Background

Oak Ridge National Laboratory (ORNL) is the largest and most diverse Department of Energy (DOE) research laboratory. ORNL was part of the overall nuclear complex that evolved from the Manhattan Project in the 1940s. ORNL has played a prominent role in developing science and technology for nuclear power programs, nuclear propulsion, nuclear medicine, and the nation's nuclear weapon program among others. Many nuclear reactors and non-reactor nuclear facilities have been constructed at ORNL since the early 1940s which have supported several research and development mission activities. Some of these facilities have already been deactivated and turned over to the Environmental Management Program. Several non-reactor nuclear facilities were constructed and operated over the years by different research and development divisions.

Responsibility

The Nonreactor Nuclear Facilities Division (NNFD) is responsible for (*a*) ensuring that each facility can be operated within the approved authorization envelope, (*b*) providing agreed-upon resources and services to support the mission work, and (c) ensuring that formal Facility Use Agreements (FUA) are in place to describe agreed-upon roles, responsibilities, authorities, and accountabilities of the program (occupant) and NNFD personnel.

NNFD will use FUAs to formally identify the division of responsibilities between the NNFD and facility occupants, the boundary elements, designated occupant use for each facility, the physical attributes of the facility that support the defined work scope and mission, the operational boundaries that identify facility use, the definition of responsibilities for ensuring that boundary limiting conditions are met (by all occupants of the facilities), and the other matters associated with administration of the FUA.

ORNL management has established the following expectations for NNFD business and personnel management.

1. Promote the DOE and ORNL nuclear strategies and missions.
    a. Promote efficient utilization of ORNL nuclear facilities for mission work.
    b. Maintain nuclear facility capabilities required for DOE and ORNL nuclear strategies.
    c. Enable R&D staff to concentrate on mission objectives.
    d. Support ORNL Program Offices in nuclear missions.

2. Add value to nuclear operations.
    a. Improve the physical condition of nuclear facilities and systems.
    b. Enhance operational discipline.
    c. Improve consistency and efficiency in Environment, Safety, Health, and Quality implementation for the NNFD facilities.
    d. Support initiatives on external regulation.

3. Create a culture of facility ownership.
    a. Focus on service to missions.
    b. Build teamwork between facility and mission staff.
    c. Set high expectations for facility condition and operations.

4. Assume the accountability and authority for compliance with Authorization Basis.

Facility Descriptions

The following paragraphs provide a brief description of each NNFD facility and its capabilities. In addition to these buildings, the Hot Cell Complex Support Services (Buildings 3074, 3104, and 3502) are also included.

Building 2026

The Radioactive Materials Analytical Laboratory (RMAL), Building 2026, is designed and built as a glove box, laboratory, and hot cell facility. The building is a two story, steel framed block building with a heavily shielded, reinforced concrete hot cell bank, hot cell support areas and laboratories on the first floor and offices and equipment room on the second.

Building 2026

Major activities in the facility include the receipt, storage, assay and disposal of a wide range of radioactive materials. Assay operations include dissolutions, dilutions, and separations followed by physical, chemical, and radiochemical examinations of individual samples. The RMAL provides a wide range of analytical support, including inorganic, organic, and radiochemical analysis to both the R&D divisions and plant operations. In addition, the RMAL staff performs in-house research and development activities involving a broad range of physical, chemical, and radiochemical measurements on radioactive materials.

Building 3025E

The Irradiated Material Examination and Testing (IMET) Facility, Building 3025E, is designed and built as a hot cell facility. It is a two-story block and brick structure with a two-story high bay which houses six heavily shielded cells and an array of sixty shielded storage wells. The Facility is housed in the eastern section (3025E) of Building 3025. It includes the SPL with its associated laboratory hood and glove boxes, an Operating Area where the control and monitoring instruments supporting the in-cell test equipment are staged, a utility corridor, a HESA, a tank vault room, office space, a trucking area with access to the high bay, and an outside steel building for storage. The facility is served by many of the same utility supply systems and support organizations that serve the remainder of Building 3025.

Building 3025E

The facility is used for physical and mechanical properties testing and examination of irradiated materials. The tests and examinations are conducted in six examination "hot" cells and/or in a laboratory hood or modified glove boxes in the SPL. Operation of the facility consists of moving irradiated test specimens into

and out of the facility; moving specimens within the facility; storage of specimens within the facility; preparation, observation, testing, and examination of the specimens within the facility; and handling associated waste.

Building 3027

The SNM Vault, Building 3027 is a single story reinforced concrete building designed and built to serve solely as a secure storage facility for packaged radioactive material (e.g., no potential for dispersion). The building consists of an entrance airlock, receiving room, five storage rooms, and one room that contains electrical and ventilation equipment. The building does not, nor is it intended to provide continuously habitable space for staff (i.e., continuously occupied office or administrative space), but rather provides specialized, conditioned, storage space that is occupied intermittently during the conduct of loading, inventory, shipping, and periodic surveillance and maintenance activities.

Building 3027

Note: Building 3027 has been designated for deactivation sometime during the 2003 calendar year.

Building 3047

The Radioisotope Development Laboratory (RDL), Building 3047, is designed and built as a glove box, laboratory, and hot cell facility. The facility is a Category 2, non-reactor nuclear facility. The building is a three-level structure with a beta-gamma hot cell bank, an alpha hot cell, glove box areas, hot cell support areas, laboratories, and an office wing.

Building 3047

Operations at the facility include the radiochemical processing of isotopes in support of the Isotope Program. Other activities involve temporary storage and movement of discrete items of inventory; trans-loading/shipment of items (transfer of items from one carrier or cask to another); receipt, packaging, repackaging, transfer, and shipment of radioactive material; and the unloading, opening, handling,

repackaging, and shipment of liquid and solid radioactive materials including waste. Laboratories are used for handling smaller quantities of radioactive material for research.

Building 3525

The Irradiated Fuels Examination Laboratory (IFEL), a hot cell facility historically known as the High Radiation Level Examination Laboratory, was initially designed and constructed to permit the safe handling of increasing levels of radiation in the chemical, physical, and metallurgical examination of nuclear reactor fuel elements and reactor parts. The IFEL, Building 3525, was constructed in 1963 and is a two-story brick building with a partial basement. The front or northern-most section is a single-story office area. The two-story area to the immediate rear houses the cell complex, the operating areas, and other supporting activities. The office area is isolated from the main part of the building, so the office area can be excluded from the secondary containment zone. The facility has a gross floor area of about 27,000 ft^2.

Building 3525

Major activities in the facility include receipt and handling of irradiated materials (fuel or non-fuel, typically as experimental capsules) in shielded casks; transfer of material into and out of the hot cells; capsule disassembly; nondestructive and destructive testing of irradiated materials; repackaging of spent nuclear fuel; packaging and shipment of irradiated materials (on-site and off-site); waste packaging for disposal; maintenance of remote equipment; and decontamination of the facility and equipment. Examination and testing activities include: metrology; metallographic sample preparation by sectioning, grinding, and polishing; optical and electron microscopy; gamma spectrometry; and, other physical and mechanical properties evaluations as appropriate to the experimental objectives of a particular program.

Building 4501

The Radiochemistry Laboratory (RL), Building 4501, is designed and built as a radiochemical laboratory, hot cell, and glove box facility with office space for support staff. The building was designed and constructed in 1952 as a steel, concrete, concrete block, and brick structure consisting of four floors, including the basement. A portion of the building has been designated as a Hazard Category 2 nuclear facility for the MSRE Conversion Project. The Category 2 portion of 4501 is identified in the MSRE Conversion Project SAR. The remainder of the building is designated as a less-than-Category 3 radiological facility. Building 4505 is immediately south of Building 4501 and the two buildings share a common wall. Ventilation supply for 4505 is located in 4501 as well as most of the utility feeds for 4505. Also, most of the utility services for Building 4507 (a BJC facility) are feed through Building 4501.

Building 4501

The nuclear Hazard Category 2 activity for Building 4501 is the MSRE Conversion Project. This activity will be performed primarily in Hot Cell D with support from other areas of the building. The mission of the Conversion Project is to extract uranium in the form of uranium hexafluoride adsorbed on sodium fluoride pellets and transforms it into a chemically stable uranium oxide by replacing fluorine with oxygen. Other areas of the building are involved in research classified as less-than-Category 3 radiological or non-radiological. This research includes separations chemistry, materials research, fundamental chemistry, nuclear medicine, and thermo-physical properties.

Building 5505

The Transuranium Research Laboratory (TRL), Building 5505, is a glove box and radiochemical hood facility designed for the purpose of conducting research of the actinides and their compounds. The building is a one-story structure of approximately 20,000 ft^2 including a service equipment room (~4,500 ft2) on the roof. The building is of reinforced concrete construction with exterior walls of concrete block faced with brick. The equipment room is of steel frame construction with exterior walls of uninsulated aluminum panels. The laboratories are located back-to-back in the central portion of the building. A central corridor provides controlled access to each laboratory for transfer of radioactive materials. The offices occupy the north, west, and south perimeters of the building and are across a corridor from the laboratories.

Building 5505

Major activities in the facility include research involving the chemistry, physics, and material science of actinides and their compounds, to provide fundamental and technological information, as well as a platform for the development of analytical instrumentation. Basic research in mass spectrometry is also performed. The facility serves as a center for cooperative actinide research and analytical development for ORNL staff, university participants and scientists from other laboratories, both in the U.S. and abroad.

Building 7920

The Radiochemical Engineering Development Center (REDC-1), Building 7920, is designed and built as a glove box, laboratory, and hot cell facility. The building is a two-level structure with a high bay area housing a heavily shielded, reinforced concrete hot cell bank, hot cell support areas, laboratories, and an office wing. The facility is served by many of the same utility supply systems and support organizations that serve other facilities in the 7900 building area.

Building 7920

Major activities in the facility include target preparation, the recovery and purification of transuranium elements, which are primarily alpha emitters of high specific activity, and the development of processing and separations flow sheets. Since the mid-1960s, the REDC has been the production, storage, and distribution center for transuranic elements utilized for the heavy-element research program of the United States Department of Energy (DOE). Target rods containing americium and curium are remotely fabricated in Building 7920, irradiated in the adjacent High Flux Isotope Reactor (HFIR), and then processed in the Building 7920 hot cells for the separation and purification of the heavy actinide elements. Mark 42 target assemblies that were irradiated at Savannah River Site are also processed in the hot cells for the separation and recovery of high-purity Am-243 (plus Pu-242 and Cm-244) for shipment. Support and development work for these operations and related isotope separations processes are performed in two small hot cells (called shielded caves) and in glove boxes in Building 7920.

Building 7930

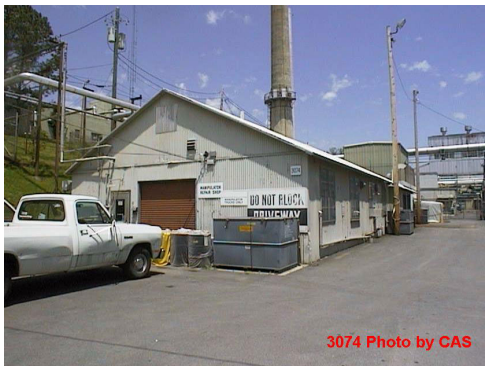
The Radiochemical Engineering Development Center (REDC-2), 7930 Building, is designed and built as a glove box, laboratory, and hot cell facility. The facility is a Category 2, non-reactor nuclear facility. The building is a three-level structure with a high bay area housing a hot cell bank, hot cell support areas, laboratories, and an office wing. The facility is served by many of the same utility supply systems and support organizations that serve other facilities in the 7900 building area.

Building 7930

Major program activities at Building 7930 include (1) chemical processing of californium to produce high purity Cf-252, (2) the fabrication of neutron sources from the Cf-252, and packaging and shipping of Cf-252 sources, (3) recovery of Cm-248 from californium, and (4) providing neutron irradiation services for researchers. Californium-252 and Cf-252 neutron sources have been made available to DOE and other U.S. Government agencies since about 1967 as a co-product of the DOE heavy-element production facilities of the High Flux Isotope Reactor (HFIR) and the REDC-1 at the ORNL.

Hot Cell Complex Shops and Central Services

The operation of the Bethel Valley Hot Cell Complex is supported by three facilities" Interim Manipulator Repair Facility (Building 3074), Resource Craft Maintenance Facility (Building 3104), and Specialized Boot and Rubber Shop (Building 3502). Continued operation of the hot cell facilities require dedicated support and specialized services. These services and support are essential for the successful operation of the hot cell facilities and are necessary to meet safety and compliance requirements involved with facility operations.



Building 3074

Building 3104

Building 3502

Hot cell support comes in many forms ranging from maintenance resources, which is provided by the Resource Craft Maintenance Facility, to technical expertise for transportation safety and hot cell operations activities. Dedicated support is also required for the remote handling activities associated with hot cell operations. The Interim Manipulator Repair Facility and Specialized Boot and Rubber Shop provide this dedicated support. These shops provide decontamination, maintenance, repair, and modification of hot cell manipulators vital to the successful operation of the hot cell facilities. These specialized services cannot be performed in the hot cell facilities due to space and time requirements.