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 (1998) level reported in the Annual Site Environmental Report (ASER) issued in 1999. Approximately 40 percent of the operations associated with DP's assigned mission were operational ready in 1998 (following the Y-12 Plant stand-down in 1994). About 10 percent of actual operating capacity was achieved. As discussed in the "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," (46 FR 18026, 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 the Y-12 Plant consistent with the RODs from the SSM and S&D PEIS. The No Action - Planning Basis Operations Alternative includes the resumption of all remaining weapons program operations at Y-12 which have been in stand-down since 1994. No major upgrades or new construction of DP facilities to maintain weapon program capabilities or capacity are included under the No Action - Planning Basis Operations Alternative. The No Action - Planning Basis Operations Alternative does incorporate ongoing upgrades to existing facilities that address action items or findings from past reviews (e.g., HEU vulnerability or health and safety studies) to resolve the findings.

- ***Assumption 2*:** To modernize Y-12's current mission capabilities and address long-term ES&H requirements, DOE is proposing new facilities for the HEU Storage Mission and Special Materials Mission at Y-12. Various alternatives for these two new facilities, the HEU Materials Facility and the Special Materials Complex, are analyzed in this SWEIS. These proposed projects are independent actions to each other, i.e., decision making for one project does not influence, and is not influenced by, decision making for the other project.

  Other potential modernization projects being considered 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., 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 the ^{233}U National Repository 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 Plant. 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; 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 (Defense Programs Operations and Emissions)

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

In 1998, approximately 40 percent of the types of Y-12 Plant operations needed to support Y-12 mission requirements had achieved operational readiness from the 1994 stand-down, and about 10 percent of Y-12 Plant operational capacity was being used. Most of the 10 percent operating capacity during 1998 resulted from the continued operation of a few critical operations at Y-12 that were required to maintain the nuclear weapons stockpile. Therefore, the environmental monitoring and environmental surveillance information described in Chapter 4 reflect only a small part of the typical operating conditions, i.e., as occurred prior to the 1994 stand-down and 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 the Action Alternative. The No Action - Status Quo Alternative, which is basically a continuation of the status of Y-12 in 1998, is presented in the SWEIS to show the potential increase in production levels and potential impacts under the No Action - Planning Basis Operations Alternative and other alternatives described in Section 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 (Defense Programs Operations and Emissions)

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

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

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

Weapons Program activity levels have been projected for the period 2001-2010 from the Stockpile Life Extension Program and other Y-12 Plant workload schedules. The weapons activity levels for this period were then associated with the respective enriched uranium production and recovery activities. The activity level for weapons production, quality evaluation, and special productions is estimated to be approximately 30 percent of the activity level at Y-12 experienced in 1987. Enriched uranium recovery operations during the period 2001-2010 is expected to be at levels equal to 1987 using 21-shift (3 shift-a-day, 7 day-a-week) operations. Therefore, uranium emission levels expected during the period 2001-2010 for enriched uranium recovery is estimated to be equal to 50 percent of the total uranium emissions for 1987. Enriched uranium emissions due to other weapons production activities are estimated to be 30 percent of the remaining 50 percent of the total uranium emissions for 1987. Thus the annual enriched uranium emissions and other process effluents from the Y-12 Plant for the period 2001-2010 are estimated to be 65 percent of the Y-12 Plant levels experienced in 1987. This estimate is considered a bounding case because of various process and facility improvements that have been incorporated at Y-12 since 1987, and because actual production levels will fluctuate over the 2001-2010 time period.

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

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).

3.2.1 Alternative 1A (No Action - Status Quo Alternative)

The No Action - Status Quo Alternative represents the current level of operations at Y-12 as reflected by the most recent monitoring data (1998) for the Y-12 Site and reported in the ASER issued in 1999. Although approximately 40 percent of the types of operations associated with DP's assigned mission were operational ready in 1998 (following the Y-12 Plant stand-down in 1994), the Y-12 Plant was only operating at 10 percent capacity, and this state/conditions 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 the Plant consistent with reduced requirements. Downsizing of the Y-12 Plant 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, deactivation and decontamination, and management of waste materials from past and current operations; Office of Science activities operated by ORNL; and DP support of other Federal agencies through the Work-for-Others Program, the National Prototype Center, and the transfer of highly specialized technologies to support the capabilities of the U.S. industrial base. The No Action - Planning Basis Operations Alternative also includes activities to store surplus enriched uranium pending disposition in accordance with the S&D PEIS ROD (62 FR 3014). Figure 3.2.2–1 shows the Y-12 Plant and EM waste management facilities outside the Y-12 Plant 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 Plant 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 anhydrous hydrogen fluoride (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.

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 the Y-12 Plant.*

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.

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, 9204-4, 9201-5, 9201-5N, 9995, 9204-2E, 9404-11, 9805-1, and 9720-46. 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 9204-2E 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 the Y-12 Plant 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 Plant 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 experienced at the Y-12 Plant in 1987 when Y-12 was in full Cold War weapons production.

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 experienced at the Y-12 Plant in 1987 when Y-12 was in full Cold War weapons production.

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

FIGURE 3.2.2–4.—*Overview of the Y-12 Plant Enriched Uranium Chemical Recovery Operations.*

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

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 Plant. 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.

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 the Y-12 Plant. Building 9995, which houses the primary operations area of the Analytical Chemistry Organization at the Y-12 Plant, 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 continue at current operations levels through 2010.

Y-12 Utility and Support Infrastructure. The Y-12 Plant 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 Plant 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 Plant 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 the Y-12 Plant 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 the Y-12 Plant averaged 18,927,000 - 22,712,000 L/day (5-6 MGD) or 600 - 750 million L/month (160-200 million gal/month).

3. Sanitary sewage from the Y-12 Plant flows by gravity to the city of Oak Ridge West End 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 Y-12 Plant 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 the Y-12 Plant 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 Plant 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 4,000,000 m^3 (141 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 3,800,000 m^3 (134 million scf) while coal usage was 78,500 t (86,500 T).

6. Plant and instrument air would continue to be supplied by compressors and air-drying equipment located throughout the Y-12 Plant. The total installed compressor capacity is approximately 386,968,100 m^3/yr (13,700 million scf/yr), while the average usage is approximately 200,925,740 m^3/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 m^3/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 Plant 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 m^3 (3.4 million scf) of gas. Total capacity of distribution is 13,395,040 m^3/yr (473 million scf/yr) or approximately 26 million scf/month.

   Helium storage capacity is 4,530 m^3 (160,000 scf) with an additional 1,020 m^3 (36,000 scf) of emergency standby storage. The No Action - Status Quo Alternative helium usage is approximately 63,150 m^3/yr (2,230,000 scf/yr). Hydrogen storage capacity is 2,550 m^3 (90,000 scf). The No Action - Status Quo Alternative hydrogen usage is approximately 10,100 m^3/yr (357,000 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 Plant under the No Action - Status Quo Alternative is 5,465,000 m^3 (193 million scf).

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

8. Electrical power would continue to be distributed throughout the Y-12 Plant using existing 161-kV feeder lines and distribution substations. The total installed transformer capacity at Y-12 is approximately 400 MVA. The Y-12 Plant 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 188,570MWhr/yr from the No Action - Status Quo Alternative levels.

9. Telecommunications systems within the Y-12 Plant 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 the Y-12 Plant 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 Plant 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 Plant 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 will require the clearing of 26 - 39 ha (64 - 98 acres). The permanent commitment of land for this facility will 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 (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.

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 on-site.

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.

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

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

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 2-3 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- 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.

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

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

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 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*

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 ORNL NABIR Program.

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 a 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 Y-12 Field Research Center site would include a 98-ha (243-acre) previously disturbed contaminated area and a 163-ha (440-acre) background area. The contaminated area would be used for conducting experiments on contaminated groundwater and subsurface sediments. The background area would provide for comparison studies in an uncontaminated area and is outside the Y-12 SWEIS analysis area shown in Figure 3.2.1-1. The contaminated area and background area would be 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) would 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, Contaminated Area at the Y-12 Plant.*

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 would serve as the primary field site for small-scale basis 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 would 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 would 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 would be a primary source for groundwater and sediment samples for NABIR investigations. Groundwater would 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 would be small in volume (approximately less than 1 m^3) (35.31 ft^3) and the drilling holes would be backfilled when no longer needed.

Collection and transportation of samples within the boundaries of the Y-12 Site would 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 would follow U.S. Department of Transportation (DOT) Hazardous Materials Regulations.

Approximately 40 in-situ research activities would be conduced 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 proposed placement of temporary work/sample preparation trailers at the test plots, no new construction would be involved with the operation of the Field Research Center. Existing utilities would be used. Heavy equipment (e.g., drill rigs, brush hogs, augers) would be used when necessary for site clearing prior to conducting research at the background or contaminated sites. The equipment would be used for short periods of time. Best management practices and all applicable rules and regulations would 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 is hosted by DOE and has as its goal to apply unique expertise, initially developed for highly specialized military purposes, to a wide range of manufacturing situations to support expansion of the capabilities of the U.S. industrial base. 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 Plant 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 3.2.1.1 and 3.2.2.1. The 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 declared surplus and used for other activities or 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 Y-SIM 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 2001. Construction of the foundation and facility would begin in the second quarter of FY 2002 and would be completed in the second quarter of FY 2005. Following test and checkout and the Operational Readiness Review, the HEU Materials Facility would be ready for operation in the first quarter of 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 topsoil and sod.

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. 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 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 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 laydown area. The laydown area would be located within or near the location designated for the facility. Following construction, the laydown 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 as described in Section 3.2.2.1. Appropriate procedures to implement this workflow would be developed after the final design is approved.

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

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, would be used 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.

- 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 (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)	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)	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 Section 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, steal 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 Plant 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.

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

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

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 Ponds 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 Ponds 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 the Y-12 Plant.

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 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.

Source: Tetra Tech, Inc/LMES 2000b.

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

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

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh)	5,000
Concrete m^3 (yd^3)	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	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 m^3 (yd^3)	none
Water L (gal)	720,000 (190,204)
Plant footprint ha (acre)	0.5 (1.2)
Employment (Workers)	49[a] (100)
Waste Category	**Average Annual Volume**
Low-level	
Liquid m^3 (gal)	0.6 (160)
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)	1269.4 (335,350)
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.

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 Plant would continue to use the existing special materials operations facilities (Buildings 9204-2, 9202, 9201-5, 9201-5N, 9731, 9404-11, 9204-4, 9204-2E, 9805-1, 9720-46, 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, 9204-4, 9201-5, 9201-5N, 9995, 9204-2E, 9404-11, 9805-1, and 9720-46 as described in Section 3.2.1.1 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. Construction of the facilities would begin in FY 2003 and would be completed in FY 2005. Following test and checkout and Operational Readiness Review, the Special Materials Complex would be ready for operation in FY 2007.

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 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 buffer area.

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 $\mu g/m^3$ (125×10^{-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 ;that 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.

Source: LMES 2000c.

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

Conventional construction techniques would be used to build the Special Materials Complex. 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 Plant 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), and extension of utilities to the new facilities.

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 Plant 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 Plant 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 the Y-12 Plant. 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.

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

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

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.

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.

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 Plant PIDAS would not be affected since Site 2 is entirely within the PIDAS. However, a security fence would be erected to isolate the work 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 water, 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.

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 Ponds 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 Ponds 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.

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.