	1.196	square yard
acre	0.40469	hectare	hectare	2.471	acre
square mile	2.58999	square kilometer	square kilometer	0.3861	square mile
<b>Volume</b>					
fluid ounce	29.574	milliliter	milliliter	0.0338	fluid ounce
gallon	3.7854	liter	liter	0.26417	gallon
cubic feet	0.028317	cubic meter	cubic meter	35.315	cubic feet
cubic yard	0.76455	cubic meter	cubic meter	1.308	cubic yard
<b>Weight</b>					
ounce	28.3495	gram	gram	0.03527	ounce
pound	0.45360	kilogram	kilogram	2.2046	pound
short ton	0.90718	metric ton	metric ton	1.1023	short ton
<b>Force</b>					
dyne	0.00001	newton	newton	100,000	dyne
<b>Temperature</b>					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths, then add 32	Fahrenheit

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**METRIC PREFIXES**

<b>Prefix</b>	<b>Symbol</b>	<b>Multiplication Factor</b>
exa-	E	1 000 000 000 000 000 000 = $10^{18}$
peta-	P	1 000 000 000 000 000 = $10^{15}$
tera-	T	1 000 000 000 000 = $10^{12}$
giga-	G	1 000 000 000 = $10^9$
mega-	M	1 000 000 = $10^6$
kilo-	k	1 000 = $10^3$
hecto-	h	100 = $10^2$
deka-	da	10 = $10^1$
deci-	d	= $10^{-1}$
centi-	c	= $10^{-2}$
milli-	m	0.01 = $10^{-3}$
micro-	$\mu$	0.001 = $10^{-6}$
nano-	n	0.000 001 = $10^{-9}$
pico-	p	0.000 000 001 = $10^{-12}$
femto-	f	0.000 000 000 001 = $10^{-15}$
atto-	a	0.000 000 000 000 001 = $10^{-18}$
		0.1

# SUMMARY

## S.1 INTRODUCTION AND BACKGROUND

### S.1.1 General

The Oak Ridge Y-12 Plant (Y-12) is one of three primary installations on the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Figure S.1.1-1 shows the location of the ORR. 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 was started in 1943 as part of the World War II Manhattan Project. The early missions of the site included the separation of  $^{235}\text{U}$  from natural uranium by the electromagnetic separation process and manufacturing weapons components from uranium and lithium.

#### Late Changes Affecting the Y-12 SWEIS

In the interim period between submitting the Draft Y-12 SWEIS for approval and the printing of the document for public release, a number of changes have occurred that affect some of the terminology used in the Y-12 SWEIS. Specifically, the changes involve:

- The National Nuclear Security Administration was established by Congress to manage the Nation's nuclear weapons complex. The National Nuclear Security Administration is a semi-autonomous agency within the Department of Energy. As one of the major production facilities within the nuclear weapons complex, Y-12 falls under the responsibility of the Y-12 Area Office as of October 1, 2000, under the new National Nuclear Security Administration. The National Nuclear Security Administration was created on March 1, 2000.
- Replacement of Lockheed Martin Energy Systems, Inc., by BWXT-Y12, L.L.C. as the M&O contractor for Y-12 on November 1, 2000.
- Change in the name of the Oak Ridge Y-12 Plant to Y-12 National Security Complex as of November 2, 2000.

Because these changes do not affect analyses present in the Y-12 SWEIS and in order to expedite public review, required revisions to the document will be made in the final version of the Y-12 SWEIS.

DOE is the Federal agency responsible for providing the Nation with nuclear warheads and ensuring that those weapons remain safe, secure, and reliable. As one of the DOE major production facilities, Y-12 has been the primary site for enriched uranium processing and storage, and one of the primary manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Y-12 also conducts, and/or supports, nondefense-related activities including environmental monitoring, remediation, and decontamination and decommissioning (D&D) activities of the Environmental Management (EM) Program; management of waste materials from past and current operations; research activities operated by ORNL; support of other Federal agencies through the Work-for-Others Program and the National Prototyping Center; and the transfer of highly specialized technologies to support the capabilities of the U.S. industrial base.

During a September 1994 Defense Nuclear Facilities Safety Board (DNFSB) technical staff review, weaknesses were identified in the Y-12 Plant Conduct of Operations program related to the criticality safety program. While these weaknesses did not represent a technical risk to facility workers, meaning that the required margins of safety were in place, they did indicate issues with training, document control, understanding of requirements, and procedures. After a full Y-12 Plant review, Plant management suspended all work in the Y-12 Plant that was not necessary to maintain regulatory compliance or the safety basis for the Plant (Stand - Down Status) until improvements could be implemented to the Conduct of Operations program at the Y-12 Plant. As of today, many but not all Y-12 Plant facilities and processes have returned to Operating Status (i.e., executing the work for which the process, facility, or system was designed) (DNFSB 1994).

Source: DOE 1996e.

**FIGURE S.1.1-1.—*Location of Oak Ridge Reservation, Principal Facilities, and Surrounding Area.***

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### S.1.2 Changing Missions

In response to the end of the Cold War and changes in the world's political regime, the emphasis of the U.S. weapons program has shifted dramatically over the past few years from developing and producing new weapons to dismantlement and maintenance of a smaller, enduring stockpile. Even with these significant changes, however, DOE's responsibility for the nuclear weapons stockpile continues, and the President and Congress have directed DOE to continue to maintain the safety, security, and reliability of the stockpile.

To fulfill its Presidential and congressional directives, DOE prepared three programmatic environmental impact statements (PEISs) to determine how best to carry out its national security missions amid a changing political climate. To implement its programmatic decisions, DOE prepares site-wide and/or project specific *National Environmental Policy Act* (NEPA) reviews. This *Site-Wide Environmental Impact Statement* (SWEIS) for the Oak Ridge Y-12 Plant was prepared to review actions that could implement decisions made in Records of Decision (ROD) for the *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS), (DOE 1996e), the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (S&D PEIS) (DOE 1996h), and the *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (S-HEU EIS) (DOE 1996b).

### S.1.3 Proposed Action and Scope

The RODs from the SSM PEIS, the S&D PEIS, and the S-HEU EIS, form a starting point for the scope of actions that are included in this SWEIS. In the SSM PEIS ROD, DOE decided to maintain the national security missions at Y-12, but to downsize the Y-12 Plant consistent with reduced requirements. These national security missions include:

- Maintaining the capability to fabricate secondaries, limited life components, and case parts for nuclear weapons. Secondaries provide additional explosive energy release and are composed of lithium deuteride and other materials. Case parts are specifically designed containers for the major components of nuclear weapons.
- Evaluating components and subsystems returned from the stockpile
- Storing enriched uranium that is designated for national security purposes (also referred to as non-surplus enriched uranium)
- Storing depleted uranium and lithium materials and parts
- Dismantling nuclear weapons secondaries returned from the stockpile
- Processing uranium and lithium (which includes chemical recovery, purification, and conversion of enriched uranium and lithium to a form suitable for long-term storage and/or future use)
- Providing support to weapons laboratories

In the S&D PEIS ROD, DOE decided that Y-12 would also store surplus enriched uranium pending long-term disposition. In the S-HEU EIS ROD, DOE decided that Y-12 would be one of four sites for blending up to 85 percent of the Nation's surplus HEU to low enriched uranium for commercial use as fuel feed for nuclear power plants and dispose of the remaining low enriched uranium as low-level waste (LLW).

In accordance with the SSM and S&D PEIS RODs, DOE will provide the capability and capacity to maintain the Nation's stockpile in support of the U.S. Nuclear Weapons Program. Further, DOE will continue the processing and storage of enriched and depleted uranium, lithium compounds, and other materials and the manufacturing and assembly/disassembly mission assigned to Y-12 in the safest, most secure and most efficient manner practicable. In accordance with the S-HEU EIS ROD, Y-12 may blend surplus HEU to produce material for commercial use as fuel feed for nuclear power plants and dispose of the remaining material as LLW. Blend stock for this activity may include DOE surplus low enriched uranium and natural uranium or commercial natural uranium. These materials would be stored onsite on an interim basis to support blending of HEU. The Y-12 Plant currently blends small quantities of HEU with low enriched, depleted, or natural uranium to produce a metal or oxide product suitable for use in various reactor programs and for multiple supply orders to DOE customers. The Y-12 Plant does not have the capability to blend large quantities of HEU (i.e., tons/year). Facility upgrades or new building construction would be required to perform this process at Y-12. Further NEPA review would also be needed to initiate these facility upgrades or any new building construction.

The physical area of analysis for the Y-12 Plant in the Y-12 SWEIS is shown in Figure S.1.3–1. A detailed map of current facility utilization at Y-12 is provided in Figure S.1.3–2.

#### **S.1.4 Development of the Y-12 SWEIS**

The Y-12 SWEIS is a tiered document that follows the RODs from the SSM PEIS, the S&D PEIS, and the S-HEU EIS. In these RODs, DOE decided that the mission of Y-12 would not change and that Y-12 would continue to maintain the capability and capacity to fabricate nuclear weapons secondaries and limited life components and case parts in support of the U. S. Nuclear Weapons Program, and store nonsurplus HEU long-term and surplus HEU pending disposition. This SWEIS “tiered” NEPA review (i.e., site-specific analysis addressing on the issues specific to the Y-12 Plant to implement the decisions made in the broader PEISs) analyzes the potential environmental impacts associated with the various Y-12 proposed actions and alternatives for implementing these decisions.

#### **S.1.5 Background**

##### **S.1.5.1 Major Programs at Y-12**

The following summarizes the activities performed under the various ongoing DOE programs at Y-12.

**Defense Programs.** The Defense Programs (DP) activities performed at Y-12 include maintaining the capability to produce secondaries and radiation cases for nuclear weapons, storing and processing uranium and lithium materials and parts, dismantling nuclear weapons secondaries returned from the stockpile, and providing special production support to DOE weapons laboratories and to other DOE programs. To accomplish the storage mission, some processing of special nuclear materials may be required to recover materials from returned secondaries. In addition, Y-12 performs stockpile surveillance activities on the components it produces.

**FIGURE S.1.3-1.—*The Y-12 Site-Wide Environmental Impact Statement Area of Analysis.***

**FIGURE S.1.3-2.—Alternative IA (No Action - Status Quo Alternative) Existing Facility Location and Utilization at Y-12.**

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The Weapons Stockpile Management Program structure at Y-12 includes:

- Core Stockpile Management
  - S Nuclear Materials Management and Storage
  - S Quality Evaluation and Surveillance
  - S Weapons Dismantlement and Disposal
  - S Stockpile Evaluation and Maintenance
  - S Materials Recycle and Recovery
  - S Modernization and Facility Transition
  - S Enriched Uranium Operations
  - S Nuclear Packaging Systems
  - S Advanced Design and Production Technologies
  - S Manufacturing Processes Program
  - S Facility Program
  - S Capital Program
- Materials Surveillance
- Y-12 Mission Support

A summary of each of the Core Stockpile Management Program components, the Materials Surveillance Program, and Y-12 Mission Support is provided in the following discussion.

***Core Stockpile Management.*** The Core Stockpile Management operations at the Y-12 Plant include the principal Oak Ridge missions of the DOE's DP in support of nuclear weapons stockpile management. These missions are structured into 12 major component programs.

***Nuclear Materials Management and Storage.*** The Nuclear Materials Management and Storage Program includes multidisciplinary initiatives in numerous facilities throughout Y-12. The program activities include (1) planning, designing, providing, and maintaining storage facilities and storage operations for the safe and secure storage of nuclear materials; (2) multiyear program planning to ensure nuclear weapons components and materials throughout the DOE Nuclear Weapons Complex are returned to Y-12 and prepared for interim or long-term storage; (3) nuclear materials planning, forecasting, and scheduling as a part of the Storage Program and as the integrator for multiple programs utilizing nuclear materials, such as Dismantlement, Stockpile Maintenance, Fissile Materials Disposition, Nuclear Nonproliferation and National Security, and Work-for-Others; (4) supporting development, design, and implementation of innovative and cost-saving technologies for storage, monitoring, and measurement of nuclear materials while reducing risks; (5) developing and maintaining technical standards for the storage of HEU, lithium, and canned subassemblies; (6) providing safeguards and security for Core Stockpile Management nuclear materials and facilities; (7) developing and implementing projects to disposition, monitor and maintain HEU in safe, optimum storage; and (8) providing interim storage of DOE surplus low enriched uranium, natural uranium, or commercial uranium for use as blendstock.

***Quality Evaluation and Surveillance.*** The Quality Evaluation and Surveillance Program includes activities required to assess the integrity of the stockpile, including safety, reliability, design compatibility, and functionality of components over the life of each weapons system in the stockpile. Y-12 has the responsibility of the Quality Evaluation and Surveillance Program pertaining to the secondaries, case parts, shelf-life units, core samples, and other vital components.

*Weapons Dismantlement and Disposal.* The Weapons Dismantlement and Disposal Program provides the activities required for the dismantlement of weapon systems that are retired from the nuclear stockpile. Components are returned to Y-12 as weapon systems directly from the military or from the Pantex Plant after initial dismantlement. At Y-12, these components are stored in various storage facilities prior to further disassembly.

*Stockpile Evaluation and Maintenance.* The Stockpile Evaluation and Maintenance Program includes activities directed at continuing the fitness of nuclear weapon warheads in the enduring stockpile and producing weapon-related hardware to support DOE and U.S. Department of Defense (DoD) requirements.

*Materials Recycle and Recovery.* The Materials Recycle and Recovery Program supports the recovery of HEU and lithium from parts recovered from retired weapons programs and quality evaluation weapons teardowns, residue materials from manufacturing processes, lightly irradiated enriched uranium from other DOE sites or commercial and private facilities throughout the country, and wastes containing HEU generated from operations throughout Y-12.

*Modernization and Facility Transition.* The Modernization and Facility Transition Program supports the definition, development, and execution of activities required to support the missions and directives of the DOE at Y-12.

*Enriched Uranium Operations.* This program includes activities directly associated with the resumption of Enriched Uranium Operations and related support at Y-12 for production of nuclear weapons components or other hardware that satisfies national priority requirements. The program also produces uranium products for other DOE programs and DOE customers (e.g., research reactors).

*Nuclear Packaging Systems.* The Y-12 Nuclear Packaging Systems Program provides for the activities required for safe, efficient, and economical packaging for transporting and storing general cargoes, radioactive materials, and other hazardous materials within and out of Y-12. The packaging program fully complies with DOE directives and Federal, state, tribal, and international regulations, requirements, and standards.

*Advanced Design and Production Technologies.* The Advanced Design and Production Technologies Program continues and accelerates the development and prototyping of advanced cost-effective and environmentally acceptable nuclear weapons production technologies and design processes required to maintain an affordable and reliable nuclear weapons stockpile.

*Manufacturing Processes Program.* The Manufacturing Processes Program for Y-12 consists of multiple projects and tasks, all of which are focused on supporting the existing and future manufacturing footprint, processes, and production requirements.

*Facility Program.* The Facility Program manages 13 production facilities (and the facility systems) that are key to the Core Stockpile Management Program. The Facility Program includes activities required for continuous operations of each facility and also includes specific facility upgrade projects related to non-routine repairs, maintenance or alteration of the facility and facility systems, and ES&H compliance.

*Capital Program.* The Capital Program manages the capital investments being made to the Y-12 Plant as either line-item projects, general plant projects, or general plant equipment activities. All major facility and process construction activities fall under this program.

**Materials Surveillance.** The Materials Surveillance Program operations involve handling, processing, storage, and accountability for weapons-grade and nonweapons-grade uranium.

**Y-12 Mission Support.** The Y-12 Mission Support activities involve functions related to, but not directly assignable to, programs within the Y-12 Site that are necessary for the Y-12 Plant to meet its mission.

Mission Support includes those functions necessary to provide the following: (1) maintain a minimum capability of processes within the production and support organizations of the Y-12 Plant; (2) ensure personnel are employed, trained, and equipped to perform their assigned jobs; (3) ensure operating and support organizations are managed; (4) and provide tasks that support Y-12 missions from a plant level (e.g., laundry, some utilities, and computer support).

**Environmental Management.** The Environmental Management (EM) activities at Y-12 include waste management and environmental restoration.

The Waste Management Program activities at Y-12 are divided into five functional areas: (1) pollution prevention, (2) waste treatment, (3) waste storage, (4) waste disposal, and (5) continuity of operations and program support. The Y-12 waste management activities address all types of facility waste: radioactive, polychlorinated biphenyl (PCB), hazardous, mixed (both radioactive and hazardous), sanitary, and industrial. The active waste management facilities at Y-12 involve over 35 facilities.

The DOE Oak Ridge Operations (ORO) Office manages environmental restoration investigation and remedial activities on the ORR, including Y-12. EM oversees and manages ORR remedial activities pursuant to the Federal Facilities Agreement for the ORR (DOE/OR-1014, January 1, 1992), serving as primary contact and coordinator with the regulators (the Tennessee Department of Environment and Conservation [TDEC] and the U.S. Environmental Protection Agency [EPA]) for implementing the Federal Facilities Agreement. There are several environmental restoration projects within the Y-12 area of analysis. These include the Bear Creek and Upper East Fork Poplar Creek watershed projects which have been merged and is now called the Y-12 Project. The environmental restoration projects are not expected to change as a result of the alternatives analyzed in the SWEIS. Ongoing environmental restoration activities have been analyzed and it is not expected that environmental restoration activities or actions which may be undertaken pursuant to the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) would change the alternatives considered in this SWEIS. In addition, the schedule for completion of activities would not change.

**Nuclear Nonproliferation and National Security.** The Nuclear Nonproliferation and National Security (NN) Program is responsible for the disposition of surplus fissile materials (surplus fissile materials were formally under the DOE Office of Materials Disposition). NN is also responsible for implementing a nuclear nonproliferation policy, bilateral nuclear treaties, and agreements with the International Atomic Energy Agency (IAEA). The National Security Program Office is responsible for supporting all NN nuclear and nonproliferation programs, verification activities, bilateral treaty support, and the interface role with the IAEA related to uranium. The HEU Disposition Project Office at Y-12 is responsible to NN for planning and technical support for surplus HEU disposition. In support of this mission, programs at Y-12 include Surplus HEU Management and Storage, and Blending of Surplus HEU, including storage and handling of low enriched uranium and natural uranium blendstock.

**Nuclear Energy.** Nuclear Energy, Science and Technology is responsible for maintaining the Nation's access to diverse energy sources as well as economic and technological competitiveness. Key activities include providing a nuclear power system for National Aeronautics and Space Administration space missions; serving the national need for a reliable supply of isotopes for medicine, industry, and research; conducting

research and development (R&D) associated with the long-term operations of current nuclear power plants; exploring advanced nuclear energy technologies; and ensuring the safe operations of reactors in DOE laboratories. Y-12 facilities are used by Nuclear Energy, Science and Technology to support certain program activities.

**Nondefense Research and Development.** ORNL uses some Y-12 facilities to house and support the laboratory's R&D activities. ORNL facility uses at Y-12 include Life Sciences, Physical Sciences, Technology Development, Technical Services, and Support Services. Other facilities are used for multiple purposes.

The Engineering Technology Division has developed a unique capability in manufacturing technologies by integrating complementary resources within ORNL and Y-12. Within this complex the ORNL R&D capabilities in materials and processes are meshed with the manufacturing, fabrication, and inspection skills of Y-12. This combination of R&D, and manufacturing expertise has been combined with over 27,870 m<sup>2</sup> (300,000 ft<sup>2</sup>) of manufacturing space and over 1,200 pieces of modern fabrication-related equipment to form the basis for the Oak Ridge Centers for Manufacturing Technology and the Y-12 National Prototyping Center, which is physically located within the east end of Y-12. The division has been the key integrator between Y-12 and ORNL. Capabilities include composites manufacturing technology, photonics, diagnostics, ultra precision manufacturing, coatings, energy conservation, and environmentally conscious manufacturing.

**Science.** The DOE Office of Science activities at Y-12 include the Field Research Center component of the ORNL NABIR Program (DOE 2000b) being implemented at Y-12, the ORNL Mouse House, and Fission Energy research activities.

**Work-for-Others Program.** The Work-for-Others Program draws on Y-12 capabilities in computer science, mathematics, statistics, physical sciences, social sciences, life sciences, technology development, and all engineering disciplines. The Work-for-Others Program objectives are to make the ORR's R&D and prototyping capabilities available to both Federal agencies (such as U.S. DoD, National Aeronautics and Space Administration, etc.) and the private sector to:

- Solve complex problems of national importance
- Improve present capabilities for future DOE programs
- Transfer technology to industry to strengthen the U.S. industrial base

The Work-for-Others Program at ORR has been and is currently involved in advanced work in the environmental, information management, materials, precision machining, hardware prototyping, and robotics technologies. These activities are carried out in various Y-12 facilities in conjunction with ongoing DOE DP activities.

**Technology Transfer Program.** The Technology Transfer Program is hosted by DOE and has as its goal to apply unique expertise, initially developed for highly specialized military purposes, to a wide range of manufacturing situations to support expansion of the capabilities of the U.S. industrial base. These activities are carried out in various Y-12 facilities in conjunction with ongoing DP activities.

#### **S.1.5.2 *Stockpile Management Restructuring Initiative***

The ongoing Stockpile Management Restructuring Initiative project supports the plan for downsizing the Y-12 Plant consistent with the future secondary and case manufacturing mission defined by the SSM PEIS and ROD. The purpose of the Stockpile Management Restructuring Initiative project is to assist in preparing the Y-12 Plant for the future production mission requirements for nuclear weapons secondaries, case

components, and other miscellaneous components, as well as providing a smaller, more cost-effective production size. The ongoing downsizing task is to minimize the number of major buildings required while maintaining the capability to perform the DP production mission.

### **S.1.5.3 Y-12 Site Integrated Modernization Program**

In 1999, DOE Headquarters asked DOE-ORO and Lockheed Martin Energy Systems, Inc. (LMES) to determine what activities would be required to develop and implement a program to modernize Y-12's facilities and ensure its capability to meet future stockpile needs. Consistent with that request, the Y-12 Site Integrated Modernization (Y-SIM) Program was established to develop and is currently implementing plans for modernizing Y-12.

The envisioned modernized Y-12 Plant includes the eventual replacement or upgrade of all major production facilities that support the DP Mission. Whereas current operations are housed in multiple facilities scattered throughout the west end of the Y-12 Plant, the Y-SIM-envisioned Plant would consolidate operations into fewer, more efficient facilities. The ultimate goal is a modernized Y-12 Plant containing the following facilities:

- HEU Materials Facility for storage of assembled weapons secondaries and other forms of highly enriched uranium
- Special Materials Complex for production of special materials
- Enriched Uranium Manufacturing Facility
- Assembly/Disassembly/Quality Evaluation Facility for the assembly, disassembly, and surveillance of nuclear weapons secondaries
- Lithium Operations Complex for production of lithium hydride and lithium deuteride parts
- Depleted Uranium Operations Facility for production of depleted uranium parts and other nonnuclear components
- Other production support facilities
- Utility and infrastructure facilities

The extent of Y-12 modernization toward this desired goal is dependent upon many factors, including sustained funding. Construction of new facilities proposed by the Y-SIM Program would be accomplished through a series of Budget Line Item construction projects. The Y-SIM Program would 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

- Reducing costs through lowered maintenance costs and improved operating efficiencies

For the HEU Materials Facility, the first component of the Y-SIM Program, the Highly Enriched Uranium Materials Facility Conceptual Design Report (Y-12 1999a) has been prepared and issued, the Project Execution Plan has been prepared, and activities have been performed to support an Independent Project Assessment and project validation to include it as a Fiscal Year (FY) 2001 Line Item Project. In addition, planning and designing of the Special Materials Complex have been expedited to bring this proposed new facility to construction in FY 2003. Alternatives for the siting, construction, and operation of the HEU Materials Facility and Special Materials Complex are included in this Y-12 SWEIS. The other potential Y-SIM Program production, production support, and utility and infrastructure facilities are still under early feasibility study and are not included as proposed projects in the Y-12 SWEIS. Further NEPA review would be required if these facilities are proposed and ripe for decision.

### **S.1.6 Public Scoping**

#### **S.1.6.1 Issue Identification Process**

DOE published the Notice of Intent (NOI) to prepare the Y-12 SWEIS in the *Federal Register* on March 17, 1999 (64 FR 13179). Additional public notice of the proposed SWEIS and the schedule for public scoping meetings were provided through the placement of advertisements in local newspapers. The public scoping period began on that day and continued through May 17, 1999. DOE invited the public to submit comments during the scoping period by postal mail, electronic mail, fax, telephone, and through written and verbal comments submitted at the public scoping meetings.

Both afternoon and evening public scoping meetings were held in Oak Ridge, TN, on April 13, 1999. More than 345 people attended the two scoping meetings held at the Oak Ridge Community Conference Center at the Oak Ridge Mall.

A court reporter typed verbatim transcripts of the entire scoping meetings and an audiotape was made of the proceedings. Blank comment forms were available for those members of the public who preferred to provide written comments. Exhibits and handouts about the Y-12 Site, the Y-12 SWEIS, the NEPA process, and the NOI were available at each meeting. Technical representatives were present to answer questions.

DOE public reading rooms in the Oak Ridge area were provided copies of the public notices, written public comments, and the transcripts of the scoping meetings. A database was created to track written and oral comments received during the scoping period. A total of 574 people submitted 701 individual comments that were recorded in the database. The comments were characterized and grouped within 20 major issue categories.

#### **S.1.6.2 Results of Public Scoping**

DOE's disposition of the issues raised during public scoping for the Y-12 SWEIS was published in the Scoping Summary Report for the Site-Wide Environmental Impact Statement, Oak Ridge Y-12 Plant (DOE 1999h) and placed in the Oak Ridge area DOE Reading Rooms at the following locations:

DOE Public Reading Room  
230 Warehouse Road  
Building 1916-T-2, Suite 300  
Oak Ridge, Tennessee 37831

Oak Ridge Public Library  
1401 Oak Ridge Turnpike  
Oak Ridge, Tennessee 37831

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The document can also be viewed on the DOE-ORO Home Page: <http://www.oakridge.doe.gov>.

#### **S.1.6.2.1** *Major Scoping Comments*

DOE has considered all scoping comments in preparing the draft Y-12 SWEIS. The major issues identified by the public centered on the shutdown of the Y-12 Plant, Proposed Action and Alternatives, the Y-SIM Program, and the health and safety of workers and the public. The major issues are discussed further in this section and addressed throughout the SWEIS.

Of 701 total comments, 503 related to the SWEIS alternatives (a postcard campaign accounted for 461 of these comments), 67 addressed modernization, and 17 focused on occupational and public health. Of the remaining 114 comments, 62 addressed specific resource areas, while 52 were considered outside the scope of this SWEIS.

***Shutdown of the Y-12 Plant.*** Some commentors opposed continuation of operations at the Y-12 Plant associated with weapons production. Several individuals stated that the production of nuclear weapons and materials should be halted immediately. Public health and safety related to Y-12 weapons production activities were also areas of concern.

The decision to continue the weapons production mission at Y-12 has already been made by DOE in the SSM PEIS ROD. Shutting down Y-12 is not a viable alternative at this time (see Section S.3.1.4). The need for nuclear weapons has already been determined by the President and Congress, and is an issue that is beyond the scope of the Y-12 SWEIS. The impacts on worker and public health and safety from Y-12 operations are included and analyzed in Chapter 5 of the SWEIS.

***Proposed Action and Alternatives.*** Commentors expressed a variety of opinions and preferences on the alternatives addressed in the SWEIS. Comments focused on which alternatives should be implemented in modernizing the Y-12 Plant and the preferred alternative that should be selected by DOE.

Commentors expressed confusion as to the exact definition of No Action and how the SWEIS would analyze this alternative. Some commentors stated that a total halt to weapons production at Y-12 and shutdown of the facility should be considered as the No Action Alternative. Other commentors stated that the No Action Alternative was not a viable alternative as indicated in the NOI because the Y-12 Plant was needed to support the Nation's Nuclear Weapon Stockpile; however, the commentors noted that NEPA regulations require analysis of a No Action Alternative.

Some commentors stated that the Y-12 mission could be accomplished solely with consolidation and upgrade of existing facilities as analyzed in the SSM PEIS. Others stated that DOE should pursue the total modernization of the Y-12 Plant via all new construction. A number of comments were received through a postcard campaign that supported the modernization of the Y-12 Plant by using a combination of upgrades to existing facilities and construction of new facilities as appropriate. Commentors wanted specific buildings identified that would be upgraded or vacated due to construction, even if they were tentative designations.

DOE has considered all comments on alternatives for the Y-12 SWEIS and has addressed the major comments described above in the following manner.

Shutting down the Y-12 Plant is not a viable alternative as explained in the NOI issued on March 17, 1999 (64 FR 13179). DOE has already decided in the SSM PEIS and S&D PEIS RODs that the mission at Y-12 would continue (see Section 3.4 of the SWEIS). Therefore, the No Action - Planning Basis Operations Alternative analyzed in this SWEIS addresses the continuation of Y-12 historic missions. This alternative

reflects the Y-12 Plant operations at planned weapons production support levels (see Section S. 3.1.3). A No Action - Status Quo Alternative, which is basically the status of Y-12 Plant in 1998, is also presented in the SWEIS to show the potential increase in production levels and potential impacts under the No Action - Planning Basis Operations Alternative and other alternatives. The No Action - Status Quo Alternative does not meet Y-12 mission requirements and is not considered reasonable because most Y-12 Plant operations were not operating in 1998 as a result of the 1994 stand-down of Y-12.

The Y-12 Plant consolidation efforts analyzed in the SSM PEIS are included in the Stockpile Management Restructuring Initiative (see Section S.1.5.2) which implements the plan for downsizing the Y-12 Plant. The potential impacts of consolidation and limited upgrade are included under the No Action - Planning Basis Operations (see Section 3.2.1.1 of the SWEIS) and consistent with the SSM PEIS ROD. Because of the age of Y-12 facilities, new requirements for natural phenomena and worker health standards, and limited budgets, upgrade alone is not considered a reasonable approach to continue the Y-12 Plant mission and meet long-term workload requirements.

Construction of an all new Y-12 Plant is not considered an alternative in the SWEIS. The Y-SIM Program, which is the foundation for an all new Y-12 Plant proposal, is a long-term process and most projects are not developed to the extent that they can be proposed and analyzed under NEPA at this time. However, new construction alternatives to support the Y-12 Plant HEU Storage Mission and the Special Materials Mission are included in the SWEIS (see Section S.3.2.3 and S.3.2.4). DOE's preferred alternative is Alternative 4 (i.e., DOE's preferred alternative for the HEU Storage Mission is to construct and operate a new HEU Materials Facility. The preferred alternative for the Special Materials Mission at Y-12 is to construct and operate the new Special Materials Complex.) A preferred site for each of these facilities will be identified in the Final Y-12 SWEIS.

***Y-12 Site Integrated Modernization Program.*** Many commentors expressed concern about the advanced age of the Y-12 facilities because many of the buildings are more than 40 years old. These commentors stated that the facilities should be modernized to reduce operating costs and to enhance environment, safety and health (ES&H) requirements. Some commentors expressed concern about the potential budget impacts of modernization on EM activities and pointed out that it is more difficult to assign a cost to such things as environmental issues and health and safety.

It also was the opinion of many commentors that modernization of Y-12 should not be delayed and should be conducted in an integrated way. Alternatively, one commentor opposed any modernization of nuclear processes and facilities and suggested several sub-alternatives for modernization and consolidation for those activities associated only with dismantling weapons and processing and storage of HEU.

As explained in Section S.1.5.3, the Y-SIM Program is a long-term process designed to modernize the Y-12 Plant in an integrated way so as not to disrupt the assigned weapons mission support activities or jeopardize the Y-12 weapons production capabilities. The parts of modernization that can be analyzed at this time are included in the SWEIS (i.e., the HEU Storage Mission Alternatives and the Special Materials Mission Alternatives; see Sections S.3.2.3 and S.3.2.4). The potential future modernization projects, such as the Enriched Uranium Manufacturing Facility are described in Section 3.3 of the SWEIS, but are not analyzed as proposed projects in the SWEIS. All modernization projects, as well as EM activities, are subject to congressional budget appropriations and changes.

Alternatives that eliminate components of the mission at Y-12 (i.e., weapons production and support activities) are not viable alternatives since they would not continue the current Y-12 mission, nor would such alternatives be consistent with the SSM PEIS ROD (see Section S.3.1.4).

**Worker and Public Health and Safety.** Comments related to worker and public health and safety stated that the SWEIS should address enriched uranium, beryllium, and other radiological and hazardous materials. This included the request that the SWEIS discuss analysis of off-site exposure to uranium-contaminated dust, potential hazard to workers due to external gamma and possible criticality reactions from storage of enriched uranium, and a chronic beryllium disease management plan.

The SWEIS analyzes potential worker and public health impacts associated with criteria pollutants, hazardous air pollutants and radiological air pollutants in Section 5.12 of this SWEIS. Criticality accidents are addressed in Section 5.14 and Appendix D of the SWEIS. Appendix D.6 presents summaries on past or ongoing beryllium studies associated with Y-12 workers and the public.

## **S.2 PURPOSE AND NEED**

The end of the Cold War resulted in the curtailment of new nuclear weapons design and production programs, a significant reduction in funding for maintaining the nuclear weapons stockpile, and the adoption of a comprehensive ban on nuclear testing. Y-12, the oldest of the Nation's nuclear weapons production facilities, now faces significant and diverse new challenges in its national security mission.

As discussed in S.1.2, DOE has prepared several PEISs to determine how best to carry out its national security requirements in the post-Cold War era. Based on those PEISs, DOE has made a number of decisions related to the long-term storage and disposition of fissile material, the maintenance of national security missions, and assurance of the safety and reliability of the nuclear weapons stockpile. In accordance with these programmatic decisions, Y-12 will continue to play an integral role in the continuance of DOE's programs supporting the Nation's nuclear defense. The purpose of DOE's action is to implement the programmatic decisions previously announced in the ROD's for the SSM PEIS and the S&D PEIS.

During the Cold War, new weapons programs provided capital investment in the DOE weapons production plants, supporting development of new technologies and construction of new and updated facilities. The end of the Cold War, together with a shrinking defense budget, halted the regular infusion of capital and technology into the plants. This situation has resulted in an 80 percent reduction in annual capital investments at the Y-12 Site and significantly increased the Y-12 Plant's maintenance backlog. Today, Y-12 is using 1980s or older processes and technologies to perform its missions. The situation at Y-12 is one in which DOE is faced with the following choices: continue to pursue expensive stop-gap repair operations or invest sufficient capital in Y-12 to modernize technologies and facilities.

The primary purpose of this SWEIS is to document a baseline for Y-12 mission operations and to evaluate the reasonable alternatives for implementing the programmatic decisions previously announced in the RODs for the SSM PEIS and the S&D PEIS. In those PEIS RODs, DOE determined that the current mission will remain at Y-12. DOE has also determined that the existing Y-12 facilities are old, over-sized, inefficient, not cost-effective, and do not maximize the attainment of ES&H goals. Consequently, this SWEIS evaluates reasonable alternatives for modernizing the HEU Storage Mission and Special Materials Mission at Y-12 to maximize efficiency, cost-effectiveness, and ES&H goals.

The purpose and need for the proposed HEU Storage Facility and the proposed Special Materials Complex are presented below.

**HEU Storage Mission.** The purpose of DOE's proposed action is to consolidate and modernize the HEU storage operations at Y-12 in accordance with the S&D PEIS ROD. By consolidating HEU in a new modern facility, Y-12 would be able to meet its HEU storage mission in a more efficient manner; improve nuclear

materials security and accountability; and enhance worker, public, and environmental safety. DOE's action is needed because existing HEU storage facilities at Y-12 are in buildings that already are 35-55 years old and require significant maintenance and funding to maintain operations and security protocol. In addition, some of the buildings in which storage facilities are located do not meet current standards for natural phenomenon events (e.g., tornado and seismic occurrences).

**Special Materials Mission.** The purpose of DOE's proposed action is to modernize special materials operations to meet projected nuclear weapons stockpile requirements in accordance with the SSM PEIS ROD and meet more protective beryllium exposure limits for workers. The action is needed because the existing processes and facilities at Y-12 needed to support production of special materials have deteriorated to the point that DOE can no longer be assured of their operational reliability. In addition, DOE must meet more stringent American Conference of Governmental Industrial Hygienists (ACGIH) exposure limits for suspended beryllium in air of 0.2 Fg/m<sup>3</sup>. The new exposure limits cannot be met using existing Y-12 facilities without excessive administrative controls and personal protective equipment which would reduce production efficiencies and jeopardize meeting nuclear weapons stockpile mission support requirements. DOE's action would ensure efficient production of adequate quantities of special materials for all anticipated scenarios considered in the nuclear weapons stockpile for the next 50 years, and reduce the health risk to workers and the public.

### **S.3 Y-12 SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT ALTERNATIVES**

#### **S.3.1 Development of Alternatives**

The DOE NEPA strategy for the SSM and the S&D Programs consists of multiple phases. The first phase was to prepare PEISs (now completed) to support program-wide decisions. In the second phase, DOE would prepare any necessary site-wide and/or project-specific NEPA documents required to implement any programmatic decisions. This Y-12 SWEIS is the next step for DOE's NEPA strategy for Y-12. As such, the proposed actions in this SWEIS are consistent with previous DOE decisions in the PEIS RODs to continue to operate and downsize Y-12, and to store nonsurplus and surplus enriched uranium. This Y-12 SWEIS takes the mission decisions made in the SSM and S&D PEIS RODs and analyzes the potential environmental impacts associated with the various alternatives for implementing these decisions.

The alternatives presented in the Y-12 SWEIS have evolved, and in the process changed significantly from those identified in the NOI on March 17, 1999. Internal DOE scoping, which formed the alternatives in the NOI, focused on the modernization of the Y-12 Plant. In this respect, alternatives (i.e., Upgrade Alternative, New Construction Alternative, and Upgrade/New Construction Alternative) centered on upgrades and new construction at the Y-12 for DOE to accomplish the mission assigned to Y-12 based on SSM PEIS and S&D PEIS ROD decisions. During preparation of the Y-12 SWEIS it became apparent that these alternatives were too broad, not well defined, and lacked in data needed to analyze the potential impacts. A reevaluation of the DOE proposed action for the Y-12 Plant resulted in the current alternatives analyzed in the Y-12 SWEIS. The new alternatives focus on two of Y-12 Plant's mission components, the HEU Storage Mission and the Special Materials Mission.

##### **S.3.1.1 Major Planning Assumptions**

The planning assumptions and considerations that form the basis of the analyses and impact assessments presented in the SWEIS are listed below.

- 
- **Assumption 1:** The mission at Y-12 will not change and is consistent with the decisions reached in the SSM PEIS ROD and the S&D PEIS ROD. All alternatives are based on this assumption. Two No Action Alternatives are presented in the Y-12 SWEIS: No Action - Status Quo and No Action - Planning Basis Operations. The No Action - Status Quo Alternative represents the current level of operations, i.e., the operations of Y-12 at the current (1998) level reported in the Annual Site Environmental Report (ASER) issued in 1999. Approximately 40 percent of operations associated with DP's assigned mission were operational ready in 1998 (following the Y-12 Plant stand-down in 1994). About 10 percent of actual operating capacity was achieved. As discussed in the "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," (46 FR 18026, as amended), "No Action" may also mean "no change" from current management directions. Accordingly, this SWEIS also evaluates a No Action - Planning Basis Operations Alternative for the Y-12 Site that presents the continuation of historical mission operations at the Y-12 Plant consistent with the RODs from the SSM and S&D PEIS. The No Action - Planning Basis Operations Alternative includes the resumption of all remaining weapons program operations at Y-12 which have been in stand-down since 1994. No major upgrades or new construction of DP facilities to maintain weapon program capabilities or capacity are included under the No Action - Planning Basis Operations Alternative. The No Action - Planning Basis Operations Alternative does incorporate ongoing upgrades to existing facilities that address action items or findings from past reviews (e.g., HEU vulnerability or health and safety studies) to resolve the findings.
  - **Assumption 2:** To modernize Y-12's current mission capabilities and address long-term ES&H requirements, DOE is proposing new facilities for the HEU Storage Mission and Special Materials Mission at Y-12. Various alternatives for these two new facilities, the HEU Materials Facility and the Special Materials Complex, are analyzed in this SWEIS. These proposed projects are independent actions to each other (i.e. decision making for one project does not influence, and is not influenced by, decision making for the other project).

Other potential modernization projects in the early planning stages have been developed to the extent practical and are described in Section 3.3 of the SWEIS. The potential impacts of these projects are addressed qualitatively and are included in the cumulative impacts in Chapter 6 of the SWEIS. These potential future projects would be addressed under separate NEPA review when conceptual design information is available and the time is appropriate to make a decision on the need for a specific facility.

- **Assumption 3:** The non-DP missions at Y-12 conducted by the Nuclear Energy, Nuclear Nonproliferation and National Security, Work-for-Others, and Technology Transfer programs are not expected to change significantly from the No Action - Status Quo Alternative over the next 10 years and would be the same as described in Chapter 2 and reflected in the current affected environment shown in Chapter 4 of the SWEIS. These missions are consistent with the missions already analyzed in the SSM PEIS, S&D PEIS, and the S-HEU EIS and are not expected to change. Budgeting and long-range planning for these programs indicate no major upgrades or new construction are proposed for these missions. To the extent that these missions do change or additional buildings or facilities are needed, they will undergo the appropriate NEPA analysis once sufficient data are available with which to assess the potential environmental impacts associated with such proposals.
- **Assumption 4:** NN missions at Y-12 involve the management of surplus HEU, including blending small quantities (i.e., kg/year) of HEU with low enriched uranium or natural uranium to produce a metal or oxide product suitable for use in various reactor programs, and for multiple supply orders to DOE customers. The HEU blending operations using existing Y-12 facilities and processes are included in the No Action - Planning Basis Operations Alternative.

- **Assumption 5:** Large volume (tons/year) down-blending of HEU at Y-12 has been considered by NN and analyzed under NEPA in the S-HEU EIS, but no projects to implement the activities (upgrade existing functions or new construction) have been proposed. Therefore, potential impacts of this down-blending are not included under No Action. However, the potential impacts from down-blending large quantities of HEU at Y-12 as described in the S-HEU EIS have been included in Chapter 6 (Cumulative Impacts) of this Y-12 SWEIS. Impacts of projects to upgrade or construct facilities will be analyzed when those projects are identified.
- **Assumption 6:** DP is currently storing  $^{233}\text{U}$  in Building 3019 (Radiological Development Facility) at the ORNL. This facility is the  $^{233}\text{U}$  National Repository and has been an ongoing operation at ORNL since 1982. The storage and disposition of this  $^{233}\text{U}$  is not included in the scope of analysis for the Y-12 SWEIS because the material is not associated with Y-12's missions or located at the Y-12 Plant. The storage and disposition of this  $^{233}\text{U}$  is currently planned for a separate NEPA review in the future. The planned NEPA review is expected to consider the status of the existing storage facility, the characterization of the material in storage (e.g., useful material or waste), the potential for beneficial uses of the material, the treatment of  $^{233}\text{U}$  material prior to disposal, and the possible alternatives for relocation and storage. The potential use of Y-12 facilities or processes for treatment and/or storage of  $^{233}\text{U}$  would be analyzed, if determined to be a viable candidate site for these actions, in the subsequent NEPA review.
- **Assumption 7:** Project construction material lay-down areas have been identified for the proposed HEU Materials Facility, the Upgrade Expansion of Building 9215, and the Special Materials Complex. Potential impacts associated with these lay-down areas are discussed in the SWEIS under each alternative. The identified sites of the construction lay-down areas are considered to be the best locations for each project based on project engineering cost and efficiencies; and their reasonable proximity to the actual construction sites. An optional construction material lay-down area may be available. The potential site is the current permanent MK Ferguson (on-site General Contractor) construction lay-down area located on Old Bear Creek Road west of the S-3 Parking Lot, as shown in Figure 3.2.1-1. Other than erection of a fence to separate the area into two areas (one for MK Ferguson materials and one for SWEIS project materials) there would be no additional major site preparations. Since the site is an operating construction material lay-down area, there would be no additional environmental impacts with the use of the site. However, availability of the MK Ferguson site for proposed HEU Storage Mission or Special Materials Mission project construction support is uncertain, therefore, the impacts of this potential option are not presented in the SWEIS. If the MK Ferguson construction lay-down area were available and used for the HEU Storage Mission or Special Materials Mission Alternatives construction projects, the potential impacts discussed in the SWEIS associated with the identified construction lay-down areas would not occur.

### **S.3.1.2 No Action - Status Quo Alternative (Defense Programs Operations and Emissions)**

The DNFSB mandated stand-down of the Y-12 Plant in 1994 essentially curtailed most Y-12 weapons program support activities. Because operations still have not resumed to full levels, the 1998 environmental conditions and operations described in Chapter 4 of the SWEIS do not reflect a fully functional Y-12 Plant performing its assigned mission at required and planned work levels.

In 1998, approximately 40 percent of the types of Y-12 Plant operations needed to support Y-12 mission requirements had achieved operational readiness from the 1994 stand-down, and about 10 percent of Y-12 Plant operational capacity was being used. Most of the 10 percent operating capacity during 1998 resulted from the continued operation of a few critical operations at Y-12 that were required to maintain the nuclear weapons stockpile. Therefore, the environmental monitoring and environmental surveillance information

described in Chapter 4, reflect only a small part of the typical operating conditions (i.e., as occurred prior to the 1994 stand-down and will resume in the near future). To aid the reader in identifying the differences between operations and environmental conditions as they are now compared to what they will be under a fully operational Y-12, a No Action - Status Quo Alternative is provided in the SWEIS. The No Action - Planning Basis Operations Alternative (discussed below) provides a second benchmark for comparison to the action alternatives. The No Action - Status Quo Alternative, which is basically a continuation of the status of Y-12 in 1998, is presented in the SWEIS to show the potential increase in production levels and potential impacts under the No Action - Planning Basis Operations Alternative and other alternatives described in Section S.3.2. The No Action - Status Quo Alternative is not considered reasonable for future Y-12 operations because it does not meet Y-12 mission requirements.

### ***S.3.1.3 No Action - Planning Basis Operations Alternative (Defense Programs Operation and Emissions)***

The Y-12 Plant has not operated at required and planned operation levels since the stand-down in September 1994. Additionally, enriched uranium metal operations performed in Building 9212 were shut down prior to the stand-down for modification in 1989. The modifications were completed but not before the stand-down prevented their restart. Since all required Y-12 DP mission functions have not been operating, existing Y-12 conditions for the most part do not represent a fully operational Y-12 Plant performing assigned mission operations at required levels to support the nuclear weapons stockpile. Therefore, an estimate of planned Weapons Program and Y-12 Plant workload schedules was compared to historical Y-12 Plant operations prior to the 1994 stand-down to estimate the DP planning basis operations requirements and potential emissions for use as a second No Action Alternative (i.e., No Action - Planning Basis Operations) in the Y-12 SWEIS for the 10-year planning period (Garber 2000).

The major production-related operations at the Y-12 Plant during the late 1980s involved enriched and depleted (or natural) uranium. These operations would resume and would continue under the No Action - Planning Basis Operations Alternative. Other activities conducted in that time period involving weapons materials included weapons disassembly, joint test assembly production, quality evaluation, and special production. These other activities have not been suspended and would continue through 2010. The contribution of these other program activities to uranium emissions and other effluents is very small relative to enriched and depleted uranium operations. While weapons dismantlement is expected to increase during the next 10 years, Y-12 Plant DP effluents and resource requirements should not vary appreciably from current baseline levels.

During the 1987 timeframe, enriched uranium recovery operations in Building 9212 were performed on a 3 shift-a-day, 7 day-a-week operation (21 shifts). Recovery operations in Building 9206 were also functioning at full capacity. An estimated 50 percent of the 1987 uranium operations emissions were from production operations and the remaining 50 percent were from enriched uranium recovery operations.

Weapons Program activity levels have been projected for the period 2001-2010 from the Stockpile Life Extension Program and other Y-12 Plant workload schedules. The weapons activity levels for this period were then associated with the respective enriched uranium production and recovery activities. The activity level for weapons production, quality evaluation, and special productions is estimated to be approximately 30 percent of the activity level at Y-12 experienced in 1987. Enriched uranium recovery operations during the period 2001-2010 is expected to be at levels equal to 1987 using 21-shift (3 shift-a-day, 7 day-a-week) operations. Therefore, uranium emission levels expected during the period 2001-2010 for enriched uranium recovery is estimated to be equal to 50 percent of the total uranium emissions for 1987. Enriched uranium emissions due to other weapons production activities are estimated to be 30 percent of the remaining 50

percent of the total uranium emissions for 1987. Thus the annual enriched uranium emissions and other process effluents from the Y-12 Plant for the period 2001-2010 are estimated to be 65 percent of the Y-12 Plant levels experienced in 1987. This estimate is considered a bounding case because of various process and facility improvements that have been incorporated at Y-12 since 1987, and because actual production levels will fluctuate over the 2001-2010 time period.

Depleted uranium and non-enriched uranium operations and emissions involving weapons materials are also expected to be at 30 percent of the levels experienced at Y-12 in 1987 except for Lithium Recovery Operations. During the period 2001-2010, Lithium Recovery Operations are expected to return to 100 percent of the levels experienced at Y-12 in 1987.

#### **S.3.1.4 Alternatives Considered But Eliminated From Detailed Consideration**

DOE is the Federal agency responsible for providing the Nation with nuclear warheads and ensuring that those weapons remain safe, secure, and reliable. By law, DOE is required to support the Nuclear Weapons Stockpile Plan. To do this, DOE must maintain a nuclear weapons production, maintenance, and surveillance capacity consistent with the President's Nuclear Weapons Stockpile Plan. For the proposed action (Continued Operation of Y-12 Missions), the following alternatives were considered but eliminated from detailed study for the reasons stated.

**Site Closure with Complete Environmental Restoration.** Members of the public have in the past, and during public scoping for the SWEIS, stated that DOE should analyze shutting down all operations at Y-12, deactivating some or all of the facilities, and cleaning up the Site for other potential uses. DOE has already considered these suggestions in previous DOE programmatic NEPA documents, specifically the SSM PEIS and the S&D PEIS. DOE recognizes that Y-12 has unique capabilities and diverse roles supporting a variety of national programs, and that there is an essential near-term need to manage and maintain the safety and stability of the existing nuclear materials inventory. In addition, the National Security Strategy for a New Century, issued by the White House in October 1998, emphasizes the need to “ensure the continued viability of the infrastructure that supports U.S. nuclear forces and weapons.” Until relieved of its mission to support the enduring nuclear weapons stockpile by the President and Congress, DOE must maintain its DP operations at the Y-12 Plant. Accordingly, the DOE view at this time is that a decision to shut down or further reduce Y-12 missions within the timeframe of the SWEIS would be highly unlikely and an unreasonable alternative.

**Construction of an All New, Smaller Y-12 Plant.** Some members of the public proposed that DOE analyze building an all new Y-12 Plant (implementing all of the Y-SIM Program projects), cleaning up the vacated facilities, and encouraging reindustrialization of the old Y-12 Site.

The long-term planning for the Y-12 Plant is being addressed in the Y-SIM Program; however, this program spans 30 years or more and includes many potential production, support, and infrastructure projects (see Section S.1.5.3). The new, smaller and more modern Y-12 envisioned by the Y-SIM Program is only conceptual at best. Although some components of the program are more defined and further along in the planning process, there is no proposal or data to support analyses of a “new” Y-12. Components of the program are prioritized based on Y-12 mission requirements and ES&H needs and are subject to limited funding levels. Therefore, creating an all new Y-12 Plant would be highly unlikely, financially remote, and unsupported by design information and data for analysis to be considered a reasonable alternative.

**Upgrade Existing Facilities for Special Materials Missions.** DOE considered the feasibility of renovating existing facilities needed to meet special materials operation requirements as part of the Y-SIM Program. The review indicated that extensive and costly renovation of the facilities would be required to

meet ES&H and mission requirements. The existing special materials facilities range from 27 to more than 50 years old and incur significant maintenance and operating costs while failing to meet future missions and safety requirements. Although renovation of some existing facilities is possible to meet capability, capacity, and ES&H requirements, other facilities cannot be upgraded. Those facilities that can be upgraded would incur extensive costs and inefficiencies because of the use of multiple aging facilities. Facilities that cannot be upgraded must be replaced by new facilities or newly constructed operations areas in existing buildings. Even though requirements could be satisfied, inefficiency from the use of multiple facilities, duplication of support services, and continued degradation of the structural integrity of old buildings and infrastructure renders this a nonviable alternative.

### **S.3.2 Alternatives**

Because all operations at the Y-12 Plant have not regained operational readiness from the stand-down of the Y-12 Plant in 1994, the existing Y-12 activities and environmental conditions do not reflect a true No Action for the Y-12 Site for comparison of action alternative impacts. Therefore two No Action Alternatives are presented in the SWEIS: No Action - Status Quo and No Action - Planning Basis Operations. The No Action - Status Quo Alternative, which is basically the status of Y-12 in 1998, is presented in the SWEIS to show the increase in production levels and potential impacts under the No Action - Planning Basis Operations Alternative and the other alternatives. The No Action - Status Quo Alternative is not considered reasonable for future Y-12 operations because it would not meet Y-12 mission requirements. The No Action - Planning Basis Operations Alternative represents a Y-12 Plant operated at full planned and required work levels.

Alternatives analyzed in the Y-12 SWEIS include the No Action - Planning Basis Operations Alternative for the mission at Y-12 and site-specific alternatives for two of Y-12's mission components (i.e., HEU Storage Mission and Specials Materials Mission). Table S.3.2-1 shows the Y-12 SWEIS Alternatives. There are two options for the Y-12 HEU Storage Mission: (1) construct and operate a new HEU Materials Facility, and (2) construct and operate an Upgrade Expansion to existing Building 9215. Under the new HEU Materials Facility construction option, two siting alternatives are analyzed (i.e., Sites A and B).

For the Special Materials Mission at Y-12, the alternative analyzed is to construct and operate a new Special Materials Complex. Three candidate sites are analyzed for construction and operation of the Special Materials Complex (i.e., Sites 1, 2, and 3).

Implementation of any of the action alternatives for the HEU Storage Mission or Special Materials Mission would result in the potential for surplus DP facilities and the possible transitioning to EM for cleanup and D&D. Appendix A.1 of the SWEIS describes the Y-12 Plant facility transition process in detail. Estimated D&D wastes from vacated HEU storage facilities and special materials operation facilities are provided in Section 5.11.2 of the SWEIS.

#### **S.3.2.1 Alternative 1A (No Action - Status Quo Alternative)**

The No Action - Status Quo Alternative represents the current level of operations at Y-12 as reflected by the most recent monitoring data (1998) for the Y-12 Site and reported in the ASER issued in 1999. Although approximately 40 percent of the types of operations associated with DP's assigned mission were operational ready in 1998 (following the Y-12 Plant stand-down in 1994), the Y-12 Plant was only operating at 10 percent capacity. This state/condition is used in the SWEIS as a basis for comparison of the impacts associated with the No Action - Planning Basis Operations Alternative and the other alternatives that reflect full Y-12 DP mission operations at required levels and recently approved projects by EM and ORNL at Y-12. The No Action - Status Quo Alternative is not considered reasonable for future Y-12 operations because it would not

meet Y-12 mission needs and would not reflect DOE's decision in the SSM PEIS ROD (61 FR 68014) to maintain and downsize the DP mission at Y-12.

**S.3.2.2 *Alternative 1B (No Action - Planning Basis Operations Alternative)***

Under the Alternative 1B (No Action - Planning Basis Operations Alternative), Y-12 would continue historic nuclear weapons program missions. The No Action - Planning Basis Operations Alternative reflects the implementation of the DOE decision in the SSM PEIS ROD (61 FR 68014) to maintain the DP national security mission at Y-12, but to downsize the Plant consistent with reduced requirements. This includes DP capabilities to produce and assemble uranium and lithium components, to recover uranium and lithium materials from the component fabrication process and disassembled weapons, to produce secondaries, cases, and related nonnuclear weapons components, to process and store enriched uranium and to supply enriched uranium, lithium, and other material products; EM activities at Y-12 related to environmental monitoring, remediation, deactivation and decontamination, and management of waste materials from past and current operations; Office of Science activities operated by ORNL; and DP support of other Federal agencies through the Work-for-Others Program, the National Prototype Center, and the transfer of highly specialized technologies to support the capabilities of the U.S. industrial base. The No - Action Planning Basis Operations Alternative also includes activities to store surplus enriched uranium pending disposition in accordance with the S&D PEIS ROD (62 FR 3014).

TABLE S.3.2-1.—Y-12 SWEIS Alternatives

<b>Y-12 Mission</b>	<b>Alternative 1A</b> <b>No Action - Status Quo Alternative</b> (Partial stand-down operation)
	<b>Alternative 1B</b> <b>No Action - Planning Basis Operations Alternative</b> (Continue historic mission operations)
<b>HEU Storage Mission</b>	<b>No Action (Same as Alternative 1B)</b> (Continue HEU storage in existing facilities)
	<b>Alternative 2A</b> <b>No Action - Planning Basis Operations Plus Construct and Operate New HEU Materials Facility</b> (Site A or Site B)
	<b>Alternative 2B</b> <b>No Action - Planning Basis Operations Plus Upgrade to existing Building 9215</b>
<b>Special Materials Mission</b>	<b>No Action (Same as Alternative 1B)</b> (Continue special materials operations in existing facilities with limited capabilities)
	<b>Alternative 3</b> <b>No Action - Planning Basis Operations Plus Construct and Operate New Special Materials Complex</b> (Site 1, Site 2, or Site 3)
<b>Both HEU Storage Mission and Special Materials Mission</b>	<b>No Action (Same as Alternative 1B)</b> (Continue historic HEU storage and special materials operations in existing facilities)
	<b>Alternative 4</b> <b>No Action - Planning Basis Operations Plus Construct and Operate a New HEU Materials Facility and a New Special Materials Complex</b>

Nondefense-related program activities under No Action - Planning Basis Operations Alternative include the construction and operation of a new CERCLA waste disposal cell (referred to as the Environmental Management Waste Management Facility) to accommodate wastes resulting from environmental remediation, and the implementation of a new Office of Science Field Research Center project at Y-12. The Environmental Management Waste Management Facility would be constructed in Bear Creek Valley just west of the Y-12 Plant in an area currently designated for waste management activities.

Design elements of the Environmental Management Waste Management Facility include site development, the above-ground engineered disposal cell, and support facilities. The total disposal cell capacity is 273,000 m<sup>3</sup> (357,000 yd<sup>3</sup>) for the low-end conceptual design and 1.3 million m<sup>3</sup> (1.7 million yd<sup>3</sup>) for the high-end design. Figure S.3.2.2-1 shows the Environmental Management Waste Management Facility Site Plan.

A large volume of clay-rich soil would be needed from a borrow area in the vicinity of the disposal facility for construction of the geologic buffer, base liner, temporary covers during operations, and cap. The Y-12 West End Borrow Area contains a suitable volume and quality of material to meet the construction needs for the disposal unit. This facility is located on Chestnut Ridge, immediately south of Bear Creek Road and approximately 0.62 km (1 mi) east of State Route (SR) 95. The Y-12 West End Borrow Area would be expanded from its current area of 7.1 ha (17.5 acres) to between 12 and 15 ha (29 and 36 acres), depending

on the waste volume scenario.

The Field Research Center component of the Office of Science NABIR Program would also be located in Bear Creek Valley near the S-3 Ponds. The Y-12 Field Research Center site would include a 98-ha (243-acre) previously disturbed contaminated area and a 163-ha (440-acre) background area. The contaminated area which is within the Y-12 SWEIS analysis area would be used for conducting experiments on contaminated groundwater and subsurface sediments. The background area which is outside of the Y-12 SWEIS analysis area would provide for comparison studies in an uncontaminated area. Initially, test plots of less than 0.4 ha (1 acre) would be constructed in proximity to the S-3 Ponds Site parking lot (Figure S.3.2.2–2).

The types of activities that could occur at the Field Research Center can be categorized into passive and active site characterization, obtaining research-quality samples, and in-situ research. The activities at the Field Research Center would be undertaken in an area limited to less than an acre and a depth of 23-m (75-ft).

Passive subsurface characterization activities are described as nonintrusive (e.g., ground-penetrating radar, electromagnetics, and resistivity) and intrusive (e.g., seismic tomography, direct push penetrometer, creation and use of injection/extraction wells). Active characterization can be defined as the addition of some substance (e.g., air, nontoxic chemical tracers such as bromide, or a gas tracer such as helium or neon) to the subsurface under controlled conditions. Approximately 40 in-situ research activities would be conducted over the 10-year life of the Field Research Center.

### **S.3.2.3 *Alternative 2 (No Action - Planning Basis Operations Alternative Plus HEU Storage Mission Alternatives)***

This alternative includes the No Action - Planning Basis Operations Alternative plus an HEU storage facility. Options considered for HEU storage include a new HEU Materials Facility at one of two proposed sites (i.e., Sites A and B), and expansion of Building 9215. Candidate sites for the new HEU Materials Facility are located on the west end of the Y-12 Plant in the West Portal Parking Lot (Site A) and in the area of the Y-12 Scrap Metal Yard (Site B). The proposed HEU Materials Facility would be a single-story concrete structure covered by an earthen berm. The new HEU Materials Facility, would enable Y-12 to safely and securely store Categories I and II HEU, including canned subassemblies that contain HEU; and HEU in metal and oxide form in cans that is part of the strategic reserve or excess inventories. Scrap materials that contain HEU awaiting recovery (Central Scrap Management Office scrap metal oxide and other miscellaneous compounds that are being returned from other DOE facilities and university programs) will be stored in existing facilities until reprocessed to an acceptable form. The expansion of Building 9215 would be a new two-story concrete and steel structure attached to the north end of the building. A discussion of each of the alternatives and the candidate sites for the proposed new HEU Materials Facility is provided in the following sections.

Source, Tetra Tech, Inc./DOE 1998a.

**FIGURE S.3.2.2-1.—The Environmental Management Waste Management Facility Site Plan.**

Source Tetra Tech, Inc./DOE 1999.

**FIGURE S.3.2.2-2.—*Location of the Background Area and the Initial Test Plots within the Field Research Center, Contaminated Area at the Y-12 Plant.***

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**S.3.2.3.1** *Alternative 2A (No Action - Planning Basis Operations Alternative Plus Construct and Operate a New HEU Materials Facility)*

The proposed HEU Materials Facility would be a single structure with a total footprint of approximately 12,077 m<sup>2</sup> (130,000 ft<sup>2</sup>). The HEU Materials Facility would replace the use of existing storage vaults and facilities located within existing Y-12 buildings. All operations associated with HEU storage would be transferred to the new HEU materials facility. Existing storage facilities would be declared surplus, used for other activities, or turned over to EM for D&D based on facility transition process review. The HEU Materials Facility would be used for long-term storage of Categories I and II HEU that is not “in process.” In process HEU is material that is actually being used in manufacturing and is tied up in equipment or being handled within manufacturing facilities or part of processing activities. The new facility would provide the capacity to store approximately 14,000 cans and 14,000 drums (208-L [55-gal] equivalents) of HEU, a surge capacity area for an additional 4,000 drums, and a storage area for material currently under international safeguards. The facility would be covered by an earthen berm. Figure S.3.2.3–1 shows the proposed HEU Materials Facility.

**HEU Materials Facility Candidate Sites**

**Site A.** Site A for the proposed HEU Materials Facility is in the Y-12 West Portal Parking Lot, just north of Portal 16. This site is outside but adjacent to the existing Perimeter Intrusion Detection and Assessment System (PIDAS). Figure S.3.2.3–2 shows the location of Site A relative to other buildings at Y-12. The West Portal Parking Lot is close to the existing HEU processing complex and represents a large level site with minimal site preparation requirements. Site A preparation involves site design, relocation of existing utilities ( e.g., lights, towers, and underground pipelines), construction of an addition to the Polaris Parking Lot, extension of utilities to the new facility site, modifications to an existing portal, removal of nearby office trailers, and modification of a cooling tower. The PIDAS would need to be extended to encompass this area after the HEU Materials Facility was completed.

**Site B.** Site B for the proposed HEU Materials Facility is located in the area of the Y-12 Scrap Metal Yard. The site is south of Building 9114, west of the western-most portion of the Y-12 PIDAS and north of Portal 33 and Second Street. Figure S.3.2.3–2 shows the location of Site B relative to other buildings at Y-12. The Old Bear Creek Road is the western boundary of the proposed Site B.

Site B preparation would involve site design and relocation of existing utilities (e.g., lights, underground water lines, storm sewers, steam lines), a portion of the Old Bear Creek Road, numerous structures, office trailers, and a portion of the Y-12 Scrap Metal Yard. The PIDAS would need to be extended to encompass this area after the HEU Materials Facility was completed. A sector of the existing PIDAS would need to be modified to install a vehicular entry gate for the new facility.

**S.3.2.3.2** *Alternative 2B (No Action - Planning Basis Operations Alternative Plus Upgrade Expansion of Building 9215)*

Under this alternative, the storage of HEU would be accommodated through the expansion of the existing Building 9215. The building expansion, 8,918 m<sup>2</sup> (96,000 ft<sup>2</sup>) would be approximately 48 by 90 m (160 by 300 ft) with two floors and would be sized to handle all of the long-term storage requirements anticipated for Y-12 similar to that described for the proposed new HEU Materials Facility. A modest amount of in-process storage associated with processing activities in Buildings 9212 and 9215 would continue.

**FIGURE S.3.2.3-1.—The Proposed New Highly Enriched Uranium Materials Facility.**

Source: LMES 2000b.

Source: tetra Tech, Inc./LMES 2000b.

**FIGURE S.3.2.3-2.—Sites A and B for the Proposed Highly Enriched Uranium Materials Facility.**

The proposed site for construction of the Building 9215 expansion is a parcel of land located west of Buildings 9212 and 9998 and north of Building 9215 as shown in Figure S.3.2.3–3. This parcel has no major permanent structures and is currently occupied by trailers and temporary facilities. The proposed site is on high ground within the PIDAS, not susceptible to flooding or stormwater runoff. The expansion of Building 9215 for HEU storage would require approximately 0.8 ha (2 acres) to accommodate the construction activities and the building expansion footprint. Personnel in the existing trailers would be relocated and the trailers would be removed and salvaged, other temporary facilities would be relocated and utilities and other infrastructure modified to support the construction activities and operation of the new expansion.

**S.3.2.4 *Alternative 3 (No Action - Planning Basis Operations Alternative Plus Special Materials Mission Alternative)***

This alternative includes the No Action - Planning Basis Operations Alternative plus a new Special Materials Complex at one of three candidate sites. The proposed action is to construct and operate a new Special Materials Complex which would enable Y-12 to ensure efficient production of adequate quantities of special materials for all anticipated scenarios considered for the enduring nuclear weapons stockpile while providing for improved worker health and safety. A key component of the proposed Special Materials Complex is the construction of a new Beryllium Facility to house all beryllium production operations at Y-12. Facility design would incorporate strategies that replace the current administrative safety and health controls and personal protective equipment with engineered controls. A discussion of the alternatives and the candidate sites for the proposed new Special Materials Complex is provided in the following sections.

**S.3.2.4.1 *No Action - Planning Basis Operations Alternative Plus Construct and Operate New Special Materials Complex***

The proposed Special Materials Complex shown in Figure S.3.2.4–1 would house a number of separate processing operations and the support facilities to serve each. These operations would be housed in distinct areas to ensure that the safety basis of the operation of each is independent of the other operation. Included in the Special Materials Complex would be:

- Beryllium production operations at Y-12
- A facility for purification of special materials
- A manufacturing/warehouse facility to produce special materials and provide for storage of new materials and parts
- An isostatic press for forming blanks for machining
- A core support structure to house common support functions for the complex

The facilities would be attached to one another with weather-protected walkways to facilitate the flow of materials.

Source: tetra Tech, Inc./LMES 2000b.

**FIGURE S.3.2.3-3.—Proposed Building 9215 Expansion Area.**

### **Special Materials Complex Candidate Sites**

**Site 1.** Site 1 for the proposed Special Materials Complex is approximately 8 ha (20 acres) and is located northwest of Building 9114 and on the north side of Bear Creek Road. The Site is situated on the drainage divide of the East Fork Poplar Creek and Bear Creek watersheds. Approximately 50 percent of the Site is currently cleared at the base of Pine Ridge and the other 50 percent is wooded on the slope of the ridge. The site area has been used for a construction lay-down area in the past. Potential construction problems associated with legacy contamination from prior operations support activities are not expected. This Site is outside the existing Y-12 Plant PIDAS. Figure S.3.2.4–2 shows the location for Site 1 relative to other buildings at Y-12. Site 1 represents a large Site with no permanent building structures and minimal infrastructure. The topography of the Site would require a moderate amount of earthwork to prepare the Site for construction.

Site 1 preparation for the proposed new Special Materials Complex involves site design, relocation of some existing utilities (e.g., underground pipelines, communications lines, and power lines), and extension of utilities to the new facilities. The PIDAS would not be expanded for this facility, since it is a nonnuclear facility. A fence would be erected to control access.

**Site 2.** Site 2 for the proposed Special Materials Complex is approximately 4 ha (10 acres) and is located at the Y-12 Scrap Metal Yard southeast of Building 9114 and east of the westernmost portion of the Y-12 PIDAS fence. Figure S.3.2.4–2 shows the location of Site 2 relative to other buildings at Y-12.

Site 2 preparation would include site design, relocation of existing utilities (e.g., lights, underground water lines, storm sewers, steam lines), two structures, and a portion of the Y-12 Scrap Metal Yard. The existing Y-12 Plant PIDAS would not be affected since Site 2 is entirely within the PIDAS. However, a security fence would be erected to isolate the work during construction.

**Site 3.** Site 3 for the proposed Special Materials Complex (see Figure S.3.2.4–2) is the same site as Site B for the proposed HEU Materials Facility described earlier. The previous discussion of construction activities associated with the HEU Materials Facility would also apply to the construction of the proposed Special Materials Complex at Site 3, except that the PIDAS would not be expanded for the nonnuclear Special Materials Complex facilities.

#### **S.3.2.5 *Alternative 4 (No Action - Planning Basis Operations Alternative Plus HEU Materials Facility Plus Special Materials Complex)***

This alternative includes the No Action - Planning Basis Operations Alternative plus construction and operation of a New HEU Materials Facility at one of two proposed sites and construction and operation of a New Special Materials Complex at one of three proposed sites.

**FIGURE S.3.2.4-1.—The Proposed Special Materials Complex.**

Source: LMES 2000c.

Source: Tetra Tech, Inc./LMES 2000c.

**FIGURE S.3.2.4-2.—Sites 1, 2, and 3 for the Proposed Special Materials Complex.**

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## S.4 AFFECTED ENVIRONMENT

The ORR, of which Y-12 is a part, is in eastern Tennessee (see Figure S.1.1–1). Y-12 is approximately 40 km (25 mi) west of Knoxville. Y-12 covers about 1,457 ha (3,600 acres) bounded by Pine Ridge to the north, Scarboro Road to the east, and Bethel Valley Road to the south. Y-12 extends west to Mount Vernon Road and then west down Bear Creek Valley to the security fence near the Roane/Anderson County border. Approximately 5,300 employees work at Y-12.

Y-12, which was created in 1943, is a heavily industrialized area (Figure S.4–1). All alternatives described in the SWEIS, including the possible construction of new facilities to implement DOE's stated missions, would occur within existing industrialized or previously disturbed areas at Y -12.

The ORR encompasses about 13,968 ha (34,516 acres) of contiguous land owned by DOE in the Oak Ridge area. The majority of ORR land lies within the corporate limits of the city of Oak Ridge (246 ha [608 acres], west of the ETPP, in Roane County, is outside the city limits). The residential section of Oak Ridge forms the northern boundary of the reservation. The Tennessee Valley Authority's (TVA's) Melton Hill and Watts Bar reservoirs on the Clinch and Tennessee rivers form the southern and western boundaries of ORR. The population of the 10-county region surrounding the ORR is about 798,925, with 5 percent of its labor force employed on the reservation. Other towns near to the reservation include Oliver Springs, Clinton, Karns, Lenoir City, Farragut, Kingston, and Harriman. Knoxville, the major metropolitan area nearest Oak Ridge, is located about 40 km (25 mi) to the east and has a population of about 167,535. Except for the city of Oak Ridge, the land within 8 km (5 mi) of the ORR is semirural and is used primarily for residences, small farms, and cattle pasture. Fishing, boating, water skiing, and swimming are popular recreational activities in the area.

Primary roads on the ORR serving Y-12 include TSRs 95, 58, 62, and 170 (Bethel Valley Road), and Bear Creek Road. All are public roads except Bear Creek Road which traverses the ORR. Average daily traffic on ORR and area roads serving Y-12 ranges from 3,200 vehicles per day on West Bear Creek Road (Level-of-Service A) to 28,320 vehicles per day on TSR 62 from TSR 170 to TSR 95 (Level of Service E). Major off site area roads for long-distance transport of materials and waste include I-40, I-75, and I-81.

The ROI where more than 90 percent of the ORR workforce resides is a four county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane Counties. In 1997, almost 40 percent of the ORR workforce resided in Knox County, 29 percent in Anderson County, 16 percent in Roane County, and 6 percent in Loudon County. The remaining 9 percent of the workforce resides in the other counties across Tennessee, none of which is home to more than 3 percent of the workforce (DOE 1999f).

ROI employment grew from 231,822 in 1990 to 268,748 in 1995, and continued to grow totaling 269,466 in 1998. The ROI labor force totaled 278,866 in 1998. The ROI unemployment rate was 3.4 percent in 1998. The unemployment rate in Tennessee was 4.2 percent in 1998 (BLS 1999). Per capita income in the ROI was \$23,520 in 1997, while the per capita income in Tennessee was \$22,699 (BEA 1999). Y-12 employs approximately 8,900 workers, including DOE employees and contractors. As a whole, DOE employees and contractors number more than 13,700 in Tennessee, primarily in the ROI.

Between 1990 and 1998, ROI population growth increased 1.1 percent annually while the state population increased 1.4 percent annually. Population in all counties in the ROI is projected to continue to grow at a somewhat slower rate between 1998 and 2020. Knox County is the largest county in the ROI with a 1998 population of 366,846. Loudon County is the smallest county in the ROI with a total population of 39,052.

**FIGURE S.4-1.—Aerial View Looking West of the Y-12 Plant at Oak Ridge Reservation, Tennessee.**

Source: LMES 2000a.

Biological resources at Y-12 include terrestrial resources, wetlands, aquatic resources, and threatened and endangered (T&E) species. Within the fenced, developed portion of Y-12, grassy and devegetated areas surround the entire facility. Buildings and parking lots dominate the landscape in Y-12, with limited vegetation present (ORNL 1992a). Fauna within the Y-12 area is limited by the lack of large areas of natural habitat.

A Biological Monitoring and Abatement Program was established in conjunction with the NPDES permit issues to Y-12 in 1992. The program includes toxicity monitoring, bioaccumulation studies, biological indicator studies, and ecological surveys. Toxicity testing and bioaccumulation studies indicate that the exposure of aquatic organisms in UEFPC to toxicants has been steadily decreasing as a result of remedial activities such as implementations of flow management and continuing mercury reductions at Y-12 (LMER 1999a).

The climate of the region may be broadly classified as humid continental. The mean annual temperature for the Oak Ridge area is 14.0EC (57.2EF). The coldest month is usually January, with temperatures averaging about 2.2EC (36EF). July is typically the hottest month of the year, with temperatures averaging 24.9EC (76.8EF). The 1998 average temperature as measured at the meteorological towers on the ORR was 15.8EC (60.4EC).

Winds in the Oak Ridge area are controlled in large part by the valley-and-ridge topography. Prevailing winds are either up-valley (northeasterly) daytime winds or down-valley (southwesterly) nighttime winds. Wind speeds are less than 11.9 km/hour (7.4 mph) 75 percent of the time; tornadoes and winds exceeding 30 km/hour (18.5 mph) are rare. Air stagnation is relatively common in eastern Tennessee (about twice that of western Tennessee). An average of about two multiple-day air stagnation episodes occurs annually in eastern Tennessee, to cover an average of about 8 days per year. August, September, and October are the most likely months for air stagnation episodes.

Average rainfall on the ORR in 1998 as measured at the meteorological towers was 128.4 cm (50.6 in). Precipitation in the region is greatest in the winter months (December through February). The driest periods generally occur during the fall months, when high pressure systems are most frequent.

Y-12's heavily industrialized development is consistent with BLM's VRM Class 5. Structures at Y-12 are mostly low profile reaching heights of three stories or less, with the exception of the East and West meteorological towers. Viewpoints affected by DOE facilities are primarily associated with the public access roadways, the Clinch River/Melton Hill Lake and the bluffs on the opposite side of Clinch River. Views are limited by the hilly terrain, heavy vegetation, and generally hazy atmospheric condition. Y-12 missions activities are consistent with BLM's VRM Class 5 classification for developed areas of ORR.

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 Y-12 boundary so noise levels at the boundary from these sources would not be distinguishable from background noise levels.

The acoustic environment along the ORR boundary in rural areas and at nearby residences away from traffic noise is typical of a rural location, with the day-average sound level in the range of 35 to 50 dBA. Areas near the ORR within the city of Oak Ridge are typical of a suburban area, with the average day-night sound level in the range of 53 to 62 dBA. The primary source of noise at the ORR boundary and at residences located near roads is traffic.

All waters drained from the ORR eventually reach the Tennessee River via the Clinch River, which forms the southern and western boundaries of the ORR. Because the ORR lies within the Ridge and Valley

Province, it is composed of a series of drainage basins or troughs containing many small streams that feed into the Clinch River rather than one simple stream valley. Each of the major facilities on the ORR lies within a separate drainage basin or watershed, and surface water at each of the plants drains into a tributary or series of tributaries, streams, or creeks, eventually reaching the Clinch River. East Fork Poplar Creek (EFPC), which discharges into Poplar Creek east of the ETTP, originates within the Y-12 Plant near the former S-3 Ponds and flows northeast along the south side of the Y-12 Plant. Various Y-12 Plant wastewater discharges to the upper reaches of EFPC from the late 1940s to the early 1980s left a legacy of contamination (e.g., mercury, polychlorinated biphenyls [PCBs], uranium) that has been the subject of water quality improvement initiatives over the past 10 to 15 years. Bear Creek also originates within the Y-12 Plant with headwaters near the former S-3 Ponds where the creek flows southwest. Bear Creek is mostly affected by stormwater runoff, groundwater infiltration, and tributaries that drain former waste disposal sites in the Bear Creek Valley Burial Groundwater Waste Management Area.

Two geologic units on the ORR, designated as the Knox Group and the Maynardville Limestone of the Conasauga Group, both consisting of dolostone and limestone, constitute the Knox Aquifer. The Knox Aquifer is the primary source of groundwater to many streams (base-flow), and most large springs on the ORR receive discharge from the Knox Aquifer. The remaining geologic units on the ORR (the Rome Formation, the Conasauga Group below the Maynardville Limestone, and the Chickamauga Group) constitute the ORR Aquitards, which consist mainly of siltstone, shale, sandstone, and thinly bedded limestone of low to very low permeability.

The Y-12 area includes a proposed historic district which encompasses the original Y-12 Plant and consists of 92 contributing buildings and structures. Two buildings in the Y-12 Plant have been proposed for National Historic Landmark status as individual properties. Much of the Y-12 Plant has been disturbed by past activities and the potential for discovery of archaeological resources eligible for listing on the NRHP is considered low. The remaining undisturbed areas are not considered likely locations for significant archaeological resources (DuVall and Associates 1999). One pre-World War II structure has been determined eligible for listing on the NRHP. No Native American traditional use areas or religious sites are known to be present in the Y-12 area and no artifacts of Native American religious significance are known to exist have or to have been removed from the Y-12 area (Souza 1997). Seven cemeteries associated with Euro-American use of the area prior to World War II are likely to have religious or cultural importance to descendants and the local community. No other traditional, ethnic or religious resources have been identified in the Y-12 area.

Routine waste at Y-12 is primarily generated from DP operations including dismantling and storing of nuclear weapons components, material and component manufacturing and production, and supporting ORNL research projects. Waste is also generated from support operations on the ORR, such as medical services, vehicle maintenance activities, general office work, construction activities, monitoring activities, and environmental restoration activities. The major waste types generated at Y-12 from routine operations include LLW, mixed-LLW, hazardous waste, and nonhazardous waste.

Mixed LLW and LLW in solid form are currently stored on-site at the Y-12 Plant pending treatment and storage. Disposal of radioactive waste generated at Y-12 has been restricted by either a lack of on-site facilities or by administrative barriers to approval of transporting and disposing of radioactive waste off site since on-site disposal ceased in the 1980's. As a result, significant quantities of LLW and mixed LLW have accumulated in storage at the Y-12 Plant. Limited quantities of accumulated, legacy mixed LLW and LLW are being shipped off site for treatment and disposal because some approvals have been obtained to use existing DOE or licensed-commercial facilities. The bulk of the waste remains stored at the Plant. Liquid LLW and mixed LLW are either treated on site and disposed of, or treated and subsequently managed as solids.

RCRA-permitted units for the storage and treatment of hazardous waste are available to support routine operations at Y-12. Adequate permitted and approved off-site facilities are available to meet any additional treatment requirements and for disposal of the hazardous waste. Sanitary and process waste liquids are treated by the city of Oak Ridge sewage treatment plant or Y-12 treatment facilities. Current facilities have a combined capacity to handle approximately 10 times the liquid waste volumes generated by current operations. The resultant solids are disposed of with other nonhazardous waste in existing, permitted landfills with an adequate capacity to handle projected waste volumes. Landfill V, a sanitary/industrial landfill at Y-12, accepts general refuse and asbestos, medical (non-infectious), and other special waste as approved on a case-by-case basis by the state regulatory authorities. Landfills VI and VII are permitted for disposal of construction and demolition waste and have ample disposal capacity for well beyond the Y-12 SWEIS 10-year planning period

In 1998, the potential MEI dose from Y-12 operations was 1.9 mrem. Atmospheric releases from Y-12 operations results in a dose of 0.53 mrem. Radioactivity in liquid effluents from ORR results in an MEI dose of 1.44 mrem. The MEI dose standard for all pathways is 100 mrem per year. The standard for airborne releases is 10 mrem per year and applies to the sum of doses from all airborne pathways (inhalation, submersion in a plume, exposure to radionuclides deposited on the ground surface, and consumption of foods contaminated as a result of deposition of radionuclides). Both the airborne and all pathway EDEs for the MEI are significantly below these limits. Additionally, DOE standards include a limit of 4 mrem per year to the MEI from the drinking water pathway. Of the estimated MEI dose of 2.1 mrem per year, 0.4 is from the drinking water pathway which is well below the 4 mrem limit.

Based on 1990 census data, the population within 80 km (50 mi) of Y-12 is approximately 880,000. In 1998 the collective EDE to that population (i.e., the total dose received by all 880,000 people) was 4.3 person-rem from atmospheric releases at Y-12. Populations drinking water from various water treatment plants downstream of Y-12 potentially received a collective dose equivalent of 1.8 person-rem. These doses from air and liquid releases represent approximately 0.002 percent of the collective dose received from naturally occurring sources of radiation. Based on a dose to risk conversion factor of  $5.0 \times 10^{-4}$  fatal cancers per person-rem (ICRP 1991), the collective EDE of 6.13 person-rem could result in less than one additional latent cancer death within the population.

The average annual dose to an involved worker at Y-12 during 1998 was 11.4 mrem. The dose to the involved workforce of 3,563 radiation workers was estimated to be 40.6 person-rem.

Workers exposed to radiation have a risk of 0.0004 per person-rem of contracting a fatal cancer (ICRP 1991 and NCRP 1993). Based on this dose to risk conversion factor, the entire exposed population of Y-12 radiation workers could expect to receive an additional 0.016 cancer deaths due to their 1998 exposure. Thus, as with the public, the annual radiation dose to Y-12 workers results in a calculated cancer fatality risk that is extremely small in comparison to the natural incidence of fatal cancer.

Chemicals used at Y-12 that are of particular concern due to their extensive use in plant operations and the nature and the potential adverse health effects from exposure include mercury, beryllium, PCBs, polycyclic aromatic hydrocarbons, and volatile organic compounds. In addition to the risks from these chemicals, workers at Y-12 are at risk from potential industrial accidents, injuries, and illnesses due to everyday operations.

Approximately 880,000 people live within a 80-km (50-mi) radius of ORR. Minorities compose 6.1 percent of this population. In 1990, minorities composed 24.1 percent of the population nationally and 17 percent of the population in Tennessee. There are no federally recognized Native American groups within 80 km (50

mi) of the Y-12 Plant. The percentage of persons below the poverty level is 16.2 percent, which is slightly higher than the 1990 national average of 13.1 percent but much lower than the statewide figure of 30 percent (Census 1990).

The Scarboro community is a primarily minority community located approximately 1 km (0.5 mi) north of Y-12. This community has been included in a number of epidemiological health studies conducted by an independent group overseen by the Tennessee Department of Health. Mercury health studies have shown that estimates for mercury intake for Scarboro residents exceeded standards for inhalation of mercury during the years of peak mercury release in the late 1950s. Impacts of uranium releases to the air on the community between 1944 and 1995 were analyzed to determine if cancer risks from uranium releases are elevated for this community. The analyses reported career screening indexes that were slightly lower than the investigators decision guide for carcinogens, but with a great deal of uncertainty.

The Health Studies Report of PCB releases from the ORR prior to the early 1970's concluded that some fishermen at the Clinch River and Watts Bar Reservoir have eaten enough fish from these sources to affect their health, including excess cancers, but estimates of how many have been affected are not possible at this time. Further studies were recommended, including studies of fish and turtle consumption, PCB blood levels in people consuming fish, PCB levels in core samples from the Clinch River and the Watts Bar Reservoir, PCB levels in the soils near EFPC, and PCB levels in cattle grazing near the creek. There are no populations in the area completely dependent on consumption of these fish from the Clinch River and the Watts Bar Reservoir for subsistence.

## **S.5 COMPARISON OF ALTERNATIVES AND 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.5-1 (located at the end of this section) presents the comparison summary of the environmental impacts for construction and operation associated with No Action - Planning Basis Operations Alternative and alternatives for the HEU Storage Mission and Special Materials Mission evaluated in this SWEIS. The No Action - Status Quo Alternative is presented in Table S.5-1 as a benchmark for comparison of the impacts associated with the No Action - Planning Basis Operations Alternative and other alternatives that reflects full Y-12 DP mission operations at required levels, and activities by EM and the Office of Science at Y-12. The No Action - Status Quo Alternative is not considered reasonable for future Y-12 operations because it would not meet Y-12 mission needs. The following sections summarize the potential impacts by resource area.

### **S.5.1 Land Use**

**Construction.** No new DP facilities or major upgrades to existing DP facilities would occur under the No Action - Planning Basis Operations Alternative. Potential land disturbance associated with construction of the Environmental Management Waste Management Facility and activities of the Office of Science Field Research Center would be approximately 31 to 47 ha (77 to 116 acres) and 4 ha(10 acres), respectively. The land disturbance would occur in areas that are already disturbed and designated for waste management and industrial use.

Potential land disturbance associated with the alternatives for the HEU Storage Mission range from 0 ha (No Action) to 5 ha (construct HEU Materials Facility). The Upgrade Expansion of Building 9215 would potentially disturb less than 1 ha. The No Action - Planning Basis Operations Alternative Plus the HEU Materials Facility would potentially disturb up to 56 ha during construction. The Upgrade Expansion of

Building 9215 Plus the No Action - Planning Basis Operations Alternative would disturb up to 52 ha (128 acres).

Construction of the Special Materials Complex would potentially disturb between 0 ha (No Action) and 8 ha (20 acres) (Site 1). Site 2 and Site 3 locations for the proposed Special Materials Complex would disturb approximately 5 ha. Except for a 2-ha (5-acre) portion of Site 1 which is covered by trees, all proposed sites are located in previously disturbed areas of Y-12 that are designated for industrial use. The clearing of the forest cover on Site 1 would result in a land use change for that area. The No Action - Planning Basis Operations Alternative Plus the Special Materials Complex would potentially disturb up to 59 ha (146 acres) and 56 ha (138 acres) for Sites 2 and 3.

The No Action - Planning Basis Operations Alternative Plus the HEU Materials Facility and the Special Materials Complex would disturb up to 64 ha (158 acres) during construction activities.

**Operation.** Under the No Action - Planning Basis Operations Alternative, the Environmental Management Waste Management Facility and the Field Research Center activities would require approximately 14 to 25 ha (35 to 62 acres) and less than 4 ha (10 acres) of land, respectively. These activities are consistent with ORR land use plans.

The potential permanent land requirement for the HEU Storage Mission alternatives range from 0.5 ha for the Upgrade Expansion of Building 9215 to 4 ha for the HEU Materials Facility. There would be no difference in land requirements between Site A or Site B for the HEU Materials Facility. Operation of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would be consistent with current ORR land use plans, and Oak Ridge End-Use Working Group recommendations (PEC 1998). The No Action - Planning Basis Operations Alternative Plus the HEU Materials Facility would result in potential permanent land requirements of up to 33 ha (82 acres) for operations. The Upgrade Expansion of Building 9215 Plus No Action - Planning Basis Operations Alternative would require up to 29.5 ha (73 acres).

Operation of the Special Materials Complex would require 4 ha of land. There would be no difference in land requirement between Sites 1, 2, or 3. Operation of the Special Materials Complex would be consistent with current ORR land use plans, and Oak Ridge End-Use Working Group recommendations (PEC 1998). The No Action - Planning Basis Operations Alternative Plus the Special Materials Complex would result in a potential permanent land requirement of up to 33 ha (82 acres) for operations.

The No Action - Planning Basis Operations Alternative Plus the HEU Materials Facility and the Special Materials Complex would result in a potential permanent land requirement of up to 37 ha (91 acres) for operations.

## **S.5.2 Transportation**

**Construction.** Under the No Action - Planning Basis Operations Alternative, approximately 75 additional vehicles per day would use area roads to support construction of the Environmental Management Waste Management Facility. Less than 10 vehicles per day would be added to area traffic for the Field Research Center activities. The additional construction-related traffic for these two activities would have a negligible impact on area roads and traffic. The Level-of-Service (LOS) on area roads would not change under this alternative from the No Action - Status Quo Alternative.

Construction-related traffic for the HEU Storage Mission Alternative would range from 0 (No Action) to 165 additional worker vehicles per day to support construction of the HEU Materials Facility at either site or the Upgrade Expansion of Building 9215. In addition, three to eight trucks per day would be expected to bring

construction materials to the project site. The No Action - Planning Basis Operations Alternative Plus the construction of the HEU Materials Facility would potentially add 258 vehicles per day on area roads. The additional construction-related traffic would have a minor impact on area roads and traffic because most project traffic would occur at off-peak travel periods.

Construction-related traffic for the Special Materials Mission Alternative would range from 0 (No Action) to 157 additional worker vehicles per day to support construction of the Special Materials Complex at any of the 3 sites. An additional five trucks per day would bring construction materials to the project site. The No Action - Planning Basis Operations Alternative Plus Construction of the Special Materials Complex would potentially add 247 vehicles per day on area roads. The additional construction-related traffic would have a minor impact on area roads and traffic because most project traffic would occur at off-peak travel periods.

**Operation.** Under the No Action - Planning Basis Operations Alternative, an additional 28 vehicles per day and 6 vehicles per day would be expected from operation of the Environmental Management Waste Management Facility and the Field Research Center activities, respectively. Because a majority of this traffic would occur on the Y-12 Site, the additional traffic would have a negligible impact on area roads and traffic.

Radiological materials and waste transportation impacts associated with the Environmental Management Waste Management Facility would include routine and accidental doses of radioactivity. The risks associated with radiological materials transportation would be less than 0.1 fatality per year. The risks associated with radiological waste transportation would be less than 0.1 fatality per year.

Operation of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would result in no additional work traffic since the existing workforce would be used. The No Action - Planning Basis Operations Alternative plus the operation of HEU Materials Facility or the Upgrade Expansion of Building 9215 would result in approximately 34 additional vehicles per day on area roads. The additional traffic would not change the LOS on area roads. There would be a one-time relocation of stored HEU to the new facility (HEU Materials Facility or the Upgrade Expansion of Building 9215) which would require approximately 3,000 on-site truck trips to complete.

Radiological materials and waste transportation impacts would include routine and accidental doses of radioactivity. The risks associated with routine radiological materials transportation would be less than 0.1 fatality per year. The risks associated with radiological waste transportation would be less than 0.01 fatality per year. The one-time relocation of stored HEU to the new HEU Materials Facility or the Upgrade Expansion of Building 9215 would result in less than 0.001 fatality.

Operation of the Special Materials Complex would result in no additional worker traffic since the existing workforce would be used. The No Action - Planning Basis Operations Alternative plus the operation of the Special Materials Complex would result in approximately 34 additional vehicles per day on area roads. The additional traffic would not change the LOS on area roads. There would be no additional radiological materials and waste transportation impacts associated with the Special Materials Complex since the facilities do not use radioactive materials.

### S.5.3 Socioeconomics

**Construction.** A peak construction workforce of approximately 100 would be needed for the Environmental Management Waste Management Facility, and less than 10 would be needed for the Field Research Center activities included under the No Action - Planning Basis Operations Alternative. The workforce increase represents less than one percent of the No Action - Status Quo ORR workforce and would have no

substantial benefit or negative impact on the socioeconomics of the Oak Ridge area or regional economy.

The construction of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would have a negligible impact on the socioeconomics of the Oak Ridge area or regional economy. Both projects would have a peak construction workforce of 220 workers and generate a total of 460 jobs (220 direct and 240 indirect) in the Region of Influence (ROI). This represents an increase of 0.2 percent in the No Action - Status Quo Alternative ROI employment. 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.

The No Action - Planning Basis Operations Alternative plus the construction of a new HEU Materials Facility or Upgrade Expansion of Building 9215 would require a total of approximately 330 construction workers. A total of 690 jobs (330 direct and 360 indirect) would be generated. This would increase the No Action - Status Quo Alternative ROI employment by approximately 0.2 percent. The total No Action - Status Quo Alternative ROI income would increase by approximately \$17.8 million, or 0.1 percent.

The construction of the Special Materials Complex would have a peak construction workforce of 210 workers and generate a total of 440 jobs (210 direct and 230 indirect) in the ROI. This represents an increase of 0.2 percent in ROI employment. The existing labor force is sufficient to accommodate the labor requirements, and no change in the level of community services provided in the ROI is expected. The Special Materials Complex construction would have a negligible impact on the socioeconomics of the Oak Ridge area or regional economy.

The No Action - Planning Basis Operations Alternative plus the construction of a new Special Materials Complex would result in a total of approximately 320 construction workers. A total of 670 jobs (320 direct and 350 indirect) would be generated. This would increase the No Action - Status Quo Alternative ROI employment by approximately 0.2 percent. The total No Action - Status Quo Alternative ROI income would increase by approximately \$17.2 million, or 0.1 percent.

The construction periods of the HEU Materials Facility and Special Materials Complex could overlap with the construction activities included under the No Action - Planning Basis Operations Alternative. In that case, there would be a greater construction workforce at Y-12 at one time, resulting in a greater increase in ROI employment, and income in any one year. The peak construction employment could reach approximately 540 direct employees, generating a total of 1,130 jobs (540 direct and 590 indirect). This would be an increase of approximately 0.4 percent in No Action - Status Quo Alternative ROI employment and would result in an increase in ROI income of almost \$30 million, or 0.2 percent. These changes would be temporary, lasting only the duration of the construction period. The existing ROI labor force could likely fill all of the jobs generated by the increased employment and expenditures. Therefore, there would be no impacts to the ROI's population or housing sector. Because there would be no change in the ROI population, there would be no change to the level of community services provided in the ROI.

**Operation.** Under the No Action - Planning Basis Operations Alternative, potential benefits of employment associated with the Environmental Management Waste Management Facility or the Field Research Center activities would be very small. Approximately 25 workers and 6 workers, respectively, would be needed for the two activities. Workers for the Environmental Management Waste Management Facility would be drawn from the local workforce. Some of the workforce associated with the Field Research Center would be researchers from outside the ROI. Visiting staff and scientists would contribute in a beneficial manner to the local economy, but the impact would be negligible.

The operation of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would result in no change in the No Action - Status Quo Alternative ROI employment, income, or population. The anticipated operation workforce of 30 for the HEU Materials Facility and 49 for the Upgrade Expansion of Building 9215 would come from existing employees. Operation of the Special Materials Complex would not result in any change in workforce requirements since existing workers would staff the facilities. No impacts to ROI employment, income, or population are expected.

Because both the HEU Materials Facility and the Special Materials Complex would be staffed by the existing Y-12 workforce during operations, there would be no change from the No Action-Status Quo Alternative or No Action - Planning Basis Operations Alternative Y-12 workforce and no impacts to ROI employment, income, or population.

#### **S.5.4 Geology and Soils**

**Construction.** The Environmental Management Waste Management Facility and the Field Research Center activities included under the No Action - Planning Basis Operations Alternative would result in a potential increase in soil erosion at the construction sites. However, soil impacts are expected to be small with proposed design controls. No impacts to geology are expected.

Construction of the HEU Materials Facility at Site A would result in a potential increase in soil erosion from the lay-down area and new parking lot. Detention basins and runoff control ditches would minimize soil erosion and impacts. No impacts to geology are expected because the facility is above ground and foundation construction would not disturb bedrock. Site B soil erosion impacts would be negligible with appropriate standard construction control measures. The Upgrade Expansion of Building 9215 would have negligible soil erosion impacts with standard construction control measures. No geology impacts are expected at Site B or at the Building 9215 expansion construction sites because the facility is above ground and foundation construction would not disturb bedrock.

Construction of the Special Materials Complex at Site 1 would result in a potential increase in soil erosion from the lay-down area and project site land clearing. Detention basins, silt fences, and runoff control ditches would minimize soil erosion and impacts. No impacts to geology are expected because the facility is above ground and foundation construction would not disturb bedrock.

Activities included under the No Action - Planning Basis Operations Alternative Plus the Construction of the HEU Materials Facility and the Special Materials Complex would result in a potential increase in soil disturbance and soil erosion from construction activities. Appropriate mitigation, including detention basins, runoff control ditches, silt fences, and protection of stockpiled soils would minimize soil erosion and impacts. No impacts to geology are expected because all new facilities would be above ground structures and foundation construction would not disturb bedrock.

**Operation.** Under the No Action - Planning Basis Operations Alternative, minor soil erosion impacts are expected from the Environmental Management Waste Management Facility. Detention basins, runoff control ditches, and cell design components would minimize impacts. The Field Research Center would have no impacts on geology and soils with standard construction-type soil erosion control measures.

The HEU Storage Mission Alternatives and Special Materials Mission Alternatives would have no impact on geology or soils during operation because of site design and engineered control measures.

The No Action - Planning Basis Operations Alternative Plus the Operation of the HEU Materials Facility and Special Materials Complex would have no impact on geology and minimal soil impacts. Appropriate facility

site design and engineered control measures (e.g., detention basins) would be used to minimize soil erosion impacts.

### S.5.5 Water Resources

#### Construction

**Surface Hydrology.** Under the No Action - Planning Basis Operations Alternative, surface water usage at the Y-12 Plant would increase slightly from the No Action - Status Quo Alternative (20.8 MLD [5.5 MGD]) to (21.2 MLD [5.6 MGD]). This would represent less than a 2 percent increase in raw water use. The Environmental Restoration Program would continue to address surface water contamination sources and, over time, improve the quality of water in both UEFPC and Bear Creek, the two surface water bodies most directly impacted by activities at the Y-12 Plant.

The Environmental Management Waste Management Facility in eastern Bear Creek Valley activities are included under the No Action - Planning Basis Operations Alternative. Potential short-term impacts to surface water resources could result from sediment loading to surface water bodies or migration of contaminants. Land clearing and construction activities would expose varying areas depending on the ultimate size of the facility. Best management practices, including standard erosion controls such as siltation fences and buffer zones of natural riparian vegetation, during construction activities would minimize the potential impacts to surface water resources. Some impacts to surface water would be expected. Tributary NT-4 would be rerouted and partially eliminated during construction at the East Bear Creek Valley site. Construction and rerouting of NT-4 would impact some areas of wetland (approximately 0.4 ha [1 acre]) which will be mitigated as part of a wetlands mitigation plan for all CERCLA activities in Bear Creek Valley (DOE 1999j).

The No Action - Planning Basis Operations Alternative also includes activities of the Field Research Center at the Y-12 Site. The primary activities of the Field Research Center at Y-12 comprise subsurface injections of possible treatment additives into the groundwater at the contaminated area. Although only small volume injections are planned, it is possible that the groundwater additives might pass through the subsurface and reach the surface waters of Bear Creek. However, previous experiences with larger tracer injections near Bear Creek (DOE 1997a) and close monitoring of environmental conditions at the contaminated area suggest that the impacts to surface waters are predictable and would be minor.

Y-12 Plant surface water withdrawals and discharges would not increase substantially during construction of the HEU Materials Facility whether at construction Sites A or B or during the Upgrade Expansion of Building 9215. Construction water requirements are very small and would not raise the average daily water use for the Y-12 Plant. During construction, stormwater control and erosion control measures would be implemented to minimize soil erosion and transport to UEFPC. Neither of the proposed construction sites (Sites A or B) or the upgrade expansion site (Building 9215) is located within either the 100-year or 500-year floodplains.

Surface water withdrawals and discharges would not increase substantially during construction of the Special Materials Complex. Construction water requirements are very small and would not raise the average daily water use for the Y-12 Plant. During construction, stormwater control and erosion control measures would be implemented to minimize soil erosion and transport to surface water (UEFPC). None of the proposed sites (Sites 1, 2, or 3) are located within either the 100-year or 500-year floodplains.

**Groundwater.** All water for the No Action - Planning Basis Operations Alternative 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 into UEFPC in accordance with NPDES permits.

Groundwater resources could be degraded by the Environmental Management Waste Management Facility in the short-term by contaminant releases from the surface or disposal cell that migrate to groundwater. Contaminant sources include construction materials (e.g., concrete and asphalt), spills of oil and diesel fuel, releases from transportation or waste handling accidents, and accidental releases of leachate from the disposal cell. Compliance with an approved erosion and sedimentation control plan and a spill prevention, control, and countermeasures plan would mitigate potential impacts from surface spills. Engineered controls and active controls, including the leachate collection system, would drastically reduce the potential for impact to groundwater resources that could result from contaminant migration from the disposal cell. Construction and operation of the disposal cell would result in few or no overall short-term impacts to groundwater resources.

Long-term, the design, construction, and maintenance of the new disposal facility would prevent or minimize contaminant releases to groundwater. These control elements would include a multilayer cap to minimize infiltration, synthetic and clay barriers in the cell liner, a geologic buffer, and institutional controls that would include monitoring and groundwater use restrictions. If releases were detected during the period of active institutional controls, mitigative measures would be implemented to protect human health and the environment. Long-term impacts to groundwater quality resulting from the disposal cell are expected to be insignificant. Research activities of the Field Research Center at the Y-12 Site would focus on injections of additives to the groundwater at both the background and contaminated areas. Although the additives would modify the chemistry of the groundwater in the immediate study area, injections of additives would be so small that impacts would be limited to the immediate study areas.

Groundwater would be extracted in the Field Research Center contaminated area at Y-12 as part of characterization-related hydraulic tests. In addition, groundwater sample collection would increase. However, groundwater extractions associated with major hydraulic tests would collect no more than 76,000 L (20,000 gal) of groundwater per year (DOE 2000b). Sampling activities in years with no major hydraulic testing would collect no more than 7,600 L (2,000 gal) of groundwater. All extracted groundwater would be collected and treated in on-site facilities prior to surface water discharge to meet existing NPDES permit limits.

All water for construction of the HEU Materials Facility would be taken from the Clinch River as part of the normal water uses at the Y-12 Plant. Some groundwater may be extracted during construction activities at either construction site (Sites A or B) or during the Upgrade Expansion of Building 9215 to remove water from excavations. Based on the results of the Remedial Investigation of UEFPC (DOE 1998b), groundwater extracted from excavations at Site A and in the area of the Upgrade Expansion of Building 9215 probably would not be contaminated. Groundwater extracted from excavations at Site B would probably be contaminated with VOCs, metals, and radionuclides from the nearby former S-3 Ponds and the Y-12 Scrap Metal Yard (DOE 1998b). Minimal impacts to groundwater quality are expected because regardless of site, extracted groundwater would be collected and treated in on-site treatment facilities to meet the discharge limits of the NPDES permit prior to release to surface water; no plans exist for routine withdrawal from groundwater resources.

All water for construction of the Special Materials Complex would be taken from the Clinch River as part of the normal water uses at the Y-12 Plant. Some groundwater may be extracted during construction activities to remove water from excavations. Based on the historical site use and the results of the Remedial Investigation of the UEFPC (DOE 1998b), groundwater extracted from excavations at Site 1 probably would not be contaminated. Groundwater extracted from excavations at Sites 2 and 3 would be the same as that described for the HEU Materials Facility Site B. The groundwater is contaminated with VOCs, metals, and radionuclides from the nearby former S-3 Ponds and the Y-12 Scrap Metal Yard (DOE 1998b). Minimal

impacts to groundwater quality are expected because regardless of site, extracted groundwater would be collected and treated in on-site treatment facilities to meet the discharge limits of the NPDES permit prior to release to surface water.

Under the No Action - Planning Basis Operations Alternative plus the construction of the HEU Materials Facility and Special Materials Complex, no groundwater would be used for construction activities. Some groundwater may be extracted during construction from excavation and field research activities. Depending on the construction site, extracted groundwater may be contaminated with VOCs, metals, and radionuclides. Minimal impacts to groundwater and groundwater quality are expected because extracted groundwater would be collected and treated in on-site treatment facilities to meet discharge limits of the NPDES permit prior to release to surface water.

## **Operation**

**Surface Hydrology.** Under the No Action - Planning Basis Operations Alternative, surface water usage at the Y-12 Plant would increase slightly from No Action - Status Quo (20.8 MLD [5.5 MGD]) to (21.2 MLD [5.6 MGD]). This would represent less than a 2 percent increase in raw water use.

HEU storage operations, whether located in a new HEU Materials Facility or in the Upgrade Expansion of Building 9215, would require an estimated 550,000 L per year to 720,000 L per year (146,000 GPY to 190,000 GPY), a small percentage of the No Action - Status Quo Alternative Y-12 Plant water usage of approximately 5,680 MLY (1,500 MGY).

The No Action- Planning Basis Operations Alternative Plus the HEU Materials Facility or the Upgrade Expansion of Building 9215 would increase water use requirements by approximately 140 MLY (37 MGY) from the 5,678 MLY (1,500 MGY) water use under No Action - Status Quo Alternative. This represents an increase of approximately 2.5 percent. Sufficient excess water capacity exists to accommodate the additional 140 MLY (37 MGY). No adverse impacts to surface water resources or surface water quality are expected because all discharges would be maintained to comply with NPDES permit limits.

Operations of the Special Materials Complex would require an estimated 59 MLY (15.5 MGY) (approximately 53 MLY [14 MGY] for cooling tower make-up water and 6 MLY [1.5 MGY] for processes). This would be approximately 1 percent of No Action - Status Quo Alternative Y-12 Site water usage of 5,680 MLY (1,500 MGY). This water use would potentially be offset by the vacating of operations in existing special materials operations facilities. No adverse impacts to surface water or surface water quality are expected because all discharges would be monitored to comply with the NPDES permit limits.

The No Action - Planning Basis Operations Plus the Special Materials Complex would increase water use requirements by approximately 197 MLY (52 MGY) from the 5,678 MLY (1,500 MGY) water use under No Action - Status Quo Alternative. This represents an increase of approximately 3.5 percent. Sufficient excess water capacity exists to accommodate the additional 197 MLY (52 MGY). No adverse impacts to surface water resources or surface water quality are expected because all discharges would be monitored to comply with NPDES permit limits.

Under Alternative 4 (No Action - Planning Basis Operations Plus HEU Materials Facility Plus Special Materials Complex), surface water withdrawals and discharges would increase slightly. Water requirements would increase by approximately 197.5 MLY (52.2 MGY) from the 5,678 MLY (1,500 MGY) water usage under the No Action - Status Quo Alternative. This represents an increase of 3.5 percent. Historical water use by Y-12 has been as high as, 8,328 MLY (2,200 MGY). Sufficient excess water capacity exists to accommodate the additional 197.5 MLY (52.2 MGY) increase. No adverse impacts to surface water or

surface water quality are expected because all discharges would be monitored to comply with the NPDES permit limits.

**Groundwater.** All water for the No Action - Planning Basis Operations Alternative would be taken from the Clinch River, with no plans for withdrawal from groundwater resources at the Environmental Management Waste Management Facility. Sampling at the Field Research Center would remove a minimal amount (7,570L [2,000 gal]) a year for research purposes. All process, utility, and sanitary wastewater would be treated prior to discharge into UEFPC in accordance with existing permits.

All water for operation of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would be taken from the Clinch River. As a storage facility, there would be no process water; utility and sanitary wastewater would be treated prior to discharge into UEFPC in accordance with the existing permits.

All water for operation of the Special Materials Complex would be taken from the Clinch River. No plans exist for groundwater withdrawal to support operation of the Special Materials Complex. Utility and sanitary wastewater would be treated prior to discharge into the UEFPC in accordance with the existing NPDES permits.

Under Alternative 4 (No Action - Planning Basis Operations Plus HEU Materials Facility Plus Special Materials Complex), no groundwater would be used for operations of facilities. No plans exist for routine withdrawal from groundwater resources; and utility and sanitary wastewater would be treated prior to discharge in accordance with permits.

### **S.5.6 Biological Resources**

**Construction.** Under Alternative 1B (No Action - Planning Basis Operations Alternative), potential impacts to terrestrial, wetlands, and threatened/endangered species are expected. Land clearing activities for the Environmental Management Waste Management Facility and soil borrow area would remove grassland, old field habitat, forest habitat, and a 0.4-ha (1-acre)- wetland. Potential threatened/endangered species affected by construction activities include the Tennessee endangered pink lady slipper and Tennessee threatened tubercled rein-orchid and carolina quillwort. There would be a minor impact on terrestrial resources from Field Research Center activities because test plots would be located in areas where site clearing and past construction have occurred.

Construction of the HEU Materials Facility at Site A would potentially impact terrestrial resources and three wetlands (0.4 ha [1 acre]) at the materials lay-down and new parking lot areas due to land clearing activities. No impact to aquatic resources or threatened/endangered species is expected at Site A. Impacts to biological resources from construction of the HEU Materials Facility at Site B or the Upgrade Expansion of Building 9215 are not expected because these areas have been previously disturbed and do not contain habitat sufficient to support a biologically diverse species mix.

If the Special Materials Complex is constructed at Site 1, approximately 4 ha (10 acre) of terrestrial habitat would be eliminated and wildlife would be dislocated and/or disturbed. Two man-made wetlands (0.4 ha [1 acre]) would potentially be impacted due to construction land clearing and sedimentation from the construction site. No impacts to aquatic or threatened/endangered species are expected at Site 1. If the Special Materials Complex is constructed at Site 2 or Site 3, no impacts to biological resources are expected because of the highly disturbed and industrialized nature of these sites and the minimal biological resources present.

**Operation.** Under the No Action - Planning Basis Operations Alternative, minor impacts to terrestrial resources are expected due to operation noise and human activities associated with the Environmental

Management Waste Management Facility and soils borrow area. No impacts to wetlands, aquatic, or threatened/endangered species are expected. The Field Research Center operations activities would have a minor impact on terrestrial resources due to noise and human activity but would have no impacts on aquatic, wetlands, or threatened/endangered species.

Operation of the HEU Materials Facility, the Special Materials Complex, or the Upgrade Expansion of Building 9215 would not impact biological resources because they would be located in previously disturbed or heavily industrialized portions of the Y-12 Site that do not contain habitat sufficient to support a biologically diverse species mix.

Activities associated with the Environmental Management Waste Management Facility and the Field Research Center activities under the No Action - Planning Basis Operations Alternative, and construction and operation of the HEU Materials Facility and Special Materials Complex is anticipated to disturb natural habitat as discussed above during land cleaning activities for new facilities. If the HEU Materials Facility is constructed at Site A potential impact may occur to three man-made wetlands approximately 0.4 ha (1 acre) in size. Additionally, construction of the Environmental Management Waste Management Facility would require rerouting of 330 m (1,000 ft) of NT-4, and the associated wetland, approximately 0.4 ha (1 acre) in size, would be impacted by potential construction related sediment and loss of adjacent wooded areas.

### **S.5.7 Air Quality**

**Construction.** Under The No Action - Planning Basis Operations Alternative, construction of the Environmental Management Waste Management Facility and the Field Research Center activities would potentially have an impact on the project areas due to fugitive dust emissions. However, engineered controls, such as the application of water or chemical dust suppressants and seeding of soil piles and exposed soils, would be implemented to minimize fugitive dust emissions. Based on the activities and the dust control measures, DOE expects that dust emissions at the Y-12 Site boundary would be below the  $PM_{10}$  NAAQS at the DOE boundary and only negligible levels of airborne dust would be expected at the nearest residential area.

Construction of the HEU Materials Facility at Site A and Site B would result in small fugitive dust impacts in the construction area. Site A construction activities would generate slightly more fugitive dust emissions because of more earth moving activities associated with the materials lay-down area and new parking lot. If the expansion to Building 9215 is constructed, small fugitive dust impacts in the construction area would be expected. Effective control measures commonly used to reduce fugitive dust emissions include wet suppression, wind speed reduction using barriers, vehicle speed, and chemical stabilization. Necessary control measures would be applied to ensure that  $PM_{10}$  concentrations remain below applicable standards.

Construction of the Special Materials Complex at Site 1, Site 2, or Site 3 would generate fugitive dust emissions which would have a small impact in the construction area. Site 1 construction would generate more fugitive dust emissions than Site 2 or Site 3 due to the larger scale of land clearing and earth moving activities to prepare the site for construction. All fugitive dust emissions would not exceed applicable standards when dust suppression methods are used.

**Operation.** Under the No Action - Planning Basis Operations Alternative, nonradiological air pollutant concentration would be well within established criteria under normal operations. Radiological dose to the MEI and off-site population under the No Action - Planning Basis Operations Alternative would increase from the No Action - Status Quo Alternative due to the restart of all Y-12 mission operations. The dose to the MEI (1,080 m [3,543 ft] from Y-12) would increase from 0.53 mrem/yr (under the No Action - Status Quo Alternative) to 4.5 mrem/yr, and the dose to the population within 80 km (50 mi) would increase from 4.3

person-rem/yr (under the No Action - Status Quo Alternative) to 33.7 person-rem/yr. Statistically, this equates to 0.017 latent cancer fatality for each year of Y-12 normal operation.

The impacts under Alternative 2A (No Action - Planning Basis Operations Alternative Plus Construct and Operate a New HEU Materials Facility) and Alternative 2B (No Action - Planning Basis Operations Alternative plus Upgrade Expansion of Building 9215) would remain unchanged from the No Action - Planning Basis Operations Alternative impacts (i.e., 4.5 millirem per year for the MEI, and 33.7 person-rem for the off-site population). The collective dose to the workers (35) under Alternative 1B (No Action - Planning Basis Operations Alternative) for the existing HEU Storage Mission is 0.74 person-rem. The collective dose to workers due to relocation of existing stored HEU to the new HEU storage facility is 5.25 person-rem. The collective dose to workers (14) during normal operations due to storage of HEU in the HEU Materials Facility is 0.29 person-rem.

There would be no radiological material associated with the Special Materials Complex operation. No change from the No Action - Planning Basis Operations Alternative radiological emissions described above at Y-12 are expected.

Under Alternative 4 (No Action - Planning Basis Operations Alternative Plus HEU Materials Facility Plus Special Materials Complex), the collective dose to workers at the Y-12 Plant would be the same as Alternative 1B (No Action - Planning Basis Operations Alternative). There would be a slight decrease in HEU storage mission worker collective dose from 0.74 person-rem to 0.29 person-rem if the HEU Materials Facility would be constructed and operated. This reduction is due to the decrease in number of workers from 35 under the No Action - Planning Basis Operations Alternative to 14 workers for the new HEU Materials Facility. The overall collective Y-12 worker dose however would not change from the 59.48 person-rem under the No Action - Planning Basis Operations Alternative because of the increased production levels and radiological emissions associated with enriched uranium operations. The Special Materials Complex is a non-rad facility and does not handle radioactive materials.

The MEI and population dose within 80 km (50 mi) of the Y-12 Site under this alternative would be the same as Alternative 1B (No Action - Planning Basis Operations Alternative). The dose received by the hypothetical MEI is 4.5 mrem/yr. The collective population dose would be 33.7 person-rem. This would be a substantial increase from the the No Action - Status Quo Alternative dose to the MEI and population of 0.53 mrem/yr and 4.3 person-rem, respectively. The increase is due to the Y-12 Plant operating at planned and required workload levels under Alternative 1B (No Action - Planning Basis Operations Alternative).

### **S.5.8 Visual Resources**

**Construction.** No additional impact to visual resources is expected under the No Action - Planning Basis Operations Alternative or from the HEU Storage Mission and Special Materials Mission Alternatives because of the design of proposed new facilities and the existing visual setting of Y-12.

**Operation.** No additional impact to visual resources is expected under the No Action - Planning Basis Operations Alternative or from the HEU Storage Mission and Special Materials Mission Alternatives because of the design of proposed new facilities and the existing visual setting of Y-12. Alternative 4 (No Action - Planning Basis Operations Alternative Plus HEU Material Facility Plus Special Materials Complex) would have no additional impacts to visual resources.

### S.5.9 Noise

**Construction.** Under the No Action - Planning Basis Operations Alternative, small noise impacts are expected from construction equipment and activities associated with the Environmental Management Waste Management Facility and the Field Research Center activities. Impacts would be limited to the general construction area. Feasible administrative or engineered controls would be used in addition to personal protective equipment (e.g., ear plugs) to protect workers against the effects of noise exposure.

Construction of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would have small noise impacts in the general construction area. Construction of the Special Materials Complex would have small noise impacts in the general construction area. Feasible administrative or engineered controls would be used in addition to personal protective equipment (e.g., ear plugs) to protect workers against the effects of noise exposure. No off-site noise impacts are expected because peak attenuated noise levels from construction of these facilities would be below background noise levels (53 to 62 dBA) at off-site locations within the city of Oak Ridge.

Construction related noise impacts under Alternative 4 (No Action - Planning Basis Operations Alternative Plus HEU Materials Facility Plus Special Materials Complex) would result from relatively high and continuous levels of noise in the range of 89 to 108 dBA. Because of the distance between construction sites and locations relative to Y-12 Plant facilities, commutative noise impacts to Y-12 employee population would be mitigated to acceptable levels (approximately 70 dBA). Potential construction activity locations under the alternative are at sufficient distance from the ORR boundary and the city of Oak Ridge to result in no change to background noise levels at these areas.

**Operation.** Under the No Action - Planning Basis Operations Alternative, small noise impacts are expected from heavy equipment and activities associated with the Environmental Management Waste Management Facility and the Field Research Center. Impacts would be limited to the general operation areas.

Operation of the HEU Materials Facility and the Special Materials Complex would generate some noise, caused particularly by site traffic and mechanical systems associated with operation of the facility (e.g., cooling systems, transformers, engines, pumps, paging systems, and materials-handling equipment). In general, sound levels for all action alternatives are expected to be characteristic of a light industrial setting within the range of 50 to 70 dBA and would be within existing the No Action - Status Quo Alternative levels. Effects upon residential areas are attenuated by the distance from the facility, topography, and by a vegetated buffer zone.

### S.5.10 Site Infrastructure

**Construction.** There would be no measurable change in Y-12 Site energy usage or other infrastructure resources under the No Action - Planning Basis Operations Alternative due to the construction of the Environmental Management Waste Management Facility or the Field Research Center activities. Existing site infrastructure would be used and energy usage would be minimal during the construction phase.

Construction of the HEU Materials Facility at Site A would result in less infrastructure impacts than Site B since no buildings would be demolished and utility relocation would be minimal. Site B would require demolition of eight buildings and realignment of Old Bear Creek Road. Construction materials and resources for the HEU Materials Facility would be the same for Site A and Site B. If the Upgrade Expansion of Building 9215 is constructed, some utility relocation would be necessary but no permanent buildings would

require demolition. Construction materials and resources for the HEU Materials Facility would be the same for Site A and Site B. Construction materials and resources requirements for the Expansion of Building 9215 would be less than that for the HEU Materials Facility.

Construction materials and resource requirements for the Special Materials Complex would be the same for Site 1, Site 2, or Site 3. Construction of the Special Materials Complex at Site 1 would result in the least impact to infrastructure since no buildings would be demolished and only small utility relocation would be required. At Site 2, five buildings would be removed. At Site 3, eight buildings would be removed and a portion of Old Bear Creek Road would be realigned.

**Operation.** Under the No Action - Planning Basis Operations Alternative, there would be a slight increase from the No Action - Status Quo Alternative in energy and resource requirements. Electrical energy consumption would increase by approximately 189,000 MWh/yr to 566,000 MWh/yr and water use would increase by 4.5 MLD (1.2 MGD) to 20.2 MLD (5.38 MGD).

Operation of the HEU Materials Facility would require approximately 5,900 MWh/yr of electricity and 1,510 L/day (400 GPD) of water. Operation of the Upgrade Expansion of Building 9215 would require approximately 10,900 MWh/year and 1,975 L/day (520 GPD) of water. Sufficient electrical energy and water capacity exists at Y-12 to support the expected increases. The No Action - Planning Basis Operations Alternative Plus the new HEU Materials Facility would require a total of 572,000 MWh/yr of electricity and 20.2 MLD (5.38 MGD) of water.

Operation of the Special Materials Complex would require approximately 30,400 MWh/yr and 228,600 L/day (63,000 gal/day) of water. Sufficient electrical energy and water capacity exists at Y-12 to support the expected increases. Combined with the No Action - Planning Basis Operations Alternative, this alternative would require a total of 596,000 MWh/yr of electricity and 20.43 MLD (5.4 MGD) of water.

Operation of the new HEU Materials Facility and the Special Materials Complex, when combined with the No Action - Planning Basis Operations, would require an increase in electrical usage to 602,000 MWh/Y and an increase in water usage of 20.43 MLD (5.4 MGD). Sufficient electrical energy and water capacity exists at Y-12 to support the expected increases.

The vacating of existing HEU storage facilities and special materials operations facilities, if new projects are constructed, could potentially offset the projected increases and minimize potential impacts on site infrastructure and resources.

### **S.5.11 Cultural Resources**

**Construction.** No impacts to cultural resources are expected under the No Action - Planning Basis Operations Alternative. NRHP-eligible properties in the proposed historic district encompassing the Y-12 Plant would continue to be actively used for DOE mission activities.

The impacts to cultural resources resulting from the Environmental Management Waste Management Facility and Field Research Center activities have been assessed in consultation with the SHPO (DOE 1999j, DOE 2000b). Although there are no known archaeological resources in the Y-12 Site area, there would be a remote possibility of encountering buried cultural resources during ground-disturbing activities. Procedures for addressing the unanticipated discovery of cultural resources are described in the Y-12 Cultural Resource Management Plan (CRMP).

No impacts to cultural resources are expected from construction of the HEU Materials Facility at Site A or Site B. The Upgrade Expansion of Building 9215 would be considered a major alteration of a historic property and require consultation with the SHPO in accordance with the Y-12 CRMP. Although there are no known archaeological resources in the Y-12 Site area, there would be a remote possibility of encountering buried cultural resources during ground-disturbing activities. Procedures for addressing the unanticipated discovery of cultural resources are described in the Y-12 CRMP.

No impacts to cultural resources are expected from construction of the Special Materials Complex at Site 1, Site 2, or Site 3. Because use of Site 1 would probably involve ground disturbance in an undisturbed area and may involve disturbance exceeding the depth and extent of previous ground disturbances the DOE-ORO would consult with SHPO and other parties to determine whether an archaeological survey is warranted. If a survey is conducted, any resources found would be evaluated for NRHP-eligibility and the effects determined in consultation with the SHPO and other parties. Although there are no known archaeological resources in the Y-12 Site area, there would be a remote possibility of encountering buried cultural resources during ground-disturbing activities. Procedures for addressing the unanticipated discovery of cultural resources are described in the Y-12 CRMP.

**Operation.** No impacts to cultural resources are expected under the No Action - Planning Basis Operations Alternative because NRHP-eligible properties would not be modified or demolished and ground-disturbing activities would be minimal. No impacts to cultural resources are expected from operation of HEU Materials Facility, the Upgrade Expansion of Building 9215, or the Special Materials Complex. Upon completion of the new HEU Materials Facility or Upgrade Expansion of Building 9215, NRHP-eligible buildings (9204-2, 9204-2E, 9204-4, 9215, 9720-5, and 9998) would no longer be used for the HEU storage mission. Upon completion of the Special Materials Complex, NRHP-eligible buildings (9201-5, 9202, 9731, and 9995) would no longer be used for the Special Materials Mission. Depending on the disposition of these historic properties, there could be impacts associated with moving the HEU Storage Mission and Special Materials Operations from these buildings. Potential impacts include changes in the character of the properties' use, the physical destruction of historic properties, and the neglect of properties leading to deterioration. If adverse effects on historic properties could result from the change of mission or subsequent disposition of these buildings, the SHPO must be consulted regarding the application of the criteria of adverse effect and in mitigation efforts to avoid or reduce any impacts in accordance with 36 CFR 800.

### **S.5.12 Waste Management**

**Construction.** The Environmental Management Waste Management Facility and the Field Research Center activities would generate small amounts of nonhazardous construction waste under the No Action - Planning Basis Operations Alternative.

If the HEU Materials Facility is constructed at Site A, construction waste would be less than Site B. At Site A approximately 3,823 m<sup>3</sup> (5,000 yd<sup>3</sup>) of nonhazardous construction debris and 14.8 million L (3.9 million gal) of nonhazardous sanitary waste would be generated during the 4-year construction period. At Site B an additional 22,707 m<sup>3</sup> (29,700 yd<sup>3</sup>) of contaminated soil (mixed LLW) would be excavated before building construction could begin. Construction of the Upgrade Expansion of Building 9215 would generate the least amount of construction waste; approximately 3,058 m<sup>3</sup> (4,000 yd<sup>3</sup>) of nonhazardous construction debris and 14.8 million L (3.9 million gal) of nonhazardous sanitary waste.

Construction of the Special Materials Complex at Site 2 would generate the most construction waste and Site 1 the least. At Site 2, approximately 46,867 m<sup>3</sup> (61,300 yd<sup>3</sup>) of contaminated soil (mixed LLW) would be excavated and an additional 3,420 m<sup>3</sup> (4,470 yd<sup>3</sup>) of nonhazardous construction debris and 1.4 million L (382,400 gal) of nonhazardous sanitary waste would be generated. At Site 3, approximately 22,707 m<sup>3</sup>

(29,700 yd<sup>3</sup>) of contaminated soil would be excavated. The amount of construction debris and sanitary waste would be the same as Site 2. No contaminated soil would be excavated at Site 1 and approximately 1,447,541 L (382,400 gal) of nonhazardous sanitary waste would be generated. Small amounts of hazardous waste would be generated by the use of construction equipment.

If both a new HEU Materials Facility and a new Special Materials Complex were constructed, the waste generated would be additional to the waste generated under the No Action - Planning Basis Operations Alternative (see Table S.5-1). The contaminated soils would be mixed LLW. Use of construction equipment would generate small amounts of hazardous waste. Nonhazardous waste would consist primarily of construction debris and wastewater.

**Operation.** Under the No Action - Planning Basis Operations Alternative, mixed LLW and hazardous waste are expected to increase slightly from the No Action - Status Quo Alternative. LLW generation rate is expected to remain approximately the same as the No Action - Status Quo Alternative. Sanitary/industrial wastes are expected to decrease by a small amount (see Table S.5-1). The operation of the Environmental Management Waste Management Facility would be a beneficial impact on Y-12 Waste Management operations because it would expand on-site CERCLA waste disposal capacity.

Operation of the HEU Materials Facility would be expected to generate small amounts of LLW, hazardous, and nonhazardous waste per year (see Table S.5-1). The Upgrade Expansion of Building 9215 would generate similar small amounts of the same types of waste (see Table S.5-1). Adequate waste management capacity exists to support the expected waste volumes. The No Action - Planning Basis Operations Alternative Plus the HEU Materials Facility operation waste generation is shown in Table S.5-1.

Operation of the Special Materials Complex would generate small amounts of hazardous and nonhazardous waste per year (see Table S.5-1). Less than 0.76m<sup>3</sup> (1 yd<sup>3</sup>) of LLW would be generated per year from Analytical Chemistry testing in support of special materials operations. Special materials operations use no radiological materials. Adequate waste management capacity exists to support the expected waste volumes. The No Action - Planning Basis Operations Alternative Plus the Special Materials Complex operation waste generation is shown in Table S.5-1.

Operation of both an HEU Materials Facility and a new Special Materials Complex would add to waste generated under the No Action - Planning Basis Operations Alternative (Table S.5-1).

### S.5.13 Environmental Justice

**Construction.** None of the proposed action alternatives would result in environmental justice impacts related to construction activities. There would be no significant health or environmental impacts on any populations. In addition, prevailing wind patterns are not in the direction of primarily minority or low-income populations. Therefore, any adverse impacts would not disproportionately affect these populations.

**Operation.** None of the proposed action alternatives would result in environmental justice impacts related to operation of Y-12 Plant facilities. There would be no significant health or environmental impacts on any populations. In addition, prevailing wind patterns are not in the direction of primarily minority or low-income populations. Therefore, any adverse impacts would not disproportionately affect these populations.

### S.5.14 Worker and Public Health

**Construction.** Under the No Action - Planning Basis Operations Alternative, construction activities of the Environmental Management Waste Management Facility would be expected to result in approximately nine non-fatal occupational injuries/illnesses per year.

Construction of the HEU Materials Facility or the Upgrade Expansion of Building 9215 would be expected to result in approximately three additional non-fatal occupational injuries/illnesses per year. Both facilities would require a 4-year construction period.

Construction of the Special Materials Complex would be expected to result in approximately three additional non-fatal occupational injuries/illnesses per year. The construction period for the Special Materials Complex is 3.5 years.

**Operation.** Under the No Action - Planning Basis Operations Alternative, the estimated number of non-fatal occupational injuries/illnesses per year for the total Y-12 workforce is 440. Because of the restart of all Y-12 mission operations, radiological impacts are expected. The annual average dose to workers would increase from the No Action - Status Quo Alternative (8.0 mrem [0.016 LCF per year]) by 3.6 mrem and result in an estimated 0.024 LCFs per year. The MEI dose would increase from the No Action - Status Quo Alternative (0.53 mrem [ $2.65 \times 10^{-7}$  LCF per year]) to 4.5 mrem/yr and result in an estimated  $2.25 \times 10^{-6}$  LCFs per year. The dose to the population within 80km (50 mi) would increase from the No Action - Status Quo Alternative (4.3 person-rem/year [ $2.15 \times 10^{-6}$  LCFs per year]) to 33.7 person-rem/yr and result in an estimated  $1.69 \times 10^{-5}$  LCFs per year.

Once constructed, the HEU Materials Facility or the Upgrade Expansion of Building 9215 would require the transfer of stored HEU in existing facilities to the new storage facility. This one-time transfer would expose workers involved in the transfer to an estimated dose of 150 mrem. An estimated 0.002 LCFs are expected from the transfer. For normal operation of the HEU Materials Facility or the Upgrade Expansion of Building 9215, the worker dose is expected to be 21 mrem/yr and the same as for the No Action - Planning Basis Operations Alternative or the No Action - Status Quo Alternative. The MEI dose and the dose to the population within 80km (50 mi) would not change from the No Action - Planning Basis Operations or the No Action - Status Quo Alternatives.

Operation of the Special Materials Complex involves no radiological materials. The MEI dose and the dose to the population within 80km (50 mi) would not change from that described above for the No Action - Planning Basis Operations Alternative.

### S.5.15 Facility Accidents

**Operation.** Under the No Action - Planning Basis Operations Alternative, the beyond-design-basis earthquake accident would result in an estimated 0.202 LCFs to the population living within 80km (50 mi), same as the No Action - Status Quo Alternative. The MEI of the public would receive a dose of 17 rem and result in an estimated 0.008 LCFs.

The postulated criticality accident under the No Action - Planning Basis Operations Alternative would result in an estimated 0.0043 LCFs to the population living within 80km (50 mi), same as the No Action - Status Quo Alternative. The MEI of the public would receive a dose of 3 rem and result in an estimated  $1.5 \times 10^{-3}$  LCFs.

The fire accident scenario involving radiological materials would result in an estimated  $9 \times 10^{-5}$  to 0.28 LCFs to the population living within 80km (50 mi), same as the No Action - Status Quo Alternative. The dose to

the MEI of the public would be 0.01 to 16 rem and result in an estimated  $5 \times 10^{-6}$  to 0.008 LCFs.

The potential accident involving a chemical release due to loss of containment would potentially expose between 200 and 1,000 workers at Y-12 to ERPG-2 concentrations or greater, same as the No Action - Status Quo Alternative (See Appendix Section D.7.2.3 of this SWEIS for definition of ERPG-2).

Except for the potential release of chlorine from the water treatment plant, no off-site exposure is expected. The release of chlorine from the water treatment plant would potentially expose up to 6,500 members of the public to ERPG-2 concentrations or greater.

Due to the design and facility construction, the HEU Materials Facility or the Upgrade Expansion of Building 9215 is expected to reduce the likelihood of a beyond-design-basis earthquake accident by approximately a factor of 5, the criticality accident by a factor of 2 to 5, and the accident involving radiological material by a factor of 2 to 5 compared to the current situation under the No Action - Status Quo Alternative. There would be no change from the No Action - Planning Basis Operations Alternative for chemical accidents.

There would be no change from the No Action - Planning Basis Operations Alternative for radiological accidents if the Special Materials Complex is constructed. The likelihood of chemical accidents for the Special Materials Complex would be lower by approximately a factor of 2 to 5 compared to the current situation under the No Action - Status Quo Alternative due to design and facility construction.