CHAPTER 3: DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

3.1 MAJOR PLANNING ASSUMPTIONS AND BASIS OF ANALYSIS

The *Stockpile Stewardship and Management Final Programmatic Environmental Impact Statement* (SSM PEIS) (DOE 1996e) identified Y-12 as a key component for maintaining the safety and reliability of the nuclear weapons stockpile without underground nuclear testing or production of new design weapons. Accordingly, DOE decided in the SSM PEIS ROD to maintain the national security missions at Y-12, but to downsize the Plant consistent with reduced stockpile requirements. In the *Storage and Disposition of Weapons-Usable Fissile Materials, Final Programmatic Environment Impact Statement* (DOE 1996h) ROD, DOE decided that Y-12 would store both nonsurplus and surplus enriched uranium pending disposition.

Pursuing these directives, this SWEIS evaluates the potential direct, indirect, and cumulative impacts associated with proposed actions and alternatives to continue current and assigned historical Y-12 missions into the 21st century. 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: The No Action - Status Quo Alternative and the No Action - Planning Basis Operations Alternative. The No Action - Status Quo Alternative represents the current level of operations, i.e. the operations of Y-12 at the current 1999 level reported in the Annual Site Environmental Report (ASER) issued in 2000. Approximately 80 percent of the operations associated with DP's assigned mission were operational ready in 1999 following the Y-12 stand-down in 1994. (Stand-down status was the suspension of all work at Y-12 that was not necessary to maintain regulatory compliance or the safety basis for Y-12 until improvements could be implemented to the Conduct of Operations program). About 30 percent of actual operating capacity was achieved throughout most of that year. As discussed in the "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," (46 FR 18026, March 23, 1981, as amended), "No Action" may also mean "No Change" from current management directions. Accordingly, the SWEIS also evaluates a No Action - Planning Basis Operations Alternative for the Y-12 Site that presents the continuation of historical mission operations at Y-12 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., decisionmaking for one project does not influence, and is not influenced by, decision making for the other project.

  Other potential modernization projects in the very early planning stages have been developed to the extent practical and are described in Section 3.3. The potential impacts of these projects are addressed qualitatively and are included in the cumulative impacts in Chapter 6. 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 (NN), Work-for-Others, and Technology Transfer programs are not expected to change significantly 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. 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., 500 to 700 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, DOE/EIS-0240 (1996), 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}U in Building 3019 (Radiological Development Facility) at the ORNL. This facility is DOE's repository for ^{233}U and has been an ongoing operation at ORNL since 1982. The storage and disposition of this ^{233}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 National Security Complex. The storage and disposition of this ^{233}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}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}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, environmental concerns, 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 3.2.2–1. 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.

3.1.1 No Action - Status Quo Alternative (Operations and Emissions)

The stand-down of the Y-12 National Security Complex in 1994 essentially curtailed most Y-12 weapons program support activities (see Section 1.1.1). Because operations still have not resumed to full levels, the 1999 environmental conditions and operations described in Chapter 4 of the SWEIS do not reflect a fully functional Y-12 performing its assigned mission at required and planned work levels.

In 1999, approximately 80 percent of the types of Y-12 operations needed to support Y-12 mission requirements had achieved operational readiness from the 1994 stand-down, and about 30 percent of Y-12 operational capacity was being used throughout most of the year. Most of the 30 percent operating capacity during 1999 resulted from 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 less than typical operating conditions, i.e., as occurred prior to the 1994 stand-down and as 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 of the Action Alternative. The No Action - Status Quo Alternative, which is basically a continuation of the status of Y-12 in 1999, 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 3.1.2. The No Action - Status Quo Alternative is not considered reasonable for future Y-12 operations because it does not meet Y-12 mission requirements.

3.1.2 No Action - Planning Basis Operations Alternative (Operations and Emissions)

The Y-12 National Security Complex 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 performing assigned mission operations at required levels to support the nuclear weapons stockpile. Therefore, an estimate of planned Weapons Program and Y-12 workload schedules was compared to historical Y-12 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 in the Y-12 SWEIS for the 10-year planning period (Garber 2000).

The major production-related operations at the Y-12 National Security Complex 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 materials 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 National Security Complex 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.

Enriched uranium activity levels have been projected for the period 2001-2010 from Stockpile Life Extension Programs and other Y-12 workload schedules. The activity levels for this period were then associated with the respective enriched uranium production and recovery activities. The activity level 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 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 National Security Complex for the period 2001-2010 are estimated to be 65 percent of the Y-12 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 not exceed historic high levels over the 2001-2010 time period.

Depleted uranium and non-enriched uranium operations and emissions involving 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.

3.2 ALTERNATIVES

A No Action - Status Quo Alternative is presented in the SWEIS but is not considered a reasonable alternative for future Y-12 operations because it would not meet Y-12 mission needs. The No Action - Status Quo Alternative is used in this SWEIS as a benchmark for comparison of the impacts associated with the No Action - Planning Basis Operations Alternative and action alternatives that reflects full Y-12 DP mission operations at required levels and approved projects by EM and Office of Science at Y-12 over the 10-year planning period.

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). There are two options for the Y-12 HEU Storage Mission: (1) construct a new HEU Materials Facility and (2) construct an upgrade expansion to existing Building 9215. The preferred option is to construct and operate the new HEU Materials Facility. Under the new HEU Materials Facility construction alternative, two siting alternatives are analyzed (i.e., Sites A and B).

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

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 (1999) for the Y-12 Site and reported in the ASER issued in 2000. Although approximately 80 percent of the types of operations associated with DP's assigned mission were operational ready in 1999 (following the Y-12 stand-down in 1994), the Y-12 National Security Complex was only operating at 30 percent capacity for the most of that year. The state of conditions are used in the SWEIS as a basis for comparison of the impacts associated with the No Action - Planning Basis Operations Alternative

and the action 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 mission at Y-12.

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

Under the No Action - Planning Basis Operations Alternative, Y-12 would continue facility operations in support of assigned 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 Y-12 consistent with reduced requirements. Downsizing of the Y-12 National Security Complex is being implemented under the direction of the Stockpile Management Restructuring Initiative Project described in Section 3.2.1.1. Y-12 assigned missions include: 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 (see Appendix A.3 and A.4 for a description of Y-12 major facilities and processes, respectively), and to supply enriched uranium, lithium, and other material products; EM activities at Y-12 related to environmental monitoring, remediation, D&D, 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). Figure 3.2.2–1 shows the Y-12 National Security Complex and EM waste management facilities outside the Y-12 Site fenced area within the Y-12 SWEIS physical study area of analysis, while Figure 3.2.2–2 presents a detailed map of facility location and utilization at the Y-12 National Security Complex under the No Action - Planning Basis Operations Alternative.

3.2.2.1 *Defense Programs*

Enriched Uranium Operations. Under the No Action - Planning Basis Operations Alternative, Enriched Uranium Operations performed in the Building 9212 Complex and the Building 9215 Complex would resume and continue. Appendix A.4 gives a description of the Buildings 9212 and 9215 Complexes that house uranium operations, and Appendix A.3.1 describes Y-12 uranium processing. Figures 3.2.2–3 and 3.2.2–4 show an overview of the enriched uranium processing stream and the enriched uranium chemical recovery operations stream, respectively. A major upgrade of the Building 9212 AHF supply and fluidized-bed reactor systems has been completed (DOE 1995b). The new systems design provide for 99.9 percent control of fugitive emissions of AHF during normal operations and, in the event of an accident, capture of the entire inventory of AHF in a secondary containment enclosure.

Highly Enriched Uranium Storage. Buildings 9720-5, 9204-2E, 9204-2, 9998, 9215, and 9204-4 would continue to be used for storage of Categories I and II HEU (See Glossary for description of Categories). (See Appendix A.4 for a description of these facilities.) Adequate storage space exists within these facilities to accommodate expected mission storage requirements for HEU at Y-12 through 2010. No major upgrades or new facility construction would occur under the No Action - Planning Basis Operations Alternative.

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

FIGURE 3.2.2–1.—*Alternative 1B (No Action - Planning Basis Operations Alternative) Facilities within Y-12 SWEIS Area of Analysis.*

Source: Tetra Tech, Inc/LMES 2000a.

FIGURE 3.2.2–2.—*Alternative 1B (No Action - Planning Basis Operations Alternative) Facility Location and Utilization at Y-12.*

Special Materials Operations. The existing facilities used to perform the Special Materials functions, including beryllium operations, would continue to be used under the No Action - Planning Basis Operations Alternative. Special Materials Operations would include activities associated with beryllium machining and spraying, and production, purification, and processing of certain special materials (nonradiological). Facilities supporting Special Materials Operations include Building 9731, 9202, 9201-5, 9201-5N, 9995, 9204-2, and 9404-11. Special Materials Operations production levels would vary according to mission requirements but would be at or below Y-12 historic operating levels for these activities.

Assembly/Disassembly/Quality Evaluation Operations. The evaluating, rebuilding, or dismantling weapons and storage of returned weapons components would continue to be performed in Buildings 9204-2E, 9204-2, and 9204-4. Supporting operations including container refurbishment, nondestructive examination, metallurgical laboratory activities, and dimensional inspection would also continue. Quality Evaluation facilities are currently being consolidated and relocated from Building 9204-4 to Building 9204-2 as part of the Stockpile Management Restructuring Initiative and the Quality Evaluation Relocation Project. Projected Assembly/Disassembly/Quality Evaluation production levels for the No Action - Planning Basis Operations Alternative are expected to continue at the current levels, which are approximately 30 percent of historic levels Y-12 experienced in 1987 when Y-12 was in full Cold War weapons production mode.

Depleted Uranium Operations. Buildings 9215, 9204-4, 9998, 9201-5, and 9201-5N would continue to be used for Depleted Uranium Operations activities under the No Action - Planning Basis Operations Alternative. These operations would include metal casting, rolling, forming, machining, plating, and waste and scrap metal management and processing. Figure 3.2.2–5 shows an overview of the Y-12 depleted uranium operations. Most depleted uranium operations are performed in the Building 9201-5 and the Building 9215 Complexes. (See Appendix A.4 for a description of these facilities.) Depleted Uranium Operations are currently being consolidated primarily in Building 9998 and the Buildings 9215 and 9201-5 Complexes as part of the Stockpile Management Restructuring Initiative. Depleted Uranium Operations production levels through 2010 under the No Action - Planning Basis Operations Alternative are expected to continue at levels approximately 30 percent of the historic levels Y-12 experienced in 1987 when Y-12 was in full Cold War weapons production mode.

Lithium Operations. Current lithium and support operations performed in Buildings 9204-2, 9404-9, 9805-1, 9720-19, and 9720-19A would continue under the No Action - Planning Basis Operations Alternative. A description of the Y-12 lithium process and activities is found in Appendix A.3.1. The buildings housing lithium production and support functions are described in Appendix A.4. Projected lithium production operations through 2010 under the No Action - Planning Basis Operations Alternative are expected to continue at historic levels Y-12 experienced in 1987 when Y-12 was in full Cold War weapons production mode.

Product Certification Organization. Under the No Action - Planning Basis Operations Alternative, the Product Certification Organization would continue to provide independent tests, inspections, and quality assurance for weapons programs and other approved Y-12 customers. The testing and inspection services provided would include a full range of physical testing and dimensional inspection services for a wide variety of materials and components. All materials utilized in Y-12 weapons activities would be tested by these operations, including fissile, non-nuclear, and hazardous materials, as well as materials requiring special handling. There are 15 major Product Certification Organization facilities operational within the Y-12 National Security Complex. These facilities are generally located in proximity to production capabilities developed at Y-12. Many facilities were consolidated in the 1990s and that consolidation would continue under the No Action - Planning Basis Operations Alternative. Product Certification Organization activities through 2010 under the No Action - Planning Basis Operations Alternative are projected to continue at current operation levels.

FIGURE 3.2.2–3.—*Overview of the Y-12 Enriched Uranium Parts Production Operations.*

FIGURE 3.2.2–4.—*Overview of the Plant Enriched Uranium Chemical Recovery Operations.*

FIGURE 3.2.2–5.—*Overview of the Y-12 Depleted Uranium Operations.*

Analytical Chemistry Organization. Under the No Action - Planning Basis Operations Alternative, the Analytical Chemistry Organization would continue to provide analytical services including project management, sampling, analyses, and data evaluation in support of DP and other customers. The services would include a full range of chemical and physical tests applied to a wide variety of materials and components including fissile, nuclear, non-nuclear, and hazardous. The Bioassay Program, which assesses any potential uranium exposure of personnel, would continue to be performed at the Analytical Chemistry Organization's Union Valley Facility located outside Y-12. Building 9995, which houses the primary operations area of the Analytical Chemistry Organization at Y-12, would continue to be used for analytical chemistry mission support of DP and other customers. Analytical chemistry activities at Y-12 under the No Action - Planning Basis Operations Alternative are projected to increase from current operations levels through 2010 to support projected activities associated with TVA, USEC, and Naval Reactors program work.

Y-12 Utility and Support Infrastructure. The Y-12 National Security Complex is supported by a broad range of utilities including: (1) steam and condensate, (2) raw and treated water, (3) sanitary sewer, (4) demineralized water, (5) natural gas, (6) plant and instrument air, (7) industrial gases, (8) electrical power, and (9) telecommunications systems.

1. Steam is used at the Y-12 National Security Complex for a variety of purposes, but primarily for building heating, ventilation, and humidity control. Additional uses include heating of process materials, hot water heating, and vacuum production using steam ejectors. The Y-12 Steam Plant (Building 9401-3) would continue to produce and distribute steam to Y-12 facilities and operations. The projected peak steam load over the next 10 years is expected to remain at historic levels of approximately 226,800 kg/hr (500,000 lb/hr). Average steam usage under the No Action - Status Quo Alternative is 83,900 kg/hr (185,000 lb/hr).

2. The source of raw water for the Y-12 National Security Complex and the city of Oak Ridge Water Treatment Plant is the Melton Hill Reservoir. The projected long-range requirements for raw and treated water for Y-12 National Security Complex is expected to be within the currently available capacities of 26,497,800 L/day (7 MGD) for treated water and 20,819,700 L/day (5.5 MGD) for raw water. Under the No Action - Status Quo Alternative, treated water usage at Y-12 averaged 15,950,000 L/day (4.2 MGD) or 479 million L/month (126 million gal/month).

3. Sanitary sewage from Y-12 flows by gravity to the city of Oak Ridge Treatment Plant. The current system capacity is approximately 5,678,100 L/day (1.5 MGD). A project initiated in the early 1990s to upgrade the Y-12 sewer system operations and correct inflow infiltration problems is now complete and the system is functioning efficiently. The No Action - Status Quo Alternative usage is approximately 2,880,000 L/day (0.76 MGD). The current capacity is adequate for projected long-term use through 2010.

4. Demineralized water is used to support various processes at Y-12 that require high-purity water. A central system located in and adjacent to Building 9404-18 would continue to serve the entire plant through a distribution piping system. The system includes four mixed-bed-type demineralizer units, each capable of delivering 545,090 L/day (144,000 gal/day) of water. The system also includes three storage tanks: one with a 113,560-L (30,000-gal) capacity and two with 75,700-L (20,000-gal) capacity each. The No Action - Status Quo Alternative usage is approximately 7,400 L/day (1,955 gal/day). The projected long-range requirements for demineralized water through 2010 are expected to be within available capacity of the current system.

5. The Y-12 National Security Complex would continue to use natural gas and coal to fuel process furnaces and steam generation and natural gas for laboratory needs. Natural gas requirements for the next 10 years are projected to be within currently available capacity. Approximately

3,965,000 m³ (140 million scf) of natural gas and 81,000 t (89,300 T) of coal would be used annually through 2010. The No Action - Status Quo Alternative usage of natural gas was 2,750,000 m³ (97 million scf) while coal usage was 64,350 t (71,000 T).

6. Plant and instrument air would continue to be supplied by compressors and air-drying equipment located throughout Y-12. The total installed compressor capacity is approximately 386,968,100 m³/yr (13,700 million scf/yr), while the average usage is approximately 200,925,740 m³/yr (7,100 million scf/yr). Plant and instrument air requirements for the next 10 years under the No Action - Planning Basis Operations Alternative are projected to be within currently available capacity. The No Action - Status Quo Alternative usage is approximately 156,000,000 m³/yr (5,500 million scf/yr).

7. Industrial gases (argon, helium, hydrogen, nitrogen, and oxygen) would continue to be delivered by truck to storage and distribution facilities at Y-12. The storage and use of industrial gases to support Y-12 operations is expected to continue at current levels through 2010. The storage capacity for argon is 116,350 L (30,737 gal), equivalent to approximately 396,270 m³ (3.4 million scf) of gas. Total capacity of distribution is 13,395,040 m³/yr (473 million scf/yr) or approximately 26 million scf/month.

   Helium storage capacity is 4,530 m³ (160,000 scf) with an additional 1,020 m³ (36,000 scf) of emergency standby storage. The No Action - Status Quo Alternative helium usage is approximately 63,150 m³/yr (2,230,000 scf/yr). Hydrogen storage capacity is 2,550 m³ (90,000 scf). The No Action - Status Quo Alternative hydrogen usage is approximately 8,774 m³/yr (310,000 scf/yr).

   The Y-12 nitrogen supply system consists of five liquid-nitrogen storage tanks, a bank of atmosphere vaporizers, a steam-to-nitrogen vaporizer, and hot-water vaporizers. Nitrogen use at the Y-12 National Security Complex under the No Action - Status Quo Alternative is 5,465,000 m³ (193 million scf).

   The Y-12 oxygen supply system consists of one 25, 890 m³ (914,460 scf) vacuum insulated storage tank for liquid oxygen. Distribution capacity is 1,438,720 m³/yr (49.2 million scf/yr). The No Action - Status Quo Alternative usage is approximately 94,000 m³ (3.3 million scf). Average annual oxygen consumption ranges from 84,950 m³ to 113,260 m³ (3 to 4 million scf).

8. Electrical power would continue to be distributed throughout the Y-12 National Security Complex using existing 161-kV feeder lines and distribution substations. The total installed transformer capacity at Y-12 is approximately 400 MVA. The Y-12 load during the 1990s averaged approximately 44 MVA. Projected electrical power requirements for Y-12 under the No Action - Planning Basis Operations Alternative are 565,710 MWhr/yr over the next 10 years, an increase of 207,810 MWhr/yr from the No Action - Status Quo Alternative levels.

9. Telecommunications systems within the Y-12 National Security Complex include the Oak Ridge Integrated Communications Network, the Cable Television Network, the unclassified Y-12 Intrasite Network, and the classified Y-12 Defense Programs Network. Under the No Action, Y-12 would continue to use the existing telecommunications systems. The existing networks are sufficient for near-term needs. Updating the networks systems would be reviewed as necessary based on technology advances and Y-12 requirements.

Stockpile Management Restructuring Initiative. The Stockpile Management Restructuring Initiative project supports the plan for downsizing Y-12 consistent with the future secondary and case manufacturing mission defined by the SSM PEIS and ROD. No new facilities were analyzed at Y-12 to support the DP national security missions in the SSM PEIS. The construction, operation, emissions, employment, and waste

management data of the downsizing and building upgrades of the DP weapons mission at Y-12 are detailed in the SSM PEIS Section 3.4.4.2 and Appendix A.3.2.

The purpose of the Stockpile Management Restructuring Initiative project is to assist in preparing the Y-12 National Security Complex for the future production mission requirements for nuclear weapon secondaries, case components and other miscellaneous components, as well as providing a smaller, more cost-effective production size.

The ongoing downsizing task, which is included under the No Action - Status Quo Alternative is to minimize the number of major buildings required while maintaining the capability to perform the DP production mission. Figure 3.2.2–6 shows the buildings affected by the Stockpile Management Restructuring Initiative. The project utilizes previous production consolidation activities started in the early 1990s and continues these efforts by consolidating and downsizing additional production operations into a minimum number of major buildings. The consolidation and downsizing of these facilities are as follows:

- Consolidating enriched uranium machining in Building 9215
- Placing Building 9201-5 machine shop in active status to maintain production machining capability
- Installing a depleted uranium sawing facility in Building 9212 to handle surge production as well as centralizing depleted uranium operations and providing a furnace for dismantled weapon material consolidation
- Refurbishing two vacuum induction furnaces in Building 9998
- Relocating the ceramic machining function out of Building 9201-5 to a smaller capacity operation in Building 9204-2 to enable the transition of Building 9201-5 for surplus
- The material phenomena upgrades originally defined for the Stockpile Management Restructuring Initiative were postponed and a plan was being developed for all Y-12 DP facilities. Implementation of this plan when completed may require major upgrades.

The Stockpile Management Restructuring Initiative project has been covered under NEPA by existing, approved Categorical Exclusion.

FIGURE 3.2.2–6.—*Buildings Affected by the Y-12 Restructuring Initiative.*

3.2.2.2 *Waste Management*

Radioactive and hazardous waste has been generated at Y-12 by the processing and storage of enriched and depleted uranium, lithium compounds, and other materials; the weapons manufacturing and assembly/disassembly mission; and the nondefense-related activities associated with the environmental restoration, nondefense R&D, and Work-for-Others Programs. As DOE missions have changed, an increasing volume of waste has been generated through the environmental restoration activities at Y-12. This increase is expected to continue into the future.

In addition to the Environmental Management Waste Management Facility described in this section that is included under the No Action - Planning Basis Operations Alternative, the following ongoing waste management activities would continue at Y-12:

- Providing LLW and mixed waste treatment and storage capabilities to the Y-12 generators
- Storing and/or treating hazardous waste
- Storing hazardous waste pending off-site shipment for treatment, storage, and/or disposal
- Storing mixed waste awaiting treatment or disposal, treatment at Y-12, or shipping to another ORR facility for treatment or disposal
- Continuing closure of inactive waste sites, as planned
- Storing PCB waste, pending off-site shipment for treatment, storage, and/or disposal
- Providing disposal capability for on-site generated, solid nonhazardous waste
- Continuing the Waste Minimization/Pollution Prevention Program

Environmental Management Waste Management Facility

DOE's Office of Environmental Management will construct and operate an on-site waste disposal facility for CERCLA waste expected to be generated by cleanup of the ORR and associated sites. The new disposal facility would be located in West Bear Creek Valley within the Y-12 SWEIS area of analysis and would require the clearing of 26 - 39 ha (64 - 98 acres). The permanent commitment of land for this facility would be 9 - 23.5 ha (22-58 acres).

Detailed information on the Environmental Management Waste Management Facility and potential construction and operation impacts can be reviewed in the remedial investigation/feasibility study (RI/FS) (DOE 1998a), its addendum (DOE 1998d), and proposed plan (DOE 1999a). The ROD (DOE 1999i) selecting the proposed remedy (construction and operation of the Environmental Management Waste Management Facility at Y-12) was published in November 1999. The TDEC and EPA are still reviewing the final design for the Environmental Management Waste Management Facility. As a result, some of the data present in this section of the SWEIS may change.

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^3 (357,000 yd^3) for the low-end conceptual design and 1.3 million m^3 (1.7 million yd^3) for the high-end design.

Site Development. The following development actions would prepare the site for construction of the disposal facility. The existing east-west trending 13.8-kV overhead electric transmission lines would require relocation to the south before significant mobilization for construction. Water, electricity, telephone lines, and sanitary waste facilities (septic system or collection tanks) would be established onsite.

Trees would be removed from the construction, spoils, and borrow areas as required. Topsoil would be removed and stored, and the facility site and borrow area would be prepared for construction activities. Fences and gates would be installed to restrict the controlled area site. Site development actions would be performed to minimize environmental impacts. Existing gravel roads would be upgraded, new gravel roads would be constructed between the borrow area and the disposal facility (as required), and temporary roads and the staging area would be developed. Detention basins and runoff control ditches would be constructed to prevent run-on and protect streams from construction activities (Figure 3.2.2–7).

Disposal Facility. The disposal facility conceptual design includes a clean-fill perimeter dike; a 3 m (10 ft) geologic buffer below a 2-m (6-ft)-thick multilayer base liner system consisting of primary and secondary geosynthetic membranes and clay liners, primary and secondary leachate collection/detection systems, and a protective soil layer; a 5-m (16-ft)-thick multilayer cap consisting of a low-permeability liner, a flexible geomembrane, a drainage layer, a biointrusion layer, and a soil/rock matrix cover (Figure 3.2.2–8). A detailed description of each of these disposal cell components can be reviewed in the *Remedial Investigation/Feasibility Study for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste* (DOE 1998a).

Support Facilities. A support area and an exclusion area would be established within the fenced control area of the disposal facility. The conceptual design for the support area includes truck scales, an office area, employee and visitor parking area, and a guard station at the main gate. An employee facility would connect the exclusion area to the support area and would include personnel showers, bathrooms, monitoring and decontamination equipment, and a break area. Water from showers and toilet facilities would go to a septic tank and drain field or to a collection tank for disposal at a wastewater treatment plant.

Waste operations would be conducted in the exclusion area, which would be assumed to be contaminated during operations. Any personnel, equipment, vehicles, or containers leaving the exclusion area would be monitored and, if necessary, decontaminated. Clothing worn in the exclusion area would be washed or packaged for disposal. Water from the washers would go to a decontamination tank. An enclosed decontamination facility with a collection sump and pump and high-pressure water spray equipment would be available to inspect and decontaminate vehicles, equipment, and containers. Decontamination water collected in the sump would be pumped to the decontamination tank. The tank would be emptied, as needed, and decontamination water would be transported by tanker truck to the ETTP Central Neutralization Facility or used for dust control in the exclusion area.

An equipment storage, maintenance, and fueling area would be constructed in the exclusion area for use during operations. A waste staging area inside the exclusion area would serve as a temporary storage area for incoming waste. This area would be used if the rate of incoming waste deliveries exceeds the rate of waste placement in the disposal facility, as could occur during inclement weather. A covered storage area would be included in the staging area.

Existing groundwater monitoring wells would be used, where possible, and additional groundwater monitoring wells would be installed as needed. Air monitoring equipment would be installed for use during construction and operations.

FIGURE 3.2.2–7.—*The Environmental Management Waste Management Facility Site Plan.*

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

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

FIGURE 3.2.2–8.—*Cross Section of the Environmental Management Waste Management Facility Disposal Cell.*

Project Borrow Area. 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. Based on the results of the *Environmental Restoration Soil Borrow Area Site Selection Study for the Remediation of Lower East Fork Poplar Creek Floodplain Soils* (DOE 1994b), 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 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. This would represent an increase of between 4.8 and 7.3 ha (11.8 and 18 acres). Figure 3.2.2–9 shows the Y-12 West End Borrow Area, including the areas projected to be impacted by excavation of fill for construction of the low- and high-end design facilities.

Construction

Construction activities for the disposal facility would include site development, disposal cell construction, construction of support facilities, capping, and closure. The disposal cell would be constructed in phases consistent with waste generation schedules. The conceptual schedule assumes that the disposal facility would be constructed and operated in two phases for the high-end scenario with the first phase of construction for the high-end scenario approximating the total low-end volume capacity. Disposal would begin once construction of the Phase I area was complete. An interim cap would be placed over the Phase I area as soon as that portion of the cell was filled. Phase II construction would be completed and this area would be ready to accept waste concurrent with interim capping of the Phase I area.

For the conceptual high-end scenario construction schedule, Phase I would include construction of all support facilities and that portion of the clean-fill dike, liner, and leachate systems to allow receipt of approximately 30-35 percent of the planned waste capacity. Phase I would include complete site clearing and preparation, and the construction of security fences, access roads, the leachate collection tanks, sediment detention basins B and C, and other necessary support facilities. A small dike would be constructed to delineate the boundary between the two phases and separate contact runoff (i.e., the rainfall that potentially contacts waste) from noncontact runoff. The clean-fill dike would be left open facing Phase II construction.

Phase II would involve construction of the remainder of the clean-fill dike, liner, leachate system, and sediment detention basin A. Construction of this phase would likely take two to three years. Phase II construction would follow Phase I construction during placement of waste in the completed Phase I area. During this period, vehicles hauling waste and fill material would use the same site access road. Once on-site, fill traffic and waste traffic would use separate routes. Installation of the final cover for the entire cell would occur during closure of Phase II.

Operations and Waste Placement

Operational scenarios would be different for the low-end and high-end waste volumes. Under the low-end scenario, most of the candidate waste volumes would be generated by FY 2009. Because it would not be cost-effective to operate the disposal facility for the small volumes generated after that date, operations would discontinue after FY 2009 and the facility would be closed by FY 2011. Candidate wastes generated after operations cease would be shipped to off-site facilities. Long-term surveillance and maintenance (S&M) would continue indefinitely. For the high-end volume scenario, on-site disposal operations are assumed to continue through FY 2030. Closure would be completed in FY 2033 and active institutional controls would continue indefinitely.

FIGURE 3.2.2–9.—*Y-12 West End Borrow Area.*

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

The operations phase would consist of waste acceptance and inspections, placement of wastes into the disposal cell, decontamination of waste containers and transport vehicles, and maintenance of the disposal facility. Facility maintenance would include providing daily cover over the emplaced waste, leachate collection and management, equipment maintenance, support facility maintenance (e.g., roads, buildings), and record keeping.

The facility would have temporary storage capacity to accommodate disposal requirements or accept deliveries during inclement weather when waste placement operations are curtailed. The temporary storage capacity would include a 1,858 m^2 (20,000 ft^2) covered storage building capable of housing approximately 612 m^3 (800 yd^3) of packaged waste.

To ensure that waste received at the disposal facility could be properly handled, the physical form of waste would be restricted. Bulk waste containing debris no larger than 20 cm (8 in) in any dimension would be handled and compacted in the disposal cell with standard earth-moving equipment. Large debris (i.e., debris with any dimension larger than 20 cm [8 in]), containers, and solidified waste could be accepted if special handling arrangements were made. Limitations on large debris would be developed to minimize void spaces in the disposal cell and prevent damage to the liner system. Appropriately sized, solidified waste in the form of slabs would be accepted. No free liquids would be permitted.

Wastes would be transported in closed trucks or by truck in large containers (e.g., intermodals) or discrete packaging such as B-25 boxes, drums, and bags. Bulk waste in the form of soil, debris, miscellaneous solids, and stabilized sediment/sludge shipped in closed dump trucks and self-dumping large containers is expected to compose the largest portion of waste received at the disposal facility, although equipment for unloading a number of different types of transport vehicles and containers would be available.

Trucks carrying waste would enter the facility via the waste traffic access road and proceed to the truck scale/acceptance facility. The trucks would be weighed, waste manifests would be verified, and waste packages would be inspected. The trucks would then proceed into the disposal facility.

Within the disposal facility, active 30 by 30 m (100 by 100 ft) working faces would be prepared to receive waste. The 0.3-m (1-ft)-thick protective soil layer placed over the geotextile during construction would be removed as needed and replaced with sand or gravel before the placement of waste in the first lift. Removal of a portion of the soil layer would allow drainage of precipitation into the leachate collection system. It is assumed that only one or two faces would be active and other faces would have temporary covers to provide containment and shielding and reduce infiltration. If more accurate waste generation data indicate that exposures would be acceptable, additional faces could be opened during periods of high disposal rates or when segregation of incoming waste streams is appropriate. Segregation of incompatible wastes is assumed to be unnecessary because wastes would be treated to land disposal restrictions (LDRs). Segregation for other purposes may be desirable but is not expected to affect productivity.

Flatbed trucks carrying discrete, smaller containers such as B-25 boxes and drums would be off-loaded onto a mobile dock in the cell. Large containers would be emptied directly into the working cell. After depositing the wastes, the containers and trucks would be decontaminated before leaving the disposal cell. Before leaving the waste staging area and entering the uncontrolled area, trucks and containers would be checked at the vehicle and waste container monitoring/decontamination facility and decontaminated again, as required.

Bulk waste would be placed in 0.3-m (1-ft) lifts and compacted. Debris and containers would be placed to minimize possible damage to the geotextile layer and to minimize void spaces after backfilling. Void spaces in the disposed waste would be filled with waste soil, clean soil, or flowable fill (e.g., low-strength grout). A cover made of soil or foam would be placed over the cell following each day's operations and would be removed from the active cell before placement of the next layer of waste. This cover would prevent precipitation from contacting the waste and reduce fugitive emissions.

A berm would separate the working face of the cell from completed cells and those areas of the cell that have yet to receive waste. This berm would segregate collected precipitation that has not contacted disposed waste from collected precipitation that is potentially contaminated because of contact with waste. Precipitation accumulating in the working cells would infiltrate into the leachate collection system. Precipitation accumulating in the unused portion of the cell would be collected in a temporary sump or basin and pumped to one of the sediment detention basins south of the facility. Leachate would be pumped from collection sumps located outside the cell to collection tanks south of the cell for storage. During peak leachate generation, up to six 18,927-L (5,000-gal) tanker truck loads per day would be required to transport leachate from the collection sumps to the ETTP Central Neutralization Facility or other wastewater treatment facility on ORR.

After storm events, the detention basins would be inspected. The basins would be excavated to original design grade when 60 percent of the capacity is filled with sediment. The sediment would be hauled to a sanitary or construction landfill on ORR.

Closure

For the high-end scenario, Phase I disposal operations and Phase II construction of the geologic buffer, clean-fill dike, and liner should be near completion at the same time. When Phase II disposal operations start, installation of the final cover on Phase I could begin.

Closure activities would include removal of leachate storage tanks (after collection volumes diminish) and other support facilities and placement of contaminated media into the disposal cell, installation of the final cover, and site restoration. Restoration could include removal of the sediment ponds, replacement of wetlands if necessary, and grading and seeding the disturbed areas outside the disposal cell to restore the area.

Deed restrictions would prohibit residential use of the property, construction of any facilities that could damage the cover, or installation of groundwater extraction wells (for purposes other than monitoring). These deed restrictions would also identify other administrative controls necessary to protect the public and the integrity of the disposal cell and would be attached to the deed description and filed with the appropriate local governmental authority.

Post-Closure Care

During development of the support facilities, monitoring of the disposal facility and its environs would begin as soon as monitoring facilities were installed. Historic information and results from pre-disposal monitoring would be used to develop a baseline for comparison with post-operation monitoring results. S&M and monitoring would be performed for an indefinite period after facility closure. These activities and the associated reporting requirements would be conducted in accordance with approved facility-specific S&M and monitoring plans.

Surveillance. An integral part of post-closure care is surveillance and site inspection. The site would be inspected to verify adequate performance of the containment features installed and to alert DOE and regulatory agencies of any potential problems. The inspections would provide an early warning that specific elements may need more careful evaluation and monitoring.

During the first year of operation, one or two inspections could be performed immediately after high rainfall events to verify the effectiveness of water retention and transport systems and the accuracy of the performance predictions. Additional data should be collected after significant events such as storm events of a 5-year intensity or greater. In the first 5 years after closure, inspections could be performed more frequently than in later years to evaluate seasonal effects on operation of the systems. Certain elements, such

as disposal-cell stability, may require more frequent inspections. The timing of the inspections could be determined after evaluation of the first year's seasonal results to provide the most useful information. After the fifth year and upon completion of the first CERCLA 5-year review, inspection frequency could be adjusted as appropriate.

Maintenance. Post-closure maintenance activities would include the clearing of uncontrolled plant growth from the disposal-cell crest and side slopes; clearing, repair, and realignment of surface water transport structures; inspection, emptying, and maintenance of the leachate collection/detection system; replacement of signs; reestablishment of survey monuments; and collection of piezometer data. Undesired plant growth would be cleared annually for the period of active institutional controls. Regrading, ditch realignment, fence and sign repair, survey monument reestablishment, and other minor maintenance items would be conducted based on surveillance findings.

Long-Term Maintenance. Long-term media monitoring (groundwater, surface water, air, and biota) would be performed to detect releases from the disposal cell. A groundwater monitoring system with wells located upgradient and downgradient of the disposal cell would be sampled annually to monitor containment concentrations and determine whether there have been contaminant releases from the disposal cell. Continued monitoring would support 5-year reviews under CERCLA [40 CFR 300.430 f(4)V]. The surface water downstream from the disposal cell would be monitored during operation of the facility and through post-closure care in support of 5-year CERCLA reviews.

3.2.2.3 *Environmental Restoration*

Environmental Restoration activities would continue in the form of characterization and remediation of contaminated areas or facilities. Environmental Restoration is not considered a land use, but an activity necessary for reuse or disposition of land and facilities. The Environmental Restoration projects at Y-12 that would continue under the No Action - Planning Basis Operation Alternative include:

- Decontamination and Decommissioning Facilities
- Upper East Fork Poplar Creek Actions
- Upper East Fork Poplar Creek East End Volatile Organic Compound (VOC) Plumes
- Upper East Fork Poplar Creek West End Mercury Area Remediation
- Groundwater/Surface Water Actions
- Soils/Sediments Contamination Reduction Actions
- Soils/Sediments Remediation Actions

3.2.2.4 *Nuclear Nonproliferation and National Security*

The No Action - Planning Basis Operations Alternative would also include continued down-blending of small quantities (kg/year) of HEU to various degrees of enriched uranium by blending HEU with depleted or natural uranium in Building 9212. The product would be metal or oxide used in various reactor programs, weapons programs, and for multiple uranium supply orders to DOE customers.

Y-12 would continue to support ongoing NN programs, operations and activities under the No Action - Planning Basis Operations Alternative. Ongoing and planned National Security Program Offices activities include:

- Verification activities
- Bilateral treaty support
- IAEA interface activities related to uranium
- Support activities pertaining to all National Security Nuclear Nonproliferation Programs

3.2.2.5 *Nuclear Energy, Science and Technology*

Under the No Action - Planning Basis Operations Alternative, DOE would continue to host existing projects and program activities of Nuclear Energy, Science and Technology at levels not exceeding those of the recent past.

3.2.2.6 *Nondefense Research and Development Program*

Y-12 would continue supporting ongoing program operations. Ongoing and planned nondefense R&D operations and activities at Y-12 that would continue under the No Action - Planning Basis Operations Alternative include:

- National Environmental Research Park Program Activities
- ORNL General Research and Support Activities
- ORNL Engineering Technology Division Activities
- ORNL Fusion Energy Division Activities
- ORNL Biology and Environmental Research Program Activities

One new Nondefense Research and Development Program initiative included under the No Action - Planning Basis Operations Alternative is the Field Research Center associated with the DOE NABIR Program. The NABIR Program is a basic research program designed to increase the understanding of fundamental biogeochemical processes that would allow the use of bioremediation approaches for cleaning up DOE's contaminated site. Because subsurface hydrogeologic and geochemical conditions at contaminated DOE sites cannot easily be duplicated in a laboratory, the Office of Science needs a field site to allow laboratory research results to be field-tested on a small scale in a controlled outdoor setting.

The Office of Biological and Environmental Research, within the Office of Science, is adding a Field Research Center component to the existing NABIR Program at Y-12, which was analyzed at ORNL (ORNL 1999). DOE has prepared an EA for the project (DOE/EA-1196, DOE 2000b) and issued a FONSI on April 18, 2000, which provides a description of the proposed action, alternatives, and potential impacts. A summary of the project is presented here. The fieldResearch Center activities are proceding independant of the Y-12 SWEIS proposed actions and alternatives.

The Y-12 Field Research Center site includes a 98 ha (243 acre) previously disturbed contaminated area and a 163-ha (440-acre) background area. The contaminated area will be used for conducting experiments on contaminated groundwater and subsurface sediments. The background area provides for comparison studies in an uncontaminated area and is outside the Y-12 SWEIS analysis area shown in Figure 3.2.2–1. The contaminated area and background area is located in Bear Creek Valley. Bear Creek Valley is approximately 16 km (10 mi) long and extends from the eastern end of the Y-12 Site to the Clinch River on the west. Bear Creek is a tributary to East Fork Poplar Creek (EFPC), which drains into the Clinch River at the ETTP. Except for the extreme eastern end of the contaminated area of the Field Research Center, the area is outside any security fences, adjacent to public use roads, but protected from unwarranted passersby. Initially, test plots of less than 0.4 ha (1 acre) will be constructed in proximity to the S-3 Ponds Site Parking Lot (Figure 3.2.2–10).

FIGURE 3.2.2–10.—*Locations of the Background Area and the Initial Test Plots within the Field Research Center (FRC), Contaminated Area at Y-12.*

A CERCLA Remedial Investigation Report was completed on the Bear Creek Valley in 1997 (DOE 1997a). The report provided a significant amount of characterization data on the S-3 Ponds Site as well as other areas of the Bear Creek Valley. The contaminated and background areas will serve as the primary field site for small-scale basic bioremediation research activities. 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. Because the activities at the Field Research Center will be undertaken in an area limited to less than an acre and a depth of 23 m (75 ft), the scale of research activities would be considered small.

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. These active characterization studies will allow the NABIR investigators to better understand the hydraulic properties of the subsurface, provide a detailed understanding of groundwater flow paths and the speed at which groundwater and other substances might move through the aquifer, and could assist in determining additional chemical and physical properties of an aquifer.

The Field Research Center will be a primary source for groundwater and sediment samples for NABIR investigations. Groundwater will be sampled by pumping water from existing wells or by installing new wells. Approximately 200 groundwater samples per year would be expected. These would be small quantity samples, approximately 1 L (0.264 gal) each and totaling less than 76,000 L (20,000 gal) per year, and would not change the groundwater flow rates or availability of groundwater. Approximately 600 core samples of sediments would be taken over the 10-year life of the proposed Field Research Center through the use of a drill rig or split-spoon sampler. Again, the sediment samples will be small in volume (approximately less than 1 m^3) (35.31 ft^3) and the drilling holes will be backfilled when no longer needed.

Collection and transportation of samples within the boundaries of the Y-12 Site will follow existing DOE procedures and meet all ES&H requirements. Samples could be shipped off-site to researchers at universities and commercial laboratories. Any shipment of hazardous materials to or from the Field Research Center will follow U.S. Department of Transportation (DOT) Hazardous Materials Regulations.

Approximately 40 in-situ research activities will be conducted over the 10-year life of the proposed Field Research Center. Two types of in-situ activities are proposed to take place: biostimulation and bioaugmentation.

Biostimulation would involve introducing substances into the subsurface to stimulate naturally occurring microorganisms in-situ to bioaccumulate or transform a heavy metal or radionuclide. Biostimulation activities might include (1) injection of electron donors or electron acceptors to change part of the chemical environment of the subsurface so that it is more favorable for microbial activity or growth, (2) injection of gases or nutrients to stimulate the growth of selected microorganisms, (3) injection of chelators to test the extent of contaminate mobilization, or (4) injection of surfactant to reduce the toxicity of a specific contaminant to microorganisms.

Bioaugmentation would involve the injection of additional microorganisms (either native or non-native) into the subsurface to either bioaccumulate heavy metals or radionuclides, or transform them such that they become less toxic or less mobile in the subsurface.

With the exception of the placement of temporary work/sample preparation trailers at the test plots, no new construction is involved with the operation of the Field Research Center. Existing utilities will be used. Heavy equipment (e.g., drill rigs, brush hogs, augers) will be used when necessary for site clearing prior to conducting research at the background or contaminated sites. The equipment will used for short periods of

time. Best management practices and all applicable rules and regulations will be followed during the use of equipment.

3.2.2.7 *Work-for-Others Program*

The Work-for-Others Program and the National Prototyping Center are hosted by DOE and include the shared use of certain facilities and resources at Y-12. Under the No Action - Planning Basis Operations Alternative, DOE would continue to host the projects and activities of other Federal agencies, foreign governments, and other countries at activity levels not exceeding those of the historic past. The Work-for-Others Program was not affected by the 1994 stand-down of Y-12 DP mission activities.

3.2.2.8 *Technology Transfer Program*

The Technology Transfer Program, hosted by DOE, has a 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. Under the No Action - Planning Basis Operations Alternative, DOE would continue to host the projects and activities of the Technology Transfer Program at levels not exceeding those of the historic past. The Technology Transfer Program was not affected by the 1994 stand-down of Y-12 DP mission activities.

Technology Transfer activities that would be expected to continue include the following:

- Predictive Maintenance
- Computer-aided Design/Manufacturing/Engineering/Specific Technologies
- Manufacturing and Inspection Technologies

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 a New HEU Storage Mission Facility. There are two proposed options for the HEU Storage Mission at Y-12: (1) construct a new HEU Materials Facility at one of two potential candidate sites, and (2) construct an upgrade expansion to existing Building 9215. The preferred option is to construct and operate the new HEU Materials Facility, which would enable Y-12 to continue to safely and securely store Categories I and II HEU, including canned subassemblies that contain HEU; HEU in metal and oxide form in cans that is part of the strategic reserve or excess inventories. Scrap material that contains HEU awaiting recovery (Central Scrap Management Office scrap metal, oxides 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. A discussion of each of the options and the candidate sites for the proposed new HEU Materials Facility is provided in the following sections.

3.2.3.1 *Alternative 1B (No Action - Planning Basis Operations Alternative)*

Under the No Action - Planning Basis Operations Alternative, the HEU Materials Facility would not be constructed. The Y-12 National Security Complex would continue to use the existing storage facilities (Buildings 9204-2, 9204-2E, 9204-4, 9215, 9720-5, 9206, and 9998) to perform the HEU Storage Mission and meet DOE requirements. Appendix A.4 gives a detailed description of these buildings. Most of these facilities have been constructed for HEU storage by building vault space within existing buildings or as appendages to buildings. The existing storage facilities rely upon an appropriate mix of both physical, engineered, and administrative controls to safely and securely store HEU. Some of the buildings in which storage facilities are located have been identified as not meeting current DOE standards for natural phenomena events (e.g., tornado and seismic occurrences). Although the facilities now used for HEU storage

provide sufficient space for current and near-term future national security needs, they do so at increasingly greater difficulty and costs associated with meeting DOE, design, ES&H, and security requirements.

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

This section includes a description of the proposed new HEU Materials Facility, its construction and operation, the candidate sites for the facility, and infrastructure requirements. The new HEU Materials Facility would replace the use of the existing storage vaults and facilities located within existing Y-12 buildings as described in Section 3.2.2.1. The Category I and II HEU materials in storage facilities located in Building 9720-5, 9204-2E, 9204-2, 9998, 9215, 9206, and 9204-4 would be consolidated in the new HEU Materials Facility. All operations associated with HEU storage, including transport and receiving, would be transferred to the new HEU Materials Facility. Existing storage facilities would be used for other activities or declared surplus and turned over to EM for D&D, based on a formal transition process review described in Appendix A.1.2. D&D estimated wastes volumes are provided in Section 5.11.2 of this document.

HEU Materials Facility Description

The proposed HEU Materials Facility would be a single structure with a total footprint of approximately 12,077 m^2 (130,000 ft^2). 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 3.2.3–1 shows an artist's rendering of the proposed HEU Materials Facility.

The design of the HEU Materials Facility would meet Y-12 Conduct of Operations and Integrated Safety Management requirements; minimize the number of personnel required for operations and security; and meet DOE requirements for SNM accountability and control. The design service life of the proposed new facility would be 50 years. The HEU Materials Facility would be equipped with appropriately sized filtered heating, ventilation, and air conditioning (HVAC) systems. These systems would constitute a vital component in the protection of workers, the public, and the environment. While the facility would not have airborne uranium emissions under routine operations, sensors would trigger a series of barriers to prevent the escape of radioactive materials from within the HEU Materials Facility during an off-normal occurrence.

The material processing areas within the HEU Materials Facility would incorporate the appropriate use of gloveboxes, inert atmosphere, negative air pressure, and other engineered controls, supported by administrative controls, to protect the facility workers from exposure to radiological and hazardous materials. Exhaust emissions for the facility would comply with the applicable Federal and state requirements. In conjunction with other engineered containment measures at the container and storage vault levels and with supporting administrative controls, the ventilation system barriers would provide a layered system of protection.

Other systems that would be included in the new HEU Materials Facility for facility operation and ES&H protection include:

- Criticality Accident Alarm System
- Emergency Notification System
- Central Alarm System
- Fire Suppression Alarm Systems
- Telephone and public address system

- Classified and unclassified computer network
- Personnel Monitoring System
- Berm and other security-related sensors
- Automated inventory system with continuous real-time monitoring

The HEU Materials Facility would provide secure docking for safeguard transports (SGTs) and safe-secure trailers (SSTs) to ensure the secure, safe transfer of secondaries and other materials containing HEU. The shipping and receiving docks at the HEU Materials Facility would accommodate the simultaneous loading and unloading of three SGTs or SSTs. A parking area for an additional seven SGTs and/or SSTs would be included within the facility site footprint. The docks and long-term parking areas would accommodate the trailers and associated tractors. The dock parking area would have the electrical hookups required for the SGTs and SSTs.

Separate confirmatory areas would contain the equipment necessary to perform material receipt verification and nondestructive assay (NDA) of the materials received. Access to the storage and work areas in the facility would be controlled and monitored using both active and passive technological methods and administrative controls. To further reduce operational costs, the new HEU Materials Facility would include provisions for an enclosed and secure transit corridor. The corridor would connect the HEU Materials Facility with potential future modernization projects such as the Enriched Uranium Manufacturing Facility. HEU storage practices would involve application of simple, rugged, easily maintained, state-of-the-art technologies and techniques. The use of a horizontal drum-storage system that would place individual drums on a seismically qualified, storage rack is being evaluated. The racks would be designed, fabricated, and installed to meet the applicable requirements specified in DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*. All racks, which would have six vertical storage locations, would include features to ensure that during a seismic event, drums/containers would not become dislodged from their storage locations. The system would require the use of a turret-mast forklift to permit straight-in and straight-out aisle entrance and exit. In addition, this forklift would also be able to handle drums from either the left or right because of the ability to reverse the fork mechanism. A guidance system would be installed to guide the forklift when operating in the storage aisle. Such a system would maximize storage space by eliminating the need for forklift turning space within the storage bays.

The can storage system being evaluated for use in the facility consists of a palletized rack storage system which will have cavities to receive the cans. Each pallet would include a removable, lockable metal cover. Final decisions on storage systems would depend on the completion of a detailed nuclear criticality safety analysis. The impact of the various storage systems and materials on workers and public health and safety would be evaluated and would be incorporated in the facility Preliminary and Final Safety Analysis Reports.

Design, site preparation, construction, and operational activities would be conducted in accordance with applicable regulations, DOE Orders, national codes, and other requirements identified in Chapter 7, and the requirements established during preparation of the Preliminary Safety Analysis Report. Some elements of the new HEU Materials Facility would be designed to meet natural phenomena PC-3 requirements (See Glossary for definition of PC levels).

The preliminary schedule for the project indicates that site preparation would begin in the second quarter of FY 2002, with construction complete in FY 2006.

HEU Materials Facility Construction

The current HEU Materials Facility design calls for a single-story storage structure with reinforced concrete floors, roofs, and walls. The entire facility would be surrounded and covered by an earthen berm of compacted clay and rock riprap (see Figure 3.2.3–1). The last clay fill would be installed to create a finish

slope that would enable water to drain off to the west, north, and east sides of the berm. Once the final clay cap has been installed, the entire berm would receive a layer of gravel.

The structure's foundation would be concrete piers that are drilled down into the bedrock of the site, or a thick concrete slab. To reduce the overall footprint of the structure, a precast-concrete crib retaining wall would be constructed on the north and west sides of the proposed HEU Materials Facility. The precast-concrete retaining wall would be 8 to 10 m (25 to 30 ft) high. A suitable foundation would be provided for the crib wall. Double cells would be required because of the proposed height of the crib walls. Crib walls would be backfilled with rock riprap.

Conventional construction techniques would be used to build the HEU Materials Facility. TDEC would be included on all permitting and inspections during construction. Construction activities would be performed in a manner that assures protection of the environment during the construction phase. Techniques would be used to minimize the generation of construction debris that would require disposal. Disposal of construction debris would be made in accordance with waste management requirements in properly permitted disposal facilities. The extent and exact nature of such activities as site clearing, infrastructure improvements, and support facility construction required would depend on the candidate site considered for the HEU Materials Facility. Throughout the construction process stormwater management techniques, such as silt fences and runoff diversion ditches, would be used to prevent erosion and potential water pollutants from being washed from the construction site during rainfall events.

As conceptually designed, about 4 ha (10 acres) of land would be required for the HEU Materials Facility. Additional land area may be required to accommodate parking, access roads, and support structures (e.g., security infrastructure requirements). The actual amount of land required depends on the selected site. During construction, about 0.8 ha (2 acres) of land would be required for a construction lay-down area. The lay-down area would be located within or near the location designated for the facility. Following construction, the lay-down area would be restored to its pre-construction condition or incorporated into the landscape or infrastructure support design of the site.

HEU Materials Facility Operation

The following discussion outlines the anticipated workflow for storage operations in the proposed new HEU Materials Facility. Storage operations in the new facility would replace existing HEU storage operations for Categories I and II as described in Section 3.2.2.1. Appropriate procedures to implement this workflow would be developed after the final design is approved.

Drum Storage. The following list identifies the main operational steps that would be involved in handling drums containing HEU materials.

- SST arrives at the loading dock
- Shipping containers are offloaded and moved to the NDA and re-containerization area
- A transfer check is performed
- Drums undergo nondestructive assay (NDA)
- HEU materials are placed in new containers if required
- Each drum is entered into the computerized tracking system and is assigned a rack location
- Each drum is moved by forklift to its assigned location in the storage area
- Each drum is connected to the automated inventory system

Canned Storage. The Continuous Automated Vault Inventory System (CAVIS), a computerized inventory and monitoring system, is being evaluated for use on those cans stored in the HEU Materials Facility. The following list identifies the main operational steps that would be used in handling cans containing HEU materials.

FIGURE 3.2.3–1.—*Artist's Rendering of Proposed Highly Enriched Uranium Materials Facility at Site A.*

- SST or in-plant transfer vehicle arrives at the loading dock
- Shipping containers with cans are offloaded and moved to the NDA and re-containterization area
- A transfer check is performed
- Cans undergo NDA
- Cans are placed in the can pallets
- Each can and pallet is entered into the computerized tracking system and is assigned a rack location
- Each loaded pallet is moved by forklift to its assigned location in the storage area
- Each loaded pallet is connected to CAVIS and then activated

An operational consideration that must be accommodated is the need to operate both the existing HEU storage facilities and the new HEU Materials Facility in parallel for approximately 1 year after the new facility is certified operational. This dual operation period would also cover the transfer of materials from the current storage facilities to the new facility. Such dual operation would result in a short-term increase in personnel and operational costs because of the need to staff the new facility while the current facilities also remain in operation. When a currently used storage facility is emptied of material (the material having been transferred to the new facility), that facility would be eligible for reuse or shutdown.

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 of but adjacent to the existing Perimeter Intrusion, Detection, and Assessment System (PIDAS). Figure 3.2.3–2 shows the location of Site A relative to other buildings at Y-12. This 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.

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

FIGURE 3.2.3–2.—*Site A for the Proposed Highly Enriched Uranium Materials Facility.*

Construction and Operation

Construction

Relocation of Utilities and Other Features. Site A would be cleared of electrical utilities that would interfere with construction of the HEU Materials Facility. Pole-mounted lighting fixtures, public address system speakers, and associated aerial cables would be removed. An overhead 13.8-kV yard feeder that enters the parking lot from the south would be rerouted around the east side of the parking lot. Overhead electrical services to a guard tower at the northeast corner of the parking lot would be removed and then the tower would be demolished. A high-mast lighting tower located on the northern boundary of the parking lot would be relocated to the north side of Bear Creek Road. Other electrical lines would be relocated as appropriate to cross under the PIDAS. Services to office trailers scheduled for removal would be disconnected.

A water line that passes under the proposed location of the vehicle gate for the new HEU Materials Facility would be relocated to pass under the existing PIDAS at another point. Water service would be extended to the new facility from the relocated water line. Another water line would also be rerouted under the PIDAS from an existing water line just north of Building 9111. An abandoned water line on the north side of the proposed facility site would be removed where it runs within the limits of the proposed project site, and concrete caps would be placed on the end points. A polyvinyl chloride (PVC) sanitary sewer main would be extended to the new facility from the current sanitary sewer system just west of Building 9703-11.

The HEU Materials Facility storm sewer system would include a comprehensive collection system that would tie into the existing system near the northeast corner of the project site. Storm sewer pipe would be reinforced concrete and would be designed to collect a 100-year storm event. The storm sewer system along Bear Creek Road would be designed to accommodate the simultaneous failure of the two 5.7 million L (1.5 million gal) water tanks on the south side of Pine Ridge. Pipe sizes, number of catch basins, locations, etc., would be a consideration of the design of the storm sewer system along Bear Creek Road.

Traffic Planning, Polaris Parking Lot, and Construction Lay-Down Area. The HEU Materials Facility footprint and the alignment of the new PIDAS may require relocation of a short stretch of Bear Creek Road (Figure 3.2.3–3). Early engineering studies show that the new PIDAS would infringe upon the southernmost lane of Bear Creek Road near the northwest corner of the site. If so, an additional vehicle lane would be built on the north side of the existing road. The new lane would be approximately 122 m (400 ft) long. Support poles to the traffic light would be relocated northward. Up to 200 car spaces may be built to replace the parking spaces lost when the proposed HEU Materials Facility is constructed on the existing West Portal Parking Lot. These additional parking spaces would be an extension of the existing Polaris Parking Lot, which is located on the north side of Bear Creek Road, just northwest of the HEU Materials Facility site (see Figure 3.2.3–3). A storm collection system featuring reinforced concrete pipe and curb and gutter catch basins and precast concrete head walls would be designed for the new parking lot expansion. The new storm sewer system would tie into the existing storm sewer system.

The construction staging area for the HEU Materials Facility would occupy approximately 0.8 ha (2 acres) of land and would be north of Bear Creek Road or at a site on the west end of Y-12. The site would be sufficiently graded and developed to accommodate a number of temporary construction trailers, storage buildings, and materials storage yards. The staging area would have electric power and potable water. Sanitary service would be provided by PVC double-wall collection tanks, which would be pumped out as needed. A smaller area 0.4 ha (1 acre) would be available for daily lay-down construction needs in the adjacent parking lot west of Site A. Figure 3.2.3–3 shows the location of the two construction lay-down areas.

Utility Extension. The cooling and potable water lines, electrical services, security systems, standby power, and telephone systems would be extended under the existing PIDAS. All the utility services would be extended from existing Y-12 services from within the Protected Area of Y-12. When completed, the new HEU Materials Facility would have no overhead utilities.

Cooling Tower Modifications. A chilled water loop would be installed to support the new HEU Materials Facility HVAC requirements. This also would require that the new cooling tower (Building 9409-24E) be completed and brought on-line. Piping would be laid in accordance with all necessary safety and security precautions. A chilled water booster pump and piping would be required in conjunction with the new chiller cell. Return chilled water would be used as condenser water.

Removal of Office Trailers. Three office trailers are located east of the West Portal Parking Lot. Personnel would be relocated, and these trailers would be removed and salvaged. The utilities to these trailers would be removed. The area where these trailers are located would be used for the approach road and new PIDAS vehicle entrance to the HEU Materials Facility.

Remediate Construction Lay-Down Area. Once the construction of the HEU Materials Facility is complete, the construction office trailers would be removed and material lay-down areas would be re-graded and seeded after removal of any soil that may have become contaminated with construction-related materials such as diesel fuel.

Site Preparation and Facility Construction. Table 3.2.3–1 lists the construction resource requirements, number of construction workers, and estimated waste generation of constructing the proposed facility on Site A. Site preparation would follow the advanced work described above and would include any excavation, filling, and grading needed to meet design requirements for an on-grade, reinforced concrete structure. Preliminary testing of Site A has shown that the parking lot was partially built on top of a filled area. The subsurface conditions encountered during testing vary widely across the site and include existing fill, residual silts, and weathered shale. Bedrock dips across the site at an angle of approximately 45 degrees as indicated by the auger refusal depths that ranged from 6 to 18 m (20 to 60 ft) below grade. Additional detailed testing would be conducted to fully characterize site geology, hydrology, and soil compaction, as well as to sample for radioactive contamination, mercury, and other materials of concern before construction.

On Site A, the HEU Materials Facility would be a one-story, reinforced concrete building covered by a soil overburden roof. The floor of the facility would be reinforced concrete slab supported on well-compacted sub-grade. Because of the extremely large loading imposed by the soil overburden and the thick roof slab, the columns, exterior walls, and storage area perimeter walls would be supported by reinforced concrete drilled piers or thick concrete mat. Piers would be socketed into sound bedrock to a depth of 1.8 m (6 ft). Drilled pier diameters and depths would vary across the building length with an average depth approximately 12 m (40 ft). The HEU Materials Facility structure would be designed to meet the requirements of the applicable DOE Orders and Standards and the appropriate model building codes for specialized construction. The design for the natural phenomena hazards (earthquake, tornadic winds, floods, and lightning) would be in accordance with DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*.

Operation

The HEU Materials Facility operations would be the same as described earlier. Table 3.2.3–2 lists the operations requirement, number of operations workers, and the expected waste generations for the proposed HEU Materials Facility.

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

FIGURE 3.2.3–3.—*Highly Enriched Uranium Materials Facility Site A Construction Lay-Down Areas, New Parking Lot, and New Alignment of Bear Creek Road.*

TABLE 3.2.3–1.—*Highly Enriched Uranium Materials Facility Construction Requirements and Estimated Waste Volumes for Site A or Site B*

Requirements	Consumption	
Materials/Resource		
Electrical energy (MWh)	5,000	
Concrete m³ (yd³)	25,100 (32, 830)	
Steel (t)	2,100	
Liquid fuel and lube oil L (gal)	568,000 (150, 050)	
Water L (gal)	7,571,000 (2,000,046)	
Aggregate m³ (yd³)	1,550 (2,027)	
Land ha (acre)	5 (12.3)	
Employment		
Total employment (worker years)	145	
Peak employment (workers)	220	
Construction period (years)	4	
Waste Category	**Volume**	
	Site A	**Site B**
Low-level		
Liquid m³ (gal)	none	none
Solid m³ (yd³)	none	none
Mixed Low-level		
Liquid m³ (gal)	none	none
Solid m³ (yd³)	none	22,707[a] (29,700)
Hazardous		
Liquid m³ (gal)[b]	3 (800)	3 (800)
Solid m³ (yd³)	38.2 (50)	38.2 (50)
Nonhazardous (Sanitary)		
Liquid m³ (gal)	14,347 (3,970,000)	14,349 (3,970,000)
Solid m³ (yd³)	none	none
Nonhazardous (Other)		
Liquid m³ (gal)	none	none
Solid m³ (yd³)[b]	3,823 (5,000)	3,823 (5,000)

[a]Excavated contaminated soil to a depth of 3 ft at Site B.
[b]Construction debris.
Source: LMES 2000b.

TABLE 3.2.3–2.—*Highly Enriched Uranium Materials Facility Annual Operation Requirements and Estimated Waste Volumes*

Requirements	Consumption
Electrical energy (MWh)	5,900
Peak electrical demand (MWe)	1.1
Liquid fuel L (gal)	none
Natural gas m^3 (yd^3)	none
Water L (gal)	550,000 (145,295)
Plant footprint ha (acres)	4 (9.9)
Employment (workers)	30 (100[a])

Waste Category	Average Annual Volume
Low-level	
Liquid m^3 (gal)	0.8 (200)
Solid m^3 (yd^3)	119 (156)
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Hazardous	
Liquid m^3 (gal)	2.5 (660)
Solid m^3 (yd^3)	1.5 (2)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	777.1 (205,300)
Solid m^3 (yd^3)	none
Nonhazardous (other)	
Liquid m^3 (gal)	4.2 (1,100)
Solid m^3 (yd^3)	178.9 (234)

[a]Approximately 100 workers would be required during the 1-year transition period while the existing HEU materials in storage are transferred to the new HEU Materials Facility.
Source: LMES 2000b.

Site B

Site B for the proposed HEU Materials Facility is located at the Y-12 Scrap Metal Yard. The site is south of Building 9114, west of the westernmost portion of the Y-12 PIDAS fence, and north of Portal 33 and Second Street. Figure 3.2.3–4 shows the location of Site B relative to other buildings at Y-12. Old Bear Creek Road is the western boundary of the proposed Site B.

Site B preparation would involve site design, relocation of existing utilities (e.g., lights, underground water lines, storm sewers, steam lines, etc.), a portion of 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 fence would need to be modified to install a vehicular entry gate for the new facility.

Construction and Operation

Construction

Table 3.2.3–1 lists the construction requirements and estimated waste volumes for the proposed HEU Materials Facility.

Relocation of Utilities and Other Features. A steam line and steam condensate line that serves the Y-12 West End Tank Farm and Building 9114 would be relocated. Numerous overhead electrical lines within the proposed site would have to be removed and a 143.8-kV electrical line along Old Bear Creek Road would be relocated westward from its current location. Numerous communications and computer lines would have to be rerouted. Portions of a sanitary sewer main that serve the west end of Y-12 would be rerouted. A water line that follows the Old Bear Creek Road alignment would also be relocated for the new facility.

Sanitary sewer services would be provided for the new facility by extending a sanitary sewer main from the relocated sewer main along Old Bear Creek Road. Potable water and firewater services for the new facility would be extended from the relocated water line along Old Bear Creek Road.

Electrical services, chilled water lines, security service lines, and computer services that would serve the proposed new facility would be extended from the Y-12 Site. These existing Y-12 services would be rerouted under the existing Y-12 PIDAS just north of Post 33.

The proposed HEU Materials Facility storm sewer system for Site B would include a comprehensive collection system that would tie into the existing Y-12 storm sewer system. Off-site water, which would be coming from the north of the proposed site, would be rerouted around the new HEU Materials Facility on the west side along the relocated Old Bear Creek Road. Storm sewer pipe would be reinforced concrete pipe and would be designed for a 100-year storm event.

FIGURE 3.2.3–4.—*Site B for the Proposed Highly Enriched Uranium Materials Facility.*

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

Traffic Planning, Construction Lay-Down Areas, and Parking. Additional parking areas would not be needed to meet the needs of the operations personnel associated with the new HEU Materials Facility at Site B. Sufficient parking is available at the S-3 Parking Lot. However, temporary parking spaces for construction workers and plant personnel would need to be developed in the west tank area and just south of old Post 17 during construction of the new facility on Site B. Approximately 0.8 ha (2 acres) would be needed for the temporary parking spaces. The temporary parking would be needed because the S-3 Parking Lot would be used as a construction lay-down area for the new facility. Figure 3.2.3–5 shows the Site B construction lay-down area and temporary parking locations. The construction staging area would have electrical power and potable water. Sanitary sewer services would be provided by PVC double-wall collection tanks, which would be pumped out as needed.

Remediate Construction Lay-Down Area. Once the construction of the HEU Materials Facility is complete, the construction office trailers and material lay-down areas would undergo remediation. The potable water lines and the electrical services would be removed. Any office trailers would be removed. The parking lot would then be paved with a 4-cm (1.5-in)-thick asphalt concrete surface. The parking lot spaces would then be relined for employee parking.

Demolition of Existing Structures. Trailers 9983-18, 9983-24, 9983-29, 9983-45, 9983-46, 9983-74, and 9983-99 would have to be removed and relocated or salvaged. Structures 9831, 9720-15, 9814, 9819, 9420, 9420-1, 9627, and 9626 would have to be demolished. The functions that occur within the buildings to be demolished would be relocated to other areas at Y-12.

Site B Environmental Remediation. A portion of the existing Y-12 Scrap Metal Yard would have to be cleared of materials and environmentally stabilized before construction of the new HEU Materials Facility could be started. Approximately 15,290 m^3 (20,000 yd^3) of scrap and an estimated 13,000 m^3 (17,000 yd^3) of contaminated soil (VOCs, metals, and radionucluides) would be removed from the site. Current planning is to dispose of this material in the new Environmental Management Waste Management Facility being constructed in the West Bear Creek Valley area of Y-12.

Operation

The HEU Materials Facility operations would be the same as described earlier. Table 3.2.3–2 lists the operations requirements, number of operation workers, and expected waste generations for the proposed HEU Materials Facility.

3.2.3.3 *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 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. The upgrade expansion of Building 9215 would replace the use of existing storage vaults and facilities located within existing Y-12 buildings as described in Section 3.2.2.1, under the No Action - Planning Basis Operations Alternative for the DP HEU Storage Mission. The Categories I and II HEU materials in storage facilities located in Buildings 9720-5, 9204-2E, 9204-2, 9998, 9206, and 9204-4 would be consolidated in the new Building 9215 storage expansion. A modest amount of in-process storage associated with processing activities in Buildings 9212 and 9215 would continue. All operations associated with HEU storage, including transport and receiving, would be transferred to the new Building 9215 storage expansion.

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

FIGURE 3.2.3–5.—*Highly Enriched Uranium Materials Facility Site B Construction Lay-Down Area and Temporary Parking Lot.*

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 3.2.3–6. This parcel has no major permanent structures and is currently occupied by trailers and temporary facilities. The proposed site is on high ground, not susceptible to flooding or storm water runoff.

The expansion of Building 9215 would allow the automated transfer of material between the storage building expansion and Building 9215, from which the material can be moved internally to Buildings 9212 and 9204-2E. An enclosed transfer system between these major production facilities is envisioned.

The design of the storage building expansion would allow much more efficient utilization of storage space than can be achieved in existing storage buildings. This would be accomplished by layout of the building expansion in repetitive bays specifically sized for optimum storage using modular storage vaults for can storage and 1.2 by 1.2 m (4 by 4 ft) pallets for drum storage. Should future needs for storage increase beyond current projections, the new expansion storage facility could be expanded by adding additional bays. The expansion of Building 9215 for consolidated HEU storage would allow the potential use of existing storage facilities for other Y-12 mission activities or to be declared surplus.

Building 9215 Expansion Site Preparation

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. The proposed site for the expansion is shown in Figure 3.2.3–6. 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 would be modified to support the construction activities and operation of the new expansion.

Construction waste from the storage building expansion would consist of excavated soils and general construction debris. Construction activities would be planned and performed to minimize the quantities of excavated soils needing disposal. Table 3.2.3–3 shows the construction resource requirements, number of construction workers, and estimated waste generation of constructing the Building 9215 expansion storage facility. The expansion of Building 9215 for consolidated storage of HEU would take approximately 4 years to implement.

Building 9215 Expansion Storage Operations

Operations within the proposed storage building expansion would be the same as described earlier under Site A for the proposed new HEU Materials Facility. Storage operations in the Building 9215 storage expansion would replace existing HEU storage operations as described in Section 3.2.2.1. Table 3.2.3–4 shows the annual operations requirements for the Building 9215 expansion storage facility.

FIGURE 3.2.3–6.—*Proposed Building 9215 Expansion Area.*

Source: Tetra Tech, Inc/LMES 2000b.

TABLE 3.2.3–3.—*Building 9215 Expansion Construction Requirements and Estimated Waste Volumes*

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh)	5,000
Concrete m³ (yd³)	7,650 (10,005)
Steel (t)	1,100
Liquid fuel and lube oil L (gal)	265,000 (70,006)
Water L (gal)	5,678,000 (1,499,968)
Land ha (acre)	1 (2.5)
Employment	
Total employment (worker years)	145
Peak employment (workers)	220
Construction period (years)	4
Waste Category	**Volume**
Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Hazardous	
Liquid m^3 (gal)	1.1 (300)
Solid m^3 (yd^3)	15.3 (20)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	14,347 (3,970,000)
Solid m^3 (yd^3)	none
Nonhazardous (Other)	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)[a]	3,058 (4,000)

[a]Construction debris.
Source: LMES 2000b.

TABLE 3.2.3–4.—*Building 9215 Expansion Storage Facility Annual Operation Requirements and Estimated Waste Volumes*

Requirements	Consumption
Electrical energy (MWh)	10,900
Peak electrical demand (MWe)	1.4
Liquid fuel L (gal)	none
Natural gas m³ (yd³)	none
Water L (gal)	720,000 (190,204)
Plant footprint ha (acre)	0.5 (1.2)
Employment (Workers)	49 (100[a])
Waste Category	**Average Annual Volume**
Low-level	
Liquid m^3 (gal)	0.6 (160)
Solid m³ (yd³)	119 (156)
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m³ (yd³)	none
Hazardous	
Liquid m^3 (gal)	2.5 (660)
Solid m³ (yd³)	1.5 (2)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	1269.4 (335,350)
Solid m³ (yd³)	none
Nonhazardous (Other)	
Liquid m^3 (gal)	4.2 (1,100)
Solid m³ (yd³)	178.9 (234)

[a]Approximately 100 workers would be required during the 1-year transition period while the existing HEU materials in storage are transferred to the new HEU Materials Facility.
Source: LMES 2000b.

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.

3.2.4.1 *Alternative 1B (No Action - Planning Basis Operations Alternative)*

Under the No Action - Planning Basis Operations Alternative, the new Special Materials Complex would not be constructed. The Y-12 National Security Complex would continue to use the existing special materials operations facilities (Buildings 9204-2, 9202, 9201-5, 9201-5N, 9731, 9404-11, and 9995) to perform the Special Materials Mission and meet DOE requirements. Appendix A.4 gives a detailed description of these buildings. The existing special materials operations facilities range in age from 27 to more than 50 years old, and the operations contained within them were not designed to meet today's health, safety, natural phenomena, environmental, and security requirements. These facilities therefore rely heavily on administrative controls to provide for the protection of workers, the public, and the environment from the hazards associated with beryllium and other special materials. In addition, some processes have not been operated in several years and would require extensive equipment upgrades and facility refurbishment. Even so, worker health and safety protection would still rely on administrative rather than engineered controls.

3.2.4.2 *Construct New Special Materials Complex*

This section includes a description of the proposed Special Materials Complex, its construction and operation, the candidate sites for the facility, and infrastructure requirements. The Special Materials Complex would replace special materials operations currently performed in Building 9731, 9202, 9201-5, 9201-5N, 9995, 9204-2, and 9404-11, as described in Section 3.2.2.1 under the No Action - Planning Basis Operations Alternative for the DP Special Materials Operations Mission.

Special Materials Complex Description

The proposed Special Materials Complex shown in Figure 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 operation of each is independent of the other operation. Included in the Special Materials Complex would be:

- All beryllium production operations at Y-12
- A facility for purification of special material
- A manufacturing/warehouse facility to produce special materials and provide for storage of raw 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.

The preliminary schedule for the Special Materials Complex project indicates that site preparation could begin as early as FY 2002 with construction complete in the FY 2006 - 2007 timeframe.

Beryllium Facility Description

The Beryllium Facility would be a two-story building constructed from reinforced concrete. Portions of the roof and exterior walls would be designed to resist the wind and missiles generated from a tornado. The first floor slab, beams, and columns would also be reinforced concrete. The ground floor would be a concrete

Source: LMES 2000c.

FIGURE 3.2.4–1.—*Artist's Rendering of Proposed Special Materials Complex.*

slab, and foundations for the concrete columns would be spread footings supported on a well-compacted subgrade. The area of the Beryllium Facility would be approximately 13,378 m^2 (144,000 ft^2). Ventilation zones would be used to contain contamination. The primary (regulated) zone would house the actual process operations, the buffer zone would be for all areas directly surrounding the primary zone, and nonregulated zones would surround the buffer zone. Each zone would have increasing negative air pressure passing from the nonregulated zone inward to the primary zone.

A containment system would be established for the collection and HEPA filtration of ventilation exhaust air from primary enclosures and equipment containing hazardous materials before discharge to the main ventilation exhaust system. Centralized air emission control systems would ensure environmentally acceptable discharges of all ventilation and would include a central discharge stack and a system to permit collection of appropriate air samples.

The major function of the second floor would be to provide space for materials storage, non-toxic support facilities, and for the HVAC and electrical support needed by the equipment on the first floor. This would allow the support equipment to be placed in close proximity to the operations without actually placing it within the regulated buffer areas.

The Beryllium Facility would house all production operations that must be performed in a beryllium control area. The facility would use state-of-the-art engineered controls to eliminate the required use of respirators during normal operations and comply with the new ACGIH limit for suspended beryllium in air of 0.2 Fg/m^3 (125 x 10^{-11} lb/ft^3). In addition to housing all the beryllium production operations at Y-12, the Beryllium Facility would house major support functions involving beryllium. The Beryllium Facility would house the following activities:

- Beryllium blank forming operations
- Beryllium machining
- Beryllium inspection and certification
- Materials and parts storage
- Beryllium analytical laboratory work
- Beryllium air monitoring laboratory analysis
- Laboratory analysis of smears to detect beryllium
- Spray operation for beryllium sprayed parts
- Inspection and certification of parts
- Tooling preparation
- Maintenance
- Prototype development
- Packaging of accepted parts

Because of the toxic nature of beryllium, appropriate measures would be incorporated in the building design to ensure isolation of workers from hazardous materials (e.g., the use of multiple occupancy zones to achieve containment; and the isolation of all people, equipment, and processes not required to be in direct contact with the toxic materials).

The Beryllium Facility would have two main production areas: (1) the blank forming and machining operations, and (2) the plasma spray operations. Equipment and supporting services would be provided to form beryllium powder into blanks. All blank forming operations would be enclosed in gloveboxes to protect workers from exposure to beryllium. Blank forming operations would include removing containers of powder from storage units, weighing and blending the powder, loading it into molds to be pressed, pressing, disassembling the molds, removing the formed blanks, cleaning and certifying blanks, and transferring them to machining.

The machining process would rough and finish grind the formed blanks to the required dimensions using speciality grinding machines. The machining operations would be enclosed in gloveboxes. The machined parts would be cleaned, inspected, and nondestructively tested. Parts that pass inspection and nondestructive testing would be certified. Beryllium part certification would include physical testing, dimensional metrology, and radiography. The certified parts would be packaged and transported to the beryllium shipping area.

All plasma spraying would be performed in inert atmosphere gloveboxes. Plasma spray operations would require a tooling preparation area, dimensional inspection area, and a radiographic inspection area to certify components. The tooling preparation area would include a demineralized water tank, a nickel plating tank, and an acid-cleaning tank. After acceptance, the completed parts would be cleaned and packaged for shipment.

The gloveboxes and any enclosed area within the secondary zone would be equipped with wash-down capability. Any water used for washing down these areas would be collected for filtration and sampling prior to their discharge to the Y-12 sanitary sewer system. The Beryllium Facility would also include a shower and change area for operations workers, and storage area for in-process and completed parts, equipment, and supplies.

A developmental laboratory area would be provided in the Beryllium Facility to support the development of process improvements and to troubleshoot existing beryllium mechanical and chemical processes. An analytical laboratory would also be included to support the Beryllium Worker Protection Program and the material production process.

Special Materials Manufacturing/Warehouse Facility Description

The Special Materials Manufacturing/Warehouse Facility would contain only standard industrial hazards. Although certain special materials production requires isolating workers from the process, it would not pose a risk that would exceed a standard industrial design approach.

The Special Materials Manufacturing/Warehouse Facility would be a rigid-framed, pre-engineered building and would occupy approximately 2,508 m^2 (27,000 ft^2). The roof structure over the production area would range from at least 7.3 to 9.75 m (24 to 32 ft). The exterior walls would be insulated with an interior liner panel. The roof would be sloped from one end to the other and be insulated. The foundation for the building columns would be spread footing supported by a well-compacted subgrade. A portion of the production processing area would be contained in a separate room constructed to maintain the required environmental control. This room would be masonry construction.

The Special Materials Manufacturing Facility would produce rough pressed parts that would be transferred to a separate building for machining and inspection. Gloveboxes would contain some special materials processing operations and would be supplied when required. Workers in the Special Materials Manufacturing Facility would use the Core Support Facility change houses.

The Facility would also have warehouse space to serve all the Special Materials Complex. The warehouse would house raw materials for special materials production and nontoxic materials that may be needed for the Beryllium Facility. Flammable solvents would not be stored in this warehouse.

Purification Facility Description

The Purification Facility would replace a production process to purify a special material that has deteriorated since the end of the Cold War. Currently, only a development-scale facility and capability for this special

material exists at Y-12. This development facility will not meet the level of production projected to support the enduring stockpile.

The Purification Facility would be a single-story, high-bay building with a partial second-level mezzanine. The Purification Facility would be approximately 929 m² (10,000 ft²) in area. The purification process uses the flammable liquid acetonitrile (ACN). As a result, facility design would be required to meet appropriate safety requirements involved with handling ACN. It would have an adjoining tank farm to store the ACN, which would have a concrete pad and roof but no exterior walls. The Purification Facility would be constructed from structural steel framing with metal roof deck and siding. The mezzanine would be steel plate supported on structural steel framing (beams and columns). The roof and wall panels would be backed with insulation and interior metal liner panels. One of the exterior walls would be constructed to relieve internal pressure. The foundation for the columns would be spread footings supported on a well-compacted subgrade. Sealed concrete curbing would contain any liquids spilled in the exterior tank farm.

Purification operations would include the following: (1) dissolution, filtration, and recrystallization (2) powder processing in a nitrogen atmosphere; and (3) drying. Because ACN would be present in substantial quantities, the purification operation would be designed with high-hazard electrical components and operations would be performed in a closed system consisting of tanks, process piping, gloveboxes, and suitable storage containers. An inert cover gas would be used in the system, in conjunction with an ACN vapor recovery system. Portions of both the main level and the mezzanine would be enclosed in a room that would contain gloveboxes and other equipment for handling the solvent ACN. All fixtures in these rooms would be explosion proof. An enclosed control room would have egress paths that do not transverse the rest of the purification operating area. The wall between the building and the covered, outdoor area would be designed to withstand an explosion in the tank farm. The main design consideration of this wall would be the protection of workers in the facility from an accidental detonation of solvent. An area for unloading and loading ACN drums would be included in the Purification Facility design.

Press Facility Description

The Press Facility would contain one 0.84-m (33-in) diameter isostatic press that would be used in the blank forming operations for special materials. The press could also be used by future lithium operations. Because of the large amount of stored mechanical energy in the press vessel during operation, the facility would have a wall capable of absorbing any inadvertent release of energy, directing it toward a metal panel wall away from the remainder of the Special Material Complex.

The isostatic press area would house the pressure vessel, the low-pressure mineral oil supply system, the high-pressure mineral oil supply system, a heated mineral oil supply system, press control console, material handling equipment, and parts staging area, and would provide a barricade to protect operating personnel in the event of a failure of the pressure vessel. The current design of the operating and support areas of the Press Facility divides it into three vertical levels. The Press Facility would occupy approximately 836 m² (9,000 ft²) and would be constructed of structural steel and reinforced concrete. The foundation for the structural columns would have spread footings supported on a well-compacted subgrade.

Core Support Facility Description

A Core Support Facility, approximately 1,728 m² (18,600 ft²) in total area, would support the beryllium, purification, and special materials processes to be located in the Special Materials Complex.

The Core Support Facility would be a 7.3-m (24-ft) two-story building of typical industrial construction, with masonry walls and a steel structural frame. Some of the interior partitions in the administration area would be gypsum board on metal studs. The facility is intended to house as many services for the production facilities of the Special Materials Complex as possible, including a common administration area, support and

engineering offices, a lunchroom, a maintenance shop, and a central loading dock and some utilities. It would also include change houses to serve all Special Materials Complex workers, except for the beryllium workers who would have a separate change house in the Beryllium Facility.

On-Site Facilities Description

Several additional on-site facilities would also be part of the Special Materials Complex, such as a chiller building, standby diesel generator building, fire protection pump house, and ozonation building. All of these would be unoccupied, remote, stand-alone buildings.

Special Materials Complex Construction

The current Special Materials Complex design calls for a number of separate operations and support facilities with varying design features (see Figure 3.2.4–1). The new Beryllium Facility would be a two-story building constructed from reinforced concrete. The roof and exterior walls would be reinforced concrete and portions would be designed to resist the wind and missiles generated from a tornado. The first floor slab, beams, and columns would also be reinforced concrete. The ground floor would be a concrete slab, and foundations for the concrete columns would be spread footings supported on a well-compacted subgrade.

The Special Materials Manufacturing/Warehouse Facility would be a rigid-framed, pre-engineered building. The foundation for the new facility would be spread footing supported by a well-compacted subgrade.

The Purification Facility would be a single-story, high-bay building constructed from structural steel framing with metal roof deck and siding. One of the exterior walls would be constructed to relieve internal pressure. The foundation for the structure columns would be spread footings supported on a well-compacted subgrade. The Purification Facility would have an adjoining tank farm that would have a concrete pad and roof but no exterior walls.

The Isostatic Press Facility would be a three-level building constructed from structural steel and reinforced concrete. The foundation for the structural columns would be spread footings supported on a well-compacted subgrade.

Conventional construction techniques would be used to build the Special Materials Complex. TDEC would be included on all permitting and inspections during construction. Construction activities would be performed in a manner that assures protection of the environment during the construction phase. Construction techniques would be used to minimize the generation of construction debris that would require disposal. Disposal of construction debris would be made in accordance with waste management requirements in properly permitted disposal facilities. The extent and exact nature of such activities as site clearing, infrastructure improvements, and support facility construction required would depend on the candidate site considered for the Special Materials Complex. Throughout the construction process storm-water management techniques, such as silt fences and runoff diversion ditches, would be used to prevent erosion and potential water pollutants from being washed from the construction site during rainfall events.

As conceptually designed, about 4 to 8 ha (10 to 20 acres) of land would be required for the Special Materials Complex. Additional land area may be required to accommodate parking, access roads, and support structures (e.g., security infrastructure requirements). The actual amount of land required depends on the selected site. During construction, about 0.8 ha (2 acres) of land would be required for a construction lay-down area. The lay-down area would be located within or near the location designated for the facility.

Following construction, the lay-down area would be restored to its pre-construction condition or incorporated into the landscape or infrastructure support design of the site.

Special Materials Complex Operation

The following discussion outlines the different operations in the proposed new Special Materials Complex. The new operations would replace existing Special Materials Operations Mission activities described in Section 3.2.2.1. Appropriate procedures to implement specific operations would be developed after the final design of each facility within the Special Materials Complex is approved.

Beryllium Operations. The Beryllium Facility would have two main production areas: (1) the blank forming and machining operations, and (2) the plasma spray operations. Equipment and supporting services would be provided to form beryllium blanks. All blank forming operations would be enclosed in gloveboxes to protect workers from exposure to beryllium. Blank forming operations would include removing containers of powder from storage units, weighing and blending the powder, loading it into molds to be pressed, pressing, disassembling the molds, removing the formed blanks, cleaning and certifying blanks, and transferring them to machining.

The machining process would rough and finish grind the formed blanks to the required dimensions using speciality grinding machines. The machined parts would be cleaned, inspected, and nondestructively tested. Parts that pass inspection and nondestructive testing would be certified. Beryllium part certification would include physical testing, dimensional metrology, and radiography. The certified parts would be packaged and transported to the beryllium shipping area.

All plasma spraying would be performed in inert atmosphere gloveboxes. Plasma spray operations would require a tooling preparation area, dimensional inspection area, and a radiographic inspection area to certify components. The tooling preparation area would include a demineralized water tank, a nickel plating tank, and an acid-cleaning tank. After acceptance, the completed parts would be cleaned and packaged for shipment.

Special Materials Manufacturing Operations. The manufacturing process produces pressed plastic parts. The blank-forming production process includes hot forming plastic materials into rough forms through a two-step pressing operation. The finished blanks are then x-rayed and visually inspected. Additional equipment used to produce O-rings includes a rolling mill, an oven with vacuum pipes, an extruder, a cutting table, and an O-ring press.

Purification Operations. Purification operations include the following: (1) dissolution, filtration, and recrystallization; (2) powder processing in a nitrogen atmosphere; and (3) drying. Because ACN would be present in substantial quantities, the purification operation would be designated a high-hazard facility for design of electrical components, and operations would be performed in a closed system consisting of tanks, process piping, gloveboxes, and suitable storage containers. An inert cover gas would be used in the system, in conjunction with an ACN vapor recovery system.

Isostatic Press Operations. Parts to be pressed are received in the staging area and placed in thick, flexible PVC containers referred to as bladders. The bladders are attached to a handling fixture that permits multiple bladders to be loaded into the press. The load is then lowered into the pressure vessel and the press closed. The air inside the vessel is displaced with mineral oil under low pressure and then the vessel is subjected to high pressure. When the pressure cycle is completed, the bladders are removed using the handling fixture. The pressed blanks are then removed from the bladders, packaged, and returned to the appropriate Special Materials Complex processing area.

Special Materials Complex Candidate Sites

Site 1

Site 1 for the proposed Special Materials Complex is approximately 16 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 EFPC 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 PIDAS. Figure 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), extension of utilities to the new facilities, and possibly relocation of the west meteorological tower.

Construction and Operation

Construction

Relocation of Utilities and Other Features. The Site 1 area would be cleared of vegetation and electrical utilities that would interfere with construction of the Special Materials Complex. The 161-kV power line that traverses the site would be rerouted around the construction area along with underground telephone lines. An existing sanitary sewer line would be replaced and upgraded to accommodate the proposed new Special Materials Complex facilities.

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

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

The Special Materials Complex storm sewer system would include a comprehensive collection system that would tie into the existing Y-12 sewer system. Storm sewer pipe would be reinforced concrete and would be designed to collect a 100-year storm event. Pipe sizes, number of catch basins, locations, etc., would be a consideration of the design of the storm sewer system along Bear Creek Road.

Traffic Planning, Parking, and Construction Lay-Down Areas. The construction of the Special Materials Complex at Site 1 would not require the rerouting of Bear Creek Road. Sufficient parking space is available at the S-3 and Building 9114 parking lots to accommodate construction workers and operations workers when the project is completed. The construction staging area for the Special Materials Complex is shown in Figure 3.2.4–3. The 0.8-ha (2-acre) lay-down area would be sufficiently graded and developed to accommodate a number of temporary construction trailers, small storage buildings, and materials storage yards. The staging area would have electric power and potable water. Sanitary service would be provided by PVC double-wall collection tanks, which would be pumped out as needed.

Utility Extensions. The potable water lines, electrical service, security systems, and telephone systems would be extended from the existing Y-12 production area to Site 1. When completed, the new Special Materials Complex would have no overhead utilities.

Remediate Construction Lay-Down Area. Once construction of the Special Materials Complex is complete, the construction office trailers would be removed and the material staging areas would be re-graded and incorporated into the landscape design of the Special Materials Complex. Although not anticipated, soils contaminated by construction-related materials such as diesel fuel would be removed and disposed in accordance with Y-12 waste management plans.

Site Preparation and Facility Construction. Table 3.2.4–1 lists the construction resource requirements, number of construction workers, and estimated waste generation to construct the proposed Special Materials Complex at Site 1. Site preparation would follow the advanced work and would include any excavation, filling, and grading needed to meet design requirements for on-grade, reinforced concrete and pre-engineered structures. Historical research of the site indicated that two areas within the site have received non-engineered fill and some unknown amount of construction debris from a past project within Y-12. The non-engineered fill/construction debris areas are not expected to be contaminated. Detailed testing would be conducted to fully characterize site geology, hydrology, and soil compaction, as well as sample for potential contamination before construction.

On Site 1, the Special Materials Complex major facilities would consist of a Beryllium Facility, a Manufacturing/Warehouse Facility, a Purification Facility, an Isostatic Press Facility, and a Core Support Facility. A detailed description of these facilities was presented earlier. A brief summary of the structural aspects of the facility is provided here.

The Beryllium Facility would be a two-story building constructed from reinforced concrete. The roof, exterior walls, first floor slab, beams, and columns would be reinforced concrete. The ground floor of the building would be a concrete slab, and foundation for the concrete columns would be spread footings supported on well-compacted subgrade. The Manufacturing/Warehouse Facility would be a rigid-framed, pre-engineered building. The roof structure over the manufacturing area would range from 7.3 to 9.75 m (24 to 32 ft). The foundation of the building columns would be spread footing supported by a well-compacted subgrade.

FIGURE 3.2.4–3.—*Special Materials Complex Construction Lay-Down Areas.*

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

TABLE 3.2.4–1.—*Special Materials Complex Construction Requirements and Estimated Waste Volumes for Site 1*

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh)	8,000
Concrete m^3(yd^3)	13,800 (18,050)
Steel (t)	3,000
Liquid fuel and lube oil L (gal)	984,200 (259,998)
Industrial gases m^3 (yd^3)	5,700 (7,455)
Water L (gal)	5,700,000 (150,578)
Land ha (acre)	8 (19.8)
Employment	
Total employment (worker years)	125
Peak employment (workers)	210
Construction Period (years)	3.5
Waste Category	**Volume**
Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Hazardous	
Liquid m^3 (gal)	11.4 (3,000)
Solid m^3 (yd^3)	107 (140)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	1448 (382,400)
Solid m^3 (yd^3)	none
Nonhazardous	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	917.4 (1200)

Source: LMES 2000c.

The Purification Facility would be a single-story, high bay building with a partial second-level mezzanine. The building would be constructed from structural steel framing with metal roof deck and siding. The mezzanine would be steel plate supported on structural steel framing (beams and columns). The foundation for the columns would be spread footings supported on a well-compacted subgrade. An adjoining tank farm to the facility would have a concrete pad and roof but no exterior walls. Concrete curbing would be constructed around the tank farm to contain any liquids.

The Isostatic Press Facility would be a three-level structure constructed from structural steel framing and concrete. The foundation for the building columns would be spread footings supported on a well-compacted subgrade.

The Core Support Facility would be a two-story building of typical industrial construction with masonry walls and a steel structural frame. The ground floor would be a concrete slab, and foundation for the building columns would be spread footings supported on a well-compacted subgrade.

All of the Special Materials Complex facilities would be designed to meet the requirements of the Standard Building Code. In addition, the design for the natural phenomena hazards (earthquake, tornadic winds, floods, and lightning) would be in accordance with DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*.

Operation

The Special Materials Complex operations would be the same as described earlier in this section. Table 3.2.4–2 lists the operation resource requirements, number of operation workers, and estimated waste generation for the proposed new Special Materials Complex.

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 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, etc.), two structures, and a portion of the Y-12 Scrap Metal Yard. The existing Y-12 PIDAS would not be affected since Site 2 is entirely within the PIDAS. However, a security fence would be erected to isolate the work site during construction.

Construction and Operation

Construction

Relocation of Utilities and Other Features. An abandoned above-ground acid pipeline that traverses Site 2 would be demolished. Numerous overhead electrical lines within the proposed site would have to be removed, and communications and computer lines would have to be rerouted. Portions of a sanitary sewer main that serve the west end of Y-12 would be rerouted. Sanitary sewer services would be provided for the new facilities by connecting to an existing sanitary sewer main in the area. Potable water and firewater service already exist at the site and would be connected to the new facilities. The storm sewer system at Site 2 would include a comprehensive collection system that would tie into the existing Y-12 storm sewer system. Off-site stormwater, which would be from the north of the proposed site, would be rerouted around the new Special Materials Complex. Storm sewer pipe would be reinforced concrete pipe and would be designed for a 100-year storm event.

TABLE 3.2.4–2.—*Special Materials Complex Annual Operation Requirements and Estimated Waste Volumes for Sites 1, 2, and 3*

Requirements	Consumption
Electrical energy (MWh)	30,400
Peak electrical demand (MWe)	5.5
Steam kg (lb)	28,600,000 (63,000,000)
Demineralized water L (gal)	2,000,000 (520,000)
Industrial Gas	
Liquid nitrogen L (gal)	4,550 (1,202)
Mixed gas m^3 (scf)	374 (13,200)
Helium m^3 (scf)	14,725 (520,000)
Oxygen m^3 (scf)	396 (14,000)
Nitrogen gas m^3 (scf)	1,500,800 (53,000,000)
Natural gas (m^3)	none
Water L (gal)	8.3×10^7 (2.2×10^7)
Plant footprint ha (acre)	4 (9.9)
Employment (workers)	36
Waste Category	**Average Annual Volume**
Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	0.8 (1)
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Hazardous	
Liquid m^3 (gal)	12.5 (3,302)
Solid m^3 (yd^3)	9.2 (12)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	932.7 (246,400)
Solid m^3 (yd^3)	none
Nonhazardous (other)	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	175.1 (229)

Source: LMES 2000c.

Electrical service, chilled water lines, security service lines, and computer services would tie into the existing services in the proposed Site 2 area.

Traffic Planning, Parking, and Construction Lay-Down Areas. Bear Creek Road alignment would not be affected by construction of the Special Materials Complex at Site 2. Additional parking areas would not be needed to meet the needs of the operations personnel associated with the new Special Materials Complex. Sufficient parking is available at the S-3 Parking Lot. However, temporary parking spaces for construction workers would need to be developed in the west tank area and just south of old Post 17 during construction of the new facility at Site 2 (see Figure 3.2.4–3). The temporary parking area would require approximately 0.8-ha (2-acres). The temporary parking would be needed because the S-3 Parking Lot would be used as a construction lay-down area for the new facility. The construction staging area would have electrical power and potable water. Sanitary sewer services would be provided by PVC double-wall collection tanks, which would be pumped out as needed.

Remediate Construction Lay-Down Area. Once the construction of the Special Materials Complex is complete, the construction office trailers and material lay-down areas would undergo remediation. The potable water lines and the electrical services would be removed. Any construction office trailers would be removed. The parking lot would then be paved with a 4-cm (1.5-in)-thick asphalt concrete surface. The parking lot spaces would then be relined for employee parking.

Site 2 Environmental Remediation. A portion of the existing Y-12 Scrap Metal Yard would have to be cleared of materials and environmentally stabilized before construction of the new Special Materials Complex could be started. Approximately 15,290 m^3 (20,000 yd^3) of scrap and an estimated 46,867 m^3 (61,300 yd^3) of contaminated soil (VOCs, metals, and radionuclides) would be removed from the site. Current planning is to dispose of this material in the new Environmental Management Waste Management Facility being constructed in the West Bear Creek Valley area of Y-12.

Site Preparation and Facility Construction. Table 3.2.4–3 lists the construction resource requirements, number of construction workers, and estimated waste generation to construct the proposed Special Materials Complex at Site 2. Site preparation would follow the advanced work described above and would include any excavation, filling, and grading needed to meet design requirements for on-grade, reinforced concrete and pre-engineered structures. As discussed above, Site 2 would have to be environmentally stabilized prior to facility construction. Detailed testing would be conducted to fully characterize site geology, hydrology, and soil compaction, as well as sample for legacy contamination before construction. The description of facility construction discussed previously in this section under Site 1 would be the same for Site 2.

Operation

The Special Materials Complex operations at Site 2 would be the same as described earlier in this section.

Site 3

Site 3 for the Special Materials Complex (see Figure 3.2.4–2) is the same site as Site B for the proposed HEU Materials Facility (see Figure 3.2.3–4) described in Section 3.2.3.2. (Note: Site A for the HEU Materials Facility was not considered for the Special Materials Complex based on siting evaluation criteria which considered the need to modify the PIDAS. This criteria, among others, ranked Site A for the HEU Materials Facility above the Special Materials Complex.) The discussion of construction activities associated with the HEU Materials Facility in Section 3.2.3.2 would also apply to the construction of the proposed Special Materials Complex at Site 3. Table 3.2.4–4 lists the construction resource requirements, number of construction workers, and estimated waste generation of constructing the Special Materials Complex at Site 3. The PIDAS would not be extended around the Special Materials Complex.

Operation

The Special Materials Complex operations at Site 3 would be the same as described earlier in this section.

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 (Alternative 2A) and construction and operation of a New Special Materials Complex at one of three proposed sites (Alternative 3).

TABLE 3.2.4–3.—*Special Materials Complex Construction Requirements and Estimated Waste Volumes for Site 2*

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh)	8,000
Concrete m^3 (yd^3)	14,500 (18,965)
Steel (t)	3,200
Liquid fuel and lube oil L (gal)	1,583,000 (418,000)
Industrial gases m^3 (yd^3)	5,700 (7,455)
Water L (gal)	5,700,000 (1,505,781)
Land ha (acre)	5 (12.3)
Employment	
Total employment (worker years)	137
Peak employment (workers)	210
Construction period (years)	3.5
Waste Category	**Volume**
Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	none
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	46,867[a] (61,300)
Hazardous	
Liquid m^3 (gal)	11.4 (3,000)
Solid m^3 (yd^3)	107 (140)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	1,448 (382,400)
Solid m^3 (yd^3)	none
Nonhazardous (other)	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	3,420 (4,470)

[a] Excavated contaminated soil to a depth of 3 ft.
Source: LMES 2000c.

TABLE 3.2.4–4.—*Special Materials Complex Construction Requirements and Estimated Waste Volumes for Site 3*

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh)	8,000
Concrete m^3 (yd^3)	14,500 (18,965)
Steel (t)	3,200
Liquid fuel and lube oil L (gal)	1,582,300 (418,000)
Industrial gases m^3 (yd^3)	5,700 (7,455)
Water L (gal)	5,700,000 (1,505,781)
Land ha (acre)	5 (12.3)
Employment	
Total employment (worker years)	137
Peak employment (workers)	210
Construction period (years)	3.5
Waste Category	**Volume**
Low-level	
Liquid m^3 (gal)	none
Solid m^3(yd^3)	none
Mixed Low-level	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	22,707[a] (29,700)
Hazardous	
Liquid m^3 (gal)	11.4 (3,000)
Solid m^3 (yd^3)	107 (140)
Nonhazardous (Sanitary)	
Liquid m^3 (gal)	1,448 (382,400)
Solid m^3 (yd^3)	none
Nonhazardous (other)	
Liquid m^3 (gal)	none
Solid m^3 (yd^3)	3,440 (4,500)

[a]Excavated contaminated soil to a depth of 3 ft.
Source: LMES 2000c.

3.3 POTENTIAL FUTURE Y-12 MODERNIZATION PROJECTS

While the proposed HEU Materials Facility and Special Materials Complex have progressed to the conceptual design level, other facilities considered for Y-12 modernization are still in the early planning phase and do not have conceptual design data to analyze at this time.

This section addresses several potential future facilities that may be considered as part of the integrated modernization efforts. These potential new facilities are summarized in Table 3.3–1 along with the existing facilities that are currently used to perform the functions addressed by potential new facilities. None of the potential future modernization projects listed in Table 3.3–1 is included in the No Action - Planning Basis Operations Alternative or the action alternatives for the Y-12 HEU Storage Mission or Special Materials Mission.

Siting

Space requirements for potential modernization projects were determined and four major areas at Y-12 have been identified as possible candidate site areas. Additionally, a greenfield option was considered. The site areas were labeled A - E. Sites A - D are shown in Figure 3.3–1 and described in the information that follows. As shown in Figure 3.3–1, there is some overlap in boundaries for the candidate site areas.

Site A is a 27-ha (67-acre) site area located primarily outside Y-12's PIDAS security area and encompasses uncontaminated parking lots containing approximately 2,100 parking spaces. Site A includes a site area (see Figure 3.2.2–2) for the proposed HEU Materials Facility. This site area possibly represents the most physically unconstrained of the available candidate sites.

Site B is a 32-ha (79-acre) site area located in Y-12's extreme western end. Current uses of the site area include construction services, non-SNM storage, and a scrap yard for contaminated metal. Use of this site would require demolition of approximately 13,935 m² (150,000 ft²) of existing low-value floor space and the provision of replacement space for functions displaced. Remediation of the contaminated metal scrap yard would be required. Site B includes a potential site area for the proposed HEU Materials Facility or the Special Materials Complex (see Figure 3.2.2–4 and 3.2.3–2). The scrap yard is currently scheduled to be cleaned to industrial standards by the end of FY 2005 by the EM program, assuming funding is in place.

Site C is 26 ha (65 acres) in area and is wholly contained in the Y-12 PIDAS. This area contains three major Y-12 production buildings currently planned for D&D within the next 5-10 years. Building 9201-4, approximately 52,210 m² (562,000 ft²) and currently owned by the EM Program, is planned for future warehouse use after D&D. This building is heavily contaminated with mercury. Buildings 9201-5 and 9204-4, 49,240 m² (530,000 ft²) and 28,520 m² (307,000 ft²), respectively, are still owned by DP but are planned for D&D within the next 10 years. Use of the Site C area would necessitate either demolition of or upgrades to these structures.

The Site D area is approximately 28 ha (69 acres) and lies outside the PIDAS area in the Property Protection Area of Y-12. Much of the space in the Site D area is 1940s era construction and primarily houses Y-12's administrative and support functions. Examples of functions within the Site D area include DOE and BWXT Y-12 Management, Engineering, the main Y-12 Cafeteria, Protective Services Organization, and Medical Services. Most of the site area is uncontaminated.

TABLE 3.3–1.—*Summary of Potential Future Y-SIM Facilities* [Page 1 of 2]

New Y-SIM Facilities	Scope	Existing Facilities Currently Used to Perform Function
Enriched Uranium Manufacturing Facility	Contains metal processing, chemical recovery operations, and support functions required for the production of enriched uranium components. Specialized metallurgical and chemical operations, include casting, rolling, forming, machining, chemical recovery, and conversion of salvage and scrap to uranium compounds and metal.	9212, 9215, 9980, 9981, 9204-2E, 9998, 9995, 9818, 9815, 9812, 9723-25, 9999
Assembly/Disassembly/ Quality Evaluation Facility	Contains the assembly, disassembly, and quality evaluation functions for the stockpile management program.	9204-2E, 9204-2, 9204-4
Depleted Uranium Operations Facility	Depleted uranium operations could potentially be performed in a combination of new and upgraded facilities. A new facility would contain the metallurgical operations and support functions required for the production of depleted uranium components. Specialized metallurgical operations would include casting, rolling, and forming of cast and wrought depleted uranium and wrought uranium-niobium alloys. Existing machine shops in Buildings 9201-5W and 9201-5N could be upgraded to provide machining capability.	9215, 9204-4, 9998, 9201-5, 9201-5N, 9201-5W
Lithium Operations Complex	Would contain the chemical processes, fabrication operations, and support functions associated with the production of LiH and LiD components. Specialized operations include LiCl power production, Li metal production, salt production, forming, machining, inspection, and chemical recovery of lithium compounds from retired and rejected components. Ancillary facilities include deuterium production and tank farms for holding process chemicals.	9204-2, 9805-1, 9404-9, 9720
Administrative/ Technical Facilities	These facilities would provide space for LMES and DOE infrastructure and support functions including administrative and technical offices, records storage, cafeteria, medical, photography, reproduction, and other functions.	9710-2, 9706-2, 9739, 9734, 9733-1, -2, -3, 9704-2, 9766

TABLE 3.3–1.—*Summary of Potential Future Y-SIM Facilities* [Page 2 of 2]

New Y-SIM Facilities	Scope	Existing Facilities Currently Used to Perform Function
Development/Product Certification/Analytical Chemistry	Consideration would be given to a combination of new and existing facilities to house the R&D function as well as centralized facilities needed for Product Certification and Analytical Chemistry laboratories.	9202, 9203, 9731, 9102-2, 9203A, 9205, 9625, 9720-34, 9824-4, 9723-24, 9995
Production Support Facility	Would provide general manufacturing support including can manufacturing, graphite machining, and other general fabrication support.	9201-1, 9215
Non-SNM Strategic Materials Storage Facility	New and existing facilities would be considered for storage of non-SNM materials and other strategic assets.	9720-33, Drum Yard, 81-22, 9204-2, 9204-4, 9998, 9201-5, 9720-46, 9720-38, 9720-14, 9720-1, 9720-18, 9720-26
Other facilities (To be determined)	A number of other facilities are also under evaluation including maintenance facilities, fire hall, emergency management, and others.	Specific facilities have not yet been determined
Utilities	Utilities and other services would be evaluated for needed upgrades and/or replacement of generating equipment, controls, and distribution systems.	Includes steam and condensate, raw and treated water, sanitary sewer, electrical power, natural and industrial gases, plant and instrument air, and telecommunications systems facilities.

Note: Li - lithium, LiCl - lithium chloride; LiD - lithium deuteride; LiH - lithium hydride.
Source: LMES 1999c.

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

FIGURE 3.3–1.—*Potential Candidate Siting Areas for New Modernization Facilities at Y-12.*

Site E is a generic greenfield site area located in concept on Y-12's Area of Responsibility. A greenfield site represents the ideal choice for maximizing the efficient layout of manufacturing facilities; however, extended construction schedules, the need to provide new infrastructure, and the prospect of possible future contamination of an existing "green" site are major constraints on this candidate site area.

Site screening and evaluation would be performed for each potential future modernization project, and alternative sites analyzed under appropriate NEPA reviews when proposals to construct these facilities are submitted.

3.4 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 (DOE 1996e) and the S&D PEIS (DOE/EIS-0229, DOE 1996h). 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 National Security Complex. Accordingly, to shut down or further reduce Y-12 missions within the timeframe of the SWEIS (i.e., next 5-10 years) would be highly unlikely and an unreasonable alternative.

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

The long-term planning for Y-12 is being addressed in the Modernization Program; however, this program spans 30 years or more and includes many potential production, support, and infrastructure projects (see Section 3.3). The new smaller and more modern Y-12 envisioned by the Modernization 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 National Security Complex would be highly unlikely, financially remote, and unsupported by design information and data for analysis to be considered a reasonable alternative at this time.

Upgrade Existing Facilities for Special Materials Missions. DOE considered the feasibility of renovating existing facilities needed to meet Special Materials Operations requirements as part of the Modernization 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.

3.5 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. Its purpose is to present the impacts of the alternatives in comparative form.

Table 3.5–1 (located at the end of this section) presents the comparison summary of the environmental impacts for construction and operation associated with the No Action - Status Quo Alternative, the 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 3.5–1 as a benchmark for comparison of the impacts associated with the No Action - Planning Basis Operations Alternative and other alternatives that reflect full Y-12 DP mission operations at required levels, and specific 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.

3.5.1 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 (12 acres) (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 (138 acres) 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 location). Site 2 and Site 3 locations for the proposed Special Materials Complex would disturb approximately 5 ha (12.4 acres). 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) (Site 1) 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 (35-62 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 (10 acres) 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 a potential permanent land requirements of up to 33 ha (82 acres) for operations. The Upgrade Expansion of Building 9215 plus the 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 (10 acres) 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.

3.5.2 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 add 165 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. Appropriate traffic control and coordination measures would be implemented during construction activities to minimize Field Research Center worker access impacts to the NABIR program activities at Y-12.

Construction-related traffic for the Special Materials Mission Alternative would add 157 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. Appropriate traffic control and coordination measures would be implemented during construction activities to minimize Field Research Center worker access impacts to the NABIR program activities at Y-12.

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. Appropriate measures would be implemented to minimize research worker access impacts to Field Research Center activities by any new Y-12 facility security requirement. There would be a one-time relocation of stored HEU to the new facility (HEU Materials Facility or 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. Appropriate measures would be implemented to minimize research worker access impacts to Field Research Center activities by any new Y-12 facility security requirement.

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.

3.5.3 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 Alternative 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 negligible impact on the socioecomonics 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 peak period 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 peak period 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 the 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 - Planning Basis Operations Alternative Y-12 workforce and no impacts to ROI employment, income, or population.

3.5.4 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 area 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 or soils. Appropriate facility site design and engineered control measures (e.g., detention basins) would be used to minimize soil erosion impacts.

3.5.5 Water Resources

Construction

Surface Hydrology. Under the No Action - Planning Basis Operations Alternative, surface water usage at the Y-12 National Security Complex 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 Y-12.

The Environmental Management Waste Management Facility activities in eastern Bear Creek Valley 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 existing 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, LMER 1999c) 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 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 Y-12. During construction, stormwater control and erosion control measures would be implemented to minimize soil erosion and transport to UEFPC. Contaminated wastewater would be collected and disposed of in accordance with applicable regulations. 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 Y-12. During construction, stormwater control and erosion control measures would be implemented to minimize soil erosion and transport to surface water (UEFPC). Contaminated wastewater would be collected and disposed of in accordance with applicable regulations. 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 Y-12. 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. Appropriate construction techniques would be implemented to minimize the seepage of groundwater into excavation sites. Therefore, dewatering is expected to be minimal and a short-term activity. No impact on groundwater (direction or flow rate) in the NABIR project area would be expected from constructing the HEU Materials Facility at Site A or B. 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 Y-12. Some groundwater may be extracted during construction activities to remove water from excavations. Appropriate construction techniques would be implemented to minimize the seepage of groundwater into excavation sites. Therefore, dewatering is expected to be minimal and a short-term activity. No impact on groundwater (direction or flow rate) in the NABIR project area would be expected from constructing the Special Materials Complex at Site 1, 2, or 3. 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. No impact on groundwater (direction or flow rate) in the NABIR project area would be expected from constructing the HEU Materials Facility or the Special Materials Complex at any of the candidate sites. 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 Y-12 would increase from the No Action - Status Quo Alternative (15.9 MLD [4.2 MGD] to 20.2 MLD [5.3 MGD]). This would represent a 27 percent increase in treated 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 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 water usage of approximately 5,822 MLY (1,538 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 5,822 MLY (1,500 MGY) water use under the 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 the No Action - Status Quo Alternative Y-12 Site water usage of 5,822 MLY (1,538 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 Alternative plus the Special Materials Complex would increase water use requirements by approximately 197 MLY (52 MGY) from the 5,822 MLY (1,538 MGY) water use under the 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 Alternative 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 5,822 MLY (1,538 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 (7,570 [2,000 gal]) a year for research purposes. All process, utility, and sanitary wastewater would be treated prior to discharge into EFPC in accordance with NPDES 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 EFPC in accordance with the existing NPDES 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 EFPC in accordance with the existing NPDES permits.

Under Alternative 4 (the No Action - Planning Basis Operations Alternative 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 NPDES permits.

3.5.6 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, and forest habitat. Additionally, construction of the Environmental Management Waste Management Facility would require rerouting of 330 m (1,000 ft) of tributary 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. Impacts would be mitigated as part of a wetland mitigation plan for all CERCLA activities in Bear Creek Valley. Potential threatened/endangered species affected by construction activities include the Tennessee endangered pink lady slipper and Tennessee threatened tuberculed rein-orchid and carolina quillwort. There would be only 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 (1 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, 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.

3.5.7 Air Quality

Construction. Under the No Action - Planning Basis Operations Alternative, 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} National Ambient Air Quality Standards (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, reduced 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. 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 maximally exposed individual (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 conservatively estimated dose to the MEI (1,120 m [3,675 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 4.5 person-rem/yr (under the No Action - Status Quo Alternative) to 33.7 person-rem/yr. Statistically, this equates to 2.25×10^{-6} latent cancer fatality (LCF) 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 mrem 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 1.16 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 0.46 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 Y-12 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 1.16 person-rem to 0.49 person-rem if the HEU Materials Facility were 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 conservatively estimated 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 No Action - Status Quo Alternative dose to the MEI and population of 0.53 mrem/yr and 4.5 person-rem, respectively. The increase is due to the Y-12 National Security Complex operating at planned and required workload levels under Alternative 1B (No Action - Planning Basis Operations Alternative).

3.5.8 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 the proposed new facilities and the existing 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 the proposed new facilities and the existing 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.

3.5.9 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 facilities commutative noise impacts to Y-12 employees population would be the 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 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.

3.5.10 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 208,000 MWh/yr to 566,000 MWh/yr and water use would increase by 4.3 MLD (1.1 MGD) to 20.2 MLD (5.3 MGD) due to restart of remaining operations that were halted by the 1994 stand-down.

Operation of the HEU Materials Facility would require approximately 5,900 MWh/yr of electricity and 1,510 L/day (400 gal/day) of water. Operation of the Upgrade Expansion of Building 9215 would require approximately 10,900 MWh/year and 1,975 L/day (520 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, the preferred alternative (new HEU Materials Facility) would require a total of 572,000 MWh/yr of electricity and 20.2 MLD (5.3 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 20.4 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 Alternative would require an increase in electrical usage to 602,000 MWh/yr and an increase of water usage to 20.4 MLD (5.4 MGD).

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

3.5.11 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 National Security Complex 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 has 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.

3.5.12 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^3 (5,000 yd^3) 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^3 (29,700 yd^3) 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^3 (4,000 yd^3) of nonhazardous construction debris and 14.8 million L (3.9 million gal) of nonhazardous sanitary waste. Small amounts of hazardous waste (e.g., used oil and diesel contaminated soil) would be generated by the use of construction equipment, and disposed of in accordance with applicable hazardous waste management plans.

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^3 (61,300 yd^3) of contaminated soil (mixed LLW) would be excavated and an additional 3,420 m^3 (4,470 yd^3) 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^3 (29,700 yd^3) 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 1.4 million L (382,400 gal) of nonhazardous sanitary waste would be generated. Small amounts of hazardous waste (e.g., used oil and diesel contaminated soil) would be generated by the use of construction equipment, and disposed of in accordance with applicable hazardous waste management plans.

If both a new HEU Materials Facility and a new Special Materials Complex were constructed, the waste generated would be added to waste generated under the No Action - Planning Basis Operations Alternative. The contaminated soils would be mixed LLW. Use of construction equipment would generate small amounts of hazardous waste. Non-hazardous 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 3.5–1 for amounts). 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 3.5–1 for amounts). The Upgrade Expansion of Building 9215 would generate similar small amounts of the same types of waste (see Table 3.5–1 for amounts). 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 3.5–1.

Operation of the Special Materials Complex would generate small amounts of hazardous and nonhazardous waste per year (see Table 3.5–1 for amounts). Less than 1 yd^3 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 3.5–1.

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 3.5–1).

3.5.13 Environmental Justice

Construction. As discussed in Section 5.3, the short-term socioeconomic impacts during construction of the facilities would be positive and not result in any disproportionately high and adverse effects on minority populations or low-income populations. Therefore, no disproportionately high and adverse effects on minority populations or low-income populations would be expected.

Operation. As discussed in Section 5.14, none of the proposed alternatives would pose significant health risks to the public and radiological emissions would remain below the annual dose limit of 10 mrem (the MEI dose is 4.5 mrem/yr for Alternative 4). Results from the ORR ambient air monitoring program show that the hypothetical EDE received within the Scarboro Community (Monitoring Station 46) is typically lower (0.16 mrem/yr) than at other monitoring stations to the south (Monitoring Station 48) and west (Monitoring Station 35) of Y-12 where the hypothetical EDE would be 0.18 mrem/yr (Monitoring Station 48) or 0.19 mrem/yr (Monitoring Station 35) (DOE 2000d). There are no special circumstances that would result in any greater impact on minority or low-income populations than the population as a whole.

3.5.14 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 decrease from the No Action - Status Quo Alternative (26 mrem [7.04×10^{-5} LCF per year]) by 14.6 mrem and result in an estimated 4.64×10^{-6} LCFs per year. The decrease in worker dose is due in part to the use of the new International Commission Radiological Protection (ICRP) 66 lung model and the bio-kinetic model for uranium from ICRP 78 approved by DOE for monitoring worker exposure. These models are based on the latest scientific information from the ICRP. The conservatively estimated MEI dose would increase from the No Action - Status Quo Alternative (0.53 mrem [2.65×10^{-7}]) by 3.97 mrem/yr to 4.5 mrem/yr and result in an estimated 2.25×10^{-6} LCFs per year. The dose to the population within 80km (50 mi) would increase from The No Action - Status Quo Alternative (4.5 person-rem/yr [2.25×10^{-6} LCFs per year]) by 29.2 person-rem/yr to 33.7 person-rem/yr and result in an estimated 1.69×10^{-5} LCFs per year. The increase in public dose is due to the resumption of all uranium operations, including those remaining in stand-down since 1994, under planning basis operations and conservative assumptions used in the analysis.

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 33 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 Alternative or the No Action - Status Quo Alternative.

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

3.5.15 Facility Accidents

Operation. Under the No Action - Planning Basis Operations Alternative, the postulated beyond-design-basis earthquake accident involving radiological materials would result in an estimated 0.21 LCFs to the population living within 80km (50 mi), the 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), the 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 1.5×10^{-3} LCFs.

The postulated fire accident scenario involving radioactive materials under the No Action - Planning Basis Operation Alternative would result in an estimated 9×10^{-5} to 0.28 LCFs to the population living within 80km (50 mi), the 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 5×10^{-6} to 0.008 LCFs.

The potential bounding accident involving a chemical release due to loss of contaminant under the No Action - Planning Basis Operation Alternative would potentially expose between 80 and 310 workers at Y-12 to Emergency Response Planning Guideline-2 (ERPG) concentrations or greater, the same as The No Action - Status Quo Alternative (See Appendix Section D.7.2.3 for definition of ERPG-2). No significant off-site exposure is expected.

Most of the accidents analyzed in this SWEIS do not vary by alternative because the same facilities are potentially involved in the accidents and subsequent consequences. However, the construction and use of the HEU Materials Facility and Special Materials Complex would replace existing facilities that were originally designed for other purposes with facilities that incorporate modern features to prevent the occurrence of accidents, as well as mitigate the accident consequences.

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-evaluation-basis earthquake accident for the HEU Storage Mission 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.

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

3.5.16 Cumulative Impacts

Potential cumulative impacts due to the impacts of the proposed action and alternatives analyzed in the SWEIS are expected to be minimal. Potential cumulative impacts from the Preferred Alternative (Alternative 4) would be expected during construction of the HEU Materials Facility (Site A) and the Special Materials Complex (Site 1). The construction impacts would be adverse but temporary. Normal operations of the new facilities would contribute to cumulative impacts because they would replace existing storage and special materials operations in existing facilities.

The existing and potential future projects included in the cumulative impact analyses were the TVA operated Bull Run and Kingston coal-fired steam plants, and Watts Bar Nuclear Power Plant; the lease of parcels ED-1, ED-3, and land and facilities within ETTP; construction and operation of the Spallation Neutron Source; surplus HEU disposition activities at Y-12; the treating of transuranic/alpha low-level waste at ORNL; construction of the ORNL Facilities Revitalization Project facilities; and various Oak Ridge area infrastructure upgrade and proposed new construction projects. The following describes issues/resource areas where potential cumulative impacts could result.

Land Use. Alternatives 3 and 4 could result in a land use change for approximately 4 ha (10 acres) if Site 1 is selected for the Special Materials Complex. The 4 ha (10 acres) portion of Site 1 is currently wooded but would change to industrial classification if developed. Construction of the SNS on ORR has cleared an approximately 45 ha (110 acres) greenfield site and resulted in a change in use from Mixed Research/Future Initiatives to Institutional/Research. Other projects on ORR, e.g., the ORNL Facilities Revitalization Project (FRP) and TRU Waste Treatment Facility involve small areas and use existing developed sites (Brownfield) and would not change existing land use classifications. These potential developments and projects would result in small area land use changes on ORR that would be adverse but would not affect land use or residential development outside the ORR boundary.

Transportation. The incremental impact of operation worker traffic at Y-12 is not expected to impact ORR or off-site area traffic because no increase in workers is expected. The existing workforce would be used for Y-12 planning basis operations levels and staffing proposed new facilities. Potential cumulative impacts to area traffic and roads could occur with all the SWEIS alternatives during construction. Depending on project scheduling, peak construction workforce traffic could be a high or an additional 433 vehicles per day with Alternative 4. Construction of the SNS would add approximately 578 workers during peak construction and increase traffic on ORNL access roads by approximately 7 percent. The ORNL FRP and the TRU Waste Treatment Facility would add a smaller amount of workers vehicles (approximately 100) to area traffic. Adverse cumulative impacts could occur if these project construction schedules overlap during peak construction periods. The impact would result in area traffic congestion, and decreased levels-of-service on area access roads to ORR. Recent improvements to ORR access roads should minimize these cumulative impacts as well as the continued staggered work schedule currently in effect at the ORR for operations workers.

Socioeconomics. The proposed actions and alternatives analyzed in the SWEIS would not have adverse impact on socioeconomic issues in the ROI. There would be no substantial change in the workforce

associated with Y-12 operations under any of the alternatives and therefore no direct or indirect adverse or beneficial cumulative impact.

Water Emissions. An increase in radioactive or chemical releases to area surface waters is not expected under No Action - Planning Basis Operation or the action alternatives. Routine operations at ORR, including Y-12, result in some release of radionuclides. The MEI dose of 4 mrem per year and the population dose of 3 person-rem per year from waterborne sources near ORR would not change. The cumulative effect from the Watts Bar Nuclear Plant waterborne emissions are estimated to be 4.2 person-rem per year to the population. This cumulative effect (ORR and Watts Bar Nuclear Plant) translates into 0.004 cancer fatalities for each year of exposure to the population living within 80 km (50 miles) of ORR. Therefore, no adverse cumulative effects from radiological waterborne releases are expected.

Air Emissions. Cumulative impacts to air from airborne radioactive releases are expected. The cumulative dose to the population within 80 km (50 miles) of ORR from ORR and other sources identified in the area would be 61.6 person-rem per year. The total annual cumulative dose translates into 0.03 LCF for each year of exposure. The contribution of Y-12 activities under the No Action - Planning Basis Operations and action alternatives would be approximately 33.7 person-rem and 0.017 LCF per year of exposure. The cumulative impacts would not be significant.

The major source of nonradiological air emissions at Y-12 is the Steam Plant. The conservative analysis in the SWEIS (see Section 5.7) shows that Y-12 NAAQs criteria pollutant concentrations when added to background concentrations (which include concentrations from all working sources including the Y-12 Steam Plant) would increase but are below the national and TDEC standards. No significant adverse cumulative impacts are expected from any of the alternatives in the SWEIS.

Utilities and Energy. The incremental increase in utilities and energy use among the alternatives would be minimal (see Site Infrastructure). TVA has excess electrical capacity to accommodate future uses at Y-12, ORR, and projected growth in the surrounding Oak Ridge and Knoxville area. In addition, installed capacity of Y-12 and ORR site utilities is much greater than projected usage. Therefore, no adverse significant cumulative impacts to utility and infrastructure supply and capacity are expected. The installed excess utility infrastructure and capacity at ORR would be a beneficial effect on future public use/development on the ORR.

Waste Generation. The cumulative volumes of LLW, mixed LLW, hazardous waste, and sanitary/industrial waste for the Oak Ridge ROI were analyzed and compared to the existing ORR and off-site waste management facilities capacity and capabilities for treatment, disposal and/or storage. The cumulative volumes from all analyzed actions resulted in generation of 37,819 m^3/yr of LLW, 1,946 m^3/yr of mixed LLW, 203 m^3/yr of hazardous waste, and 29,412 m^3/yr of sanitary/industrial waste. The Y-12 incremental portion of this volume was 1,404 m^3/yr of LLW, 69 m^3/year of mixed LLW, 18.5 m^3/year of hazardous waste, and 7,295 m^3/year of sanitary/industrial waste. The existing ORR and off-site waste management facilities have sufficient capacity and capabilities for treatment, disposal and/or storage. Therefore, no significant cumulative impacts on ORR or area waste management facilities are expected.

Public Health. The analysis of potential cumulative radiological health effects of routine ORR operations includes Y-12 proposed actions and other identified radiological sources within the study area. The cumulative effect from all sources for the general population is a small (less than 5 percent) increase over that from ORR. The ORR total dose to the population within 80 km (50 miles) was conservatively estimated at 90 person- rem per year and translates into 0.045 LCF per year. The cumulative dose to the population was conservatively estimated to be 94 person-rem per year and results in an estimated 0.047 LCF per year. Therefore, no significant cumulative impacts on public or worker health are expected from the proposed actions and SWEIS alternatives.