APPENDIX A: Y-12 PLANNING, PROCESS AND FACILITY INFORMATION

This appendix to the Y-12 Site-Wide Environmental Impact Statement (SWEIS) presents information on the principal planning, processes, and facilities associated with the Y-12 National Security Complex. This includes a description of the facility planning and transition process; a summary of major Y-12 configurations and infrastructure; a description of the Y-12 production processes; a description of Defense Programs (DP) major facilities (designated by building complex or specific buildings); a summary of principal Waste Management activities (designated by unit names since these are usually located in larger buildings); and information dealing with traffic and transportation. Tables and figures related to these discussions are included in order to conveniently summarize selected facility information.

A.1 FACILITY PLANNING PROCESS AND FACILITY TRANSITION PROGRAM

This section summarizes information dealing with facility planning processes at Y-12. In addition, information on facility transition programs and the decontamination and decommissioning (D&D) of facilities is also summarized.

A.1.1 Y-12 Facility Planning

The Y-12 Weapons Programs Organization, in which the Required Technical Base and Facilities Program resides, has the overall responsibility for formulating the DP capital investment and workforce strategy for the Y-12 Site. The Weapons Program is integrally linked with the Modernization Program and the Utilities and Infrastructure Management Program. Together, this triad works to accomplish the following objectives:

- Convey program requirements to the Site organizations to ensure that Y-12 plans for the capacity and capability commensurate with directive schedules and funding (Weapons Programs/Required Technical Base and Facilities Program)

- Migration (planning, project development, and execution) of current state to future state with respect to facilities and infrastructure (Modernization Program)

- Maintenance of all utilities and distribution systems, development of their requirements, and prioritization of resources (Utilities and Infrastructure Management Program)

- Development and prioritization of maintenance, upgrades, and replacement of site-wide infrastructure buildings, roads, parking lots, etc. (Utilities and Infrastructure Management Program/Modernization Program)

Planning at the Y-12 National Security Complex begins with an understanding of current and proposed missions, coupled with a vision of the future role of the facility in meeting overall DP requirements. A strategic plan is prepared for the Y-12 National Security Complex that provides guidance on its objectives and long-range plans, including site and facilities considerations relating to the manufacturing footprint. The site and facilities planning process uses the strategic plan as a starting point for developing long-range alternatives, prioritizing proposed projects, and generally setting the direction for infrastructure investment.

At a detailed level, the site and facilities planning process at Y-12 involves three major steps: (1) identification of needs, (2) packaging of proposed solutions into projects or activities, and (3) prioritization of those projects and activities to meet budget constraints. These steps are iterative and ongoing, as needs and budget projections change.

In the past, Y-12 has used the Condition Assessment Survey tools and procedures developed by the U.S. Department of Energy (DOE) Headquarters to systematically assess and document the physical condition of its facilities. Condition Assessment Survey data have provided information to identify maintenance needs.

Other needs, particularly for operational improvements, acquisition, and disposition, have been identified by program managers and facility managers in response to facility conditions, workload requirements, and programmatic guidance from DOE.

These needs and proposed solutions are then formalized into requests for funding of capital projects, expense-funded projects, or work authorization packages. Processes for setting priorities differ, depending on the proposed funding source, but generally involve formal or informal committees of middle managers passing initial recommendations to senior management for modification and approval.

A.1.2 Y-12 Facility Transition Program

Facility Transition, which is part of the Modernization and Facilities Transition Program, involves preparing surplus facilities for disposition with their safe, compliant, and cost-effective management until disposition. Disposition could include reuse by another entity, transfer to the DOE Office of Nuclear Material and Facility Stabilization (EM-60), or demolition by DP. Any of these disposition alternatives may be preceded by an extended period of surveillance and maintenance (S&M): the program has developed a systematic approach for placing surplus facilities in a safe and compliant condition and minimizing S&M costs in a framework that protects workers, the public, and the environment.

Figure A.1.2–1 is a top-level flow diagram of the decision and planning process. While the flow diagram represents a linear sequence of events, many of the steps in the process can be done in parallel. S&M is not final disposition, and facilities in long-term S&M will be periodically reevaluated to determine if the time is right for a more permanent disposition. The level of activity required at each step in the process will depend on the size and complexity of the facilities.

A.1.2.1 *Surplus Facilities Identification*

Identification of surplus facilities is obtained through the Y-12 Ten-Year Plan and the downsizing activities described in the Activity Implementation Plan. The surplus facilities identified in these documents constitute the baseline for surplus facilities to be managed by the program.

A.1.2.2 *Disposition Strategy*

The disposition options for surplus facilities are to reuse the facility, transfer it to EM-60, demolish it, or place it in long-term S&M. The preferred option is to find a reuse (new owner) for the facility. If reuse is not feasible, transfer to EM-60 or demolition by DP are the next preferences. For process-contaminated facilities, Environmental Management (EM) is the departmental organization designated to deactivate and decontaminate as necessary and take the facility to its final disposition.

The final disposition could be demolition or a reuse option that was not available in its former contaminated state. The uncontaminated facilities that EM will take will be demolished with DP funding whenever justified on the basis of cost savings or other programmatic imperatives, such as need for the land. Demolition is subject to funding constraints. Long-term S&M is not a final disposition alternative, although it may be used while waiting for a reuse opportunity, demolition funding, or EM's readiness to accept a contaminated facility. The final selection of a disposition option for a facility will involve the approval of Y-12 Site management and DOE.

FIGURE A.1.2–1.—*Facility Disposition Approach*.

A.1.2.3 *Scheduling and Budgeting*

After the disposition strategy for a facility is selected, a baseline schedule and cost estimate for the disposition of the facility would be developed and incorporated into the budget planning process. Developing the budget submission requires a team effort involving numerous Y-12 organizations: Weapons Programs Management; Operations; Engineering; Environment, Safety and Health; Maintenance; Waste Management; Facility Safety; Fire Protection; and others as required.

A.1.2.4 *Walkdown Assessments*

Walkdown assessments identify actions required to place facilities in a safe and compliant condition, taking into account the status of the facility and a necessary and sufficient approach to requirements. The assessment process is used to determine what actions need to be performed in a facility prior to reuse, transfer to EM, demolition, or long-term S&M. Figure A.1.2–2 shows the process flow for the stabilization actions required to place a surplus facility in a safe and compliant condition.

A.1.2.5 *Reuse*

The stabilization approach is tailored to the disposition strategy for the facility. If the facility is a candidate for reuse, then it is anticipated that some actions will need to be completed prior to transfer to a new owner. These actions typically will address removal of potential *Resource Conservation and Recovery Act* (RCRA) wastes, equipment, materials, etc., that are not needed by the new owner.

A.1.3 Transfer to EM

If reuse is not an option, process-contaminated facilities are candidates for transfer to EM-60. Process contamination is defined as contamination of systems or structural components by radioactivity or hazardous chemicals. The definition excludes contamination from conventional building materials, such as asbestos and lead-based paint, and from polychlorinated biphenyl (PCB) oils. It also excludes facilities in which bulk or containerized hazardous materials have been used or managed if no residual contamination remains after the hazardous materials are removed.

Transfer to EM will be done as prescribed by DOE O 430.1A, *Life Cycle Asset Management*. Because a facility's budget for S&M is transferred along with the facility, notification of intent to transfer is required two budget-years in advance of the proposed transfer. This time will allow EM-60 to incorporate the S&M costs into its budget planning and to complete a pre-transfer agreement. The pre-transfer agreement documents the actions that will be required by Y-12 prior to EM's accepting the facility.

A.1.4 Demolition

If a facility is targeted for demolition, a demolition plan is prepared. Consideration will be given to options that could range from having a subcontractor remove the facility and salvage the materials with no cost to DOE, destruction of the facility by fire with fire protection personnel using this fire as a training exercise, a low-bid subcontractor award contract, or other options. The intent is to minimize the costs to DOE while maintaining a safe and compliant process.

FIGURE A.1.2–2.—*Stabilization Action Process.*

A.1.4.1 *Long-Term S&M*

If near-term disposition by reuse, transfer, or demolition is not feasible, the facility will be placed into long-term S&M. The basic difference in the process at this time is the implementation of an S&M plan. The facility will be stabilized to a safe and compliant condition as determined by analysis of the walkdown assessments (based on necessary and sufficient principles). After stabilization, personnel access to the facility will be limited, and an S&M plan will be implemented. The objective is to minimize the S&M costs, consistent with risk management concepts. Reduction of S&M costs will potentially involve things such as shutting off utility services (e.g., electrical, water, steam), decontaminating radiation-contaminated areas, removing materials, and eliminating inspections on equipment no longer in service. Systems such as the Criticality Accident Alarm System, Fire Protection, Emergency Notification System, and Emergency Lighting/Egress will remain in service as necessary to ensure the health and safety of workers, the public, and the environment.

A.1.5 Y-12 Decontamination and Decommissioning of Facilities

It is important to recognize that the decisions to conduct near-term cleanup and D&D activities at Y-12 do not depend on whether the proposals for the Y-12 SWEIS alternatives are implemented. Regardless of proposed actions, substantial cleanup of both soil and groundwater contamination and substantial D&D of buildings already determined to be necessary for future operations are either occurring or planned. When specific proposals are completed for the D&D of facilities that would be phased out as a result of the implementation of the proposed Y-12 SWEIS actions, the appropriate *National Environmental Policy Act* (NEPA) process would be followed.

The required level of effort to complete the D&D of Y-12 facilities would be a function of the types of chemical and radiological materials used when the facility was operational, and the extent to which radioactive and hazardous/toxic materials have been deposited on the internal and external surfaces of components, systems, and structures.

Because the specific number and types of Y-12 facilities that may be proposed for transition to EM have not been identified for the future schedule of D&D, it is not possible to quantitatively analyze potential impacts at this time. However, radiological impacts from D&D activities to the general population are expected to remain below the negligible level for a maximally exposed individual (1 mrem/yr) based on the off-site releases reported in previous annual environmental reports for the Oak Ridge Reservation (ORR) published by DOE. All D&D activities are regulated by DOE Orders, and exposure limits to the general population would be similar to exposure limits for facility operations.

A.2 Y-12 Site Configuration and Infrastructure

This section summarizes information dealing with the Y-12 Site configuration and infrastructure.

A.2.1 Site Configuration

The Y-12 Area of Responsibility in the ORR covers a total of 2,136 ha (5,279 acres). The main area of Y-12 is largely developed and encompasses 328 ha (811 acres), with 255 ha (630 acres) fenced (4 by 2 km [3 by 1 mi]). Approximately 580 buildings, trailers, and other structures house about 714,317 m^2 (7.6 million ft^2) of laboratory, machining, dismantlement, storage, and research and development (R&D) areas. Because of the Site's defense support manufacturing and storage facilities, the land in the Y-12 area is classified in DOE's industrial category.

Many of the buildings used for Y-12 production processes were built during the 1940s for the Plant's original mission of electromagnetically separating isotopes of uranium. These buildings have been modified over the years to accommodate changing missions. The separation of lithium isotopes using column exchange technology was performed at one time in some of the buildings, but that process was discontinued in the 1960s.

The Building 9212 Complex was built in the early 1940s with several buildings added in the 1950s. The most recent production facility additions at Y-12 were made in the late 1960s and early 1970s as part of the Production Facilities Modifications Program. The major facilities added at that time were Buildings 9204-2E, 9201-5W, and 9201-5N. The current beryllium operations are located in Buildings 9202, 9201-5, 9201-5N, and 9995; these buildings range from 27 to more than 50 years old.

Generally speaking, the Y-12 National Security Complex can be divided into three areas: (1) the East End mission support area; (2) the West End manufacturing areas; and (3) the West End environmental area. East End facilities are generally technical, administrative, and Y-12 support functions. The West End manufacturing area is generally considered an area inside the Perimeter Intrusion Detection and Assessment System (PIDAS) fence. The area inside the PIDAS boundaries contains manufacturing and nuclear material storage facilities as well as technical and Y-12 support operations and program management, product certification, quality control, product engineering and scheduling, maintenance, and utilities. The West End environmental area is managed by EM and contains tank farms, waste management treatment facilities, and storage areas; included are such facilities or areas as the Bear Creek Road Debris Burial Area, Rust Spoil Area, Liquid Organic Waste Storage Facility, Hazardous Chemical Disposal Area, Oil Landfarm, Oil Landfarm Contaminant Area, and Sanitary Landfill 1.

A.2.2 Site Infrastructure

An extensive network of existing infrastructure provides services to Y-12 activities and facilities. The Y-12 area contains 104 km (65 mi) of roads ranging from well-maintained paved roads to remote, seldom-used roads that provide occasional access.

Electric power is supplied by the Tennessee Valley Authority (TVA) and is distributed throughout the Y-12 Site via three 161-kV overhead radial feeders. In addition, there is one 161-kV interconnecting overhead feeder. Some sections of the three lines are supported from suspension insulators on self-supporting steel towers; most sections, however, are supported on wooden-pole H-frame structures. Thirteen 13.8-kV distribution systems ranging in size from 20 MVA to 50 MVA are located within such buildings as 9201-1, 9201-2, 9201-3, 9204-4, 9201-4, 9201-5, 9204-1, and 9204-3. Each system consists of a high-voltage outdoor transformer with indoor switchgear, 15-kV feeder cables, power distribution transformers, and auxiliary substation equipment.

The electrical distribution loads outside major buildings are carried out through 13.8-kV overhead circuits, primarily radial-feed type. Two 13.8-kV tie lines are capable of transferring large blocks of power between the distribution substations. These tie lines are used as alternate power feeds to sections of Y-12 when part of the 161-kV transmission system is out of service. The total installed transformer capacity is approximately 400 MVA. According to the draft report, *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999), the Y-12 National Security Complex load during the 1990s averaged approximately 44 MVA.

Natural gas is used for furnaces, the Steam Plant, and laboratories and is supplied via a pipeline from the East Tennessee Natural Gas Company at "C" Station located south of Bethel Valley Road near the eastern end of the Y-12 Site. A 36-cm (14-in) 125-psig line is routed from "C" Station to the southwest corner of the Y-12 Site perimeter fence. From this point, a 20-cm (8-in) line feeds the Steam Plant and a 15-cm (6-in) branch line serves the process buildings and laboratories in the east end of the Site. The western end of the

Y-12 Site, other than the Steam Plant, is served by 10-cm (4-in) and 5-cm (2-in) headers that are fed from the Steam Plant line. Two other pressure reducing stations, one at the Steam Plant and the other at Building 9202, reduce the gas pressure from 125 psig to 25 psig and 35 psig, respectively. The gas pressure is further reduced and the flow metered at each use point.

Steam used in heating and processing is supplied from a central Y-12 Steam Plant which was originally built in 1955 and upgraded and modernized several times to date. The Steam Plant operates 24 hr/day, 365 days/year. It includes four coal-fired boilers, each of which is rated at 200,000 lb/hr at 500EF and 235 psig. Each boiler is capable of firing on either pulverized coal or natural gas, and includes two coal pulverizers and four burners. Coal for the Steam Plant is purchased regionally, delivered by truck, and stored in a bermed area near the Steam Plant. Runoff from the coal pile is collected and treated in the Steam Plant Wastewater Treatment Facility prior to discharge to the sanitary sewer system. Natural gas is supplied from the Y-12 system through an 8-in-diameter, and a 125-psig underground main; a pressure reducing station reduces the pressure to 25 psig for use in the burners.

Steam is distributed throughout Y-12 at 235 psig through main headers ranging in size from 5 cm (2 in) to 46 cm (18 in) in diameter. Condensate is collected and returned to the Steam Plant using a similar network of pipes; a majority of the returned condensate is used as feed to the demineralized water system.

The source of raw water for the Y-12 National Security Complex and a city of Oak Ridge filtration plant is the Melton Hill Reservoir section of the Clinch River. Raw water is pumped approximately 9,000 ft from the reservoir to a 1.5 million gal storage tank and pumping station east of the Plant. From the pumping station, raw water is pumped to a 91 MLD (24 MGD) filtration plant water system that also serves Oak Ridge National Laboratory (ORNL) and the city of Oak Ridge. Separate underground piping systems provide distribution of raw and treated water within the Y-12 National Security Complex. Raw water is routed to Y-12 by two lines: a 41-cm (16-in) main from the booster station, installed in 1943; and a 46-cm (18-in) main from the 61-cm (24-in) filtration plant feed line. The raw water system has approximately 8 km (5 mi) of pipes with diameters ranging from 10-cm (4-in) to 46-cm (18-in). The primary use of the raw water is to maintain a monthly average minimum flow of 7 MGD in the East Fork Poplar Creek (EFPC).

Treated water is routed from the city of Oak Ridge filtration plant to Y-12 facilities by three lines: one 61 cm (24 in) main and two 41 cm (16 in) mains; the total treated water system contains approximately 31 km (19 mi) of pipe ranging in size from 3 cm (1 in) to 61 cm (24 in) in diameter. The treated water system supplies water for fire protection, process operations, sanitary sewage requirements, and boiler feed at the Steam Plant. Treated water usage at Y-12 averages 5 to 6 MGD, or 160 to 200 million gal/month. The ownership and operation of the treated water system were transferred from DOE to the city of Oak Ridge in May 2000.

Demineralized water is used to support various processes at Y-12 that require high-purity water. A central system located in and adjacent to Building 9404-18 serves the entire Y-12 Site through a distribution piping system. This system consists of feedwater storage, carbon filters, demineralizers, a deaerator, and demineralized water storage tanks. The primary source of feedwater is condensate return which is cooled and stored in two storage tanks (13,000 gal and 30,000 gal). The secondary source of feedwater is softened water from the Steam Plant; feedwater from the storage tanks is filtered, demineralized, deaerated, and stored until needed.

The demineralization system includes four mixed-bed-type demineralizer units, each capable of delivering 100 gpm of water. These units, which use commercial resins, operate alternately—one unit is online while the other three are on standby. The system also includes three storage tanks: one with a 30,000-gal capacity and two with a 20,000-gal capacity each. Demineralized water is distributed in 8m-cm (3-in) and 15-cm

(6-in) mains constructed mostly of stainless steel. The mains run above and below the ground in approximately equal proportions. The *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report indicates that the existing system is in good mechanical condition.

The Y-12 Site's sanitary sewer system was first installed in 1943 and expanded as Y-12 grew. Sanitary sewage from Y-12 flows by gravity to a 46-cm (18-in) sewer main that leaves the east end of the Y-12 Site near Lake Realty and connects to the city main near the intersection of Bear Creek and Scarboro roads. The current system capacity is approximately 1.5 MGD.

According to the *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report, the sanitary sewer system has been upgraded over the past couple of years and is judged to be in good shape. The storm drainage system, however, is judged to be in need of repair; some lines are collapsed, most lines have sediment buildup, and some mains are undersized because of changes in the Y-12 Site layout over the years.

The chilled water systems were renovated and upgraded during the mid-1990s. Most chillers that were more than 20 years old were replaced, and the newer chillers were inspected and renovated to eliminate the use of chlorofluorocarbons and to restore the chillers to optimal mechanical condition.

Industrial gases include compressed air, liquid nitrogen, liquid oxygen, liquid argon, helium, and hydrogen. Compressed air is supplied by three different systems that use compressors and associated air-drying equipment located throughout Y-12. The high-pressure (110 psig) instrument air system serves specific production buildings in the west end of the Y-12 Site. The low-pressure (100 psig) system also serves the production facilities in addition to serving the production support buildings and ORNL facilities located at Y-12. The Y-12 air system (90 psig) serves those areas where air quality is not a concern. All three systems are supplied from the same set of compressors and are different only in the operating pressure and the cleanliness of the piping systems (i.e., the Y-12 air piping system contains legacy oil and moisture from previous operations).

Both the high- and low-pressure instrument air systems provide dry, clean, oil-free air for air operated valves, instruments, gages, air-spindle bearings, and breathing air (for both respirators and suits). The Y-12 air system is supplied from the low-pressure system; however, since the piping system is not the same quality as the parent system, the Y-12 air system is operated at a lower pressure to prevent backflow and cross contamination of the low-pressure system. Air compressors and dryer systems have been installed throughout Y-12. Twelve compressors are located in Buildings 9976, 9767-1, 9767-13, 9401-3, 9727-4, 9404-2, 9767-5, and 9767-10.

Liquid nitrogen is normally delivered to Y-12 by trailer truck. The Y-12 nitrogen supply system consists of five liquid-nitrogen storage tanks, a bank of atmospheric vaporizers, a steam-to-nitrogen vaporizer, and hot-water vaporizers. Nitrogen is delivered to all production facilities and laboratories at 90 psig through a network of 5-cm (2-in), 8-cm (3-in) and 10-cm (4-in) pipes. The five storage tanks have a combined capacity of 241,084 L (63,688 gal), or approximately 5.9 Mscf. A bank of 12 atmospheric vaporizers, each with a capacity of 4500 scf/hr at 0EF, is capable of producing 38.8 Mscf/month. In Building 9727-3, four standby hot water vaporizers with a combined capacity of approximately 300,000 scf/hr can provide an additional 100 Mscf/month. The *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report indicates that usage in 1998 at Y-12 was 192 Mscf.

Liquid oxygen is delivered to Y-12 by truck. The oxygen supply system consists of one 914,460 scf vacuum-insulated storage tank for liquid oxygen. Oxygen is generated by passing the liquid oxygen through two banks of atmospheric vaporizers that have a capacity of 5,800 scf/hr, or 4.1 MScf/month. The gas pressure is reduced to 90 psig, metered, and distributed to production facilities through a 5-cm (2 in) overhead pipeline. According to the *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report, oxygen consumption between 1994 and 1998 ranged from 3 to 4 Mscf per year.

Liquid argon is delivered to Y-12 by trailer truck. The Y-12 argon system consists of five vacuum-insulated liquid storage tanks and 12 atmospheric fin-type vaporizers. The storage tanks have a combined capacity of 116,351 L (30,737 gal) equivalent to approximately 3.4 Mscf of gas. The argon distribution system operates at 75 psig and includes a system of filters, dryers, regulators and meters. Gas is distributed to production areas and laboratories through a network of 5-cm (2-in) and 8-cm (3-in) pipes. Argon is also piped to the cylinder-filling station at Building 9977.

The Y-12 National Security Complex receives and stores high-purity helium at 3,000 psig in a jumbo tube trailer. The helium facility at Building 9977-1 includes a jumbo tube trailer with a capacity of 160,000 scf. In addition, 36,000 scf of helium at 1,800 psig is stored in a tube trailer and serves as emergency standby. The Building 9977-1 cylinder-filling facility also houses the high pressure reducing station. Helium gas is distributed throughout Y-12 at 90 psig through a 5 cm (2 in) overhead pipeline. The *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report indicates that the condition of the current system is adequate to serve the long-term needs of Y-12.

The hydrogen supply at Y-12 is stored in Building 9977-2 in multi-cylinder tube trailers in open concrete block stalls. Four trailers are used on a rotating basis: one is in service, one is in ready standby, one is in emergency standby, and one is being refilled. Each trailer has a capacity of approximately 30,000 scf, providing a total capacity of 90,000 scf. Stored gas is pressurized at 2,000 psig. A two-stage pressure-reducing station delivers 50 psig gas through a meter. The gas is then distributed through a 5-cm (2-in) overhead pipeline to Y-12 and laboratory facilities. The draft report, *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999), indicates that current usage is approximately 1,000 scfd.

According to the *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report, systems supplying industrial gases are generally oversized and do not operate at optimum efficiency. For example, the nitrogen system has an installed capacity of over 140 Mscf/min while current usage is averaging approximately 14 Mscf/min. The oxygen system has a capacity of over 4 Mscf/min compared to an average consumption in FY 1998 of approximately 300,000 scf/min. These oversized conditions results in excessive losses and increase the cost to users.

The four basic telecommunications systems within Y-12 are the Oak Ridge Federal Integrated Communications Network (ORFICN), the Cable Television (CATV) Network, the unclassified Y-12 Intrasite Network, and the Y-12 Defense Programs Network (Y-12DPNet). ORFICN consists of copper cable distributed throughout Y-12 and within all its buildings. This network is used for telephone, fax, and special data and alarm circuits and is operated by U.S. West.

The CATV Network consists of coaxial cable that is run to selected sites within Y-12. This network has the ability to send and/or receive video among the ORR buildings at a given site and some off-site locations. Broadcasts originating at one plant can be seen at the other two as well as off-site locations and the DOE Federal Building. The CATV Network is managed and operated by ORNL's Computing, Information, and Networking Division (CIND).

The unclassified Y-12 Intrasite Network consists of a fiber-optic backbone network with fiber-optic connectivity to most buildings within Y-12. The unclassified network uses a 100-Mbps fiber-distributed data interface (FDDI) Ring for the backbone network. This network uses a routed Ethernet service to separate Internet protocol (IP) sub-nets for each building. Within these buildings, desktop connectivity consists of mostly Category V data wiring. Most desktops presently have shared 10 Mbps connectivity, although some locations have switched 10 and 100 Mbps connectivity. External connections to the Internet are made through the ORNL Network that is managed and operated by CIND.

The Y-12DPNet is the Classified Services Network (CSN) and presently consists of a coaxial broadband network and a fiber-optic backbone network with fiber-optic connectivity to most buildings within the protected areas of Y-12. The coaxial broadband network is still used for terminal-to-host connectivity and some Ethernet service in areas not connected by fiber optics. A fiber-optic backbone network, consisting of a 100 Mbps FDDI Ring, is used for 100 Mbps Ethernet service to buildings with fiber-optic connectivity. Within these buildings, desktop connectivity consists mostly of old, nonstandard cabling with shared 10 Mbps service. This network is connected to other nuclear weapons complex sites through DOE's SecureNet.

As part of the ORR system, telephone services for Y-12 are provided by U.S. West; approximately 7,000 voice and data lines are provided. In addition, a Plant-wide public address and emergency notification system is provided. Finally, a classified computer network supports the DP mission.

A.3 Major Y-12 Production Processes

The Y-12 mission activities required to support the production and maintenance of secondaries, structural and radiation case components and other miscellaneous components of the nuclear weapons physics package include:

- Providing secondary materials
- Processing materials
- Fabricating parts and components
- Assembling and disassembling secondary components
- Performing quality evaluations of secondary assemblies
- Providing safe, secure storage of secondary material and products
- Packaging and shipping materials, components, and assemblies

Functional capabilities required to perform these activities include operations to physically and chemically process, machine, inspect, assemble, certify, disassemble, and store secondary materials. Management of wastes generated from these operations is also required. The fabrication of secondaries and cases can be subdivided into the following major material production processes: uranium, lithium, and nonnuclear/special materials. The following typical process descriptions are provided to illustrate the functional activities and operations associated with each of the major production processes. These processes are based on traditional secondary and case fabrication methods and represent upper bounds to the types and number of processes that would be continued in the downsized and modernized Y-12.

A.3.1 Process Descriptions

Processes described in this section include those dealing with uranium, lithium, special materials, and nonnuclear.

A.3.1.1 *Uranium*

The uranium process provides finished enriched and depleted uranium parts and products. The operations are capable of all uranium handling and processing functions, from raw materials handling to finished parts manufacturing. In addition, uranium storage areas are provided for storage of in-process uranium materials and for the HEU strategic reserve.

The production of uranium parts and products involves casting or wrought processing; metal-working; machining, inspection, and certification; chemical recovery; assembly/disassembly/quality evaluation; and in-process storage. The products from casting or wrought processing are billets and cast parts that feed directly to machining and metal-working. Billets are cropped and cast parts are delugged before they are sent to the next operation. The input to casting consists of retired weapons parts, metal buttons from storage, and recycled scrap metal from metal-working and machining. A casting charge is made up and processed in a criticality-safe configuration in a vacuum induction furnace. Scrap metal and machine turnings are degreased, cleaned, and briquetted before direct recycle.

Metal-working prepares a wrought product as feed for machining. Cropped billets from casting are preheated in a salt bath, rolled into a sheet, annealed in a salt bath, blanked, and pressed. The blanking operations are a major source of recycled metal for casting. Formed parts are cleaned, debrimmed, and machined.

Both formed and cast blanks are machined to finished dimensions and inspected. Scrap metal and machine turnings are returned to casting for cleanup and reuse. Miscellaneous solids are sent to the chemical recovery systems for treatment to recycle the material back to metal buttons. Product inspections and certification are accomplished with coordinate measuring machines, optical gauging, high-energy x-ray radiography, ultrasonic and dye penetrant flaw-inspection methodology, plating thickness gaging, and mechanical properties testing.

Enriched uranium chemical recovery receives feed from virtually all areas in the process. The major feeds are residuals from casting, impure metal chips from machining, and a miscellaneous array of combustibles from all areas. The feeds are incinerated and processed in a head-end treatment consisting of acid dissolution, leaching, and feed preparation for solvent extraction. The feed solution is processed through primary extraction by which it is purified, concentrated by evaporation, and purified further by secondary extraction. The resulting solution is converted to oxide, then to UF_4, and then to uranium metal buttons. Secondary residues are returned to the head-end treatment. Finished metal is returned to casting for reuse.

Assembly operations assemble parts into subassemblies using joining techniques such as welding, adhesive bonding, and mechanical joining. Disassembly takes retired weapons apart and recycles all materials of value. The quality evaluation function receives weapons from the stockpile for disassembly, evaluation, and life cycle testing. Shipping containers for weapons parts and subassemblies are certified and refurbished as part of the assembly and disassembly process.

Uranium storage includes storage vaults for in-process uranium materials, which include buttons and other scrap materials directly recycled, as well as semifinished and finished components. The vaults at Y-12 are also used for the strategic reserve, which includes assembled secondaries and HEU metal castings and surplus HEU awaiting final disposition.

A.3.1.2 *Lithium*

The lithium process provides finished lithium hydride and lithium deuteride parts. Primary functional elements of this process include powder production and forming, finishing and inspection, and deuterium production. These systems are briefly described below.

The lithium hydride and lithium deuteride from storage, recycled weapons parts, and manufacturing scrap are broken, crushed, and ground to produce powder. The powder is loaded into molds and cold isostatically pressed to form solid blanks.

The blanks are unloaded from the molds and placed into vacuum furnaces where they are outgassed by heating under vacuum. After cooling, the outgassed blanks are loaded into form-fitting bags, heated, and then warm pressed. After being warm pressed, the blanks are cooled to room temperature and removed from the bags. The fully dense machining blanks that result from forming operations are radiographed to detect any high-density inclusions. Powder production, mold loading, and radiography are all performed in dry gloveboxes to minimize reaction of the lithium hydride and lithium deuteride with moisture in the atmosphere. Mold unloading, furnace loading and unloading, and bag loading and unloading are all conducted in an inert glovebox. The lithium hydride or lithium deuteride is handled outside inert-atmosphere gloveboxes only when it is sealed in a mold or bag.

The blanks from forming operations are machined to final shapes and dimensions on lathes using single-point machining methods in finishing operations. Most machine dust is collected for direct recycle salvage operations. The finished part weight and dimensions are inspected using certified balances and contour measuring machines. All machining and inspection activities are conducted in dry gloveboxes to minimize any reaction with moisture in the atmosphere. Certified parts receive a final vacuum outgassing treatment before final assembly.

Deuterium is required for many of the products and is stored for future use. Deuterium oxide, or heavy water, is electrolytically reduced. The resulting deuterium is compressed and stored for use. If necessary, the compressed deuterium gas is used to reconvert the lithium metal to deuteride in the final step of wet chemistry.

Lithium wet chemistry can be used to pre-produce lithium hydride and lithium deuteride to meet production requirements for many decades. The principal function of wet chemistry is to purify lithium hydride and lithium deuteride by removing oxygen and other trace elements. The principal feeds to this system are retired weapons components from the disassembly operation, machine dust, powder, and killed parts from other operations. Purification is accomplished by transforming the lithium hydride and lithium deuteride through a chemical dissolution process, then the solution is evaporated and crystallized. The crystals are then reduced to lithium metal and impurities are removed. The lithium metal is reconverted to lithium hydride and lithium deuteride by combining it with hydrogen or deuterium gas. The resulting lithium hydride and lithium deuteride billet, sealed in a thin stainless-steel can, is transferred to lithium storage.

The production of lithium hydride and lithium deuteride components creates a considerable amount of scrap that must be recycled to recover the lithium and deuterium. Much of the machine dust, unacceptable formed parts, machined parts that fail inspection, and stockpile returned parts are directly recycled. Salvage operations typically process material that is too impure to be recycled. Salvage operations primarily involve washing and chemical recovery. Items that require washing include machining tools and fixtures, filters used throughout the processes, and sample bottles. Oil-soaked lithium hydride and lithium deuteride blanks from the powder-forming operations are also prepared for storage. Solutions from the purification and wash operations, including mop and dike water streams, are neutralized, filtered, crystallized, and sent to storage or waste disposal.

Long-term storage is required for chemicals and pre-produced lithium hydride and lithium deuteride billets. Interim storage is provided for lithium hydride and deuteride components from disassembly or retired weapons and rejected components from forming and finishing operations.

A.3.1.3 *Special Materials*

Special materials such as diallyl-phthalate are required to support DP. Diallyl-phthalate based molding compound is formed into near-net-shape blanks that are later machined to finished parts. The primary forming operation is compression or transfer molding, which is followed by a drying and final curing step. Current beryllium operations are located in Buildings 9202, 9201-5, 9201-5N, and 9995. Beryllium machining, final dimensional inspection, and beryllium part certification currently provide worker protection through the use of vent hoods and personal protective equipment. All of these operations rely heavily on administrative controls for worker protection. The existing buildings in which beryllium operations are located range from 27 to more than 50 years old.

A.3.1.4 *Nonnuclear*

The nonnuclear process is responsible for producing certain weapons components composed of nonnuclear materials and for providing the uranium and lithium processes with specialized material and support services. Many types of materials are processed to provide a diverse product line consisting of both nonnuclear metal components and tooling and a variety of polymer-based items. The principal manufacturing technologies employed are hydroforming, hydrostatic forming, rolling, forging, heat treating, welding, machining, cold/hot isostatic pressing, grinding, winding, casting, plating, molding, and coating.

The nonnuclear process handles several product streams, which are described briefly in the following paragraphs.

Several types of urethane foams are required to be produced. The urethane components and blowing agents are pumped into molds and allowed to expand to fill the mold. After curing, the foam moldings are ejected and trimmed to final shape.

Steel and aluminum are construction materials for both components and support tooling, making this a relatively high throughput product line. The usual fabrication route for both materials is rough machining, heat treatment, and finish machining.

Operations to produce stainless-steel cans consist of blanking, followed by hydroforming and hydrostatic forming with subsequent machining and heat treatment. Ultrasonic cleaning is required before heat treatment to ensure cleanliness for welding, which completes the assembly.

Ceramic finished parts are finished from blanks or procured. Procured parts are inspected and certified prior to final assembly.

Polyvinyl chloride is formed into bags and castings and is also applied as a coating. Items to be coated are dipped into a tank of curable, plasticized polyvinyl chloride formulation, whereas castings are produced by transferring the polyvinyl chloride liquid into a mold. All items are heat cured.

Figures A.3.1–1 through A.3.1–3 depict the waste management system associated with the Y-12 production missions. Waste management facilities for treatment and storage are described in Section A.5.

FIGURE A.3.1–1.—*Waste Management Process - Solid Waste Treatment.*

FIGURE A.3.1–2.—*Waste Management Process - Declassification*.

FIGURE A.3.1–3.—*Waste Management Process - Process Wastewater Treatment and Waste Thermal Treatment.*

A.4 Y-12 DEFENSE PROGRAMS MAJOR FACILITIES DESCRIPTION

Of the approximately 714,317 m^2 (7.6 million ft^2) of total floor space at the Y-12 National Security Complex, DP occupies roughly 427,350 m^2 (4.6 million ft^2); approximately 223,000 m^2 (2.4 million ft^2) are in major manufacturing facilities, and approximately 195,100 m^2 (2.1 million ft^2) are in support facilities (LMER 1999, SPAS 1999, DOE 1999). According to the *Oak Ridge Y-12 Plant Site Facility Plan, FY 1999-FY 2008* (SPAS 1999), 49 DP buildings are in surplus; most of these are small support structures that are not process-contaminated. The long-term objective is to plan for the removal of these facilities when it becomes cost-effective or a compliance requirement mandates action. Another 11 facilities are planned to be surplus within 10 years, assuming the availability of funding for downsizing. The remainder of the DP buildings are anticipated to have a continuing mission.

All Y-12 facilities used in processing and storage of HEU are located in the protected area of Y-12 surrounded by the PIDAS (except Buildings 9983 and 9710-3, which house only calibration sources managed by Radiological Control and the Protective Services Organization). Figure A.4–1 shows the locations of major DP facilities. Table A.4–1 provides an overview of the DP facilities. Table A.4–2 (located at the end of this appendix) lists all facilities at the Y-12 National Security Complex. The following provides information on the major DP facilities located at Y-12.

A.4.1 Building 9212 Complex

The Building 9212 Complex includes Buildings 9212, 9818, 9815, and 9980. Over 100 operations or processes have been or are capable of being performed within the Building 9212 Complex. The primary missions performed in this Complex include the following:

- Casting of HEU metal (for weapons, reactor fuels, storage, and other purposes)
- Accountability of HEU from Y-12 activities (quality evaluations, casting, storage)
- Recovery and processing of HEU to a form suitable for storage and/or future designation (from Y-12 activities and commercial scrap)
- International Atomic Energy Agency (IAEA) sampling of surplus enriched uranium
- Packaging HEU for off-site shipment
- Preparation of special uranium compounds and metal for research reactor fuel

The largest building, Building 9212, is a multistory facility constructed in the early 1940s of structural steel frame infilled at the perimeter with thick hollow clay tiles. It was built in stages over a period of years. The substructure basement is constructed of reinforced concrete. The original structure consisted of a headhouse 22 by 94 m (72 by 308 ft) (N–S direction) and four wings projecting from the east side of the headhouse, each 11 by 80 m (36 by 264 ft) (A, B, C, and D Wings).

In 1948, new structures were added in the space between the A, B, and C Wings (A-1, B-1, and C-1 Wings) and adjoining D-Wing (D-1 Wing). Finally, a single-story 34 by 122 m (113 by 400 ft) long steel frame structure was added in 1951 (E-Wing). Other less extensive modifications or additions have been added subsequently.

TABLE A.4–1.—*Y-12 Defense Program Major Facility Overview* [Page 1 of 2]

Facility Designation	Function	Mission	Current Status
Building 9212 *Includes Buildings 9818, 9815, 9980, 9981*	• Uranium Recovery Operations • Metallurgical Operations • In-Process Storage • X-ray density	• Recovery of HEU to a form suitable for storage • Casting HEU metal (for weapons, storage, reactors, or other uses) • HEU down-blending • Accountability of HEU from Y-12 activities • Nondestructive evaluation of parts	Operating except for uranium recovery operations. Operations expected to resume in FY 2002.
Building 9206 *Includes Building 9720-17*	• Chemical recovery of intermediate enrichments of HEU (20% to 85% ^{235}U) • In-Process Storage	• Recovery of HEU to a form suitable for storage	Not Operating-HEU materials will be transferred to Building 9212 for processing or to a storage location. Operations in Building 9206 will not resume
Building 9720-12 *Includes a small storage area in Building 9201-5*	• Storage of combustibles, residues and other solid waste material contaminated by HEU	• Storage of combustibles, residues, and other solid wastes awaiting chemical recovery of HEU	In use as a storage facility
Building 9215 *Includes Building 9998*	• Storage • Dismantling • Fabrication (rolling, heat treating, forming, shearing, machining, inspection, etc.) of parts	• Storage and handling of HEU • Dismantling of weapons • Fabrication and inspection of metal parts • HEU down-blending	Operating
Building 9720-5 *Includes bonded storage area in 9204-4*	• Storage of HEU • Receiving • Shipping • SNM vehicle material transfers	• Warehouse for shipping and receiving HEU from other sites • Transient, interim, and long-term storage of HEU • In-Plant material transfers in SNM vehicle	Operating
Buildings 9204-2 and 9204-2E	• Assembly • Product Certification • Disassembly • Storage	• Assembly of new or replacement weapons • Quality operations for certification • Disassembly of retired weapons • Storage of retired weapons assemblies, subassemblies, and components • LiH/LiO production	Operating

TABLE A.4–1.—*Y-12 Defense Program Major Facility Overview* [Page 2 of 2]

Facility Designation	Function	Mission	Current Status
Building 9204-4	• Quality Evaluation/Disassembly • Metalworking • Testing • Plating	• Currently, only Quality Evaluation/Disassembly is conducted	Operating
Building 9995	• Analytical Chemistry Organization	• Provides analytical support services for Y-12 and regulatory compliance	Operating
Building 9201-5W	• Metal machining	• Machining of metal parts	Not operating. In standby awaiting refurbishment
Building 9201-5N	• Machining • Dimensional Inspection • Electroplating • X-ray density	• Depleted uranium and stainless-steel machining • Dimensional inspection of parts • Electroplating of parts • Nondestructive evaluation of parts	Operating
Buildings 9202 and 9203	• Process Development • Beryllium Operations	• Development and refinement of manufacturing processes employed at Y-12 • Technology transfer support	Operating
Building 9996	• Storage	• Tooling and material storage	Active
Building 9201-1	• Metal and graphite machining	• General machine shop • Machining and tooling • Work for others • Technology transfer	Operating
Building 9201-5	• Machining • Dimensional Inspection • Nondestructive Evaluation (x-ray density)	• Machining of beryllium • Dimensional inspection of parts • Nondestructive evaluation of parts	Operating

Note: SNM - special nuclear material.
Source: DOE 1996.

FIGURE A.4.–1.—*Major Defense Program Facilities at Y-12.*

The Building 9212 Complex houses two major process areas: (1) the Building 9212 Uranium Recovery Operations (also called Chemical Recovery Operations), which occur primarily in the Headhouse, Wings B-1, C, and C-1, and Buildings 9818 and 9815; and (2) the Metallurgical Operations which occur in the E-Wing. Buildings 9818, 9815, 9880, and 9981 are small structures adjacent to Building 9212, which contain services for operations in Building 9212.

The HEU materials located in the Building 9212 Complex are in various chemical forms, both liquids and solids, and are in more than 6,000 separate containers. All this material is considered "in process." Material awaiting processing, including solid process residues, fluorides, low-equity residues, and aqueous and organic solutions of many kinds, is stored throughout the building. Solids are typically stored in cans made from ordinary carbon steel or stainless steel, depending on the material. Liquids are stored in plastic criticality-safe bottles.

There are no floor areas where solutions may collect to greater than 4 inches in depth. Nearly all vessels in the solvent extractions operation are of safe geometry. Solid oxides and residues are stored in cans of limited volume and controlled mass. The foundry operation, which involves the use of large amounts of uranium metal, is closely controlled, and each operation is subjected to criticality safety analysis and control.

Large quantities of combustible organics can be in-process in the B-1 Wing. In the past, there have been some minor explosions in the chemical recovery operations involving Nitric Acid Dissolvers, Muffle Furnaces, and Destructive Distillation Unit Operations.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identifies interim corrections associated with Building 9212. These include manual fire fighting capability that is provided on-site 24 hours/day; the three active extraction systems are segregated from each other; and the dissolution processes are performed in well-ventilated chemical fume hoods or dissolvers. The E-Wing baghouse is equipped with flame-resistant bag filters that reduce the predicted likelihood of a major fire with significant release of HEU to very low (i.e., not expected to occur in the life of the facility). Finally, every inventory period the E-Wing bag filter is shaken down and the residue is collected; the material is removed to minimize the accumulation of HEU.

The Building 9212 Complex is currently operating except for uranium recovery special operations. It is expected that most of these operations will resume in FY 2002.

The following summarizes Building 9212 Uranium Recovery Operations and Metallurgical Operations.

A.4.1.1 *Uranium Recovery Operations*

Uranium recovery operations include recovery/purification of HEU-bearing scrap into forms suitable for reuse and accountability of the HEU contained therein. The majority of this scrap and waste was generated by Y-12's weapon production or disassembly operations and by the recovery processes themselves. Some scrap and waste were generated through nuclear materials production; additional scrap is received from other sites for recovery or for accountability of the HEU it contains. The nature of these HEU-bearing materials varies from combustible and noncombustible solids to aqueous and organic solutions. Concentrations of HEU vary in these materials from pure uranium compounds and alloys to trace quantities (parts per million levels) in combustibles and solutions.

The recovery and purification process can be divided into the following general groupings:

- Headend Operations (Headhouse, B-1, C, and C-1 Wings)
  - Bulk reduction of scrap (mostly burning)
  - Dissolution of scrap into uranyl nitrate solution
  - Separation of uranyl nitrate from nonuranium materials
  - Continuous Recovery and Purification Operations (B-1 and C-1 Wings)
  - Organic solvent extraction
  - Evaporation
  - Conversion of uranyl nitrate to UO_3
  - Conversion of UO_3 to UF_4

- Reduction
  - Blending of UF_4
  - Calcium reduction of UF_4 powder to uranium metal

- Special Processing
  - Special materials production
  - Accountability of scrap
  - Scrap dissolution
  - Packaging of materials for shipment

- Waste Streams and Materials Recovery (Buildings 9818 and 9815)
  - Nitrate recycle
  - Biodenitrification
  - Materials storage and handling
  - Chemical makeup

The Biodenitrification Unit, located in Building 9818, utilizes such treatment methods as neutralization, pH adjustment, and nitrate removal to treat liquid mixed low-level waste (LLW) (e.g., nitrate solutions from enriched uranium recovery). The Phaseout/Deactivation Program Management Plan has been approved by DOE for Building 9206 (see Section A.4.2); waste that was generated and transported to Building 9818 will no longer be generated.

A.4.1.2 *E-Wing Metallurgical Operations*

Casting of enriched uranium metal and alloys occurs in vacuum induction furnaces located in E-Wing. Cast components are shipped to M-Wing in Building 9215 via the intrasite Special Nuclear Materials (SNM) Vehicle for machining. Machine turnings are washed in water and freon to remove machine coolant and boron, dried, and pressed into briquettes for reuse in the casting operation. A number of presses and shears are used to condition recycled weapons components and other metal parts for casting. Recycled metal may be washed with nitric acid to remove surface oxide prior to casting. Waste from the casting operations is sent to the chemical recovery operations for accountability and recovery.

Metallurgical Operations can be described in the following general groupings of activities:

- E-Wing Casting
  - Preparation of metal feed
  - Casting metal into parts or cylinders
  - Packaging of materials for shipment
  - Machine turning recycle

A.4.2 Building 9206 Complex

The Building 9206 Complex includes the primary Building 9206 and an immediately adjacent Building 9720-17. The Complex is centrally located in Y-12 near the east end of the protected area. Building 9720-17, adjacent to the south side of Building 9206, is constructed of prefabricated metal and occupies approximately 297 m^2 (3,200 ft^2). Building 9720-17 was constructed in the 1950s. This metal-frame building has transit siding and a concrete slab on grade.

Building 9206 is a multi-story facility constructed in the early 1940s of structural steel infilled at the perimeter with thick, hollow clay tile. It is approximately 50 by 79 m (165 by 260 ft). The building consists of a second floor in its center portion and two sections elevated to two stories. The two one-story sections are approximately 18 by 50 m (60 by 165 ft) and 24 m (80 ft) in plan with a height of 6 m (18 ft). The center section measures approximately 37 by 50 m (120 by 165 ft) with a height of 10 m (32 ft). Also contained in Building 9206 is an incinerator, which is currently permitted for burning combustible waste containing uranium.

Building 9206 has generally been reserved for intermediate enrichments (20 to 85 percent) of HEU. Its original design mission was to recover HEU from the electromagnetic separation process. After World War II, Building 9206 received intermediate enrichments of uranium from the gaseous diffusion plants as uranium hexafluoride. An ammonia gas reduction and hydrofluorination was used to convert the uranium hexafluoride (UF_6) to uranium tetrafluoride (UF_4). In the mid-1950s, a UF_6 to UF_4 conversion facility using fluorine and hydrogen gas was installed to perform the same function. In either case, the UF_4 was reduced with calcium metal to purified uranium metal. Supporting the conversion processes, recovery processes were installed to recover and purify uranium contained in the increasing waste processes. Many of these processes were patterned after the recovery process equipment that was installed in Building 9212.

In the late 1960s, Building 9206 underwent modifications to install denitration and fluid bed systems for the conversion of uranyl nitrate to UF_4. The mission of converting recovered uranyl nitrate from the Savannah River back into metal was transferred to Building 9206 in 1973. The machining-turning-cleaning process was installed in the mid-1980s for recycling intermediate enrichments of uranium turnings. In 1988, shipments of uranyl nitrate from the Savannah River were stopped. A year later the weapon production rate was severely decreased. In 1993, decommissioning of Building 9206 began. Since that time, most of the processes have been shut down and some processes have been removed from the facility.

The *Building 9206 Complex Phaseout/Deactivation Program Management Plan* (LMES 1999) describes the activities to transition the existing chemical recovery capabilities from Building 9206 to Building 9212 and deactivation of the 9206 Complex. The project is expected to last 6 to 10 years. The phaseout and deactivation will reduce the risk of existing hazards and place the building in a positive, safe, and environmentally secure configuration. Some in-process holdup still remains in the facility tanks and process lines.

There are no plans to resume operations in Building 9206. At the present time, Building 9206 is designated as an in-process HEU storage area; this will be its function until the stored material can be transferred to Building 9212 for processing, or to another storage location. Building 9206 has five permitted RCRA waste

storage locations. The locations are used for storage of both hazardous waste, as defined by RCRA, and nonhazardous waste mixed with HEU awaiting recovery or disposal. The hazardous wastes include characteristic and listed wastes. Hazardous materials include a number of strong and weak acids as well as various organic materials.

Material transfers occurring within the Building 9206 Complex are performed by a number of different methods. Dollies designed to provide safe spacing of fissile material containers are used to perform the majority of the container transfers. Personnel are also permitted to transfer single fissile material containers by carrying them. Process material transfers are accomplished with pumps and airlifts.

The *Highly Enriched Uranium Working Group Report* (DOE 1996a) identified that the storage of pyrophoric material and flammable gases for the furnaces in Building 9206 under certain conditions can result in explosions. The report also noted that Building 9720-17 is not protected by an automatic sprinkler system to detect and suppress a fire; however, sprinklers are not necessary if the combustible level is kept low.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identified interim corrections associated with Building 9206: manual fire fighting capability is provided on-site 24 hours/day; materials are stored in taped cans; much of the uranium is in the form of oxides that do not burn; reactor vessels are inspected daily as a part of the operator's round; and natural gas supply to the building has been shut off and tagged outside the building.

A.4.3 Building 9720-12

Building 9720-12 is a warehouse facility located in the western portion of Y-12. The building is a single-story, steel structure with sheet metal exterior walls. It is 15 by 91 m (50 by 300 ft) with a pitched roof 5 m (15 ft) high at the eaves. The mission of Building 9720-12 is to provide storage for items and materials that have been removed from the Material Access Areas. The western portion of the facility is used for storage of combustibles that contain recoverable amounts of enriched uranium. The storage area is also used for other hazardous materials including RCRA storage, PCBs, and drums of beryllium. Combustible material storage containers include cans, plastic bags, and carbon-steel (208-L) 55-gal drums. Drums containing combustible materials are stored on wooden pallets and are collocated with other combustible materials that are also in drums on wooden pallets.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identified interim corrections associated with Building 9720-12: sprinkler systems are provided in storage areas; a manual fire fighting capability is provided on-site 24 hours/day; and materials are stored in sealed drums.

A.4.4 Building 9201-5

Building 9201-5 is a multi-story, steel frame and concrete structure that was constructed in the early 1940s. The building is a large production/processing facility previously used for depleted uranium and nonuranium processing. Three small storage areas for enriched uranium combustibles have been established on the third floor of the building. The building has several collocated operations, including lithium hydride storage and arc melt operations. The third floor storage area also includes miscellaneous parts, combustibles, and depleted uranium. Combustible materials storage containers include cans, plastic bags, and carbon-steel 208-L (55-gal) drums.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report, identified interim corrections associated with Building 9201-5: sprinkler systems are provided in storage areas; a manual fire fighting capability is provided on-site 24 hours/day; and materials are stored in sealed drums.

A.4.5 Building 9215 Complex

The Building 9215 Complex consists of Buildings 9215 and 9998. Building 9998 is physically attached to the northeast corner of Building 9215. Both are multi-story steel buildings with hollow clay tile walls. Building 9215 was constructed in the early 1940s, and Building 9998 was added shortly thereafter. Both buildings have been expanded and modified over the years. Included in Building 9215 is a Blister Area in the northwest corner of the building where HEU parts and scraps are packaged and shipped. The Blister Area was constructed in the 1970s and is configured as an "L" shaped steel-frame structure with cement block shear walls.

The mission of the Building 9215 Complex is to provide for storage and handling of HEU inventories, to aid in the dismantlement of nuclear weapons, to provide fabricated metal shapes as needed for the nuclear weapons stockpile maintenance, and to support nuclear programs at other U.S. and foreign facilities. Materials stored in Building 9215 are considered to be part of the backlog awaiting processing. Not all of the materials will be processed in Building 9215.

Operations performed in the Building 9215 Complex are rolling and forming in O-Wing and machining of HEU parts in M-Wing. Additionally, the basement contains an HEU storage vault. Third Mill operations include salt-bath heat treating, rolling, shearing, and plate cutting of depleted uranium, depleted uranium alloys, and nonradiological materials. Arc melt operations include sawing, skull casting, and vacuum arc remelting of depleted uranium and depleted uranium alloys. P-Wing operations include forming, heat treating, and rolling of depleted uranium, depleted uranium alloys, and nonradiological materials.

Building 9998 contains H-2 inspection, machining, and storage areas, H-1 foundry (casting of depleted uranium, depleted uranium alloys, and nonradiological materials using induced melting and arc melting processes), and an R&D area. Operations in both areas include the handling, packaging, and transporting of HEU materials and parts. The Blister Area allows collection, packaging, receipt, and shipment of outgoing HEU metal parts, chips, metal scrap, and contaminated combustibles. F-Area/A-Wing operations include metal forming, heat treating, and arc melting of depleted uranium, depleted uranium alloys, and nonradiological materials.

The *Highly Enriched Uranium Working Group Report* (DOE 1996a) noted that there have been 16 reportable occurrences for the Building 9215 Complex partition area. These occurrences include 15 off-normal occurrences and 1 unusual occurrence. The off-normal occurrences include person/clothing contamination (11 cases), inventory difference (1 case), loss of ventilation (1 case), injury (1 case), and loss of facility power (1 case). The unusual occurrence occurred on April 30, 1996, and involved an operator safety requirement violation.

According to the *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report, interim corrections associated with Building 9215 include the packing of machine turnings in coolant to prevent dry out and spontaneous combustion, and the use of vented ship dollies to prevent pressurization due to hydrogen generation.

The Building 9215 Complex is currently operating; all operations have resumed since the 1994 stand-down.

A.4.6 Building 9720-5

Building 9720-5 historically has been used as a warehouse for weapons-related materials and reactor fuel. The facility was built in 1944 and has since been renovated. The current mission is an operating warehouse used for short- and long-term storage of materials, including high-equity uranium, weapons assemblies, reactor fuel, and low-equity materials awaiting recycle.

The facility is a single-story building with a concrete floor elevated about 1 m (4 ft) above local grade; air is exhausted unfiltered through roof-mounted fans. The main warehouse dimensions are approximately 46 by 91 m (150 by 300 ft). Five dock areas serve the transfer of SNM and non-SNM materials to and from approved transport vehicles.

The *Highly Enriched Uranium Working Group Report* (DOE 1996a) raised several concerns about Building 9720-5. These included concerns about potential flooding by a 5,000- or 10,000-year flood, and collapse of the Brookhaven fuel storage vault walls and storage racks during an earthquake. While the potential for fires of sufficient intensity to threaten materials in the vaults is low, the potential for a wide-scale facility fire that would then involve the drums storage in cages was judged to be higher. Differences in construction, operating practices, amount of combustibles, design of the specific storage arrays, and specific locations of the arrays within the buildings means that fire risks are expected to vary among the Building 9720-5 storage arrays.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identified interim corrections associated with Building 9720-5. The partitioned area is covered by wet-pipe sprinkler systems, portable fire extinguishers, and fire alarms; forklift trucks are required to be electrically operated; wooden surfaces are periodically painted with fire retardant paint; and all hot work operations (i.e., cutting, welding, etc.) are controlled by special permit. Use of combustible/flammable liquids in the facility is very limited.

A.4.7 Buildings 9204-2 and 9204-2E

Building 9204-2 was built in 1943 and has been used to support nuclear weapons production since that time. The main structure of the building is structural steel and concrete with freestanding hollow clay tile exterior and interior walls. As a result of a major upgrade program, Lithium Process replacement, some of the major processes and equipment were upgraded in the early 1990s. In addition, a portion of Building 9204-2 is being modified for storage of HEU materials.

Building 9204-2E, which comprises the major portion of the building partition, is a multi-story facility, reinforced concrete slab structure built in 1971 to house weapon assemblies. Exterior walls on the first floor are reinforced concrete, but are clay tile and concrete block with brick veneer on the second and third floors. Interior walls are also clay tile and concrete block. Major assembly and disassembly facilities are located in Building 9204-2E. According to the *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) report, the building is generally in good condition except for a structural problem with the west wall and deterioration of the third floor from Kathene leakage.

Four current HEU activities at 9204-2E include:

- Assembly of new or replacement weapons
- Quality certification of components and assemblies
- Disassembly of retired weapons assemblies
- Storage of retired assemblies, subassemblies, and components

Assembly and disassembly operations areas, five vault-type rooms, and one vault are located in Building 9204-2E. Most of the HEU is composed of metal pieces or weapons components. According to the *Highly Enriched Uranium Working Group Report* (DOE 1996a), significant quantities of various hazardous materials are collocated with HEU in the operations areas.

Barriers to exposure of workers or the public to radiation or chemical hazards or to releases of radioactive materials to the environment include packages and containers, and vault and/or room walls; and some operations employ gloveboxes, hoods, and ventilation systems with high-efficiency particulate air (HEPA) filters. Both Buildings 9204-2 and 9204-2E are protected by smoke and heat detectors, sprinklers, and alarm systems. Operations and storage activities are conducted by procedure in accordance with criticality safety approvals that incorporate double contingency. At least two independent criticality alarm systems cover each HEU area to annunciate a criticality accident.

According to the *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report, interim corrections associated with these buildings includes fixed fire suppression systems and smoke alarms; ventilation, both for recirculating and exhausting, is HEPA filtered; the ventilation system includes a smoke removal system; uranium chips are packed in coolant to prevent dry out and spontaneous combustion; machining and work with lithium hydride, lithium deuteride, and uranium are conducted in controlled atmospheres to prevent ignition; and machining is conducted under exhaust hoods in conjunction with respirator use to prevent internal contamination.

A.4.8 Building 9204-4

Building 9204-4 was built in 1943 and is a three-story structure (including the basement level) 73 by 112 by 27 m (240 by 368 by 87 ft). The main structure is steel and concrete. The roof is constructed with precast concrete roof planks over structural steel beams. The exterior and original interior walls are constructed of 30 cm (12 in) of hollow clay tile with no attachment between the walls and structural slabs or beams. Building 9204-4 has complete fire detection and fire suppression coverage.

Areas within Building 9204-4 can be functionally classified as follows: (1) quality evaluation of current weapons production programs and disassembly of obsolete weapons; (2) metal-working operations (forging, forming, heat treating) and grit blast cleaning of depleted uranium, depleted uranium alloys, and metals such as steel and aluminum; (3) a Bonded Storage Area (occupying approximately 929 m^2 [10,000 ft^2]) and vault-type room for storage of SNM (occupying approximately 557 m^2 [6,000 ft^2]); (4) radiography, ultrasonic, and other nondestructive testing (NDT); and (5) a plating area. The only active operational areas involving HEU within Building 9204-4 are quality evaluation, assembly, and storage in the vault-type room and the Bonded Storage Area. The plating area, while shut down, contains residual materials. The Bonded Storage Area and the vault-type room are set aside for storage of HEU in drums.

Key safety features of Building 9204-4 include a criticality alarm system and detectors. Two criticality detectors are located in Building 9204-4: one in the quality evaluation area (on the second floor) and the other adjacent to the Bonded Storage Area (on the first floor). The building is equipped with a fire detection and fire suppression system consisting of wet-pipe sprinklers. The ventilation exhaust system is HEPA-filtered. Additionally, the quality evaluation and disassembly areas are equipped with HEPA-filtered gloveboxes for use in performing a limited number of operations.

HEU is normally stored within specially designed packages and containers except when quality evaluations or disassembly operations are being performed. A variety of packaging configurations for HEU-bearing materials is used. For relatively pure metal and weapons components, packaging configurations include (1) 114 208-L (30 55-gal) drums and overpacks designed to U.S. Department of Transportation (DOT) requirements with weapons components or canned subassemblies, (2) metal stored in cans with birdcages, (3) metal components or canned subassemblies with special metal vessels designed for use in quality

evaluation operations, and (4) metal in slip-lid cans. Sealed and unsealed polypropylene bottles are used for low concentration HEU solutions or mop water, respectively. Polyethylene bags contain paper, plastic, mop heads, and other miscellaneous combustible materials used in the process areas. The total number of HEU storage containers within the quality evaluation and disassembly partition is approximately 100, with the majority (<60 percent) being 208-L (55-gal) drums and polyethylene bags of combustibles. Storage of HEU in the process areas is minimal due to criticality safety approval limitations.

Storage configurations range from drum arrays in vaults to cans and bottles stored on transport carts and dollies within vault-type cages. Polyethylene bags are stored within the process areas or consolidated into 208-L (55-gal) drums prior to shipment from the facility.

Building 9204-4 press operations include the forming of depleted uranium, depleted uranium alloys, and non-radiological materials using 7,500-ton, 1,500-ton, and 1,000-ton presses.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identified interim corrections associated with this building to include fixed fire suppression systems and smoke alarms which alarm locally and to remote continuously monitored locations; ventilation, both recirculating and exhausting, is HEPA filtered; uranium chips are packed in coolant to prevent dry out and spontaneous combustion; machining and work with lithium hydride, lithium deuteride, and uranium are conducted in controlled atmospheres to prevent ignition; and machining is conducted under exhaust hoods in conjunction with respirator use to prevent internal contamination.

A.4.9 Building 9995

Building 9995, the Analytical Chemistry Organization (ACO), is a multistory 37 by 10 m (123 by 361 ft) facility that was constructed in 1952. It is a steel-frame structure with hollow clay tile and concrete block walls on reinforced concrete foundation. A 2-inch-thick gypsum roof deck covers the majority of the building with concrete on the remainder. The building is within the Y-12 PIDAS area. Building 9995 has had two major expansions since it was originally constructed. A south addition was added in 1969 that is currently used for analytical development. An annex office area was added in 1981. The roof on the main structure was replaced in the early 1970s. The primary operations area is divided between first-floor and basement levels. Two service elevators connect the various floors of the building; the elevators are original equipment and according to the draft report, *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999), they are not code compliant.

Building 9995 is equipped with approximately 150 chemical fuming hoods with supporting heating, ventilation, and air conditioning (HVAC) systems that form the primary engineered safety feature. Most chemical fume hoods in the building are original equipment; limited hood upgrades have been performed and approximately 20 hoods were replaced in the mid-1980s with additional units having been added or replaced at various times during laboratory alteration projects. There are 52 separate supply and exhaust systems; however, most air is supplied by seven major air handling units that provide conditioned, filtered air to the various rooms in Building 9995. Five major exhaust fans support hoods, and each hood is fitted with a continuous flow monitor to allow convenient confirmation of hood flow before use. The ventilation system in Building 9995 is a zoned, once-through system that provides more than six air exchanges per hour.

The facility was designed for, and is currently used as, an analytical chemistry laboratory, providing analytical support for DP, Work-for-Others, and operation and maintenance (O&M) contractor, regulatory compliance programs. The total facility is restricted to a maximum of 5 kg (11 lb) of HEU for criticality safety. Analyses associated with HEU include impurities by emission spectroscopy, x-ray fluorescence spectrometry or Davies-Gray titration, carbon analysis by LECO carbon analyzer, and isotopic analysis by thermal oxidation mass spectrometry. Control of enriched uranium is facilitated by bar coding of samples

and by a computer system for recording the location of materials within the facility. Most work is done in hoods. The area is provided with sprinklers in the event of a fire.

The *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report indicates that special facilities located in Building 9995 include the Lithium Preparation Room, Argon-purged gloveboxes, and a gas-mixing laboratory. The Lithium Preparation Room has its own roof-mounted HVAC system, independent of the rest of the building; the room atmosphere is humidity controlled at 10 percent relative humidity in the winter and 15 percent in the summer to limit hydrolysis of reactive lithium or lithium compounds. Agron-purged gloveboxes are provided in several laboratories for handling materials that require dry inert atmospheres; these are self-contained systems, and mostly include filters and desiccant systems to maintain and dry the recirculating argon while others are once-through argon-purge types. A gas-mixing laboratory is located in the room off Dock 11 in Building 9995; ACO personnel mix gases in cylinders for use by various Y-12 operations.

Fire protection for Building 9995 is provided by the Y-12 Fire Department. The building is also protected by a sprinkler system, an alarm system, and by departmental procedures. An alarm system located on the first floor of Building 9995 responds to the sprinkler trip alarm, glovebox heat detectors, pull boxes, and other heat detectors located in the building. In the event of a fire, it is expected to be restricted to a limited area and, because of the small amount of enriched uranium present, is not expected to have large radiological consequences. Chemical reactions resulting from the mixing of incompatible chemicals are expected to be minimal because the sample sizes are limited and operations are performed according to procedures. Safety showers are readily available throughout the laboratory.

The *Highly Enriched Uranium Vulnerability Assessment Corrective Action Plan for the Oak Ridge Y-12 Plant* (LMES 1997) report identified interim corrections associated with Building 9995 to include the location of sprinkler systems throughout the process and storage areas; flammable liquids are stored in approved flammable storage cabinets; limited quantities of gases and solvents are maintained in inventory; and portable fire extinguishers are found throughout the areas, as are cans of fire suppressant carbon in areas where chip fires are possible.

A.4.10 Buildings 9119, 9983, and 9710-3

The HEU calibration standards and test facilities are in Buildings 9119, 9983, and 9710-3. Building 9119 is an office building built of noncombustible materials and located in the western end of Y-12. The current mission of the building supports a variety of DP-related organizations. HEU sources are stored in this building in a Nuclear Materials Control and Accountability Vault. The sources are used for the calibration of nondestructive assay (NDA) equipment. Building 9983 is a small wooden frame storage building located next to Building 9711-1 in the eastern half of Y-12. Radiological control instrument calibrations are performed in Building 9983. Y-12 personnel use these sources for calibration purposes and to store sources awaiting disposal. Building 9710-3 is an office building constructed of noncombustible materials and is located in the eastern section of Y-12. This building houses the Protective Services Force which uses these sources to test the portal monitors at Y-12.

According to the *Highly Enriched Uranium Working Group Report* (DOE 1996a), HEU sources in Building 9119 are stored in fireproof safes with combination locks. The Y-12 personnel store the sources in a cabinet in Building 9983. Both buildings are protected with automatic sprinkler systems. Protective Service personnel lock the sources in Building 9710-3 in a file cabinet; the building is also protected by an automatic sprinkler.

A.4.11 Building 9201-5W

Building 9201-5W is a single-story structure 79 by 80 m (258 by 263 ft) built in 1967. The main structure is steel and concrete with brick veneer. The major portion of Building 9201-5W is a large machine shop area containing machining equipment and controls with nominal storage for in-process parts and materials. Offices for shop supervision are provided on a mezzanine. The building is used as a machine shop and performs machining, plating, and support operations (including NDT and dimensional inspections) of depleted uranium, depleted uranium alloys, and nonradiological materials. Currently, the facility is on standby awaiting refurbishment.

A.4.12 Building 9201-5N

Building 9201-5N is a one-story steel and concrete building 55 by 101 m (182 by 331 ft) with a basement that was built in 1972. It is connected to Building 9201-5W via an underground tunnel for transport of materials and parts. The building is protected by smoke and heat detectors, sprinklers, and an alarm system.

Activities conducted in Building 9201-5N include:

- Electroplating of parts
- Machining of depleted uranium and stainless steel parts
- Dimensional inspection of parts
- Nondestructive evaluation (x-ray and density) of parts
- Beryllium machining

Barriers to exposure of workers or the public to radiation or chemical hazards or to releases of radioactive or toxic materials to the environment include gloveboxes, hoods, and ventilation systems with HEPA filters. Ventilation exhaust stacks are monitored for radiological materials as appropriate.

A.4.13 Buildings 9202 and 9203

Building 9202 was built in 1954 and is a two-story building 55 by 110 m (182 by 360 ft) with a basement and a four-story laboratory wing. The structure is steel and concrete with a brick veneer over the office at the front of the building. An addition, which houses a welding laboratory, was added in 1972. According to the *Y-12 Site Integrated Modernization Deployment Study* (Y-12 1999) draft report, a small beryllium blank forming area is operated in Building 9202. Activities conducted in Building 9202 include development of material and metallurgical synthesis, forming, and evaluation techniques and processes.

Building 9203 was built in 1944 and is a two-story building 51 by 60 m (166 by 176 ft) long with a basement. The structure is steel and concrete with a brick veneer over the office at the front of the building. Activities conducted in Building 9203 include development of processes for material characterization as well as measurements, and instrumentation and control.

A.4.14 Building 9996

Building 9996 is a three-story structure 25 by 78 m (82 by 256 ft) that was built in 1955. The main structure is steel and concrete with brick veneer. Building 9996 is used as a tooling and material storage facility to support operations in immediately adjacent portions of Building 9212.

A.4.15 Building 9201-1

Building 9201-1 is a two-story structure 84 by 162 m (276 by 530 ft) built in 1944. The main structure is steel and concrete with brick veneer. Building 9201-1 is a large, general machine shop with several areas containing machining equipment and controls. Nominal storage for in-process parts and materials and offices for supervision are also provided. The building is used as a general machine shop for nonuranium metal and graphite parts.

A.5 WASTE MANAGEMENT ACTIVITIES

This section summarizes information for facilities used to manage the various waste streams generated at the Y-12 National Security Complex; including LLW, mixed LLW, RCRA-hazardous waste, TSCA-regulated waste, and nonhazardous waste. Some inactive facilities that were closed recently and facilities that are expected to operate in the near future (within 3 years) are included here as well.

The majority of waste management facilities at Y-12 are operated under the EM Program, but some are managed by DP. Waste management facilities are located in buildings, or on sites, dedicated to their individual functions, or are collocated with other waste management facilities or operations. Many of the facilities are used for more than one waste stream (see Figure A.5–1).

DOE is authorized to manage radioactive waste that it generates under the *Atomic Energy Act of 1954*. LLW is generated during many plant operations including, machining operations that use stock materials such as steel, stainless steel, aluminum, depleted uranium, and other materials. DOE stores, treats, and repackages, but does not dispose of, LLW at Y-12. The majority of the LLW generated at Y-12 is otherwise uncontaminated scrap metal and machine turnings and fines. Waste treatment provides controlled conversion of waste streams generated from operations to an environmentally acceptable, or to a more efficiently handled or stored, form. This activity includes continuing O&M of facilities that treat wastewater and solid waste generated from production and production support activities. LLW at Y-12 is managed in accordance with DOE Orders (e.g., DOE Order 435.1), policy, and guidance related to management of radioactive waste. Management of this waste is not directly regulated by EPA or TDEC. Waste minimization and planned treatment facilities are expected to continue reducing the magnitude of these wastes.

The TDEC Division of Solid Waste Management (DSWM) regulates management of both hazardous and non-hazardous waste streams under RCRA. The major sources of hazardous waste are plating rinsewaters, waste oil, and solvents from machining and cleaning operations; contaminated soil, soil solutions, and soil materials from RCRA closure activities; and waste contaminated with hazardous constituents from construction/demolition activities. Facilities used to store or treat RCRA-hazardous waste at Y-12 are regulated by the DSWM as authorized by the EPA. These facilities may also be used to manage mixed waste (waste that is RCRA-hazardous and radioactive). Mixed waste is generated from site development, sampling, metal preparation, fabrication, enriched and depleted uranium operations, assembly, and industrial engineering functions at Y-12. Mixed waste is put in storage awaiting treatment or disposal, treated at Y-12, or sent to another ORR facility for treatment and disposal. There are no facilities for the disposal of RCRA-hazardous or mixed waste currently in operation at Y-12. Some disposal of RCRA-hazardous and mixed wastes is done at a permitted off-site commercial facility.

FIGURE A.5–1.—*Major Environmental Management Facilities at Y-12.*

Major activities that generate nonhazardous waste include construction and demolition activities that produce large volumes of non-contaminated wastes, including lumber, concrete, metal objects, and soil and roofing materials. Industrial trash is generated by daily operations throughout the Plant. These operations include janitorial services, floor sweepings in production areas, and production activities. Storage and physical treatment (e.g., shredding, compaction) of non-hazardous waste does not generally require a permit under RCRA. There are three landfills in operation for disposal of non-hazardous waste at Y-12. These disposal facilities are regulated by the TDEC DSWM.

PCB-containing waste is generated at Y-12 during spill cleanup and stabilization activities as part of ongoing O&M actions. TSCA-regulated waste that contains PCBs is managed at Y-12 in accordance with EPA regulations (40 CFR 761) and with a Federal Facilities Compliance Agreement (FFCA) for managing PCBs on the ORR (EPA, August 19, 1997). Per the FFCA between the EPA and DOE, ORR waste containing PCBs may be stored in TSCA-compliant facilities. Provisions in 40 CFR 761.65 allow storage of PCB-contaminated materials in RCRA-compliant storage facilities under certain circumstances. Therefore, TSCA-regulated waste is often collocated with RCRA-hazardous waste at Y-12.

Waste management functions are generally identified as storage, treatment, or disposal. Facilities, or waste management units, may be permitted or designated for one or more waste stream and function. The following description of waste management facilities at Y-12 are grouped by functional program area and focus on facilities currently available for waste management at Y-12.

A.5.1 Waste Storage at Y-12

The following text and Table A.5.1–1 (located at the end of Section A.5.1) summarize waste storage capabilities at Y-12 and are ordered by ascending building number. Information on these facilities is based on the following references: Bechtel Jacobs 2000, LMES 2000, and PAI 1996.

A.5.1.1 *Cyanide Treatment Unit*

The Cyanide Treatment Facility in Building 9201-5N has a small (8 m^3) storage area associated with it. This facility is described in Section 5.2.7.

A.5.1.2 *Storage for Mixed Waste Residue/Ash*

Buildings 9212 and 9206 provide container storage areas for mixed waste residue or ash. A RCRA operating permit was issued on September 28, 1995 for these two units. The ash resulted from the burning of solvent- and uranium-contaminated solid wastes. The ash does not contain free liquids. Uranium-bearing solutions generated during the uranium recovery process (Building 9818) and laboratory analyses are also stored in these areas. These solutions, as well as the residue, are mixed (hazardous and radioactive) wastes and are being stored prior to further uranium recovery. Occasionally, uranium-bearing materials generated off-site may be stored in Buildings 9212 and 9206, prior to uranium recovery at Building 9212. Although a Phaseout/Deactivation Program Management Plan has been approved by DOE for Building 9206, and the recovery operations within this facility will no longer be operated, this building will continue to store hazardous and mixed waste for several years into the future.

A.5.1.3 *Building 9212 Tank Farm*

Building 9212 Tank Farm, a RCRA permit-by-rule facility, has never been placed in operation, but there are future plans to do so when Enriched Uranium Operations are restarted. The facility consists of three dikes containing four 37,854 L (10,000 gal) stainless-steel tanks that will eventually be used to collect nitrate waste from Building 9818 operations before being transferred to the West End Tank Farm (WETF).

A.5.1.4 *Liquid Storage Facility*

The Liquid Storage Facility is a hazardous and mixed waste storage and pretreatment facility built during the Bear Creek Burial Ground closure activities. It is located in Bear Creek Valley approximately 3 km (2 mi) west of Y-12, and operates under RCRA permit-by-rule. It collects, stores, and pre-treats groundwater and other wastewater received from the Bear Creek Burial Ground seep collection system, the Disposal Area Remedial Actions Solid Storage Facility, tankers, polytanks, and a water collection/storage tank in the diked area to accommodate rainfall accumulation. Feed streams may contain oil contaminated with PCBs, VOCs, non-VOCs, and heavy metals. Most equipment is in an outdoor, containment area and includes: two 284,000 L (75,000 gal) bulk water storage tanks; a 22,700 L (6,000 gal) oil storage tank; gravity separator; two filtering units; composite monitoring station; and tanker transfer station. Collected liquids are pre-treated by traveling through the gravity separator, filters, and composite monitoring station prior to entering bulk storage tanks. The wastewater is then transferred by tanker to the Groundwater Treatment Facility for further treatment.

A.5.1.5 *Containerized Waste Storage Area*

The Containerized Waste Storage Area (Buildings 9500-120, 9500-121, and 9500-149) consists of three concrete pads covering approximately 2,320 m^2 (24,800 ft^2). An impermeable dike for spill containment surrounds each pad. The area was previously RCRA-permitted and closed. It is currently being used for LLW storage.

A.5.1.6 *PCB and RCRA Hazardous Drum Storage Facility*

Building 9720-9 is a 1,161 m^2 (12,500 ft^2), single-story, prefabricated metal building with slab on grade built in 1955. The facility provides a drum storage area for mixed and PCB waste, including an area for flammable waste. The building is used to store both RCRA and PCB mixed waste.

A.5.1.7 *Container Storage Facility*

Building 9720-12, a Container Storage Facility, also called the LLW Storage Areas, provides storage for mixed (hazardous and radioactive) waste residue, ash, and combustibles. It also contains some classified waste. A RCRA operating permit was issued on September 28, 1995. The ash is produced from burning solvent- and uranium-contaminated wastes. Unburned solvent- and uranium-contaminated solid wastes are also stored in Building 9720-12. The waste at Building 9720-12 contains no free liquids and is typically generated during the uranium recovery process. Some of this waste is also stored in Buildings 9212 and 9206, as described above.

A.5.1.8 *Classified Waste Storage Facility*

The Classified Waste Storage Facility (Building 9720-25) is a 1,635 m^2 (17,600 ft^2), single-story building with masonry-bearing walls and a precast concrete roof system built in 1962. It provides storage for PCB waste, LLW and mixed LLW, which is classified for national security purposes under provisions of the *Atomic Energy Act*. A RCRA operating permit was issued on September 28, 1995. The facility meets Y-12 security requirements for classified waste management and guidelines for the management of LLW and mixed LLW.

A.5.1.9 *PCB Storage Facility*

The PCB Storage Facility (Building 9720-28) provides storage capability for PCB waste, primarily PCB-containing ballasts. Building 9720-28 is a 335 m^2 (3,600 ft^2), single-story building with masonry-bearing walls and a structural steel roof built in 1984.

A.5.1.10 *RCRA and Mixed Waste Staging and Storage Facility*

The RCRA Staging and Storage Facility (Building 9720-31) is a 610-m^2 (6,571 ft^2), single-story building with masonry-bearing walls and a precast concrete roof system built in 1986. A RCRA permit was issued on September 28, 1995. Solid, liquid, and sludge wastes are prepared for off-site shipment at this facility. The facility consists of seven storage rooms and seven staging rooms, each with a separate ventilation system. The staging rooms house small containers that are packed with compatible materials and shipped. The storage rooms hold larger containers, such as 208 L (55 gal) drums.

A.5.1.11 *Production Waste Storage Facility*

The Production Waste Storage Facility (also a Container Storage Area, Building 9720-32) has not yet been used for storage, but future use is planned. The building is separated into two areas, a smaller one for ignitable RCRA waste, and a larger area for non-ignitable waste. Both areas have curbing and may be used for containerized liquids if stored on self-containing pallets. A RCRA operating permit for the facility was issued September 3, 1996 for storage of hazardous and mixed waste. This facility houses the nondestructive assay equipment for Y-12 and has a design capacity for storage of 616,968 gal (2,335 m^3).

A.5.1.12 *Low-Level Waste Storage Pad*

The Low-Level Waste Storage Pad is located in the Sludge Handling Facility (Building 9720-44) which originally provided water filtration and sludge dewatering to support a storm sewer cleaning and relining project. The facility is currently being used to store containers of LLW sludge.

A.5.1.13 *Liquid Organic Solvent Storage Facility*

The Liquid Organic Waste Storage Facility (Building 9720-45, OD-10) is a 209 m^2 (2,250 ft^2) single-story pavilion with metal posts and roof panels, built in 1987. A RCRA permit was issued on September 30, 1994. It contains four 24,600 L (6,500 gal) and two 11,400 L (3,000 gal) stainless-steel tanks for storage of ignitable non-reactive liquids, including those contaminated with PCBs and uranium. In addition, a diked and covered storage area provides space for 40,000 L (10,600 gal) of containerized waste. The facility is set up for segregating various spent solvents for collection and storage. Major solvent waste streams are transferred to tanks until final disposition.

A.5.1.14 *RCRA and PCB Container Storage Area*

The RCRA and PCB Container Storage Area (Building 9720-58) is a 390 m^2 (4,200 ft^2), single-story, prefabricated metal building with metal wall panels built in 1987. It holds a RCRA permit issued on September 28, 1995. It is a warehouse facility used for staging prior to treatment or disposal of PCB- and RCRA- contaminated equipment (e.g., transformers, capacitors, and electrical switchgear) and non-reactive, non-ignitable RCRA, mixed, and PCB waste.

A.5.1.15 *Classified Container Storage Facility*

The Classified Container Storage Facility (Building 9720-59, also a Production Waste Storage Facility) is a 1,403 m^2 (15,105 ft^2), single-story, prefabricated metal building with metal wall panels. Building 9720-59 was issued a RCRA permit on September 3, 1995 and stores both RCRA and PCB wastes.

A.5.1.16 *Disposal Area Remedial Action Solid Storage Facility*

The DARA Solid Storage Facility (Building 9 720-60) provides 1,625 m^2 (17,500 ft^2) of storage space for PCB-, RCRA-, and uranium-contaminated soil. The facility has a synthetic liner for leachate collection and a leak detection system. Collected leachate is transferred to the Liquid Storage Facility for pretreatment. The DARA Solid Storage Facility is an interim status facility under RCRA, but is now being managed through the CERCLA process. No additional wastes are being added to the facility.

A.5.1.17 *OD7 Waste Oil Storage Tank Area*

Building 9811-1, houses three areas for storage of RCRA liquids (OD7, OD8, and OD9), and is an 81 m^2 (874 ft^2) single-story prefabricated metal building with metal wall panels, built in 1986. OD7 contains a diked storage area for tanks (permitted September 30, 1994). The OD7 contains four 114,000 L (30,000 gal) tanks, two 37,900 L (10,000 gal) tanks, and associated piping and pumps. The OD7 facility is now inactive and there are no plans to use it in the future.

A.5.1.18 *OD8 Waste Oil/Solvent Drum Storage Facility*

The Waste Oil Solvent Drum Storage Facility (Building 9811-1, OD8) was issued a RCRA permit on September 28, 1995. It has a capacity for 750,208 L (55 gal) drums and a smaller number of Tuff tanks. RCRA waste oil/solvent mixtures containing various concentrations of chlorinated and nonchlorinated hydrocarbon solvents, uranium, trace PCBs, and water for specific chemical constituents are stored at OD8 in 208 L (55 gal) drums and 1,140 L (300 gal) Tuff tanks.

A.5.1.19 *OD9 Waste Oil/Solvent Storage Facility*

The Waste Oil/Solvent Storage Facility (Building 9811-1, OD9) is a RCRA-permitted (September 30, 1994) storage facility that houses LLW, mixed LLW, and hazardous waste, including PCBs. It consists of a diked area supporting five 151,000 L (40,000 gal) tanks, a tanker transfer station with five centrifugal transfer pumps, and a drum storage area. Four tanks house PCB and RCRA wastes contaminated with uranium. A fifth tank is empty. A diked and covered pad furnishes space for 33 m^3 (1,165 ft^3) of containerized waste. The diked area contains additional space for a sixth 151,000 L (40,000 gal) tank.

A.5.1.20 *Organic Handling Unit*

The Organic Handling Unit in Building 9815 has a small (8 m^3) storage area associated with it. This facility is described in Section 5.2.6.

A.5.1.21 *Depleted Uranium Oxide Storage Vaults I and II*

The Depleted Uranium Oxide Storage Vaults I and II (Buildings 9825-1 and -2 oxide vaults) are located on Chestnut Ridge northeast of Building 9213. The vaults are constructed of reinforced concrete and provide a retrievable storage repository for uranium oxide, uranium metal, and a blended mixture of uranium sawfines and oxide. The vaults contain a negative pressure exhaust system that operates during material entry. The exhaust is filtered and monitored prior to its release to the atmosphere. The facility uses forklift trucks, electric hoists, and a motorized drum dumper. Waste is no longer accepted in the vaults. Building

9809-1 is also being used as storage for drummed, depleted uranium oxide materials; it is a 111 m^2 (1,200 ft^2), single-story building with masonry-bearing walls and a structural steel roof system built in 1990.

A.5.1.22 *West Tank Farm*

The West Tank Farm provides storage for mixed and LLW sludge and is associated with the WETF. It operates under RCRA permit-by-rule. The West Tank Farm includes thirteen 1.89 million L (500,000 gal) tanks. Six are utilized as process bioreactors, and three serve as holding tanks for an effluent polishing system. The remaining four tanks hold sludges that are RCRA-hazardous due to either listing or characteristic. Currently, one tank is empty and one is being emptied. In addition, three 378,541 L (100,000 gal)tanks provide storage for radioactively contaminated calcium carbonate sludge generated as a result of WETF processes.

A.5.1.23 *Oil Landfarm Soil Storage Facility*

The Oil Landfarm Soil Storage Facility is a RCRA-interim status facility containing approximately 1,377 m^3 (14,832 ft^3) of soil contaminated with PCBs and volatile organics (DOE 1993). The soil was excavated from the Oil Landfarm and Tributary 7 in 1989. The soil is contained in a covered, double-lined concrete dike with a leak-detection system. The leak-detection system will soon be modified to enhance detection capabilities.

A.5.1.24 *Old Salvage Yard*

The Old Salvage Yard, located at the west end of Y-12, contains both low-level uranium-contaminated and non-radioactive scrap metal. Most scrap currently sent to this area is contaminated. The Contaminated Scrap Metal Storage is an area within the Old Salvage Yard that is used to store uranium-contaminated scrap metal Contaminated scrap is placed in approved containers and eventually will be transferred to the aboveground storage pads or shipped off site for disposal. Non-contaminated scrap is sold when allowed.

A.5.1.25 *Salvage Yard*

The Salvage Yard is used for the staging and public sale of nonhazardous, non-radioactive scrap metal that has been approved by DOE for release. It consists of a 3.2 enclosed hectare (ha) (8 acres); 0.4 ha (1 acre) is paved. The New Salvage Yard provides accumulation and sorting space for the scrap metal. This facility is located on the north side of Bear Creek Road, near the Bear Creek Burial Grounds.

TABLE A.5.1–1.—*Storage Capabilities for Hazardous, Low-Level and Mixed Low-Level Waste at Y-12* [Page 1 of 4]

Facility Number/Name [a]	Waste Streams Stored [b]	Capacity [c]	Comment
Building 9201-5N, Cyanide Treatment Facility	Cyanide spent plating batches, mixed LLW	8 m^3 2,200 gal	RCRA permit issued September 28, 1995. Small Storage area. Primarily treatment facility for hazardous and mixed wastes (Table A.5.2-1 and Section A.5.2.7).
Building 9206, Container Storage Area	LLW and mixed LLW consisting of uranium-contaminated liquid, residue, and ash	15 m^3 3,975 gal	RCRA permit issued September 28, 1995
Building 9212, Container Storage Area	LLW and mixed LLW consisting of uranium-contaminated liquid, residue, and ash	15 m^3 3,814 gal	RCRA permit issued September 28, 1995. Hazardous waste will continue to be stored here for several years into the future
Building 9212, Tank Farm	Nitrate-bearing wastewater also containing hazardous and radioactive constituents	151 m^3 40,000 gal	RCRA permit-by-rule. Not yet in operation, but use is planned
Liquid Storage Facility	Liquid hazardous and mixed LLW	416 m^3	RCRA permit-by-rule. Also a pre-treatment unit (Table A.5.2-1). Provides temporary storage before treatment
Buildings 9500-120, 9500-121, and 9500-149 Containerized Waste Storage Area	LLW planned for Above Grade Storage	632 m^3 8443,060 gal 134,640 lgal	Three concrete pads. Formerly RCRA permitted, but now RCRA closed. No permit required
Building 9720-9, PCB and RCRA Hazardous Drum Storage Facility	PCB/RCRA/radioactive waste	1,404 m^3 370,800 gal 202,770 lgal	RCRA permit issued September 28, 1995
Building 9720-12, Container Storage Facility aka Low-level Waste Storage Areas	Solid LLW and mixed LLW	123 m^3 32,500 gal	RCRA permit issued September 28, 1995. Also contains hazardous and nonhazardous classified waste
Building 9720-25, Classified Waste Storage Area	Classified solid LLW and mixed LLW	198 m^3 32,470 gal 19,770 lgal	RCRA permit issued September 28, 1995

TABLE A.5.1–1.—*Storage Capabilities for Hazardous, Low-Level and Mixed Low-Level Waste at Y-12* [Page 2 of 4]

Facility Number/Name [a]	Waste Streams Stored [b]	Capacity [c]	Comment
Building 9720-28, PCB Storage Facility aka Waste Materials Preparation Facility	PCB waste	NA	Permit not required. Managed per 40 CFR 761 and EPA Compliance Agreement
Building 9720-31, RCRAand Mixed Waste Staging and Storage Facility	PCB/RCRA/radioactive waste	170 m^3 177,630 gal 101,990 lgal	RCRA permit issued September 28, 1995
Building 9720-32, Container Storage Area/Production Waste Storage Facility	RCRA ignitable and hazardous waste	2,335 m^3 616,968 gal	RCRA permit issued September 3, 1996. Has not yet been used, but use is planned
Building 9720-44, LLW Storage Pad	LLW sludge	NA	Building was formerly used for sludge dewatering project and now is used only for storage of low-level sludge.
Building 9720-45, OD-10, Liquid Organic Solvent Storage Facility	Liquid and solid mixed LLW. Waste oil, combustible and flammable liquids. Ignitable, non-reactive and radioactive waste	198 m^3 32,000 gal 10,560 gal	RCRA permit issued September 30, 1994
Building 9720-58, RCRA and PCB Container Storage Area	PCB-contaminated equipment, RCRA mixed waste	1,130 m^3 177,630 gal 120,860 lgal	RCRA permit issued September 28, 1995
Building 9720-59, Classified Waste (Container) Storage Area	PCB/RCRA/radioactive waste	1,090 m^3 287,943 gal	RCRA permit issued September 3, 1996
Building 9720-60, DARA Solid Storage Facility	Solid mixed LLW including PCB-contaminated waste	3,058 m^3 807,840 gal	RCRA permit application submitted June 1993. RCRA interim status. Facility full as of August 1994. Contains contaminated soil. Currently within the Environmental Restoration Program

TABLE A.5.1–1.—*Storage Capabilities for Hazardous, Low-Level and Mixed Low-Level Waste at Y-12* [Page 3 of 4]

Facility Number/Name [a]	Waste Streams Stored [b]	Capacity [c]	Comment
Building 9811-1, OD-7, Waste Oil Storage Tank Area	RCRA organics and mixed LLW contaminated with Beryllium	530 m^3 140,000 gal	RCRA permit issued September 30, 1994. Inactive unit, not currently planned for future use
Building 9811-1, OD-8, RCRA Storage Facility Waste Oil Solvent Drum Storage Facility	Liquid and solid hazardous waste, LLW and mixed LLW	723 m^3 102,100 gal 89,050 lgal	RCRA permit issued September 28, 1995
Building 9811-8, OD-9, Waste Oil/Solvent Storage Facility	LLW, Liquid mixed LLW (including PCBs), and hazardous waste. Non-ignitible, non-reactive oils/solvents, some with chlorinated organics	790 m^3 200,000 gal 8,800 gal	RCRA permit issued September 30, 1994. Site includes five storage tanks. Includes 33 m^3 of storage for drums
Building 9815, Organic Handling Unit	Liquid hazardous waste, solvents and mixtures containing RCRA hazardous constituents	8 m^3 2,500 gal	Storage space added to permit for treatment unit (Table A.5.2-1 and Sect. A.5.2.6) on November 19, 1997
Depleted Uranium Storage Vaults I and II (Buildings 9825-1 and 2 oxide vault) and Building 9809	Solid LLW (depleted uranium oxides and sawfines)	1,020 m^3	Two vaults of reinforced concrete no longer accept waste. Air permit for vaults. Building 9809 takes containerized depleted uranium oxide materials
West Tank Farm	Mixed LLW (sludge)/LLW sludge	25,741 m^3 6,800,000 gal	RCRA permit by rule. Storage associated with WETF (Table A.5.2-1 and Sect. A.5.2.5)
Building 9830-2 through 7, Above grade Low-level Waste Storage Facility	Solid LLW	7,130 m^3	Six aboveground pads for LLW awaiting completion of EMWMF. No permit required
Oil Landfarm Soil Storage Facility (Containment Pad)	Solid mixed waste contaminated with PCBs and volatile organics (soils excavated from Oil Landfarm closure)	536 m^3 115,117 gal	RCRA application submitted June 1993. Interim status. No new wastes being stored

TABLE A.5.1–1.—*Storage Capabilities for Hazardous, Low-Level and Mixed Low-Level Waste at Y-12* [Page 4 of 4]

Facility Number/Name [a]	Waste Streams Stored [b]	Capacity [c]	Comment
H-1 Salvage Yard, Contaminated Scrap Metal Storage Area (Old Salvage Yard)	Solid LLW (uranium-contaminated scrap)	4,740 m^3	No permit required. Scrap is containerized for later transfer to aboveground storage pads
New Salvage Yard	Non-hazardous, non-radioactive scrap metal	1 ac paved 8 ac enclosed	Accumulation area for scrap metal that is sold to the public. May not be classified as waste by regulatory definition, but included here for informational purpose

[a] Facility names may vary slightly between references. Both names are presented in a few instances to avoid confusion.
[b] The term "solid" as used here describes physical state, not a regulatory classification.
[c] Capacity (m^3 - cubic meter; gal- gallons; lgal - liquid gallons) refers to design capacity as indicated in a database of RCRA interim status and active units at Y-12 that is maintained and used for RCRA annual reporting. The database design capacities are in gallons and have been converted to m^3 for comparability with other waste information. Non-RCRA unit capacities were obtained from other sources, primarily DOE, 1996.
Notes: EMWMF - Environmental Management Waste Management Facility; DARA - Disposal Area Remedial Action;
Sources: Bechtel Jacobs 2000, LMES 2000, PAI 1996.

A.5.2 Treatment of Waste at Y-12

Table A.5.2–1 (located at the end of Section A.5.2) summarizes waste treatment capabilities at Y-12 by facility. Information on these facilities is based on the following references: Bechtel Jacobs 2000b, DOE 1995a, LMES 2000b, and PAI 1996.

A.5.2.1 *Central Pollution Control Facility*

The Central Pollution Control Facility (Building 9623), a 1,858 m^2 (20,000 ft^2) multi-story, structural-steel building with masonry walls began operation in 1985. The Central Pollution Control Facility operates under RCRA permit-by-rule and an NPDES permit issued in April 28, 1995. It is the primary facility for treatment of non-nitrated waste. It receives wastes that are acidic or caustic, oily mop water containing beryllium, thorium, uranium, emulsifiers, and cleansers. The Central Pollution Control Facility provides both physical and chemical processing, including oil/water separation, neutralization, precipitation, coagulation, flocculation, carbon adsorption, decanting, and filtration. Treated water is discharged to EFPC through an NPDES monitoring station or sent to the WETF for further processing. Sludge from the treatment processes is transferred to the WETF. Spent carbon cartridges and filters are disposed of in commercial TSD facilities.

A.5.2.2 *Plating Rinsewater Treatment Facility*

The Plating Rinsewater Treatment Facility treats dilute, non-nitrate bearing, plating rinsewater contaminated primarily with chromium, copper, nickel, and zinc. In addition, the facility can remove chlorinated hydrocarbons. Currently, the facility is not operating because the Plating Shop (Building 9401-2) that formerly produced most of Y-12's rinsewater has been deactivated. The facility's neutralization and equalization equipment are kept outdoors in a diked basin. The remainder of the facility process is located in Building 9623 with the Central Pollution Control Facility. Rinsewater may be received in tankers, polytanks, or in any acceptable waste shipping container. The Plating Rinsewater Treatment Facility performs the following treatment operations: pH adjustment, flow equalization, heavy metal removal, degassification, and clarification. After the clarification operation, the rinsewater is transferred to the Central Pollution Control Facility. Treated rinsewater is sometimes recycled for use as make-up water for Central Pollution Control Facility processes. Sludge from the clarification process is transferred to the Central Pollution Control Facility and then taken to the West Tank Farm for interim storage.

A.5.2.3 *Central Mercury Treatment System*

The Central Mercury Treatment System (CMTS) is designed to treat mercury-contaminated sump water from former mercury use building. The CMTS was installed as part of the Y-12 Integrated Mercury Strategy Program to achieve compliance with regulations and guidance addressing mercury contamination in EFPC. Sump water from Buildings 9201-5, 9201-4, and 9204-4 is treated at the CMTS. The CMTS is located at the Central Pollution Control Facility. A new outfall (Outfall 551) is the discharge point where treated wastewater is discharged in conformance to NPDES monitoring guidelines.

Mercury-contaminated wastewater is pumped from building sumps located in Buildings 9201-4 and 9201-5 to the 2100-U tank, and into a ground equalization tank located just south of Building 9201-4. From the 2199-U tank, the wastewater is pumped to the Central Pollution Control Facility for treatment and discharge. Mercury-contaminated sump water is also accumulated in a Tuff tank located at Building 9204-4 and is periodically transferred to the Central Pollution Control Facility for treatment at the CMTS.

The CMTS process consists of equalization capacity provided by the 2100-U tank and F-901 tank, influent filtration, granular-activated carbon adsorption, neutralization, and carbon dewatering. The system is designed to treat a maximum of 50 gpm.

A.5.2.4 *West End Treatment Facility*

The WETF (Building 9616-7) treats mixed-LLW and LLW-contaminated wastewater generated by Y-12 production operations and other DOE-ORO meeting the facility waste acceptance criteria and operating under RCRA permit-by-rule. Treatment methods include hydroxide precipitation of metals, sludge settling and decanting, biodenitrification, bio-oxidation, pH adjustment, degasification, coagulation, flocculation, clarification, filtration, and carbon adsorption. Wastewaters are primarily nitrate-bearing and include the following: nitric acid wastes, mixed acid wastes, waste coolant solutions, mop water, and caustic wastes. Wastes are received at the WETF in 18,927-L (5,000-gal) tankers, 1136-L (300-gal) polytanks, drums, carboys, and small bottles. Detailed waste characterization documentation and jar tests are used to determine the treatment scheme for wastewater shipments. Treatment at WETF is performed in three processes: (1) Head End Treatment, (2) West Tank Farm biological treatment, and (3) Effluent Polishing. The Head End Treatment Process consists of waste receiving, hydroxide precipitation of heavy metals, sludge settling, and decanting. Biological treatment in the West Tank Farm consists of biodenitrification, then bio-oxidation.

The Effluent Polishing System consists of pH adjustment, degasification, coagulation, flocculation, clarification, filtration, carbon adsorption, and effluent discharge to the EFPC through an NPDES monitoring station.

Legacy mixed-LLW treatment sludges are presently being removed from sludge storage tanks at the West Tank Farm for off-site disposal. Currently generated mixed-LLW and LLW treatment sludges are being accumulated and concentrated for final characterization and disposal. Other treatment residuals, such as spent carbon and personal protective equipment, are being sent for immediate off-site disposal where feasible or otherwise characterized for on-site treatment or disposal.

A.5.2.5 *Organic Handling Unit for Mixed Waste*

The Organic Handling Unit (Building 9815) has replaced the Uranium Treatment Unit that was located on the east side of Building 9206. (Note: The Uranium Treatment Unit closure certification was accepted by the State of Tennessee on July 24, 1996, without comments.) The Organic Handling Unit provides storage and treatment of organic solutions containing enriched uranium. The uranium level in the waste material arriving at the Organic Handling Unit is typically less than 400 ppm. These wastes are characterized as mixed hazardous and radioactive wastes. The facility uses an assay reduction process to dilute the ^{235}U isotope with ^{238}U isotope in such a manner that they cannot be easily separated chemically or physically. This is accomplished by first mixing depleted uranyl nitrate with the organic solution and then neutralizing the organic solution by adding sodium hydroxide or other acceptable material. Since uranyl nitrate solution is not readily soluble in most organic solutions, “extractant” may be added to the organic solution.

TABLE A.5.2–1.—*Treatment Capabilities at Y-12 for Hazardous, Mixed Low-Level, and Low-Level Waste* [Page 1 of 3]

Treatment Unit	Treatment Method(s)	Input Streams	Output Streams	Capacity [a] (m^3/yr)	Comment
Building 9623, Central Pollution Control Facility (CPCF)	Neutralization, passive and press filtration, carbon adsorption, oil/water separation, flocculation, clarification, and sludge decanting	Non-nitrate liquids containing LLW, mixed LLW, and hazardous waste	Treated water discharged to EFPC, solids to WETF, and spent carbon to off-site disposal	10,200	NPDES permit issued April 28, 1995. RCRA permit-by-rule. Utilization approximately 15% of capacity
Building 9623, Plating Rinsewater Treatment Facility	Neutralization, flow equalization, electrochemical reduction, degassification, coagulation	Non-nitrate plating wastewater containing industrial waste and RCRA heavy metals.	Treated wastewater used as process water for CPCF and discharged to EFPC, sludge to CPCF for treatment and then to WETF	30,283	RCRA permit-by-rule. Utilization rate approximately 2.5% (due to recent decrease in plating operations)
Building 9623, Central Mercury Treatment System (CMTS)	Filtration, clarification, carbon adsorption, neutralization, carbon dewatering	Mercury-contaminated sump water with low turbidity	Treated water transferred to CPCF, then discharged to EFPC, solids to Y-12 landfill	50 gal/min	Mercury is removed from groundwater pumped from former mercury-use buildings 9201-4, 9201-5, and 9204-4. Part of RMPE program to decrease mercury loading in EFPC
Building 9616-7, WETF	Head End Treatment System (HETS): precipitation of metals, sludge settling and decanting; Tank Farm 1 and 2 (WTF bioreactors): biodenitrification, bio-oxidation; Effluent Polishing System (EPS): flocculation, clarification and filtration	Nitrate-bearing wastewater (up to 80%) and sludge containing LLW, mixed LLW, and RCRA hazardous and sanitary/industrial waste. Also small quantity of magnesium chips	Treated water discharged to EFPC. Solid/sludge to Tank Farm for storage	10,221	NPDES permit issued April 28, 1995. RCRA permit-by-rule. Utilization rate approximately 10% for wastewater. Processes approximately nine, 55 gal drums magnesium chips per year.

TABLE A.5.2–1.—*Treatment Capabilities at Y-12 for Hazardous, Mixed Low-Level, and Low-Level Waste* [Page 2 of 3]

Treatment Unit	Treatment Method(s)	Input Streams	Output Streams	Capacity [a] (m^3/yr)	Comment
Building 9815, Organic Handling Unit	Mixing depleted uranyl nitrate with organic solution, neutralization	Liquid LLW and mixed LLW consisting of organic solutions containing enriched uranium	Neutralized wastewater goes to WETF	500 gal/day	RCRA permit issued September 28, 1995. Also has space for 9m^3 (2,500 gal) mixed waste storage
Building 9201-5N, Cyanide Treatment Facility (CTF)	Chemical oxidation (alkaline chlorination), pH adjustment	Liquid mixed LLW and hazardous waste primarily from cyanide spent plating bathes (10 - 60,000 ppm CN and trace heavy metals)	Treated water (< 10 ppm CN) to WETF	185 to 195 gal/day	RCRA permit issued September 28, 1995. Also storage for 8m^3 (2,200 gal) mixed waste. Air discharge permit. Total capacity assumes operation 250 days/yr, 8 hr/day. 1996 utilization rate at approximately 50%
Building 9818, Biodenitrification Unit	Neutralization, pH adjustment, nitrate removal	Liquid mixed LLW (nitrate solutions from enriched uranium recovery-Building 9212)	Biosludge to West Tank Farm Wastewater to WETF	2,100	RCRA permit-by-rule
Building 9212, Uranium Recovery Operations	Leaching, filtration, dissolution, oxidation, evaporation, extraction	Metal and organic removal from aqueous stream, aqueous neutralization, purification for recycle	All waste diverted to Biodenitrification Unit	2,100	System exempt from permitting requirements under agreement with state. Same capacity as Acid Neutralization and Recovery Facility
Building 9616-7, Groundwater Treatment Facility (GWTF)	Carbon adsorption, air stripping, precipitation and filtration (iron removal)	Liquid LLW and mixed LLW (groundwater)	Treated groundwater discharged to EFPC, spent carbon and sludge to storage and TSCA incinerator, and filter bags to storage for off-site disposal	14,480	NPDES permit April 28, 1995. RCRA permit-by-rule. Facility running at capacity during rainy season

TABLE A.5.2–1.—*Treatment Capabilities at Y-12 for Hazardous, Mixed Low-Level, and Low-Level Waste* [Page 3 of 3]

Treatment Unit	Treatment Method(s)	Input Streams	Output Streams	Capacity [a] (m^3/yr)	Comment
Building 9416-35, Liquid Storage Facility	Oil/water separation by filter cartridges (pre-treatment for GWTF)	Liquid mixed LLW (leachate from certain capped burial grounds in Bear Creek Valley)	Wastewater to GWTF, oil containing PCB and some RCRA constituents to TSCA Incinerator	3,975	RCRA permit-by-rule. Facility running at capacity during rainy season. Also a storage unit (Table A.5.1-1)
Building 9201-2, East End Mercury Treatment System	Filtration, clarification, carbon adsorption	Mercury-contaminated sump water with low turbidity	Treated water discharged to EFPC, solids to Y-12 landfill	30 gal/min	Mercury is removed from groundwater pumped from former mercury-use Building 9201-2. Part of RMPE Program to decrease mercury loading in EFPC
Building 9616-9, Steam Plant Wastewater Treatment Facility	Sedimentation, neutralization, precipitation, clarification and sludge dewatering	Wastewater from Steam Plant operations, demineralizers, and coal pile runoff	Treated water discharged to EFPC sanitary sewer system, solids to Y-12 sanitary landfill	177,914	NPDES permit. RCRA permit-by-rule. Utilization rate currently above design capacity
Building 9401-5, Uranium Chip Oxidation Facility	Thermal oxidation	Solid LLW (depleted uranium tailings)	Uranium oxide to an off-site commercial facility	Classified	Treatment done by single drum batch
Building 9401-4, Waste Feed Preparation Facility	Compaction/ repackaging	Compactible solid LLW	Compacted solid LLW	NA	This facility is no longer in operation

a Capacity combines all input waste streams.

Notes: CMTS - Central Mercury Treatment System; CN - Cyanide; CPCF - Central Pollution Control Facility; CTF - Cyanide Treatment Facility; EPS - Effluent Polishing System; HETS - Head End Treatment System; GWTF - Groundwater Treatment Facility; RMPE Program - Reduction in Mercury Plant Effluent Program; TSCA - *Toxic Substances Control Act*

Sources: Bechtel Jacobs 2000, LMES 2000, PAI 1996.

A.5.2.6 *Cyanide Treatment Unit*

The Y-12 Cyanide Treatment Unit (located in Building 9201-5N) provides storage and treatment of LLW and mixed-LLW solutions containing metallic cyanide compounds from spent plating baths and precious metal recovery operations or other areas; the unit's RCRA permit was issued on September 28, 1995. Treatment is by chemical oxidation and pH adjustment. The cyanide reduction process performed within the unit is currently performed in 208 L (55 gal) containers. After waste is treated at the Cyanide Treatment Unit, it is transferred to the WETF for further treatment, then discharged to the EFPC.

A.5.2.7 *Biodenitrification Unit*

The Biodenitrification Unit (Building 9818) has been in stand-down, but restart is anticipated. It is capable of treating nitrate-bearing, liquid-mixed LLW generated by enriched uranium recovery operations in Building 9212. The denitrification unit removes nitrates from the waste and also separates liquids and solids. The wastewater is then transferred to the WETF for further treatment, and the sludge is transferred to the West Tank Farm.

A.5.2.8 *Uranium Recovery Operations*

Uranium Recovery Operations (Building 9212) is a recovery process to increase production efficiency at Y-12. Liquid waste from the operation is transferred to the Biodenitrification Unit. The system is exempt from permitting requirements under RCRA.

A.5.2.9 *Groundwater Treatment Facility*

The Groundwater Treatment Facility (Building 9616-7) treats wastewater from the Liquid Storage Facility at Y-12 and seepwater collected at East Chestnut Ridge waste piles to remove volatile organic compounds (VOCs), non-VOCs, and iron. It is part of the DARA program to treat groundwater contaminated with LLW and mixed-LLW that is collected from the Bear Creek Burial Grounds. The Groundwater Treatment Facility is located at the far west end of Y-12, in the same building as the WETF. This facility uses an air stripping operation to remove VOCs. In addition, carbon adsorption eliminates nonvolatile organics and PCBs. Precipitation and filtration are used to remove iron. After treatment, wastewater is sampled and recycled if additional processing is required. Wastewater that meets discharge specifications is pumped into the EFPC through a National Pollutant Discharge Elimination System (NPDES) monitoring station.

A.5.2.10 *Liquid Storage Facility*

The Liquid Storage Facility provides pretreatment for contaminated groundwater and other remedial action wastewater. The facility is described in Section 5.1.4.

A.5.2.11 *East End Mercury Treatment System*

The East End Mercury Treatment System (EEMTS) is designed to treat mercury-contaminated sump water from Building 9201-2, a former mercury use building constructed in the late 1940s and located in the eastern part of the Y-12 Site on Second Street directly south of the North Portal Parking Lot. The EEMTS was installed as part of the Y-12 Integrated Mercury Strategy Program to achieve compliance with regulations and guidance addressing mercury contamination in EFPC. The EEMTS process consists of influent filtration, granular-activated carbon adsorption, and associated water transfer equipment. Sump water from Building 9201-2 is treated at the EEMTS. A new outfall (Outfall 550) is the discharge point where treated water is discharged in conformance to NPDES monitoring guidelines. Mercury-contaminated wastewater is pumped from building sumps located in the basement of Building 9201-2 to the treatment unit installed on the first floor. The water is treated there and released to EFPC through the NPDES Outfall 550.

A.5.2.12 *Steam Plant Wastewater Treatment Facility*

The Steam Plant Wastewater Treatment Facility treats wastewater from Steam Plant operations, demineralizers, and coal pile runoff (MMES 1995a). Treatment processes include wastewater collection/sedimentation, neutralization, clarification, pH adjustment, and dewatering. The treatment facility uses automated processes for continuous operation. All solids generated during treatment are nonhazardous and are disposed of in the sanitary landfill. The treated effluent is monitored prior to discharge to the Oak Ridge public sewage system. The Y-12 utilities department manages this facility.

A.5.2.13 *Uranium Chip Oxidation Facility*

The Uranium Chip Oxidation Facility (Building 9401-5) is a 348 m^2 (3,750 ft^2), single-story, prefabricated building with metal wall panels built in 1987. The facility thermally oxidizes depleted and natural uranium machine chips under controlled conditions to a stable uranium oxide. Upon arrival, chips are weighed, drained of machine coolant, placed into an oxidation chamber, and ignited. The oxide is transferred into drums and transported off-site for disposal. The Uranium Chip Oxidation Facility is not designed to treat uranium sawfines. Hence, sawfines are currently blended with uranium oxide and placed in the oxide vaults as a short-term treatment method.

A.5.2.14 *Waste Feed Preparation Facility*

The Waste Feed Preparation Facility is a 335 m^2 (3,600 ft^2), single-story, prefabricated building with metal wall panels built in 1984 (Building 9401-4). This facility is no longer in operation. It was previously used to process and prepare solid LLW for volume reduction (compaction and repackaging) by an outside contractor or storage facility.

A.5.2.15 *Steam Plant Ash Disposal Facility*

The Steam Plant Ash Disposal Facility is used to collect, dewater, and dispose of sluiced bottom ash generated during operation of the coal-fired Y-12 Steam Plant. To comply with environmental regulations for landfill operations, it includes a leachate collection system and a transfer system to discharge the collected leachate into the Oak Ridge public sewage system. The dewatered ash is disposed of in Landfill VI.

A.5.3 Disposal of Waste at Y-12

On-site waste disposal facilities in operation at Y-12 are limited to industrial and construction/demolition landfills. Table A.5.3–1 (located at the end of Section A.5.3) summarizes waste disposal capabilities at Y-12. None of the landfills accept, or plan to accept, RCRA-hazardous, TSCA-regulated, or radioactive waste. Waste that contains residual radioactive materials at levels below authorized limits established in accordance with DOE Order 5400.5 may be accepted for disposal. All DOE facilities may receive materials containing residual radioactivity of any radionuclide on material surfaces provided that they are below limits specified in DOE Order 5400.5. Current waste acceptance criteria (WAC) for the landfills include a ceiling for residual radioactivity of 35 pCi/gm for total uranium on a volumetric basis. Materials containing uranium and other radioisotopes with residual levels of radioactivity below DOE authorized limits on a volumetric basis are accepted for disposal on a case-by-case basis. DOE is now reevaluating the existing ceiling of 35 pCi/gm for total uranium for the on-site disposal facilities, as well as future acceptance of materials containing residual levels of other isotopes, in accordance with guidance for the release and control of property containing residual radioactive material under DOE Order 5400.5 that were issued after the landfill began operations (DOE 1995b, DOE 1997). Review of the WAC should not alter the type of wastes accepted at the Y-12 landfills. An overview of previously used landfills and a planned CERCLA waste disposal

facility are also included in Table A.5.3–1 for background information. Information on the ORR disposal facilities is based on the following references: Burns 1993, FWC 1995, MMES 1992, MMES 1995b, PAI 1996, and Schaefer 2000.

A.5.3.1 *Industrial Landfill IV*

Industrial Landfill IV is used for disposal of classified, non-hazardous industrial waste, for construction/demolition waste, and for approved special waste. This landfill is intended for the disposal of classified waste. Approximately 12 percent of the landfill's design capacity has been filled. The landfill has a footprint of about 1.6 ha (4 acres).

A.5.3.2 *Industrial Landfill V*

Industrial Landfill V is used for disposal of unclassified, non-hazardous sanitary/industrial waste and for approved special waste. Approved special wastes have included asbestos materials, empty aerosol cans, materials contaminated with beryllium, glass, fly ash, coal pile runoff sludge, empty pesticide containers, and Steam Plant Wastewater Treatment Facility sludge. The landfill area is located on Chestnut Ridge near the eastern end of the Y-12 Site and serves Y-12, ORNL, ETTP, and other DOE prime contractors at Oak Ridge. The landfill is equipped with a liner and leachate collection system. Disposal of special waste is approved on a case-by-case basis by the State of Tennessee. Requests are filed with the state to provide disposal for additional materials as needed. The landfill is approximately 15 percent filled. The landfill has a footprint of almost 10.5 ha (26 acres) and is being constructed in phases as disposal capacity is needed.

A.5.3.3 *Construction/Demolition Landfill VI*

Construction/Demolition Landfill VI accepts unclassified, non-hazardous construction/demolition debris and approved special waste. Dewatered ash from the Y-12 Steam Plant is currently disposed of in Landfill VI. The facility has been constructed to 100 percent design capacity and has been in operation since 1993. It is approximately 93 percent filled and has a footprint of about 1.6 ha (4 acres).

A.5.3.4 Construction/Demolition Landfill VII

Construction/Demolition Landfill VII has been constructed and is on standby status. It will not be placed in service until Landfill VI has been filled to capacity. It has a footprint of slightly more than 12 ha (30 acres).

A.5.3.5 On-site Low-Level Waste Disposal Capability

Y-12 has no active disposal facility on-site for LLW. All disposal activities at the Bear Creek Burial Grounds were terminated on June 30, 1991. These burial grounds were used to dispose of radiologically contaminated waste. Similar waste streams generated today are containerized and stored at Y-12 or are shipped off-site for disposal.

TABLE A.5.3–1.—*Disposal Capabilities at Y-12*

Facility Number and Name	Waste Streams Accepted	Capacity [a]	Comment
Industrial Landfill IV	Classified, nonhazardous, nonradioactive industrial wastes, construction/demolition wastes, and approved special wastes	Total capacity: 85,300 yd^3 (65,217 m^3) Approximately 4 acres Estimated remaining capacity: 88%	Permit issued by TDEC in January 1989. Placed in operation in October 1989. The landfill is developed in phases as disposal capacity is needed.
Industrial Landfill V	Unclassified, nonhazardous, nonradioactive industrial wastes, and approved special wastes	Total capacity: 2,145,039 yd^3 (1,640,000 m^3) Approximately 25.9 acres Estimated remaining capacity: 85%	Class II permit issued by TDEC in April 1993. Placed in operation in April 1994. The landfill is developed in phases as disposal capacity is needed. Replaced Sanitary Landfill II
Construction/Demolition Landfill VI	Construction/demolition debris and approved special wastes	Total capacity: 174,000 yd^3 (133,033 m^3) Approximately 4 acres Estimated remaining capacity: 7%	Class IV permit issued by TDEC in April 1993. Placed in operation in December of 1993. All phases of the landfill have been developed. CDL VII will be placed in operation when CDL VI is filled to capacity.
Construction/Demolition Landfill VII	Construction/demolition debris and approved special wastes	Total capacity: 1,850,000 yd^3 (1,414,426 m^3) Approximately 30.4 acres Estimated remaining capacity: 100%	Class IV permit issued by TDEC in December 1993. Facility was constructed and prepared for operation in January 1995. Currently in standby status. Facility will be placed in service when CDL VI fills to capacity.
Planned Facility of Interest			
Environmental Management Waste Management Facility	RCRA, TSCA, mixed and LLW generated by remedial actions under CERCLA	Total Capacity: 1,300,000 yd^3 (993,921 $m^{3)}$	Currently in design phase. Operation start anticipated for 2001
Inactive Facilities of Interest		**Estimated Capacity or Size if available**	
Spoil Area I	Construction debris	Approximately 4 acres	Completed 1985
Sanitary Landfill I	General trash and wastes from ORR		Facility was removed from service in 1983.
Sanitary/Industrial Landfill II	Unclassified, nonhazardous, nonradioactive waste and special waste when specifically permitted by TDEC	Approximately 10-12 acres	Placed in service in 1983. Final closure in 1995. Special waste permitted by TDEC included asbestos-containing materials, coal-pile runoff sludge, steam-plant wastewater treatment plant sludge, waste containing < 12ppm mercury, and materials contaminated with beryllium-oxide.

[a] Capacity refers to design capacity.
Sources: Burns 1993, FWC 1995, MMES 1995b, MMES 1992, PAI 1996, Schaefer 2000.

However, the Environmental Management Waste Management Facility that is currently under construction will provide a new disposal capability at ORR for various types of hazardous and radioactively-contaminated waste under certain conditions. This facility has only been approved to accept waste generated as a result of response actions to expedite cleanup of contamination that resulted from previous DOE and *Atomic Energy Act* (AEA) operations on the ORR and that are conducted under *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) authorization (or in a few cases, under the Inactive Hazardous Substances Site Remedial Action Program [State Superfund] of the State of Tennessee).

The Environmental Management Waste Management Facility will use state-of-the-art disposal technologies, including lined cells with leachate collection capabilities. The WAC for the Environmental Management Waste Management Facility are still being developed and are subject to approval by DOE, EPA, and TDEC. It has a design capacity of 993,921 m^3 (1,300,000 yd^3). Section 3.2.1 describes the Environmental Management Waste Management Facility.

A.6 TRAFFIC AND TRANSPORTATION

This section supports the results of the transportation analyses presented in Section 5.2 of this document. The various types of materials transported as a result of Y-12 operations that have the potential to impact human health include radioactive and hazardous (chemical, explosive, etc.) materials and wastes. For this SWEIS, DOE evaluated the transportation impacts associated with three material types (radioactive wastes, radioactive materials, and hazardous [nonradiological] materials/wastes) transported to and from multiple on-site (ORR) and off-site locations. The assumptions and methodology used in the transportation analysis are described in the following section.

A.6.1 Route Selection

To evaluate transportation impacts, DOE chose reasonable surrogate shipment routes to represent all the potential shipment destinations. Figure A.6.1–1 shows the location of the current weapons complex sites with stockpile stewardship and management missions. The shipments and routes modeled were based on 1999 shipment and receipt records for Y-12 operations. The shipping and receiving records for 1999 (No Action - Status Quo Alternative) Y-12 operations from the Enterprise Transportation Analysis System were reviewed and used as the basis to calculate the transportation impacts under the No Action - Planning Basis Operations Alternative. The information contained in these records included the number of shipments and receipts and the origins and destinations of shipments of radioactive materials and wastes, chemicals, and hazardous materials/wastes.

For 1999 operations, 1,025 total shipments and receipts were reported for Y-12. Of these, 685 shipments were of radiological materials, 47 shipments were of radiological waste, and the remaining 293 shipments were of hazardous wastes and materials. The shipments and receipts of these materials encompassed numerous locations throughout the United States. Table A.6.1–1 presents the various routes considered in this analysis and the total number of shipments for each origin/destination. A majority of the listed routes had a large number of shipments and receipts (10 or more); for these routes the actual origin and destination reported in the Enterprise Transportation Analysis System was modeled. Due to uncertainties in future projected shipments and receipts for Y-12 operations, the routes with fewer number of shipments and receipts (much less than 10) were collectively evaluated assuming the longest shipping distance. Although many of the actual routes were shorter in distance, assuming the longest potential distance bounds the impacts. The longest route considered was from Y-12 to Lawrence Livermore National Laboratory (LLNL) in Livermore, California.

TABLE A.6.1–1.—*Transportation Routes and Number of Shipments Analyzed*

Material Transported	Origin	Destination	Number of Shipments
Radioactive material	Y-12, TN	Columbia, SC	256
Hazardous material/waste	Y-12, TN	Columbia, SC	63
Radioactive material	Arlington Heights, IL	Y-12, TN	113
Hazardous material/waste	Y-12, TN	Oak Ridge, TN	84
Hazardous material/waste	Y-12, TN	ORNL, TN	51
Radioactive waste	Y-12, TN	Clive, UT	47
Hazardous material/waste	Y-12, TN	ETTP, TN	46
Hazardous material/waste	Y-12, TN	Houston, TX	29
Radioactive material	LLNL, CA	Y-12, TN	259
Radioactive material	Pantex, TX	Y-12, TN	22
Hazardous material/waste	Madison, WI	Y-12, TN	20
Radioactive material	Mound Facility, OH	Y-12, TN	26
Radioactive material	Y-12, TN	Los Alamos, NM	9

Note: ORNL-Oak Ridge National Laboratory
Source: HIGHWAY results.

Detailed route selection for material and waste shipments by truck was determined by the HIGHWAY 3.3 computer code (ORNL 1993). HIGHWAY is a computerized road atlas that details more than 240,000 miles of interstate and other highways. The user can specify the routing criteria to constrain the route selection; options such as using only commercial routes, avoiding toll routes, and using only those routes that comply with DOT regulations for highway route-controlled quantities of radioactive materials can be selected. HIGHWAY calculates the total route length and the distances traveled through rural, suburban, and urban population zones. The distribution of distance among the population zones for the modeled routes is presented in Table A.6.1–2. The code also determines population densities (people per square kilometer) for the three population zones along the specified route using 1990 census data. Population densities determined by HIGHWAY for each modeled route are shown in Table A.6.1–3. The distance and population densities for each population zone are input into the RADTRAN 4 computer code to determine the incident-free (non-accident) and accident impacts for each shipment.

TABLE A.6.1–2.—*Transportation Routes and Population Zones*

Origin	Destination	Distance (km)		
		Rural	Suburban	Urban
Y-12, TN	Columbia, SC	322	129	3
Arlington Heights, IL	Y-12, TN	588	272	61
Y-12, TN	Oak Ridge, TN	0	3.2	0
Y-12, TN	ORNL, TN	8.2	3.1	0
Y-12, TN	Clive, UT	2642	316	43
Y-12, TN	ETTP, TN	10.8	7.3	0
Y-12, TN	Houston, TX	1,127.2	330.7	22.5
LLNL, CA	Y-12, TN	3,345	510	59
Pantex, TX	Y-12, TN	1,461	281	15
Madison, WI	Y-12, TN	730.1	313.9	63.8
Mound Facility, OH	Y-12, TN	306	162	14
Y-12, TN	Los Alamos, NM	1,935	312	21

Source: HIGHWAY results.

TABLE A.6.1–3.—*Population Density Distributions Along Modeled Routes*

Origin	Destination	Population Density (persons/km^2)		
		Rural	Suburban	Urban
Y-12, TN	Columbia, SC	14.1	262.1	1,836.1
Arlington Heights, IL	Y-12, TN	15.4	351	2,756.8
Y-12, TN	Oak Ridge, TN	0	166.2	0
Y-12, TN	ORNL, TN	4.9	89.8	0
Y-12, TN	Clive, UT	6.3	354.7	2,121.5
Y-12, TN	ETTP, TN	16.2	89.8	0
Y-12, TN	Houston, TX	12.9	321.5	2,085.3
LLNL, CA	Y-12, TN	6.5	340.1	2,069.3
Pantex, TX	Y-12, TN	9.4	294.2	1,963.1
Madison, WI	Y-12, TN	15.5	342.3	2,047.4
Mound Facility, OH	Y-12, TN	17.3	342.4	2,047.4
Y-12, TN	Los Alamos, NM	8.0	314.2	1,906.5

Source: HIGHWAY results.

A.6.2 Vehicle-Related Impacts

This section addresses the impacts of traffic accidents and vehicle emissions associated with transporting each material or waste type to its destination. These impacts are not related to the radioactive or hazardous materials/wastes being transported and would be the same as the impacts from the transportation of any nonhazardous material. DOE calculated accident impacts as the number of fatalities that would be expected due to additional vehicle traffic along the proposed routes. Fatalities were calculated on a per-shipment basis and were then totaled for all shipments of the specified material and route. Calculations were based on the unit-risk factors (risk per kilometer traveled) developed from national statistics for highway accident-related deaths (SNL 1986). These nonradiological unit-risk factors are presented in Table A.6.2–1.

TABLE A.6.2–1.—*Nonradiological Unit-Risk Factors Associated With Truck Transport (per one-way shipment)*

	Rural	Suburban	Urban
Fatalities (fatalities/km)			
Nonoccupational	5.3×10^{-8}	1.3×10^{-8}	7.5×10^{-9}
Occupational	1.5×10^{-8}	3.7×10^{-9}	2.1×10^{-9}
Latent fatalities from vehicle emissions (latent fatalities/km)	--	--	1.0×10^{-7}

Source: SNL 1986.

In addition to risks from accidents, DOE estimated health risks from vehicle emissions. Impacts from vehicle emissions were calculated as the expected number of excess latent fatalities. The distance traveled in an urban population zone and the impact factor for particulate and sulfur dioxide truck exhaust emissions (SNL 1982) were used to estimate urban-area pollution effects due to waste shipments. The impact factor, 1.0×10^{-7}, estimates the number of latent fatalities per kilometer traveled. This impact factor is only valid for urban population zones; therefore, latent fatalities expected from exhaust emissions are only estimated for the total distance that is traveled through urban zones. Note that impacts due to exhaust gases are small relative to impacts from accident fatalities. The nonradiological latent fatality unit-risk factor is also presented in Table A.6.2–1.

Table A.6.2–2 presents vehicle-related impacts such as number of fatalities for total round-trip shipments between analyzed locations. These values were multiplied by the appropriate number of route shipments (Table A.6.1–1) to obtain the total impacts. All shipments were assumed to be round trip to account for the return of the empty shipping casks. Therefore, the data in Table A.6.2–2 were created assuming twice the one way mileage shown in Table A.6.1–2. The expected vehicle pollution latent fatalities were calculated only for distance traveled in urban population zones.

TABLE A.6.2–2.—*Vehicle-Related Impacts for Total Round-Trip Truck Shipment*

Origin	Destination	Shipment Type	Fatalities		Latent Fatalities from Vehicle Emissions
			Occupational	Public	
Y-12, TN	Columbia, SC	Radioactive material	2.72×10^{-3}	9.61×10^{-3}	1.54×10^{-4}
Y-12 , TN	Columbia, SC	Hazardous waste/material	6.70×10^{-4}	2.36×10^{-3}	3.78×10^{-5}
Arlington Heights, IL	Y-12, TN	Radioactive material	2.25×10^{-3}	7.95×10^{-3}	1.38×10^{-3}
Y-12, TN	Oak Ridge, TN	Hazardous waste/material	2.00×10^{-6}	7.00×10^{-6}	0
Y-12, TN	ORNL, TN	Hazardous waste/material	1.37×10^{-5}	4.84×10^{-5}	0
Y-12, TN	Clive, UT	Radioactive waste	3.84×10^{-3}	1.36×10^{-2}	4.04×10^{-4}
Y-12, TN	ETTP, TN	Hazardous waste/material	1.74×10^{-5}	6.14×10^{-5}	0
Y-12, TN	Houston, TX	Hazardous waste/material	1.05×10^{-3}	3.72×10^{-3}	1.31×10^{-4}
LLNL, CA	Y-12, TN	Radioactive material	2.70×10^{-2}	9.55×10^{-2}	3.06×10^{-3}
Pantex, TX	Y-12, TN	Radioactive material	1.01×10^{-3}	3.57×10^{-3}	6.60×10^{-5}
Madison, WI	Y-12, TN	Hazardous waste/material	4.90×10^{-4}	1.73×10^{-3}	2.55×10^{-4}
Mound Facility, OH	Y-12, TN	Radioactive material	2.71×10^{-4}	9.58×10^{-4}	7.28×10^{-5}
Y-12, TN	Los Alamos, NM	Radioactive material	5.44×10^{-4}	1.92×10^{-3}	3.78×10^{-5}

Note: Based on travel through urban areas only.
Source: SNL 1982.

A.6.3 Cargo-Related Incident-Free Impacts

This section estimates the radiological impacts of incident-free transportation (i.e., no occurrence of accidents) to occupational and public receptors. When radioactive materials or wastes are transported, there is some external radiation dose from the transported cargo. DOE used the RADTRAN 4 model (SNL 1992) to estimate the radiological impacts. Required route-specific inputs such as the number of miles traveled, population densities adjacent to shipping routes, and the number of miles traveled in each of the population zones (urban, suburban, and rural) are determined using the HIGHWAY model described in Section A.6.2. Four radiation exposure scenarios were analyzed using the RADTRAN 4 code as follows:

- Along Route (off-link): Exposure of members of the public who reside adjacent to routes of travel
- Sharing Route (on-link): Exposure of members of the public sharing the right of way
- Stops: Exposure of members of the public while shipments are at rest stops
- Occupational (crew): Exposure of vehicle crews

Among the more sensitive RADTRAN 4 input parameters is the Transportation Index (TI). The TI represents the radiation dose at 1 m away from the surface of the shipping package and is limited by regulation (10 CFR 71). Although experience indicates that the external dose rate is well below the regulatory limit in many shipments, RADTRAN 4 modeling was performed with the regulatory limit TI of 10.

The incident-free impacts estimated from RADTRAN 4 are in units of person-rem. These can be converted into latent cancer fatalities (LCFs) using conversion factors. For doses to the public, one person-rem is expected to cause 5×10^{-4} LCFs, and for doses to workers one person-rem is expected to cause 4×10^{-4} LCFs (ICRP 1991).

In addition to the RADTRAN 4 inputs described in Section A.5.5, other unique parameters can affect impacts from truck shipments. The vehicle speed was assumed to be 15, 25, and 55 mph in urban, suburban, and rural zones, respectively. DOE believes that these speeds actually underestimate the probable speed of the truck through each of the population zones. This assumption results in a conservative overestimation of exposure and also accounts for the possibility of speed reductions due to traffic. All truck shipments were assumed to have 0.011 hour of stopping time for every kilometer traveled, accounting for overnight stopping. Transport of the distance between the waste and the crew is assumed to be 10 m. During stops, there are an assumed 50 members of the public present 20 m from the waste shipment.

A.6.4 Cargo-Related Accident Impacts

This section presents the impacts due to transportation accidents in which an environmental release of radioactive material/waste occurs. Radiological impacts were evaluated considering the probability of a given accident occurring and the consequences of that accident. The RADTRAN 4 model estimates the collective accident risk to populations by considering the spectrum of possible accidents and summing the results for each type of accident. The estimates in Section A.6.4.1 do not show the risk from a given accident occurring but present the total expected impacts considering the probability and consequences of all accidents.

A.6.4.1 *Accident Types*

All accidents can be represented by a spectrum of severity classes ranging from those considered least severe to most severe. The severity class of an accident is dependent on the crush force or impact speed and the duration of a 1,300-Kelvin fire (NRC 1977). The accident severity categories and associated conditional probabilities found in NUREG-0170 (NRC 1977) were used in assessing cargo-related accident impacts for this analysis. Each accident severity category has an associated conditional probability. The conditional probabilities represent the likelihood that an accident will involve the mechanical forces and the heat energy associated with each of the categories.

Table A.6.4–1 shows what fraction of the total accidents would be expected to be from each severity category, as based on NUREG-0170. For example, of all possible truck accidents that may occur, 55 percent would be classified as a Level 1 severity accident. According to these fractional occurrences, a Level 1 accident occurs more often but is the least severe while a Level 8 is highly unlikely but is the most severe. The table also represents the fraction of all accidents of that type that could occur in each of the population density zones. Of all expected Level 1 severity accidents, 10 percent would occur in the rural population density zone, another 10 percent would occur in the suburban population density zone, and 80 percent would occur in the urban population density zone.

TABLE A.6.4–1.— *Accident Conditional Probability of Occurrences*

Accident Severity Category	Fractional Occurrences	Population Density Zone		
		Rural	Suburban	Urban
		Truck		
1	0.55	0.1	0.1	0.8
2	0.36	0.1	0.1	0.8
3	0.07	0.3	0.4	0.3
4	0.02	0.3	0.4	0.3
5	2.8×10^{-3}	0.5	0.3	0.2
6	1.1×10^{-3}	0.7	0.2	0.1
7	8.5×10^{-5}	0.8	0.1	0.1
8	1.5×10^{-5}	0.9	0.05	0.05

Source: NRC 1977.

A.6.4.2 *Accident Release*

As with the accident severity categories and conditional probabilities discussed in the previous section, accident releases were calculated using NUREG-0170 (NRC 1977). Three factors are used to determine the amount of material that is released into the environment and available for inhalation. These factors include the release fraction, the aerosolized fraction, and the respirable fraction.

The release fraction is the fraction of material that would be released from the shipping container in an accident of a given severity category. For this analysis, all waste containers were assumed to be Type B shipping containers with material release fractions assumed to be typical for low-level radioactive waste. The estimated release fractions are reported in Table A.6.4–2.

The aerosolized fraction represents the fraction of the material released in an accident of a given severity that becomes aerosolized. The respirable fraction represents the fraction of aerosolized material that could be inhaled. Both of these factors are dependent on the physical and chemical characteristics of the waste form. For this analysis, the aerosolized and respirable fractions for the radioactive material and waste considered were assumed to be 1 (i.e., all the material that is released is aerosolized and respirable).

TABLE A.6.4–2. — *Estimated Release Fractions*

Accident Severity Category	Release fraction
1	0
2	0
3	0.001
4	0.01
5	0.05
6	0.1
7	0.5
8	1

Source: Modeling results.

A.6.4.3 *Radiological Material and Waste Characterization*

To determine the potential cargo-related impacts from accidents, DOE estimated the radiological content of the radioactive materials and wastes shipped to and from Y-12. For both the radiological materials and wastes transported representative concentrations were assumed due to the classification of actual concentrations. The radionuclide concentrations (curies per kilogram) and amounts per package (curies per package) used in the analysis are presented in Tables A.6.4–3 and A.6.4–4. The wastes and materials were assumed to be transported in 55-gal drums with radioactive materials shipment having 50 packages per shipment and radioactive waste shipments having 48 packages per shipment.

TABLE A.6.4–3.—*Representative Uranium Concentrations for Radioactive Materials*

Radionuclide	(Ci/kg)	(Ci/package)
U-232	8.80×10^{-4}	0.0792
U-234	2.10×10^{-3}	0.189
U-235	8.40×10^{-5}	7.56×10^{-3}
U-236	9.71×10^{-6}	8.73×10^{-4}
U-238	3.20×10^{-4}	0.0288

Source: Modeling results.

TABLE A.6.4–4.—*Representative Uranium Concentrations for Radioactive Wastes*

Radionuclide	(Ci/kg)	(Ci/package)
U-232	8.80×10^{-4}	0.0845
U-234	5.88×10^{-4}	0.0565
U-235	1.89×10^{-5}	1.81×10^{-3}
U-236	2.05×10^{-6}	1.97×10^{-4}
U-238	3.27×10^{-4}	0.0314

Source: Modeling results.

A.6.4.4 *Exposure Pathways for Released Material*

RADTRAN 4 assumes that the material available to the receptor in any given accident is dispersed into the environment according to standard Gaussian diffusion models. Default data for atmospheric dispersion were used, representing an instantaneous ground-level release and a small diameter source cloud. The calculation of the collective population dose after the release and dispersal of radioactive material includes the following pathways:

- External exposure to a passing radioactive cloud
- External exposure to contaminated soil
- Internal exposure from inhaling airborne contaminants

TABLE A.4–2.—*Y-12 Facilities* [Page 1 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
Defense Program (DP) Facilities Currently Surplus				
9104-01	OFFICE BLDG.	5,340	B-1	1969
9104-02	OFFICE BLDG.	5,340	B-1	1970
9104-03	OFFICE BLDG.	5,340	B-1	1970
9208-00	ENGINEERING	27,000	A-3	1945
9213-00	SURPLUS FACILITY (OLD CRITICALITY E)	23,500	B-1	1951
9401-02	PLATING SHOP	12,900	B-4	1946
9404-03	STORAGE	5,500	A-5	1947
9404-08	CARPENTRY/ELECTRICAL SHOP	3,000	A-2	1949
9409-15	COOLING TOWER FOR 9204-3	1,350	WOOD	1987
9409-19	COOLING TOWER FOR 9207	3,550	WOOD	1951
9409-28	COOLING TOWER FOR 9207	770	WOOD	1962
9409-29	COOLING TOWER FOR 9207	1,850	MET./WD.	1964
9409-32	COOLING TOWER FOR 9207	1,500	MET./WD.	1966
9416-02	UTILITIES-WATER TREATMENT	250	A-1	1944
9416-14	UTILITIES-WATER TREATMENT	44	A-5	1964
9416-22	UTILITIES - WATER TREATMENT	44	A-5	1964
9416-23	UTILITIES - WATER TREATMENT	44	A-5	1967
9416-25	UTILITIES-WATER TREATMENT	64	A-5	1964
9416-27	FIRE PROTECTION VALVE HOUSE	64	A-5	1978
9418-04	TANK BLDG.	400	A-1	1944
9418-05	TANK BLDG.	400	A-1	1944
9418-06	UTILITIES-TANK BLDG.	400	A-4	1944
9418-09	UTILITIES-TANK BLDG.	400	A-1	1944
9620-02	Z OIL FILTER & PUMPHOUSE	1,000	A-1	1945
9703-11	POST 16-WEST PORTAL	590	A-1/A-5	1955
9703-14	POST 3-SOUTH PORTAL (9213 AREA)	100	A-4	1952
9720-32A	PSO OPERATIONS	3,400	A-3	1970
9720-36	EXPLOSIVES STORAGE MAGAZINE	128	A-1	1974
9722-06	MOTOR GENERATOR BLDG. (9934-59)	144	A-4	1987
9723-16	OFFICE BUILDING	11,025	D-3	1944

TABLE A.4–2.—*Y-12 Facilities* [Page 2 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9724-01	TSD PARKING FACILITY	288	A-1	1987
9732-02	CARPENTER SHOP	400	A-4	1944
9732-03	PAINTER FACILITY	400	A-4	1944
9733-04	ELECTRICAL ENGINEERING	11,450	A-4	1945
9734-00	PROJECT ENGINEERING	11,700	A-2	1951
9754-02	MOTOR VEHICLE SERVICE STATION	276	A-3	1979
9767-03	COMPRESSOR BLDG.	8,500	A-3	1959
9767-05	COMPRESSOR BLDG.	1,300	A-4	1962
9767-07	UTILITIES	404	A-4	1968
9770-01	EMERGENCY GENERATOR	155	A-2	1945
9770-06	PROCESS ANALYSIS-SAMPLING STATION	43	A-4	1954
9770-07	PROCESS ANALYSIS-SAMPLING STATION	43	C-3	1968
9823-00	UTILITIES-COAL SAMPLING STATION	400	A-5	1965
9824-04	GAS AUTOCLAVE FACILITY	1,400	A-5	1976
9824-05	GAS AUTOCLAVE FACILITY	600	A-5	1976
9828-05	WEST PROPANE FACILITY	225	A-5	1977
9949-26	POST 6 PEDESTRIAN ENTRANCE NW 92	30	A-5	1978
9949-29	POST 32 (NW OF 9720-6)	60	A-1	1980
9949-31	POST 40 ON 30 FT TOWER	38	A-5	1980
9949-35	POST 45	36	A-5	1983
9949-36	POST 48 ON TOWER (SE 9107)	36	A-5	1983
9949-37	POST 41	36	A-5	1984
9949-43	POST 21, GUARD BOOTH CHECK POINT	110	A-5	1987
9949-44	POST 21A, GUARD BOOTH CHECK POINT	40	A-5	1987
9949-47	POST 47, ASSESSMENT TOWER (TOWER)	49	A-5	1988
9949-48	POST 42, ASSESSMENT TOWER (TOWER)	49	A-5	1988
9949-49	POST 49, ASSESSMENT TOWER (TOWER)	49	A-5	1987
9949-50	POST 46, ASSESSMENT TOWER (TOWER)	49	A-5	1988
9949-51	POST 43, ASSESSMENT TOWER (TOWER)	49	A-5	1988
9949-56	POST 37	49	B-5	1986
9949-58	POST 39	49	B-5	1986

TABLE A.4–2.—*Y-12 Facilities* [Page 3 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9949-59	POST 36	49	B-5	1986
9949-60	POST 27	100	A-5	1986
9949-63	POST 10	36	A-5	1988
9949-64	POST 10, ID CHECK BOOTH	98	A-5	1988
9949-68	POST 14	36	A-5	1988
9983-09	OFFICES AND TESTING	576	C	1969
9983-10	OFFICES	540	C	1968
9983-11	STORAGE	480	C	1966
9983-13	OFFICES	576	C	1975
9983-15	UTILITIES	576	C	1973
9983-AG	ENVIRONMENTAL RESTORATION	1,960	C	1989
9983-AH	ENVIRONMENTAL RESTORATION	1,960	C	1989
9984-A-00	RADIO COMMUNICATIONS	192	A-2	1964
9990-02	PERIMETER AIR MONITORING STATION 32	168	FIBGL.	1987
9999-02	MOTOR GENERATOR	140	A-4	1949
76 Total DP Facilities Currently Surplus		**161,237**		
Projected Surplus Within 10 Years (Funding Dependent)				
9201-05	ASSEMBLY OPERATIONS	530,500	B-2/B-4	1945
9204-04	ASSEMBLY OPERATIONS	307,475	B-2	1949
9206-00	ENRICHED URANIUM OPERATIONS	67,294	B-3	1946
9409-17	COOLING TOWER FOR 9206	1,400	WOOD	1944
9416-09	PUMPHOUSE	300	A-1/A-2	1945
9510-02	DISPOSAL PIT	900	A-1	1944
9616-04	CHEMICAL SERVICES	120	A-5	1958
9622-00	DYE PENETRANT WASTE STORAGE	217	A-4	1979
9720-17	URANIUM CHEMISTRY (STEEL & TRANS)	4,100	A-1	1958
9767-02	UTILITIES	1,200	A-1	1945
9768-00	UTILITIES	1,200	A-2	1945
11 Total DP to Be Surplus Within 10 Years		**914,706**		
Continuing Mission				
0081-22	TEMPORARY BULK WORK ORDER MATE	14,578	A-1	1944

TABLE A.4–2.—*Y-12 Facilities* [Page 4 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
0910-00	BOOSTER PUMPING STATION	1,475	A-4	1966
1401-02	RIVER CHLORINE BLDG. (T-318)	44	STL. & TRN.	
1404-01	RIVER PUMP STATION (T-278)	1,968	A-4	
1404-02	RIVER CHLORINE BLDG. (T-318)	462	A-3	
1404-03	RIVER COMPUTER ROOM	252	A-4	
1404-04	RIVER KMNO4 BLDG.	208	A-3	
1404-06	RIVER SWITCH-GEAR BLDG.	864	A-3	
1404-07	EGRF-EQUIPMENT STORAGE BLDG.	14,500	A-4	
1405-00	WATER PLANT	123,540	B-3	1943
1405-01	WATER PLANT 4 MILLION GALLON RES	30,250	A-4	1943
1405-02	WATER PLANT 3 MILLION GALLON RES	30,100	A-4	1943
1414-00	BOOSTER STATION	7,646	A-4	1954
1415-00	RESERVOIR-SCARBORO RD.	N/A	CONC. F/TK	1954
1416-00	BEAR CR. RESERVOIR-WEST	N/A	CONC. F/TK	1954
1417-00	CATHODIC PROTECTION OF RESERVOIR	N/A	CONC. F/TK	1954
1501-01	ELZA SWITCHYARD EQUIP. ROOM (K-74)	2,800	A-2	1944
1501-02	BATTERY ROOM STORAGE	1,950	A-2	1944
1501-03	ALTERNATE 161-kV FEEDER (K-741-A)	305	A-4	1989
2001-00	ROADS & GROUNDS SHOP	5,625	A-1	1968
2002-00	WATER PLANT MAINTENANCE BLDG.	4,900	A-5	1978
2002-01	BLDG. UNDER SURGE TANK	5,625	A-5	
2002-01A	GENERATOR BLDG.	432	A-3	
2003-00	WATER PLANT THICKENER PUMP STA.	396	A-4	1980
2004-00	WATER PLANT DIKE PREVENTER STA.	320	A-4	1980
2005-00	HEAVY EQUIPMENT GARAGE	3,900	A-1	1984
2006-00	10-IN. EAST BACKFLOW PREVENTER B	360	A-4	1987
2007-00	PUMP STORAGE BLDG.	840	A-5	1988
2008-00	EQUIPMENT STORAGE BLDG.	1,254	A-5	1988
2009-00	PARTS STORAGE BLDG.	583	A-4	1988
2010-00	SALT STORAGE BLDG.	1,253	A-5	1988
2011-00	VEHICLE WASH BLDG.			

TABLE A.4–2.—*Y-12 Facilities* [Page 5 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
2013-00	METER BUILDING	524	A-5	
2014-00	WATER TREATMENT BLDG.	224	A-5	
7620-00	CLARK CENTER			
7621-00	HEADQUARTERS BLDG. (FOR 7620)	793	A-1	
7622-00	BARBECUE SHELTER (FOR 7620)	2,123	A-1	
7623-00	BATH HOUSE (FOR 7620)	1,008	CINDER BLK.	
9100-11	SWINE SHED-W		A-7	
9100-12	SWINE SHED-E		A-1	
9100-13	SWINE SHED BARN		A-1	
9100-14	SWINE PRODUCTION		A-1	
9103-00	OFFICES INFORMATION PROCESSING C	71,800	B-1	1971
9106-00	OFFICES	16,000	B-2	1977
9107-00	TRANSPORTATION SAFEGUARD FACILITY	11,742	A-3	1980
9109-00	OFFICE BLDG.	9,350	B-3	1984
9110-00	OFFICE BLDG.	8,630	B-3	1985
9111-00	NUMERICAL CONTROL TOOL DESIGN	15,000	B-6	1984
9112-00	MECHANICAL DESIGN COMPUTER APPL.	11,500	B-6	1984
9113-00	TRIDENT II OFFICE BLDG.	60,850	B-5	1987
9114-00	MK-F OFFICE BLDG.	37,500	B-5	1987
9115-00	HS OFFICES	15,300	B-3	1989
9116-00	HS OFFICES	15,300	B-3	1988
9117-00	INTERACTIVE GRAPHICS SYS. OPER. C	19,500	A-5	1987
9119-00	FCAP ‘88 OFFICE BLDG.	72,458	B-5	1991
9201-01	TOOL DESIGN	263,128	B-2	1955
9201-01W	SEAWOLF ASSEMBLY FACILITY	8,770	B-5	1990
9201-05N	PRODUCTION MACHINING PLATING SPE.	80,500	B-2	1972
9201-05W	MACHINE SHOP	61,000	B-2/B-4	1967
9202-00	BUDGETS	128,800	B-1	1954
9203-00	LABORATORY DEVELOPMENT	41,700	B-2	1954
9203A-00	LABORATORY DEVELOPMENT	13,650	B-3	1968
9204-02	ASSEMBLY OPERATIONS	270,000	B-1	1945

TABLE A.4–2.—*Y-12 Facilities* [Page 6 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9204-02E	ASSEMBLY OPERATIONS	151,200	B-1	1969
9205-00	UTILITIES	3,443	A-4	1951
9212-00	ENRICHED URANIUM OPERATIONS	314,377	B-2	1949
9215-00	ENRICHED URANIUM MACHINING & FORMING	157,000	B-2	1959
9217-00	GENERAL SHOPS	1,350	A-5	1965
9217-01	GENERAL SHOPS	1,350	A-5	1965
9219-00	LABORERS, IRONWORKERS, & RIGGER	7,350	A-3	1965
9401-03	PROCESS MAINTENANCE	74,200	B-4	1955
9404-01	STORES (ANIMAL FEED & BEDDING)	4,650	A-2	1951
9404-02	PLANT & INSTR. AIR COMPRESSORS	4,650	B-2	1955
9404-05	PAINT SHOP	5,800	A-2	1944
9404-06	TOWER WATER PUMPHOUSE	800	A-2	1944
9404-09	RUBBER SHOP	3,340	A-1	1945
9404-10	PUMPHOUSE B-2	3,400	A-1	1945
9404-11	PURIFICATION FACILITY	1,000	A-2	1944
9404-12	PUMPHOUSE A-4	1,900	A-2	1944
9404-13	PUMPHOUSE A-5	1,000	A-2	1944
9404-16	UTILITIES S. B-4	1,480	A-4	1953
9404-17	PUMPHOUSE SW A-4 SB & MW	1,400	STL/TRN.	1955
9404-18	MW PLANT (STEEL & TRANSITE)	4,100	A-1	1955
9404-20	WEST END LABORERS AND MASONS	1,000	A-1	1955
9404-21	PUMPHOUSE 24-IN. BOOSTER PUMPS	553	A-4	1973
9404-24	FIRE WATER PUMPHOUSE	1,040	A-4	1991
9409-02	ORIGINAL AII COOLING SPRAY POND	5,600	CONC.	1960
9409-06	COOLING TOWER FOR 9731	1,800	MET./WD	1943
9409-10	COOLING TOWER FOR 9204-2	2,400	WOOD	1949
9409-12	COOLING TOWER FOR 9201-4	2,004	WOOD	1956
9409-13	COOLING TOWER FOR 9201-5	7,300	WOOD	1958
9409-18	COOLING TOWER FOR 9202	1,350	WOOD	1956
9409-20	COOLING TOWER FOR 9204-4	1,600	CONC.	1988
9409-22	COOLING TOWER FOR 9212	4,200	WOOD	1953

TABLE A.4–2.—*Y-12 Facilities* [Page 7 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9409-22E	COOLING TOWER FOR 9212	1,332	METAL	1967
9409-23	COOLING TOWER FOR 9995	3,350	MET./WD.	1957
9409-24	COOLING TOWER FOR 9212	1,450	WOOD	1955
9409-24E	COOLING TOWER FOR 9212	600	METAL	
9409-26	COOLING TOWER FOR 9215	1,900	WOOD	1961
9409-30	COOLING TOWER FOR 9737	480	WOOD	1966
9409-31	COOLING TOWER FOR 9202	940	WOOD	1965
9409-33	COOLING TOWER FOR 9995	500	MET./WD.	1971
9409-34	COOLING TOWER SE 9727-4	528	MET./WD.	1983
9409-35	COOLING TOWER FOR 9720-6	100	METAL	1986
9409-36	COOLING TOWER FOR 9213	80	METAL	
9416-01	UTILITIES-WATER TREATMENT	72	A-2	1971
9416-04	COOLING TOWER CONTROLS	230	A-4	1943
9416-10	UTILITIES-WATER TREATMENT	300	A-1/A-2	1945
9416-11	UTILITIES-WATER TREATMENT	44	A-5	1964
9416-12	UTILITIES-WATER TREATMENT	44	A-5	1965
9416-13	UTILITIES-WATER TREATMENT	44	A-5	1965
9416-15	UTILITIES-WATER TREATMENT	44	A-5	1967
9416-16	UTILITIES-WATER TREATMENT	44	A-5	1967
9416-17	UTILITIES-WATER TREATMENT	44	A-5	1967
9416-18	UTILITIES - WATER TREATMENT	50	A-5	1967
9416-19	UTILITIES - WATER TREATMENT	50	A-5	1964
9416-20	UTILITIES WATER TREATMENT	90	A-5	1967
9416-21	UTILITIES - WATER TREATMENT	64	A-5	1967
9416-24	UTILITIES - CONTROL BLDG.	64	A-2	1973
9416-26	UTILITIES - WATER TREATMENT	64	A-5	1965
9416-28	FIRE PROTECTION VALVE HOUSE	150	A-4	1983
9416-29	EFFLUENT MONITORING STATION	99	CONC. BELOW GRAD	1985
9416-30	FIRE PROTECTION VALVE HOUSE	44	A-5	1972
9416-31	FIRE PROTECTION VALVE HOUSE	171	A-4	1986
9416-32	WATER TREAT. BLDG. & VALVE HOUSE	200	A-5	1987

TABLE A.4–2.—*Y-12 Facilities* [Page 8 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9416-33	WATER TREAT. BLDG. & VALVE HOUSE	200	A-5	1987
9416-36	VALVE HOUSE	45	A-5	1990
9416-37	VALVE HOUSE	43	A-5	1990
9416-38	SPRINKLER VALVE HOUSE	36	A-5	1989
9416-39	SPRINKLER VALVE HOUSE	43	A-5	1990
9416-40	SPRINKLER VALVE HOUSE	43	A-5	1990
9416-41	SPRINKLER VALVE HOUSE	171	A-5	1989
9416-42	SPRINKLER VALVE HOUSE	50	A-5	1986
9416-43	SPRINKLER VALVE HOUSE	48	A-5	1993
9416-44	SPRINKLER VALVE HOUSE	75	A-5	1994
9416-45	VALVE HOUSE W. OF B-2	45	A-5	1970
9416-46	VALVE HOUSE N. OF 9423	64	A-5	1984
9417–06	WATER SPRINKLER RISER	336	A-5	1985
9417-07	WATER HEATER BLDG.	336	A-5	1988
9417-08	DECHLORINATION FACILITY	144	A-9	1991
9417-09	DECHLORINATION FACILITY	90	A-9	1991
9418-10	VACUUM PUMP BLDG.	80	A-3	1992
9419-02	UTILITY (WOOD & TRANSITE)	1,000	A-1	1944
9420-00	CONSOLIDATED SHOPS	27,217	A-5	1980
9420-01	HOST/TRIG TRAINING	5,000	A-5	1985
9422-01	STORM DRAIN MONITORING	80	C	1987
9422-02	STORM DRAIN MONITORING	64	C	1987
9422-03	STORM DRAIN MONITORING	72	C	1987
9422-04	STORM DRAIN MONITORING	64	C	1987
9422-05	STORM DRAIN MONITORING	64	C	1987
9422-06	STORM DRAIN MONITORING	64	C	1987
9422-08	STORM DRAIN MONITORING-SITE 14A	64	A-7	
9422-10	STORM DRAIN MONITORING	64	C	1987
9422-11	STORM DRAIN MONITORING	64	C	1987
9422-12	STORM DRAIN MONITORING	64	C	1987
9422-13	STORM DRAIN MONITORING	64	C	1987
9422-14	STORM DRAIN MONITORING-SITE SP	64	C	1987

TABLE A.4–2.—*Y-12 Facilities* [Page 9 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9422-15	STORM DRAIN MONITORING	64	C	1987
9422-16	STORM DRAIN MONITORING	64	C	1987
9422-17	STORM DRAIN MONITORING	64	C	1987
9422-18	SANITARY SEWER MONITORING- STA	120	C	1991
9422-20	OUTFALL MONITORING - SITE IHgTU	64	C	1993
9422-21	STORM DRAIN MONITORING- SITE WE	64	C	1993
9423-00	MAINTENANCE	5,000	A-5	1987
9423-02	METER BLDG.	224	A-5	1993
9424-03	FOAM BLDG. FOR 9720-58	300	A-5	1993
9501-01	ELECT. SUBSTATION/9201-1	NA	NA	1943
9501-02	ELECT. SUBSTATION/9201-2	NA	NA	1943
9501-03	ELECT. SUBSTATION/9201-3	NA	NA	1943
9501-04	ELECT. SUBSTATION/9204-1	NA	NA	1943
9501-05	ELECT. SUBSTATION/9201-4	NA	NA	1944
9501-06	ELECT. SUBSTATION/9201-5	NA	NA	1944
9501-07	ELECT. SUBSTATION/9204-2	NA	NA	1943
9501-08	ELECT. SUBSTATION/9204-3	NA	NA	1944
9501-09	ELECT. SUBSTATION/9204-4	NA	NA	1944
9610-00	OIL AND PAINT STORAGE	2,350	A-4	1944
9610-01	FLAMMABLE LIQUID STORAGE	135	A-5	1989
9611-02	SEWAGE EJECTOR STATION	200	A-1	1986
9611-03	SEWAGE LIFT STATION PKG. FIBER	176	UG-FIBRE	1993
9611-04	LEACHATE LIFT SUMP	293	UG-CONC.	1993
9616-03	CHEMICAL UNLOADING STATION	1,400	A-1	1945
9616-03TK3	WORK SHOP - MAINTENANCE	380	PLATE TANK	1945
9616-05	CYLINDER STORAGE BLDG. (FLUORINE)	2,800	A-5	1987
9616-09	STEAM PLANT WASTE WATER FACILITY	3,300	A-5	1985
9616-10	BULK SULFURIC ACID UNLOADING STA.	335	A-5	1986
9621-00	RCRA STORAGE AREA	770	CONC.	1945
9625-00	KATHABAR EQUIPMENT	1,300	A-5	1987
9626-00	MK-F SECURITY/MEDICAL	5,000	A-5	1977
9627-00	MK-F TRAINING/ENVIRONMENT	9,248	A-5	1986

TABLE A.4–2.—*Y-12 Facilities* [Page 10 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9701-05	POST 15 - EAST PORTAL & WAITING RO	400	A-4	1960
9701-06	POST 5 - EAST PORTAL	150	A-4	1960
9702-00	TELEPHONE & TELEGRAPH	2,090	A-4	1953
9702-01	TELEPHONE COMM. CTR. OFFICE	14,400	A-3	1995
9703-15	S&H OFFICE/TRAINING	12,056	A-5	1987
9703-16	IRON WORKER SHOP	6,600	A-5	1962
9704-02	ACCOUNTING & BUDGET	43,650	B-6	1952
9706-01	PHYSICAL SECURITY DEPARTMENT	6,900	A-2	1945
9706-01A	COMPLIANCE & RESOURCE MANAGEMENT	7,700	A-2	1946
9706-02	MEDICAL	27,600	A-2	1948
9709-00	TRAINING FACILITY, CENTER FOR CONT	53,000	A-1	1954
9710-02	POST 21 (GUARD HEADQUARTERS)	25,540	A-1	1948
9710-03	GUARD HEADQUARTERS (NEW)	41,124	B-3	1988
9711-01	TECHNICAL LIBRARY	27,092	A-1	1960
9711-05	CONFERENCE ROOM	57,650	B-1/B-6	1948
9712-00	GARAGE	33,890	A-1	1945
9714-00	TRANSPORTATION SAFEGUARDS	41,183	A-5	
9714-01	RANGE TOWER	64	A-5	1988
9714-02	SECURITY BOOTH	48	A-5	1989
9720-01	STORES	43,000	A-1	1944
9720-02	MAINTENANCE STORES (BULK MATERIAL)	47,800	A-1	1944
9720-03	DUO PACKING & SHIPPING	8,400	A-3	1965
9720-04	OFFICE AND EXCESS MAT'L FUNCTION	12,960	A-4	1969
9720-05	PSO WAREHOUSE	53,979	A-1/A-4	1945
9720-06	GENERAL PLANT MAINTENANCE	63,700	B-4	1952
9720-07	BM STORES	28,300	A-5	1955
9720-08	STORES	142,700	A-5	1957
9720-12	STORAGE WAREHOUSE	15,000	A-4	1957
9720-13	PLANT MAINTENANCE WAREHOUSE	10,700	A-5	1955
9720-14	WEAPONS RETURN STORAGE	2,400	A-5	1955
9720-15	PAINT SHOP	5,100	A-3	1955

TABLE A.4–2.—*Y-12 Facilities* [Page 11 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9720-16	MAINTENANCE (RIGGERS)	15,000	A-5	1957
9720-18	DEPLETED URANIUM STORAGE	6,050	A-5	1958
9720-19	FOAM SHOP	3,756	A-4	1962
9720-19A	SHOP	2,475	A-4	1987
9720-19B	STORAGE BUILDING	3,000	A-4	
9720-20	DEVELOPMENT MAINT. SHOPS & OFFICES	4,800	A-5	1963
9720-21	STORES	2,950	A-4	1964
9720-22	STORAGE	16,000	A-3	1967
9720-23	BULK CHEMICAL STAGING BLDG.	2,600	A-5	1986
9720-24	TOOL STORAGE	11,200	A-3	1970
9720-26	MERCURY STORAGE	13,600	A-4	1963
9720-27	REACTIVE METAL STORAGE	1,200	A-3	1971
9720-28	INTERIM - LLW DISPOSAL BLDG.	3,600	A-3	1984
9720-30	STORAGE FACILITY	792	A-5	1974
9720-33	ON HOLD FOR FUTURE USE STORAGE	39,903	A-3	1970
9720-34	STORAGE & SHOP	800	A-5	1963
9720-37	STORAGE FACILITY	210	A-5	1980
9720-38	MATERIAL DISPATCHING STOR. BLDG.	7,700	A-5	1982
9720-40	STORAGE SHED FOR GAS BOTTLES	1,300	A-5	1990
9720-46	LITHIUM STORAGE	3,465	A–5	1988
9720-47	SODIUM HYPOCHLORITE STATION	2,400	A-5	1987
9720-48	MAINTENANCE - STORAGE PUMPS	3,750	A-5 OPN	1986
9720-49	MAINTENANCE - STORAGE	2,500	A-5 OPN	1986
9720-50	MAINTENANCE - STORAGE	4,000	A-5 OPN	1986
9721-51	MAINTENANCE - STORAGE	2,500	A-5 OPN	1986
9720-52	MAINTENANCE - STORAGE	4,000	A-5 OPN	1986
9720-53	MAINTENANCE - STORAGE	4,000	A-5 OPN	1987
9720-60	SOLIDS STORAGE FACILITY (DARA SOIL)	14,000	A-8	1989
9720-73	LINEMAN BLDG. (LABORER YARD)	1,800	A-5	1994
9720-74	90 DAY - STANDBY BLDG.	192	A-5	1994
9720-75	90 DAY - HAZ. WASTE STORAGE BLDG.	488	A-5	1994

TABLE A.4–2.—*Y-12 Facilities* [Page 12 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9720-76	90 DAY - WORK BAY STORAGE BLDG.	240	A-5	1994
9720-77	90 DAY - NON-HAZ. WASTE STORAGE	255	A-5	1994
9720-78	90 DAY - NON-HAZ. WASTE STORAGE	276	A-5	1994
9720-79	CHOCKER BARN (9929-1 YARD)	1,404	A-5	1994
9720-80	EQUIPMENT STORAGE	120	C	1996
9720-81	EQUIPMENT STORAGE	120	C	
9721-00	BIODENITRIFICATION NITRIC ACID REC	288	A-5	1989
9722-02	MEDICAL EMERGENCY	820	A-1	1944
9722-03	ELECTRICAL MAINTENANCE - EMERGE	5,100	A-5	1983
9722-04	EMERGENCY GENERATOR BLDG.	352	A-4	1988
9722-05	MOTOR GENERATOR BLDG. (9949-57)	144	A-4	1987
9723-04	ELECTRICAL MAINTENANCE	10,700	A-1	
9723-14	ADMINISTRATIVE OFFICES	16,800	A-1	1954
9723-18	CHANGE HOUSE	15,900	A-1	1944
9723-19	CHANGE HOUSE	15,000	A-1	1944
9723-21	UTILITIES	4,600	A-1	1944
9723-24	LABORATORY DEVELOPMENT	12,122	A-1	1950
9723-25	ADMINISTRATIVE OFFICES	19,590	B-6	1949
9723-26	CHANGE HOUSE - SHOE EXCHANGE	96	A-5	1981
9723-27	CHANGE HOUSE	11,750	A-5	1989
9723-28	CHANGE HOUSE & EMERG. MEDICAL	10,000	A-5	1990
9723-31	CHANGE HOUSE	29,172	A-5	1991
9723-33	CHANGE HOUSE	12,740	A-5	1991
9724-00	RADIO BLDG. REPEATER STATION (CH)	240	A-5	1981
9724-02	RADIO REPEATER STATION (BUFFALO)	480	A-5	1988
9724-03	RADIO REPEATER STATION	187	A-4	1951
9724-05	TRANSMITTER RECEIVING STATION	87	A-4	
9725-00	COMPOSITE MANUFACTURING CENTER	6,000	A-5	1986
9727-03	UTILITIES	2,950	A-5	1955
9727-04	UTILITIES	1,750	A-5	1963
9727-04A	UTILITIES	960	A-3	1963

TABLE A.4–2.—*Y-12 Facilities* [Page 13 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9728-00	LAUNDRY	13,600	A-1	1943
9729-00	STORES $C0_2$ SHIP., REC., DELIVERY	3,500	A-2	1943
9731-00	SITE PROGRAMS MAINTENANCE	37,300	B-1	1944
9732-01	GENERAL SHOPS	400	A-4	1944
9733-01	CATALOG LIBRARY	14,750	A-2	1951
9733-02	ENGINEERING DIVISION	13,200	A-1	1945
9733-03	ELECTRICAL ENGINEERING	11,400	A-1	1951
9736-00	ESTIMATING	7,800	B-2	1944
9737-00	ELECTRICAL	63,400	B-1	1960
9738-00	GENERAL SHOPS	8,750	A-2	1944
9739-00	PROJECT ENGINEERING	21,600	A-2	1947
9744-00	UTILITIES	8,400	A-2	1944
9752-00	UTILITIES	1,200	A-2	1944
9754-03	MOTOR VEHICLE SERVICE STA. (NEW)	312	A-3	
9755-00	CAR WASH BLDG.	100	A-5	1985
9755-00A	ADDITION TO CAR WASH BLDG.	1,250	A-5	
9764-00	OFFICES	4,450	A-1	1946
9766-00	OFFICES	35,450	A1	1944
9767-01	UTILITIES	3,500	A-2	1948
9767-04	UTILITIES	5,390	A-5	1962
9767-06	OFFICE BLDG.	7,500	B-3	1967
9767-08	CHILLER BLDG.	4,800	A-5	1984
9767-09	TRANSFORMER, SWITCHGEAR AND EM	211	A-4	1962
9767-10	CHILLER BLDG. (AREA 5)	12,000	A-5	1989
9767-11	CHILLER BLDG. (DEV. 9202)	4,860	A-5	1986
9767-12	CHILLER BLDG. (9737)	3,000	A-5	1985
9767-13	CHILLER BLDG. (COMPRESSOR) WEST	20,460	A-5	1986
9769-00	ANALYTICAL LABORATORIES	19,520	B-1	1945
9769-00E	ANALYTICAL LAB ADDITION	11,736	B-5	1991
9770-03	LABORATORY STORAGE	242	A-2	1963
9770-08	PROCESS ANALYSIS -SAMPLING STA.	50	A-3	1970

TABLE A.4–2.—*Y-12 Facilities* [Page 14 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9770-09	WASTE MONITORING STATION	75	A-4	1980
9771-00	MAIL ROOM	2,050	A-1	1945
9802-01	UTILITIES	166	A-4	1945
9802-02	UTILITIES	166	A-4	1955
9803–00	UTILITIES	176	A-4	1955
9804-00	UTILITIES	128	A-4	1955
9805-00	DEUTERIUM GAS STORAGE	1,850	A-3	1959
9805-01	DEUTERIUM PROD. FACILITY	6,895	A-5	1957
9808-00	PLANT MAINTENANCE	6,700	A-5	1956
9811-02	TANKER TRANSFER STA., TRIDENT II	1,875	A-8	1989
9811-03	TANKER TRANSFER STATION	1,800	A-5	1989
9811-04	TANKER TRANSFER STA., TRIDENT II	1,455	A-5	1989
9811-05	WASTE COOLANT FACILITY	4,800	CONC.	1990
9811-06	DRY ASH HANDLING FACILITY	1,518	B-5	1990
9811-07	WET ASH HANDLING FACILITY	5,900	A-8	
9811-09	SPILL CONTROL TRANSFER STATION	1,016	A-5	1988
9811-12	TRANSFORMER OIL RECYCLING FAC.	9,480	A-5	1997
9812-00	TANK PIT	1,500	A-5	1963
9813-00	AMMONIA STORAGE	1,300	A-5	1959
9814-00	TEAMSTER OFFICE	864	A-5	1945
9815-00	ORGANIC HANDLING FACILITY	1,020	A-1	1960
9816-00	FIRE DEPARTMENT	590	A-4	1962
9817-00	FIRE DEPARTMENT	2,700	A-5	1962
9817-01	SMOKE TRAINING FACILITY	800	A-4	1980
9817-02	FIRE TRAINING FACILITY	600	A-5	1990
9818-00	NITRIC ACID RECOVERY FACILITY	7,500	B-4	1976
9819-00	RECORDS STORAGE	805	A-5	1945
9820-00	ELECTRICAL STORAGE	384	A-5	1962
9821-01	EXPLOSIVE FORMING	120	A-5	1962
9821-02	EXPLOSIVE FORMING	60	A-5	1962
9821-03	EXPLOSIVE FORMING	1,600	A-5	1962

TABLE A.4–2.—*Y-12 Facilities* [Page 15 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9821-04	FORMING COIL HOUSE	200	A-5	1964
9821-05	MAGAZINE BUNKER FOR EXPLOSIVE F	224	CONC. BLK	1985
9821-06	MAGAZINE BUNKER FOR EXPLOSIVE F	224	CONC. BLK.	1985
9822-00	SOLVENT SETTLING BASIN	620	CONC.	1958
9824-01	HIGH PRESSURE TEST CELL	800	A-4	1968
9824-02	HIGH PRESSURE TEST CELL	300	A-4	1968
9824-03	HIGH PRESSURE ACCUMULATOR BUNK	198	A-4	1974
9826-00	TRUCK SCALES	1,800	A-5	1987
9826-01	COMPUTER BLDG. FOR TRUCK SCALES	63	A-1/A-5	1987
9826-02	COMPUTER BLDG. FOR TRUCK SCALES	64	A-5	1986
9827-00	ROD BENDING SHOP\STORAGE	945	A-1	1945
9828-01	BAG FILTER SYSTEM	500	B-5	1973
9828-02	PROBE STATION	172	A-5	1973
9828-03	FILTER HOUSE	500	A-5	1973
9830-01	CAPCA OIL &SOIL STOR. VAULT- RUB	3,920	A-8	1989
9831-00	ELECTRICAL SHOP	16,900	A-5	1945
9929-01	OLD CARPENTER SHOP	15,000	A-1	1944
9949-01	POST 7 (NW 9202)	400	A-1	1967
9949-03	POST 12 (NW 9201-2)	96	A-5	1993
9949-04	POST 25 (TO 9207)	30	A-5	1978
9949-05	POST 2 (NORTH PORTAL)	80	A-5	1978
9949-06	POST 14 (CENTRAL PORTAL)	535	A-1/A-5	1945
9949-07	POST 9 (NORTH 9201-1)	142	A-1	1973
9949-17	POST 3 (AT 9213)	125	A-4	1985
9949-25	POST 44 ON TOWER	81	A-5	1988
9949-28	POST 28	60	A-5	1988
9949-30	POST 17 TEMP.	60	A-5	1980
9949-33	POST 24 (N 9204-01)	38	A-5	1983
9949-38	GUARD BOOTH, EAST PORTAL	160	B-1/B-5	1987
9949-39	GUARD POST 23A	40	A-5	1987
9949-40	POST 22B, GUARD BOOTH CHECK POINT	55	A-5	1987

TABLE A.4–2.—*Y-12 Facilities* [Page 16 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9949-41	POST 22A, GUARD BOOTH CHECK POINT	40	A-5	1987
9949-42	POST 22, GUARD BOOTH CHECK POINT	40	A-5	1987
9949-45	POST 20, GUARD POST	160	B-1/B-5	1987
9949-46	POST 20A, GUARD BOOTH	40	A-5	1987
9949-52	POST 13 (VENDOR'S ACCESS ENTRANCE)	234	A-2	1987
9949-55	POST 2	238	A-5	1985
9949-57	POST 38	49	B-5	1986
9949-61	POST 1	36	A-5	1988
9949-62	POST 1, ID CHECK BOOTH	98	A-5	1988
9949-65	POST 16	36	A-5	1988
9949-66	POST 16, ID CHECK BOOTH	98	A-5	1988
9949-67	POST 16, ID CHECK BOOTH	50	A-5	1988
9949-69	POST 14, ID CHECK BOOTH	98	A-5	1988
9949-70	POST 8, ID CHECK BOOTH	215	B-5	1988
9949-71	POST 8	60	A-5	1988
9949-72	POST 8	60	A-5	1988
9949-73	POST 8	50	A-5	1988
9949-74	POST 24, ID CHECK BOOTH	300	A-5	1988
9949-75	POST 24, ID CHECK BOOTH	50	A-5	1988
9949-76	POST 33, ID CHECK BOOTH	128	B-1/B-5	1988
9949-77	POST 33, ID CHECK BOOTH	50	A-5	1988
9949-78	POST 33, ID CHECK BOOTH	60	A-5	1988
9949-79	POST 17, ID CHECK BOOTH	45	A-5	1988
9949-80	POST 33, ID CHECK BOOTH	60	A-5	1988
9949-83	POST 33 EQUIPMENT BUILDING	420	C	
9959-00	STORES	4,525	A-3	1954
9959-01	ELECTRICAL STORAGE	170	A-3	1966
9959-02	STORES - CYLINDER STORAGE	2,265	A-3	1944
9959-03	CHEMICAL STORAGE	49	A-5	1966
9976-00	UTILITIES	3,100	WD. & TRN.	1955
9977-00	UTILITIES (NITROGEN STATION)	270	STL. & TRN.	1943

TABLE A.4–2.—*Y-12 Facilities* [Page 17 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9977-01	UTILITIES (NITROGEN STATION)	750	STL. & TRN.	1964
9977-02	UTILITIES	2,700	CONC. & CONC. BLK.	1955
9980-00	FORMER PHYSICAL TESTING, X-RAY	5,900	B-2	1950
9981-00	UTILITIES PHYSICAL TESTING, X-RAY	13,020	B-2	1949
9983-00	RADCON ORGANIZATION	1,165	A-1	1944
9983-01	TRAINING	672	C	1976
9983-02	LUNCH ROOM	576	C	1969
9983-06	LUNCH ROOM	1,200	C	1969
9983-18	HP TRAILER	1,230	C	1972
9983-20	OFFICE		C	
9983-24	ELECTRICIANS TRAILER	420	C	1969
9983-28	OFFICES FOR MKF	600	C	1980
9983-29	RADIO BASE TRAILER	612	C	1969
9983-30	TECHNICAL INFORMATION OFFICE	1,344	C	1986
9983-31	OFFICES FOR EMCS	450	C	1969
9983-32	OFFICES	720	C	1987
99833-35	OFFICES	720	C	1986
9983-37	HEALTH PHYSICS	600	C	1986
9983-39	OFFICES	600	C	1986
9983-40	CHANGEHOUSE	1,440	C	1986
9983-43	OFFICES - ALLEGHENY ELEC., INC.	450	C	1986
9983-45	ELECTRICAL TRAILER	600	C	1986
9983-46	ELECTRICAL TRAILER	720	C	1986
9983-47	TRAILER (INACTIVE)	600	C	1984
9983-49	SURVEY/ENGINEERING TRAILER	420	C	1986
9983-55	OFFICE	2,160	C	1986
9983-58	ENVIRON. RESTORATION OFFICES	2,160	C	1986
9983-62	OFFICES	3,600	C	1990
9983-63	OFFICES	3,600	C	1990
9983-64	OFFICES	3,600	C	1990
9983-65	OFFICES	3,600	C	1990

TABLE A.4–2.—*Y-12 Facilities* [Page 18 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9983-66	OFFICES - MECHANICAL ENGINEERING	2,160	C	1986
9983-68	CHANGEHOUSE	1,440	C	1986
9983-71	MODULAR OFFICE TRAILERS	3,600	C	1990
9983-72	MODULAR OFFICE TRAILERS	3,600	C	1990
9983-73	PROJECT ENGINEERING OFFICES	1,440	C	1977
9983-76	WEST BURIAL OR LANDFILL (WAS K-150)	720	C	1985
9983-77	WEST BURIAL OR LANDFILL (WAS K-150)	576	C	1976
9983-79	WEST LANDFILL OFFICE	576	C	1986
9983-81	OFFICES - CONSTRUCTION ENGINEER	1,344	C	1986
9983-82	ENGINEERING OFFICES	1,344	C	1986
9983-83	OFFICES	4,771	C	1973
9983-84	HP TRAILER	1,344	C	1986
9983-85	OFFICES, FIRE PROTECTION (WAS K-1550Q)	720	C	1973
9983-86	TRAINING CENTER	4,320	C	1986
9983-88	TRANSPORTATION SAFEGUARDS (W91	1,344	C	1969
9983-90	CONST. ENGR. OFFICE (WAS K-1550-M)	720	C	1986
9983-94	PHYSICAL THERAPY (S 9706-2)	2,160	C	1987
9983-97	ELECTRICAL TRAILER	600	C	1987
9983-99	CHANGEHOUSE	1,440	C	1986
9983-AD	ENGINEERING OFFICES	1,344	C	1986
9983-AF	ENGINEERING OFFICES	1,344	C	1986
9983-AJ	EQUIPMENT ROOM	630	C	1990
9983-AK	CLASSROOM ASSOC.	630	C	1990
9983-AL	OFFICES	280	C	1986
9983-AR	BREAK ROOM N. OF 9949-45	288	C	1992
9983-AS	BREAK ROOM SW OF 9825-2	288	C	1992
9983-AT	BREAK ROOM SW OF 9204-3	288	C	1992
9983-AV	STORES - HAZ. MATERIALS SA485	120	C	1992
9983-AW	RANGE EQUIPMENT STORES BLDG.	288	C	1992
9983-AZ	WTSD SAMPLING CREW TRAILER	363	C	1993
9983-BR	HEALTH PHYSICS	155	C	1993

TABLE A.4–2.—*Y-12 Facilities* [Page 19 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9983-BZ	STORAGE BLDG.	240	C	1993
9983-CC	BOUNDARY CONTROL STATION #42	112	C	1993
9983-CD	BOUNDARY CONTROL STATION #23	120	C	1993
9983-CE	BOUNDARY CONTROL STATION #22	120	C	1993
9983-CF	BOUNDARY CONTROL STATION #9	120	C	1993
9983-CH	ENVIRONMENTAL 90 DAY YARD	840	C	1994
9983-CJ	TRAILER (INACTIVE)	200	C	1994
9983-CK	PERSONNEL FROM 9720-5	840	C	1994
9983-CL	OFFICE PERSONNEL	200	C	1994
9983-CM	TRAILER (INACTIVE)	224	C	1994
9983-CN	CONSTRUCTION SUPPORT	144	C	1994
9983-CR	CONSTRUCTION SUPPORT	128	C	1994
9983-CS	TRAILER (INACTIVE)	128	C	1994
9983-CT	ELECTRICAL CONSTRUCTION SUPPORT	192	C	1994
9983-CU	ELECTRICAL CONSTRUCTION SUPPORT	128	C	1994
9983-CV	FISHER EQUIPMENT TRAILER	360	C	1994
9983-CW	CONSTRUCTION SUPPORT	300	C	1994
9983-CX	ESCORT/VEHICLE DISPATCH OFFICE	200	C	1994
9983-CY	FIELD OFFICE	198	C	1994
9983-CZ	TRAILER (INACTIVE)	144	C	1994
9983-EB	HP SUPPORT TO CONST. ACTIVITIES	240	C	
9983-EE	FLAMMABLE LIQUID STORAGE	200	C	
9983-EF	CONSTRUCTION SUPPORT, WAREHOUSE	200	C	
9983-EG	TRAILER (INACTIVE)	288	C	
9983-EJ	OFFICE SPACE	720	C	
9983-EP	WAREHOUSE STORAGE SHED	216	C	
9983-EQ	WAREHOUSE STORAGE SHED	120	C	
9983-ER	TRAILER (INACTIVE)	120	C	
9983-ES	TRAILER (INACTIVE)	120	C	
9983-ET	TRAILER (INACTIVE)	120	C	
9983-EW	STORAGE	552	C	

TABLE A.4–2.—*Y-12 Facilities* [Page 20 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9983-EY	RADCON TECH OFFICE	120	C	
9983-EZ	CONSTRUCTION SUPPORT, ELECTRICA	720	C	
9983-FA	CONSTRUCTION SUPPORT, ELECTRICA	240	C	
9983-FC	OFFICE SPACE	180	C	1996
9983-FD	OFFICE SPACE	1,307	C	1996
9983-FE	OFFICE SPACE	1,307	C	1996
9983-FF	OFFICE SPACE	1,307	C	1996
9983-FG	OFFICE SPACE	1,307	C	1996
9983-FH	CONSTRUCTION SUPPORT	120	C	1996
9983-FJ	OFFICE SPACE	480	C	1996
9983-FM	OFFICE SPACE	240	C	1996
9983-FN	OFFICE SPACE	240	C	1996
9983-FP	RESTROOMS	96	C	1996
9983-FQ	RESTROOMS	96	C	1996
9983-FR	RESTROOMS	96	C	1996
9983-FS	OFFICE SPACE	1,440	C	1996
9983-FT	OFFICE SPACE	660	C	1996
9983-FV	OFFICE SPACE	600	C	1998
9985-00	FIRE ALARM MONITOR STATION	71	A-5	1972
9987-00	INACTIVE RECORDS STORAGE	2,094	B-1	1943
9989-00	SO_2 MONITOR STATION (Y# 176240)	48	C	1973
9990-00	SO_2 MONITOR STATION	48	C	1973
9990-01	GAS PRESSURE REDUCING STATION	175	STL. & TRN.	1961
9990-03	COAL SAMPLING STATION	4,270	B-1	1989
9993-00	MAINTENANCE STORAGE	3,120	STL. & TRN.	1974
9995-00	PLANT LABORATORY	84,000	B-2	1952
9996-00	WEAPON MATERIAL MANAGEMENT ESO	33,501	B-3	1955
9998-00	H-1 FOUNDRY	137,100	B-3	1949
9999-00	MOTOR GENERATOR (W9212)	515	A-4	1955
9999-05	EMERGENCY GENERATOR BLDG.	250	A-4	1986
9999-06	ELECTRICAL SWITCHGEAR BLDG.	2,976	B-3	

TABLE A.4–2.—*Y-12 Facilities* [Page 21 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9999-07	EMERGENCY GENERATOR BLDG.	250	A-4	1986
K-1650-00	CENTRAL CONTROL FACILITY	21,120	B-2	
K-741A	POWER OPERATED	304		
533 Total DP w/Continuing mission		**4,412,496**		
620 Total DP		**5,488,439**		
Environmental Management (EM) Facilities				
9201-04	ALPHA 4 (OUT OF SERVICE)	561,900	B-2	1945
9401-04	MAINT. FREE ISSUE FAC. - INTERIM LLW	3,600	A-5	1984
9401-05	URANIUM CHIP OXIDIZERS	3,750	A-5	1987
9404-07	HS STORAGE PUMPHOUSE	3,000	A-2	1944
9424-01	FOAM HOUSE FOR OD-9 (FP)	350	A-5	1993
9424-02	FOAM HOUSE FOR OD-10 (FP)	400	A-5	1993
9616-06	LIQUID WASTE FACILITY	2,600	A-5	1989
9616-07	WEST ENVIRONMENTAL PROJECT	24,554	B-5	1985
9616-08	FILTER TREATMENT FACILITY	1,125	A-5	1986
9616-11	LEACHATE TREATMENT FACILITY	4,805	A-5	1989
9623-00	CENTRAL POLLUTION CONTROL FACILITY	20,000	B-3	1985
9624-00	ENVIRONMENTAL SUPPORT FACILITY	37,200	A-5	1992
9704-01	OFFICES, COMPUTER ROOM & UTILITIES	8,700	A-1	1952
9720-09	RCRA	12,500	A-5	1955
9720-25	STORES	17,600	A-4	1962
9720-31	RCRA - MIXED STORAGE BLDG	6,571	A-4	1986
9720-32	NDA FACILITY	30,977	A-3	1970
9720-41	PROCESS STORAGE BLDG.	3,306	A-5	1988
9720-44	SLUDGE HANDLING FACILITY	4,900	A-5	1986
9720-45	LIQUID ORGANIC WASTE FACILITY	2,250	A-5	1987
9720-58	TRANSFORMER STORAGE AREA (PCB)	4,200	A-5	1987
9720-59	PRODUCTION WASTE STORAGE FACILITY	15,105	A-5	
9722-00	OFFICE, BREAKROOM	1,000	A-5	1987

TABLE A.4–2.—*Y-12 Facilities* [Page 22 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9809-01	URANIUM OXIDE STORAGE SHED	1,200	A-3	1990
9811-01	WASTE OIL STORAGE	4,875	A-5	1988
9811-08	TRANSFER STA. (OIL DISPOSAL, OD-9)	874	A-5	1986
9825-01	UNDERGROUND VAULT (CONCRETE)	1,600	CONC.	1984
9825-02	UNDERGROUND VAULT (CONCRETE)	1,600	CONC.	1984
9830-02	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9830-03	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9830-04	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9830-05	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9830-06	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9830-07	STORAGE PAD FACILITY - RUBB	7,172	A-8	1993
9840-04	DRUM CLEANING STATION (OD10)	312	A-5	1993
9983-44	OFFICES (SANITARY LANDFILL NO. 2)	336	C	
9983-67	ENVIRON. RESTORATION OFFICES	2,160	C	1986
9983-74	OFFICES IN SALVAGE YARD (WAS K-15)	720	C	1986
9983-78	OFFICE TRAILER FOR WASTE COOLING	200	C	1986
9983-93	ENGINEERING OFFICES	624	C	1986
9983-BC	INGRESS & EGRESS BLDG. TF#2	118	C	1993
9983-BD	TRUCK DRIVER'S WAITING AREA	294	C	1993
9983-BE	TANK FARM OFFICE	294	C	1993
9983-BF	INGRESS & EGRESS BLDG. TF#1	118	C	1993
9983-BG	CARPENTER'S SHOP	294	C	1993
9983-BH	SAW SHOP	294	C	1993
9983-BJ	METAL SHED - STORAGE	396	C	1993
9983-BK	INSULATOR SHOP	384	C	1993
9983-BL	LUNCH ROOM	288	C	1993
9983-BM	INGRESS & EGRESS BLDG. TF#3	121	C	1993
9983-BN	WEST END TRAINING CENTER	1,043	C	1993
9983-BP	LAUNDRY	245	C	1993
9983-BQ	FOREMAN'S OFFICE	247	C	1993
9983-BS	STORAGE SHED	307	C	1993

TABLE A.4–2.—*Y-12 Facilities* [Page 23 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9983-BT	MAINT. PLANNER/COORD. OFFICE	245	C	1993
9983-BU	GENERAL FOREMAN'S OFFICE	245	C	1993
9983-BV	FOREMAN'S OFFICE	245	C	1993
9983-BW	MAINTENANCE SUPPLY BLDG.	290	C	1993
9983-BX	LUNCH ROOM	288	C	1993
9983-BY	INGRESS & EGRESS BLDG. TF#4	124	C	1993
9983-CA	OFFICE TRAILER	240	C	1993
9983-CB	BOUNDARY CONTROL STATION	216	C	1993
9983-CG	WTSD SAMPLING CREW TRAILER	150	C	1993
9983-CQ	WTSD SAMPLING CREW TRAILER	198	C	1994
9983-EX	OFFICE FOR TECH	120	C	
9983-FK	RESTROOMS	96	C	1996
9983-FL	OFFICE SPACE	240	C	1996
	67 Total EM Facilities	**835,066**		
Energy Research (ER) Facilities				
9102-01	OFFICE BLDG.	6,250	A-4	1964
9102-02	OFFICE BLDG.	6,200	B-3	1976
9105-00	OFFICE BLDG.	7,400	B-3	1977
9108-00	TECHNICAL STAFF OFFICES - ET	7,510	A-3	1981
9201-02	SITE PROGRAMS MAINTENANCE	257,200	B-1	1944
9201-03	SITE PROGRAMS MAINTENANCE	187,300	B-1	1944
9204-01	ENGINEERING	196,700	B-1	1944
9204-03	PU LAB	216,200	B-3	1945
9207-00	LAB/OFFICE	247,500	B-3	1945
9210-00	UTILITIES	65,700	B-3	1945
9211-00	UTILITIES	76,600	B-3	1945
9220-00	UTILITIES	22,350	A-3	1967
9224-00	CELL FRACTIONATION SYSTEMS	10,100	A-3	1968

TABLE A.4–2.—*Y-12 Facilities* [Page 24 of 24]

Building Number	Description and/or Use	Gross Floor Area (ft^2)	Construction Type[a]	Year Built
9401-01	ENGINE TEST CELLS	12,000	A-4	1945
9404-04	PUMPHOUSE	5,500	A-2	1947
9409-04	COOLING TOWER FOR 9201-2	7,650	WOOD	1945
9422-00	HELIUM COMPRESSOR BLDG.	2,500	A-5	1980
9610-02	FLAMMABLE MATERIALS STORAGE	683	A-4	1990
9610-03	FLAMMABLE MATERIALS STORAGE	512	A-4	1990
9720-39	COLD STORAGE BLDG.	8,000	A-5	1984
9735-00	LAB	15,100	B-2	1944
9743-2	ANIMAL QUARTERS	22,000	A-2	1949
9770-02	RADIATION SOURCE	155	A-2	1945
9983-16	ANIMAL RADIATION-FAC. CONTROL	100	C	1972
9983-17	CONTROL SOURCE & EXPOSURE ROOM	720	C	1972
9999-01	MOTOR GENERATOR (E 9204-3)	500	A-1	1986
9999-03	ELECTRICAL SWITCHGEAR & RECTIFIER	2,400	A-5	1978
9999-04	ELECTRICAL EQUIPMENT	300	A-5	1979
	28 Total ER Facilities	**1,385,130**		
	620 BLDG. Total DP	**5,488,439**		
	67 BLDG. Total EM	**835,066**		
	28 BLDG. Total ER	**1,385,130**		
	715 TOTAL BLDG. Total Y-12 Plant	**7,708,635**		

Note: 9983-XX number denotes the facility is a trailer.

[a] Construction Type Legend

A. Single-story building with
1. Wood frame
2. Masonry bearing walls with wood roof framing
3. Masonry bearing walls with structural steel roof system.
4. Masonry bearing walls with precast concrete roof system
5. Prefabricated metal building with metal wall panels
6. Prefabricated metal building with masonry walls
7. Precast concrete wall panels with concrete roof system
8. Concrete basin with pre-engineered structure (metal and polyester)

B. Multi-story building with
1. Reinforced concrete structure with masonry walls
2. Reinforced concrete and structural steel with masonry walls
3. Structural steel skeleton with masonry walls
4. Structural steel skeleton with cement-asbestos wall panels
5. Structural steel skeleton with metal panels
6. Wood frame

C. Prefabricated portable structure

Note: In general, all wood frame buildings with wood framing have asphalt shingle roof coverings, prefabricated buildings have metal panels, and all others have built-up roofs.

Source: SPAS 1999.

References Appendix A

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