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# STABILIZATION AND SHUTDOWN OF OAK RIDGE NATIONAL LABORATORY'S RADIOISOTOPES PRODUCTION FACILITY\*

R. E. Eversole  
Isotopes Facilities Shutdown Program  
Chemical Technology Division  
Oak Ridge National Laboratory  
Oak Ridge, Tennessee 37831

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# STABILIZATION AND SHUTDOWN OF OAK RIDGE NATIONAL LABORATORY'S RADIOISOTOPES PRODUCTION FACILITIES

Robert E. Eversole  
Chemical Technology Division  
Oak Ridge National Laboratory  
P.O. Box 2008-6015  
Oak Ridge, Tennessee 37831-6015  
(615) 576-7483  
FAX 576-7965

## ABSTRACT

The Oak Ridge National Laboratory (ORNL) has been involved in the production and distribution of a variety of radioisotopes for medical, scientific and industrial applications since the late 1940s. Production of these materials was concentrated in a number of facilities primarily built in the 1950s and 1960s. Due to the age and deteriorating condition of these facilities, it was determined in 1989 that it would not be cost effective to upgrade these facilities to bring them into compliance with contemporary environmental, safety and health standards. The U.S. Department of Energy (DOE) instructed ORNL to halt the production of isotopes in these facilities and maintain the facilities in safe standby condition while preparing a stabilization and shutdown plan. The goal was to place the former isotope production facilities in a radiologically and industrially safe condition to allow a 5-year deferral of the initiation of environmental restoration (ER) activities. In response to DOE's instructions, ORNL identified 17 facilities for shutdown, addressed the shutdown requirements for each facility, and prepared and implemented a three-phase, 4-year plan for shutdown of the facilities. The Isotopes Facilities Shutdown Program (IFSP) office was created to execute the stabilization and shutdown plan. The program is entering its third year in which the actual shutdown of the facilities is initiated. Accomplishments to date have included consolidation of all isotopes inventory into one facility, DOE approval of the IFSP Environmental Assessment (EA), and implementation of a detailed management plan for the shutdown of the facilities.

## BACKGROUND

In December 1989, DOE instructed ORNL to prepare the isotopes production and distribution facilities (with the exception of immediate facility needs for  $^{85}\text{Kr}$ ,  $^3\text{H}$ , and  $^{90}\text{Y}$ ) for safe shutdown.<sup>1</sup> In response, ORNL identified 17 facilities for shutdown, as indicated in Table 1. Subsequently, one of the facilities (Building 3550), was removed from the listing by DOE directive.<sup>2</sup> Each of these facilities is located within the ORNL complex with the exception of Building 9204-3, which is part of the Y-12 Plant. ORNL is currently placing these facilities in a safe shutdown condition while maintaining them under the existing maintenance and surveillance procedures. In summary, the objectives of the shutdown program are to determine and complete the required shutdown tasks on the isotopes facilities in order to place them in a radiologically and industrially safe condition and minimize the necessary maintenance and surveillance of the isotopes facilities during the interim period before the initiation of final decontamination and decommissioning.

**Table 1. Scheduled shutdown facilities<sup>a</sup>**

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Krypton-85 Enrichment Facility	Building 3026-C
Alpha Powder Facility	Building 3028
Source Development Laboratory	Building 3029
Radioisotope Production Laboratory-C	Building 3030
Radioisotope Production Laboratory-D	Building 3031
Radioisotope Production Laboratory-H	Building 3118
Radioactive Gas Processing Facility	Building 3033
Radioactive Production Laboratory Annex	Building 3033-A
Isotope Area Storage and Service Building	Building 3036
Alpha Handling Facility	Building 3038-AHF
Radioisotope Packaging and Shipping Facility	Building 3038-M
Isotopes Materials Laboratory	Building 3038-E
Isotopes Technology Building	Building 3047
Fission Products Development Laboratory	Building 3517
Tritium Target Preparation Facility	Building 7025
Actinide Facility	Building 9204-3

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<sup>a</sup>Building 3550 was originally included but was subsequently removed by DOE directive.

## **IFSP OBJECTIVE**

The goal of the IFSP is to place 16 formerly utilized isotopes facilities at ORNL (see Table 1) in a radiologically and industrially safe condition for routine, long-term maintenance and surveillance prior to eventual decommissioning.<sup>3</sup> These facilities will be placed in a condition to meet the requirements for environmental restoration specified by the DOE "Policy Memorandum for Acceptance of Facilities for Environmental Restoration," issued March 15, 1991, by L. F. Duffy.<sup>4</sup> A radiologically and industrially safe condition for a facility is defined as a state in which (1) all hazardous materials, including radioactive materials, high-level wastes, and contaminated liquid wastes have been removed; (2) the structures and radiation monitoring systems are in a stable physical condition that is adequate to contain and monitor any radioactive contamination in accordance with DOE Order 5480.1A,<sup>5</sup> "Environmental Protection, Safety, and Health Protection Program for DOE Operations," August 31, 1981; (3) the security systems and procedures are adequate to prevent unauthorized entry; (4) all hazardous chemicals will be removed, and the general requirements for industrial safety will be achieved; and (5) compliance with all environmental, health and safety regulatory requirements has been assessed and documented.

## **PROGRAM PLAN**

Upon establishing the list of facilities to be shut down, preparation of a program plan<sup>1</sup> for the IFSP was initiated. The work required to complete the program was divided into three work phases as described below.

**Phase I - Development of a safe shutdown plan while maintaining the facilities**

under the existing maintenance and surveillance plan.

**Phase II** - Refinement of the initial shutdown plan and implementation of the required actions for placing the facilities in a safe condition and obtaining an approved, minimal maintenance and surveillance plan.

**Phase III** - Completion of the required actions for acceptance and transfer of the facilities into the Environmental Restoration (ER) Program.

The primary activities in Phase I, that supported development of a program plan included (1) defining all activities required to bring facilities into safe shutdown and developing a work breakdown structure, (2) establishing National Environmental Protection Act (NEPA) documentation requirements for all planned activities, (3) updating the inventory of all radioactive materials stored in facilities to be shut down, and (4) assembling an initial cost estimate and project schedule. A 4-year schedule for completion of shutdown activities in all facilities was developed. The project schedule is shown on Fig. 1. Phase I concluded at the end of fiscal year (FY) 1990 with the publication of the *ORNL Isotopes Facilities Shutdown Program Plan*<sup>1</sup> and the formation of a program office. Phase II was initiated at the beginning of FY 1991. In addition to providing essential surveillance for all facilities, IFSP activities during the first 2 years of Phase II were directed towards (1) establishing the program by developing a program quality assurance (QA) plan and a program management plan that includes a detailed cost/schedule tracking system, (2) preparing and obtaining approval of NEPA documentation for planned shutdown activities, (3) consolidating all radioisotopes inventory into a single facility, and (4) performing a detailed review of the cost and schedule for all shutdown activities and revising the original program plan accordingly. These activities are currently being completed and actual shutdown of facilities will be initiated in early FY 1993. Completion of shutdown and turnover of facilities to the ER Program is on schedule for the end of FY 1994.

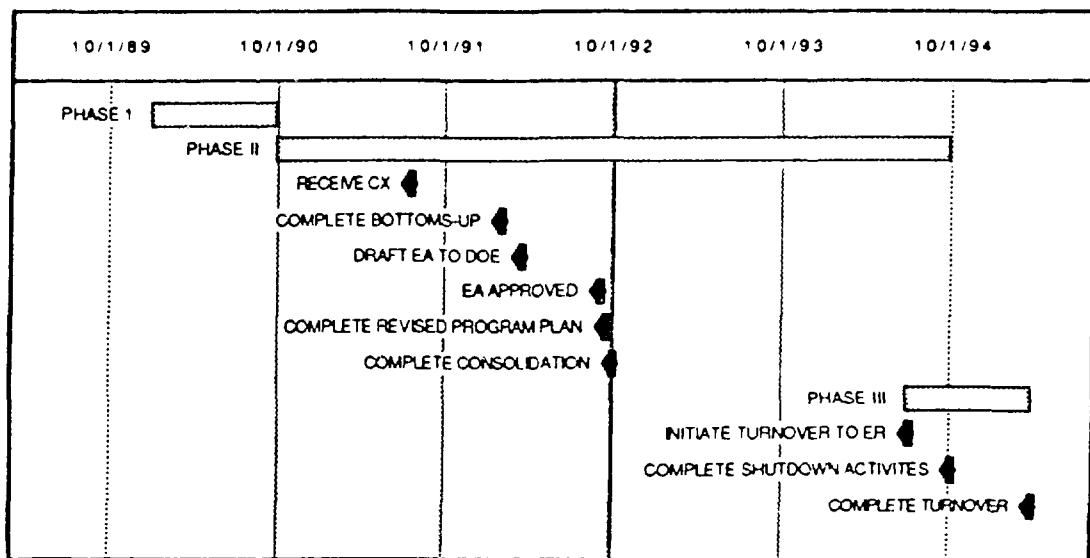


Figure 1. Isotopes Facilities Shutdown Program Schedule.

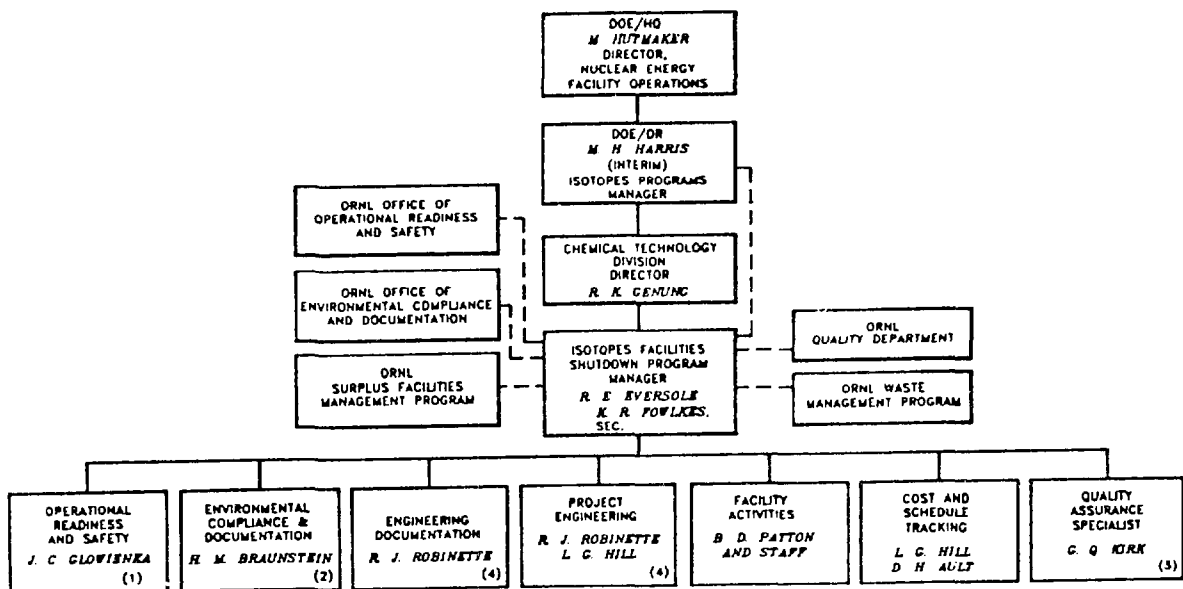
# PROGRAM MANAGEMENT

The Oak Ridge National Laboratory Isotopes Facilities Shutdown Program Management Plan<sup>3</sup> was prepared to document the objectives, define organizational relationships and responsibilities, and outline the management control systems to be employed. This plan has been developed by the DOE Oak Ridge Field Office (OR) and ORNL. It will be reviewed periodically and revised as necessary, with agreement from the major participants. The management plan complies with the intent of DOE Order 4700.1,<sup>6</sup> "Project Management System."

A program office was established in the Chemical Technology Division (CTD) to direct and manage the IFSP activities. The CTD Director has delegated programmatic responsibilities to the IFSP Manager. While the majority of the work on IFSP is performed within CTD, key support will be provided by other ORNL functional organizations. The functional relationships among the organizations involved in the IFSP are shown in Fig. 2.

The IFSP Manager reports to the CTD Director and is responsible for the development, implementation, and completion of required actions for acceptance and transfer of designated ORNL Isotope Program facilities into the ER Program. The IFSP Manager is the single point of contact with OR for all technical, schedule, or budget issues. She/he is responsible for the general technical direction and management of the overall program, including environmental compliance, engineering, an activity oversight for the 16 involved facilities, cost and schedule tracking, and reporting and configuration management. Specific technical skills are provided by functional organizations within CTD and other ORNL organizations. The IFSP Manager is also accountable for securing the support and commitment to IFSP of the functional staff members (both internal and external to CTD), QA planning, and implementation of the program.

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- (1) ASSIGNED TO IFSP TEAM BY ORNL OFFICE OF OPERATIONAL READINESS & SAFETY
- (2) ASSIGNED TO IFSP TEAM BY ORNL OFFICE OF ENVIRONMENTAL COMPLIANCE & DOCUMENTATION
- (3) ASSIGNED TO IFSP TEAM BY ORNL QUALITY DEPARTMENT
- (4) UNDER SUBCONTRACT WITH H&R TECHNICAL ASSOCIATES

Figure 2. IFSP Organization Chart

As indicated in the IFSP organization chart, representatives from Quality, Waste Management, Surplus Facilities, the Office of Operational Readiness and Safety, and the Office of Environmental Compliance and Documentation maintain close contact with the program manager for both oversight and support activities. For effectiveness in pursuing program objectives, personnel from Operational Readiness and Safety, Environmental Compliance and Documentation, and QA are assigned to the IFSP team in a matrix capacity to aid the IFSP Manager in accomplishing needed actions within their respective parent organizations.

The IFSP Management Plan defines a configuration management system (CMS) designed to provide contributing participants with management techniques and information that will ensure complete integration of technical, cost, and schedule objectives as well as plans for the duration of the IFSP. State-of-the-art project management software is used to integrate the technical, cost, and schedule objectives. Emphasis is placed on three principal functions: (1) baseline definition, (2) performance monitoring, and (3) change control. An activity data sheet that defines the baseline scope, cost, schedule, and milestones for each work breakdown structure (WBS) element has been developed. The technical, schedule, and cost objectives are tracked for each activity to ensure that the work is performed within the scope of all three parameters. Change control can be initiated when cost or schedule variances are out of tolerance or variances occur in the scope or budget. A change control board reviews and approves all recommended actions.

## **PROGRAM STATUS**

The IFSP is currently at the midpoint of Phase II and is on schedule for the turnover of all facilities to the ER program by the end of FY 1994. While the physical modifications required to stabilize and shut down all facilities are just being initiated, there has been significant progress in the first two years of the program. The removal of radioisotopes inventory from IFSP facilities has been very successful. It was recognized early in Phase II that by removing the inventory from facilities a significant reduction in safety documentation would be achieved. At the beginning of Phase II, approximately 1,300,000 Ci of various isotopes were stored in 13 IFSP facilities. Currently, there is approximately 350,000 Ci stored in two facilities. Most of this material is currently stored in Building 3517, the designated IFSP interim storage facility. The balance of the material is tritium contained in the radioluminescent (RL) lights stored in Building 3026-C. The RL lights will be shipped off-site when DOE designates a receiver. The removal of inventory from IFSP facilities was initiated in late FY 1991 when a categorical exclusion (CX) from NEPA documentation was approved by DOE. Most transfers were to other ORNL facilities, but several notable off-site transfers include shipments of Sr-90 to Richland, Washington, gaseous tritium to Savannah River and Cs-137 to France. The recently completed hazards screening of IFSP facilities has validated the earlier assumption regarding the reduction in safety documentation as a result of removing isotopes inventory. With the exception of Building 3517, all IFSP facilities have been screened out as "generally acceptable" and are thus exempt from further safety documentation. Operational Safety Requirements (OSR) documents for these facilities have now been replaced with Limiting Condition Documents. This change has allowed a significant reduction in the number of instrumentation in these facilities and corresponding reduction in the maintenance cost for these facilities.

Other significant accomplishments include the completion of facility applications for acceptance of IFSP facilities into the ER Program and completion and approval of an EA of planned shutdown activities. The ER Program will begin accepting facilities in FY 1994 and all facilities will be accepted by the end of the year. The EA resulted in a "finding of no significant impact," thus, allowing the physical modifications needed to stabilize and shut down facilities in FY 1993.

In FY 1992, the IFSP completed a detailed "Bottoms-Up" review of the cost and schedule for completion of all planned activities. This effort involved all IFSP personnel from the line individuals performing the work up through the program manager. As a result of this effort, the cost estimate for completion of the program was reduced from \$46,000,000 to \$40,000,000.

The major remaining hurdle is the resumption of the repackaging operation in Building 3517. This will involve the opening of sources in this facility and the subsequent handling of radioactive powder. This limited resumption of operation will require approval from DOE. A plan for resumption of operations has been developed and is being implemented. This implementation culminates in an operational readiness review (ORR) schedule for April 1993. Successful completion of the ORR will allow the repackaging operations to proceed and be complete by April 1994 and the building to be stabilized and turned over to the ER Program at the end of FY 1994.

## REFERENCES

1. S. M. Gibson, B. D. Patton, and M. B. Sears, *ORNL Isotopes Facilities Shutdown Program Plan*, ORNL/TM-11689, October 1990.
2. J. A. Reafsnyder to A. W. Trivelpiece, Letter, "Oak Ridge National Laboratory (ORNL)," Isotope Facility Shutdown Plan, August 14, 1990.
3. L. G. Hill, R. E. Eversole, R. K. Kibbe, *Oak Ridge National Laboratory Isotopes Facilities Shutdown Program Management Plan*, ORNL/TM-11829, May 1992.
4. L. F. Duffy, Memorandum, "Policy for Acceptance of Facilities for Environmental Restoration, March 15, 1991.
5. DOE Order 5480.1A, "Environmental Protection, Safety, and Health Protection Program for DOE Operations," August 31, 1981.
6. DOE Order 4700.1, "Project Management System," March 6, 1987.