ORNL/ER-249/R2

MARTIN MARIETTA

ENVIRONMENTAL RESTORATION PROGRAM

Work Plan for the Isotopes Facilities Deactivation Project at Oak Ridge National Laboratory

ENERGY SYSTEMS

ER

MANAGED BY
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FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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Energy Systems Environmental Restoration Program

Work Plan for the Isotopes Facilities Deactivation Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee

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PREFACE

This workplan was prepared to describe the detailed plan proposed by Lockheed Martin Energy Systems, Inc., in the deactivation of various facilities on the Oak Ridge Reservation that, in the past, had been used to prepare radioactive isotopes. Although this element of work is not part of the Comprehensive Environmental Response Compensation and Liability Act, it is being accomplished in accordance with the substantive requirements of the act. This revision includes two additional buildings that were added to the Isotopes Facilities Deactivation Program since completion of the original issue of the work plan and incorporates the technical, cost and schedule information developed in the baseline plan. This project is listed under Work Breakdown Structure 1.6.6.2.10.02, Isotopes Facilities Deactivation Program, Activity Data Sheet 6504IS.

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TABLES

ABBREVIATIONS

ADM	action description memorandum
AHF	Alpha Handling Facility
ALARA	As Low As Reasonably Achievable
AR	Administrative Record
CAT	collection and transfer system
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRM	Center for Risk Management
CX	categorical exclusion
D&D	decontamination and decommissioning
DMC	Document Management Center
DOE	U.S. Department of Energy
EA	environmental assessment
EM-40	DOE Headquarters Office of Decontamination and Decommissioning
EM-60	DOE Headquarters Office of Facility Transition and Management
Energy Systems	Lockheed Martin Energy Systems, Inc.
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ES&H	environment, safety, and health
FDDM	Facility Disposition Decision Model
FFA	Federal Facility Agreement
FPDL	Fission Products Development Laboratory
FSET	Facility Safety Evaluation Team
HAZWOPER	hazardous waste operations and emergency response
HEPA	high-efficiency particulate air
HQ	DOE Headquarters
HSD	hazards screening document
HVAC	heating, ventilation, and air conditioning
IFDP	Isotopes Facilities Deactivation Project
IFSP	Isotopes Facilities Shutdown Program
LCD	Limiting Conditions for Operations Document
LLLW	liquid low-level (radioactive) waste
NEPA	National Environmental Policy Act
NRWTP	nonradiological wastewater treatment plant
ORNL	Oak Ridge National Laboratory
ORO	DOE Oak Ridge Operations Office
ORR	operational readiness review
OSR	operational safety requirement
PSET	Plant Safety Evaluation Team
PSS	problem safety summary
PWTP	process waste treatment plant
QA	quality assurance
RAMSPAC	radioactive materials shipping and packaging
RCRA	Resource Conservation and Recovery Act
RL	radioluminescent
RP	radiation protection
RTG	radio-thermoelectric generator
RTS	Radiochemical Technology Section

S&M	surveillance and maintenance
SA	safety assessment
SAR	safety analysis report
SARUP	Safety Analysis Report Update Program
SLLW	solid low-level (radioactive) waste
TRU	transuranics
TSHASP	task-specific health and safety plan
USQD	unreviewed safety question determination
WBS	work breakdown structure
WESF	Waste Encapsulation Storage Facility

EXECUTIVE SUMMARY

The purpose of the Isotopes Facilities Deactivation Project (IFDP) is to place former isotopes production facilities at the Oak Ridge National Laboratory in a safe, stable, and environmentally sound condition; suitable for an extended period of minimum surveillance and maintenance (S&M) and as quickly and economical as possible. Implementation and completion of the deactivation project will further reduce the risks to the environment and to public safety and health. Furthermore, completion of the project will result in significant S&M cost savings in future years. The IFDP work plan defines the project schedule, the cost estimate, and the technical approach for the project. A companion document, the IFDP management plan, has been prepared to document the project objectives, define organizational relationships and responsibilities, and outline the management control systems to be employed in the management of the project. The project has adopted the strategy of deactivating the simple facilities first, to reduce the scope of the project and to gain experience before addressing more difficult facilities. A decision support system is being developed to identify the activities that best promote the project mission and result in the largest cost savings. This work plan will be reviewed and revised annually.

Deactivation of IFDP facilities was initiated in FY 1994 and will be completed in FY 2000. The schedule for deactivation of facilities is shown in Fig. ES-1. The total cost of the project is estimated to be $51M. The costs are summarized in Table ES-1. Upon completion of deactivation, annual S&M costs of these facilities will be reduced from the current level of $5M per year to less than $1M per year.

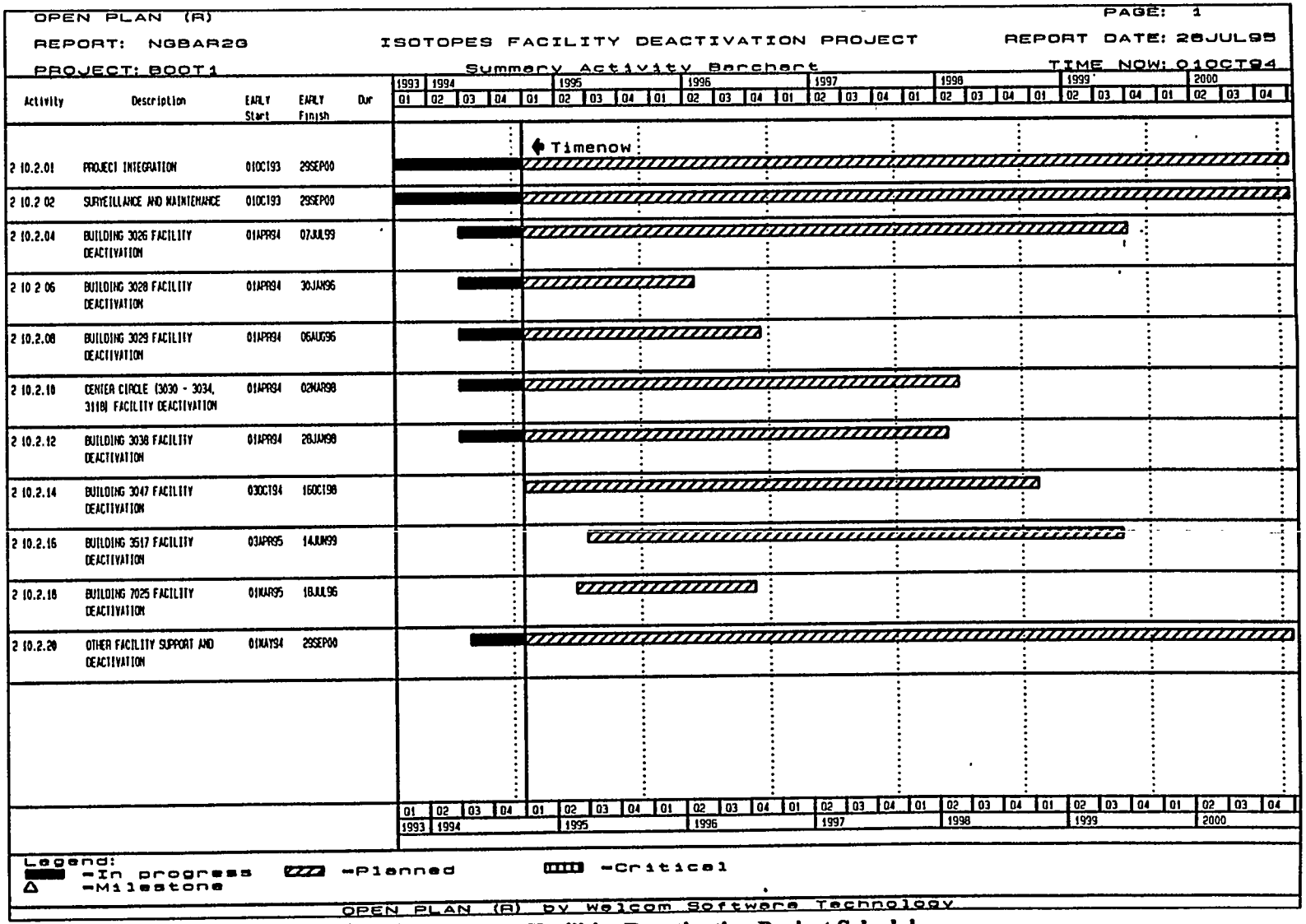

Fig. ES-1. Isotopes Facilities Deactivation Project Schedule

Table ES-1. Isotopes Facilities Deactivation Project Cost Summary

Arranged By: WBS
Fiscal Year Range 1995 - 2000

	Fiscal Year						
	1995	1996	1997	1998	1999	2000	Total
2.10.2.01 PROJECT INTEGRATION	478	499	515	464	482	316	2754
2.10.2.02 SURVEILLANCE AND MAINTENANCE	3077	3008	2477	2343	1384	631	12920
2.10.2.04 BUILDING 3026 FACILITY DEACTIV	314	295	185	1170	251	.	2215
2.10.2.06 BUILDING 3028 FACILITY DEACTIV	288	163	.	.	.	.	451
2.10.2.08 BUILDING 3029 FACILITY DEACTIV	97	504	.	.	.	.	601
2.10.2.10 CENTER CIRCLE 3030/3034.3118 F	392	777	84	222	.	.	1475
2.10.2.12 BUILDING 3028	229	510	649	215	.	.	1603
2.10.2.14 BUILDING 3047 FACILITY DEACTIV	500	.	843	707	16	.	2066
2.10.2.16 BUILDING 3517 FACILITY DEACTIV	443	349	1364	1726	590	.	4472
2.10.2.18 BUILDING 7025 FACILITY DEACTIV	80	155	.	.	.	.	235
2.10.2.20 OTHER FACILITY SUPPORT AND DEA	791	861	501	520	541	561	3775
Sub-Total	6689	7121	6618	7367	3264	1508	32567
Overhead	2715	2639	2691	2887	1077	447	12456
Sub-Total	9404	9760	9309	10254	4341	1955	45023
Contingency	270	422	0	3074	1301	586	5653
Grand Total	9674	10182	9309	13328	5642	2541	50676

1. INTRODUCTION

1.1 PURPOSE

This work plan documents the objectives, technical requirements, and detailed work plans including schedules, milestones, and cost estimates. A companion document, the Isotopes Facilities Deactivation Project (IFDP) management plan, defines organizational relationships and responsibilities and outlines the management control systems to be used in the management of the project. This plan has been developed by the Environmental Restoration (ER) Program of Lockheed Martin Energy Systems, Inc. (Energy Systems) for the U.S. Department of Energy (DOE) Oak Ridge Operations Office (ORO).

1.2 SCOPE

Nineteen facilities are currently in the IFDP, as listed in Table 1. A description of each facility is contained in Appendix A. Two of these facilities, Buildings 3093 and 3099, are ancillary facilities and are not discussed individually. To complete its mission, the IFDP must execute those activities required to deactivate and place each facility in shutdown condition. A deactivated shutdown facility is one in which (1) hazardous materials and waste and transferable radioactive contamination have been removed from accessible areas, (2) containment structures are in sound physical condition, (3) energy sources in the facility have been de-energized to the maximum extent practical, (4) use and occupancy of the building have been terminated, and (5) the facility is structurally sound and weathertight. The IFDP will identify all activities required to achieve these conditions in IFDP facilities and will manage their execution according to this plan. Existing building-specific procedures will be utilized and modified as required to conform to ER policy.

1.3 MISSION

The mission of the IFDP is to deactivate former Oak Ridge National Laboratory (ORNL) isotopes production facilities. Specifically, the IFDP will

- place facilities into a safe, stable, inactive condition with the lowest practical surveillance and maintenance (S&M) costs while maintaining safety envelopes adequate to ensure the safety and health of the workers, the public, and the environment;
- establish a baseline S&M program consistent with surplus and post-deactivation facility liabilities;
- ensure facility acceptance into the DOE Headquarters (HQ) Office of Decontamination and Decommissioning (D&D) Program (EM-40); and
- minimize waste generation.

Table 1. Scheduled shutdown facilities

Krypton-85 Enrichment Facility	Building 3026-C
Metal Segmenting Facility	Building 3026-D
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
Alpha Handling Facility	Building 3038-AHF
Radioisotope Packaging and Shipping Facility	Building 3038-M
Isotope Materials Laboratory	Building 3038-E
Isotope Technology Building	Building 3047
Fission Products Development Laboratory	Building 3517
Tritium Target Preparation Facility	Building 7025
Radioisotopes Production Laboratory—E	Building 3032
Radioisotopes Area Services	Building 3034
*Storage Cubicle	Building 3093
*Storage Pad	Building 3099

* Ancillary Facility

1.4 PROJECT BACKGROUND

In 1989, DOE instructed the Oak Ridge National Laboratory (ORNL) to prepare various isotopes production facilities for safe shutdown. In response, ORNL identified candidate facilities for shutdown and established the Isotopes Facilities Shutdown Program (IFSP). A program plan (Gibson, Patton, and Sears 1990) and management plan (Hill, Eversole, and Kibbe 1992) were prepared and approved by DOE (Reafsnyder 1992). The objective of the program was to evaluate and execute all required tasks in the isotopes facilities required to place them in a radiologically and industrially safe condition and to minimize the required surveillance and maintenance (S&M) of the facilities. The program was managed by the Office of Nuclear Energy and executed by the Chemical Technology Division (CTD) of ORNL. Implementation of the program began in FY 1991 and was to be concluded at the end of FY 1994. All facilities were to be transitioned into the Decontamination and Decommissioning (D&D) Program upon completion of the IFSP. The program was executed as planned until mid-FY 1992 when a shortfall with anticipated FY 1993 funding was identified. DOE instructed the IFSP to reduce activities to levels necessary for minimal S&M of the facilities. The program entered FY 1993 with no new appropriations but was subsequently funded by the DOE Office of Environmental Management and Uranium Enrichment Operations (EM&UE). It was determined in FY 1993 that the EM&UE Office of Facility Transition and Management (EM-60) would manage the program. Before acceptance of the IFSP, EM-60 commissioned an Independent Technical Review (ITR) of the program. The scope of the ITR was to assess the IFSP and make recommendations that might enhance facility safety, accelerate the deactivation of these facilities, and minimize deactivation costs.

2. PROJECT OBJECTIVES AND APPROACH

2.1 PROJECT OBJECTIVES

2.1.1 Environment, Safety, and Health Objectives

- Serve as a local and national model for DOE-HQ Office of Facility Transition and Management (EM-60) Environment, Safety, and Health (ES&H) protection awareness and preparedness.
- Characterize the potential risks posed by IFDP facilities adequately to design deactivation and S&M plans which effectively protect human ES&H systems.
- Plan and implement deactivation activities to minimize worker, public, and ecological risk.
- Develop and implement an S&M program and deactivation alternatives designed to place the IFDP facilities in a storage configuration that minimizes S&M worker, public, and environmental risk for the present and future.
- Develop plans and establish systems to monitor known releases and to mitigate and document planned (discharges) and unplanned (spills) releases associated with deactivation and S&M activities.
- Seek opportunities to develop and apply innovative technologies (e.g., remote and robotics systems) to further reduce potential worker exposure to hazards and further reduce S&M and deactivation costs.

2.1.2 Compliance Objectives

- Serve as a model project with respect to the identification of, and compliance with, requirements, orders, and guidelines applicable to EM-60 deactivation and S&M activities.
- Identify the DOE Orders and guidelines, state requirements, U.S. Environmental Protection Agency (EPA) requirements, other federal requirements, and ER Program and Energy Systems project requirements that are applicable to deactivation and S&M plans and actions.
- Identify and follow EM-60 deactivation project pathways that reduce downstream S&M compliance activities, costs, and liabilities.
- Design project and quality assurance (QA) plans to enable all deactivation activities to comply with applicable and relevant requirements.
- Review facility health and safety compliance strategies appropriate for EM-60 rather than operating facilities.

2.1.3 EM-60/EM-40 Transition Objectives

- Serve as a model EM-60 project, with respect to the development, negotiation, and implementation of EM-60/EM-40 transition criteria and agreements that are consistent with DOE-HQ and DOE-ORO guidance.

- Identify the minimum set of deactivation activities that must be completed for each facility to transition, and a process for identifying additional transition activities that could reduce life cycle cost using cost and risk decision criteria and rules.

- Establish and maintain a formal system for planning, estimating, scheduling, and accomplishing EM-60/EM-40 facility transition actions.

2.1.4 Waste Management Objectives

- Incorporate secondary waste stream minimization into deactivation and S&M plans.

- Implement deactivation alternatives that maximize waste segregation and recycling opportunities, while minimizing life cycle waste management costs.

- Provide a platform for developing and applying new systems and technologies for technically sound and cost-efficient waste treatment, storage, and disposal.

- Develop and implement project approaches and plans designed to minimize waste handling and packaging requirements.

- Develop estimates and projections regarding the nature and magnitude of wastes expected from deactivation and S&M activities to support Waste Management Program planning and to use in deactivation program planning.

- Maximize acceptance of IFDP waste by private industry through generating waste streams that meet applicable industry waste acceptance criteria.

2.1.5 Life Cycle Cost and Risk Objectives

- Serve as a national model for the development and implementation of project plans designed to reduce life cycle facility deactivation, decontamination, compliance, and S&M costs, risks, and liabilities.

- Develop and apply the Facility Disposition Decision Model (FDDM) to provide a defensible basis for decisions regarding when, how, and to what extent to deactivate surplus federal facilities.

- Evaluate risk and cost trade-offs among alternative IFDP project pathways to identify the deactivation, decontamination, and S&M pathways that minimize life cycle costs and risks.

- Utilize the FDDM to integrate stakeholder, management, and technical considerations into a common decision framework.

2.2 PROJECT APPROACH/STRATEGY

The basic mission of the IFDP is to place former isotopes production facilities into a safe, stable, and deactivated state with the lowest possible S&M cost while maintaining safety envelopes adequate to protect the safety and health of the workers, the public, and the environment and to complete the turnover of all facilities to the ORNL D&D Program. Technical requirements define the project's completion and the acceptable conditions for turnover to the ORNL D&D Program.

The technical requirements defined in the first editions (Rev 0 & Rev 1) of the IFDP Work Plan, represented the best technical judgement of engineers and technicians experienced in the past operations and knowledgeable of the current conditions of these facilities. In order to provide a more systematic and consistent method of developing technical requirements, a facility end-point determination process was developed to support this (Rev 2) and future editions of the work plan. The end point determination procedure is based upon the model developed to define the necessary deactivation activities for the PUREX and UO_3 facilities at the Hanford Reservation in Richland, Washington. The process is documented in *Deactivation End Point Determination Process for the Isotopes Facilities Deactivation Project*, Parsons Engineering Inc., March 30, 1995. The process was piloted on Buildings 3026-C and 3026-D. The process was then used on Buildings 3038-E, 3038-AHF, 3038-M, 3517, 3033, 3032, and 7025. The results from the application of the process to these facilities is summarized in Table 2. Review of the conditions in the remaining IFDP facilities were very similar to those already reviewed and thus the end points already identified were directly applicable. The IFDP technical requirements have been reviewed and updated based upon these end points. When complete, the FDDM will be used to fine tune the end point determination process.

Table 2. IFDP Facility Status After Deactivation

FACILITY AREA	AREA STATUS DESCRIPTION
Access Areas	
Operating Areas	• Remove loose, flammable material . • Remove and dispose of radioactive inventory. • Appropriately label radiation hot spots. • Appropriately mark and label areas of fixed contamination. • Stabilize asbestos containing material. • Remove Zinc Bromide from hot cell viewing windows.
Administrative Areas	• Remove loose, flammable material. • Stabilize asbestos containing material. • Where contamination levels require posting they will be decontaminated to below posting levels. • Appropriately label areas of fixed contamination. • Remove stored gas cylinders.
No Access Areas	
Manipulator Hot Cells and Yttrium Hot Cell in 3038	• Remove waste and debris from hot cells. • Wash down the interior of the hot cells. • Drain liquid from the hot cell windows where the liquid is not required for shielding as in lead glass windows. • Maintain Cell Ventilation.

Table 2 (continued)

FACILITY AREA	AREA STATUS DESCRIPTION
Alpha Handling Facility Hot Cells in Building 3038	• Remove waste and debris from hot cells. • Wash down the interior of the hot cells. • Drain water from the hot cell water tanks. • Remove the in-cell high-efficiency particulate air (HEPA) filters.
Glove Boxes	• Remove all material and debris from the glove boxes. • Seal all ports externally. • Maintain the ventilation where the boxes are connected to the cell ventilation or hot off-gas systems since these will be operational to support other facilities. • Where the glove boxes are on local ventilation or other system which will not be maintained the box will be isolated and sealed.
Building 3038 Attic Area	• Remove and dispose of loose, flammable material and debris. • Stabilize asbestos containing material where it is a hazard to workers.
Building 3038 Barricade	• Remove all debris. • Perform an As Low as Reasonably Achievable (ALARA) decontamination to remove loose easily remove material. • Seal the area so that the local ventilation system can be shut down.
External Areas	
Roofs	• Assure the structural integrity of the roof and establish a surveillance and maintenance program to maintain the integrity.
Exterior Walls	• Eliminate sources of food and water and seal holes in the exterior of the building to prevent vermin intrusion.
Operational Systems	
Cell Ventilation System	• Remove in-cell filters in hot cells. • Stabilize asbestos on the ductwork where applicable. • Building 3517 has five sets of filters including an underground set with a sump system which must be maintained. • The system will continue to operate since it provides ventilation to other facilities which will not be deactivated. • The system ductwork integrity will be verified where appropriate.
Local Ventilation Systems	• Shutdown local ventilation systems after the ventilation inlets have been appropriately dispositioned. (Hoods or other inlets)
Glove Boxes	• Remove all material and debris. • Seal all ports externally. • Maintain ventilation to Building 3038 boxes.
Ventilation Hoods	• Remove Resource Conservation and Recovery Act (RCRA) materials. • Remove loose flammable materials. • Close, seal and shut down hood.

Table 2 (continued)

FACILITY AREA	AREA STATUS DESCRIPTION
Building 3517 Cask Storage Area	• Transfer the casks to EM-30 for disposition or move the casks into the 3517 high bay area for long term storage.
Fire Protection System	• For Building 3026C&D the system must be maintained as a wet system. • For facilities in the Isotope Circle the system has been modified to a dry system. • Buildings 3517 and 3038 will be on an alarmed system with a manually operated valve outside the building to be operated by the fire department.
Storm Drains	• Leave the drains as they are.
Radiation Monitoring System	• Abandon the radiation/air monitoring systems in place and re-evaluate the monitoring requirements based on the final deactivated condition of the facility.
Process Off-Gas System	• In Building 3517 shut down the system and remove the filters.
Mothballed Systems	
Cranes	• Abandon in place.
Fork Trucks	• Abandon in place.
Abandoned Systems	
Hot Drains	• Abandon in place • Some facilities are required by the Federal Facilities Agreement to plug the drains and this will be the regulatory required end-point.
Electrical System	• Lock-out systems within the building except for the lighting and equipment required to support S&M. • Fans for the heating system in Building 3026 are required to be operational. • The sump for the underground filters for Building 3517 is required to be operational.
Compressed Air	• Disconnect the Supply line external to the facility.
Process Drains	• Abandon in place.
Water Systems	• Disconnect external to the facility and abandon in place.
Steam Heat	• Abandon in place in all facilities except 3026 C&D where the system must be modified and maintained since the facility will have a wet fire protection system.
Communications System	• De-energize the system and abandon in place

2.2.1 General Technical Requirements

General technical requirements define the IFDP's overall approach to fulfilling the end-state condition required for turnover to the ORNL D&D Program. Applicable requirements set forth in the draft DOE Policy Memorandum for Acceptance of Facilities for ER Program, issued March 15, 1991, by L. F. Duffy, will be met.

The IFDP shall ensure that imminent hazards to personnel or the environment are controlled through partial closure, removal, isolation, mitigation, or stabilization. The IFDP shall also ensure that structures can be maintained in a safe condition, with removal of immediate threats to human health and safety or implementation of appropriate compensatory measures (barriers, access controls, administrative controls, etc.).

The IFDP's end state shall result in the classification of IFDP facilities as nonoccupied facilities. As such, compliance with DOE Order 6430.1A, *General Design Criteria,* is not required. IFDP activities shall ensure that access during the surveillance phase is not required at a greater frequency than necessary to maintain the nonoccupied facility status.

The IFDP will end with IFDP facilities being turned over to the ORNL D&D Program for basic S&M, and eventual D&D. Existing ORNL ER Program systems shall be used for the project's execution, except as provided in this project work plan and the project management plan.

2.2.2 Configuration Requirements

The configuration of IFDP facilities shall be modified and controlled sufficiently to ensure safety and regulatory compliance during project performance and post project S&M. As the minimum configuration control requirement, records shall be established and archived for essential systems for post project S&M and provide meaningful D&D planning. As a minimum, the following records should be established and maintained:

- a description of each facility and a summary of its history and past use;
- final radiological status surveys;
- logbook files, equipment operating procedures, S&M requirements, procedures, records, drawings, photographs, etc., that reflect "as-left" configuration;
- zero energy-check records for electrical circuits that were de-energized;
- facility hazards screening documents (HSDs) and related facility authorization basis documentation;
- radiological posting in compliance with applicable requirements set forth in the *ORNL Health Physics Manual* and the *DOE Radiological Control Manual*;
- pending radiation occurrence reports, event fact sheets, unusual occurrence reports, and/or any other out-of-standard condition reports finalized and closed out;
- documentation demonstrating compliance with worker safety and health requirements;
- any required permits relating to the facility's current or anticipated use (Activities shall not preclude subsequent closure options until permitting dictates final closure.); and
- deactivation check sheets completed and approved by the responsible personnel performing the actual work, the overview organizations, and plant management.

2.2.3 Hazardous and Radioactive Materials Removal/Stabilization Requirements

Hazardous and radioactive materials shall be removed from the facilities or stabilized/fixed sufficiently to ensure long-term safety and regulatory compliance of IFDP facilities, enable plant classification as a nonoccupied facility, and enable subsequent successful D&D.

Materials shall be removed and/or stabilized sufficiently to ensure that the facilities comply with the *ORNL Radiological Control Manual*, as applicable to a nonoccupied facility after completion of deactivation. As a general guide, "as-left" contamination and radiation levels should be no greater than the levels encountered during normal operation and occupancy of the facilities.

To ensure long-term safety and regulatory compliance, the following requirements apply:

- Permanent radiation areas to be entered for surveillance shall be decontaminated and released or the surface contamination fixed or stabilized to preclude resuspension and/or migration of loose contamination. Temporary radiation areas inside and outside of buildings shall be eliminated.

- Packaged radioactive and mixed waste with identified final disposition shall be removed and disposed of.

- All hazardous materials shall be removed.

- Accessible interior glove box surfaces shall be decontaminated or the surface contamination stabilized. Openings to glove boxes shall be sealed in a manner that ensures confinement of remaining contamination.

- Loose or damaged (friable) asbestos in areas expected to be entered during surveillance shall be removed or stabilized.

- Tanks, vessels, and pipes shall be drained using installed equipment and features. Heels shall not contain material classified as hazardous waste.

- Hazardous materials used for deactivation and cleanup work shall be collected and disposed of.

- Emergency lighting and associated batteries from the facilities shall be removed and disposed of.

To ensure minimum life cycle cost, the following requirements apply.

- The remaining surplus materials, furniture, equipment, supplies, and spare parts should be inventoried, labeled, segregated, and transferred to other facilities for use or disposed of as waste.

- Disposal of waste materials will be maximized during deactivation.

- Existing system and equipment capabilities will be used for material removal/stabilization to the maximum extent possible.

- Operations and inventories that require implementation of operational safety requirements (OSRs) during the surveillance period will be eliminated.

2.2.4 Surveillance and Maintenance Requirements

Facility configuration shall ensure that D&D options are not foreclosed and that facility safety and environmental protection can be maintained until D&D.

To ensure safety and environmental protection during surveillance, the following requirements apply:

- Consistent with ORNL Plant Safety Basis, the operation of safety and utility systems shall be reduced to the lowest extent possible, while maintaining ventilation, alarms, and other capabilities necessary for a deactivated facility. Required vital safety systems and utility systems shall be fully functional and have operating procedures in place.

- To minimize points of ingress, doors to the facilities shall be locked from the inside except those required for entrance by surveillance crews.

- Security systems and procedures shall be adequate to prevent unauthorized entry to facilities.

- Liquid effluent sources from facilities shall be eliminated prior to the transfer to D&D. Flow routes to disposal sites will be isolated. Isolation will be achieved by sealing or turning off valves at supply points and screening off accessible outlets of the discharge pipes for varmint control.

- Facility penetrations (louvers, pipe openings, etc.) will be closed off where practical to prevent intrusions by birds and other animals.

- Systems that were opened to facilitate deactivation and could present a radiological and/or an industrial safety problem, if left open, shall be adequately closed off.

- Known facility roof leaks and/or deteriorated roof panels shall be repaired.

- Radiation space monitoring and continuous air monitoring systems shall be reduced to a level commensurate with the surveillance requirements. As a general guide, "as-left" contamination and radiation levels in the plants should be low enough that only portable monitoring equipment is required during surveillance entries.

To achieve a nonoccupied facility status, the following requirements apply:

- Ventilation and monitoring equipment shall be eliminated or consolidated, relocated, housed, operated, and/or maintained such that facility entry frequency does not compromise the nonoccupancy status.

- Fire protection systems shall be modified or eliminated to both achieve and reflect the nonoccupied status and to minimize system testing and maintenance.

- Electrical and water supply services to the process buildings shall be isolated.

- The building steam system shall be deactivated wherever practical. If not practical to deactivate the system, it shall be inspected and upgraded to ensure a 10-year operating life.

2.3 FACILITY DEACTIVATION PROCESS

The process of deactivating IFDP facilities is illustrated in Fig. 1. The figure indicates the general sequence of the deactivation process; however, some steps (i.e., waste disposal) are performed in parallel with other steps or are continuous throughout the deactivation process. The exact deactivation sequence is actually determined on a facility-specific basis. The following lists the specific goals to be accomplished in completing each step shown in Fig. 1.

1. Characterize facility conditions:

- update radiological surveys,
- assess facility conditions,

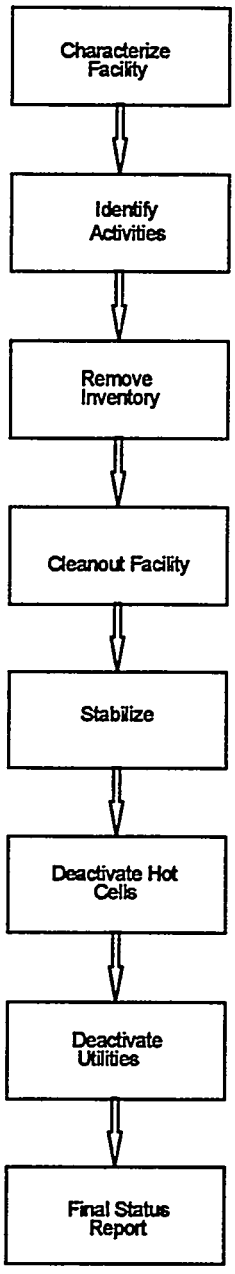

Fig. 1. Deactivation process for surplus facilities.

- inventory hazardous chemical inventory,
- inventory radioactive materials in facility, and
- baseline current S&M activities.

This activity is required to assess existing ES&H risks associated with a facility and to baseline exist S&M costs.

2. Identify deactivation activities (procedures):

- establish deactivation end-point criteria,
- evaluate for liability/cost reducing activities,
- assess based upon worker risk, and
- finalize evaluation utilizing EM-40 acceptance criteria.

Based upon the information obtained in step 1, activities will be identified that will reduce ES&H risks and S&M costs. These will be prioritized according to risk reduction and cost savings.

3. Remove inventory:

- radioactive materials, and
- hazardous chemicals, except those needed for decon tasks.

This step is required to meet EM-40 acceptance criteria. This reduces the hazards classification of a facility and allows a reduction in facility safety documentation. It will also reduce the S&M costs associated with maintaining an inventory list.

4. Clean out facility:

- remove useable surplus equipment,
- remove loose unanchored equipment from hot cells, hoods, and glove boxes, and
- characterize, package, and remove all wastes.

This step will salvage usable equipment and is a good housekeeping practice. Neat orderly facilities draw far less attention from auditors. This also eliminates combustible materials from facilities which, in some cases, will reduce fire protection requirements.

5. Stabilize facility:

- remove transferrable contamination from secondary containment,
- bond and label fixed contamination,
- repair deficiencies in primary containment systems,
- remove potential airborne contamination from hoods and glove boxes,
- deactivate all services to hoods and glove boxes and seal drains, and
- repair roofs.

A structurally sound facility is required by the EM-40 facility acceptance criteria. Removal of contamination will reduce hazards to S&M personnel, reduce background levels, ensuring longer life for seals and glove boxes, reduce the frequency of filter changes, and minimize the potential for a release

to the environment. Since drains will be plugged, all sources of liquids must be eliminated and thus, all services to hoods and glove boxes must be taken out of service.

6. Deactivate hot cells:

- flush cells to reduce gross levels of potential airborne contamination,
- terminate all fluid penetration into cells,
- deactivate all electrical service to the cells,
- plug all drains, and
- seal and lock all access ports.

Deactivation of hot cells will decrease future S&M costs. This will allow removal of monitrons and continuous air monitors from facilities. The service life of manipulator boot and in-cell filters will be extended. Plugging of all drains is required by the Federal Facility Agreement (FFA). With all drains being plugged it is essential that all possible pathways for introduction of liquids into cells be eliminated and thus all penetrations and access ports must be sealed.

7. Deactivate utilities in facilities:

- deactivate all electrical circuits except those used for monitoring systems,
- deactivate and drain all piping, and
- remove all unnecessary instrumentation.

This eliminates utility costs and future maintenance of these systems.

8. Prepare Final Facility Status Report:

- document facility history,
- document "as-left" condition, and
- develop procedures for post-deactivation S&M and for unplanned entries.

The EM-40 acceptance criteria requires that the facility conditions be documented at the time of turnover. Procedures for S&M are required by DOE Orders on Conduct of Operations.

2.3.1 Deactivation Activities

The following is a description of activities to be performed in IFDP facilities to complete deactivation and achieve a configuration requiring minimal S&M. These activities are required to reduce facility S&M costs and/or mitigate ES&H vulnerabilities. The first six of the activities are generic (i.e., deactivate hot cell) in that the same basic activity will be repeated in several facilities. This is followed by a description of activities for each facility. In the following section, the term *clean* is the process of removing debris followed by a wipe down of surfaces to remove loose contamination.

2.3.1.1 Deactivate hot cell

Most IFDP facilities include one or more hot cells. The activities required to deactivate a hot cell are generic in nature but will vary considerably in intensity and duration depending upon the condition of the individual hot cell. The following are the general steps to be taken; however, the sequence will vary on a case-by-case basis.

- Remove all waste and loose equipment from hot cell.

- Perform general wipe down to remove potential airborne contamination.
- Stabilize primary containment (i.e.,drain leaking windows).
- Identify, label, and plug all service lines to the cell.
- Replace manipulator boots and remove in-cell filters.
- Plug all drains.
- Document final radiological condition of the cell.
- Secure all access to cell interior.

The final condition of the cell will be such that there is a minimal chance for a release to the building. No planned maintenance would be required in the 10-year interval before D&D. It should be noted that the manipulator will remain in the cell because this is the least expensive way to seal the manipulator ports and to minimize waste generation during deactivation.

2.3.1.2 Deactivate glove boxes

Glove boxes will be deactivated. For small glove boxes (ones that can fit into a B-25 waste container), all service will be disconnected and the box filled with waste, sealed, loaded into a B-25 container, and disposed of as solid low-level (radioactive) waste (SLLW). The box will then be packaged and disposed of as waste. Large glove boxes will be cleaned to remove all transferable contamination from its interior, painted to bond any fixed contamination, and all ports sealed. All service piping will be disconnected and sealed. All drains will be disconnected and sealed.

2.3.1.3 Deactivate hoods

All high-velocity, air-flow hoods will be wiped down to remove transferrable contamination, liquid low-level (radioactive) waste (LLLW) drains are to be plugged, and the hood locked sealed and tagged out-of-service. All utility services to hoods remaining in place will be disconnected.

2.3.1.4 Piping, utility, and alarm deactivation

All water, air, steam (if practical), and gas piping will be disconnected at the supply header coming to the facility. All lines will be drained. All electrical service not essential to the basic S&M requirements of the deactivated facility will be disconnected at the main breaker box. All radiation protection (RP) instruments and alarms will be removed.

2.3.1.5 Fire protection

Fire protection systems can be converted to dry or the buildings must be heated to maintain minimum temperatures above 40°F. In facilities with a non combustible construction, all combustible materials will be removed from the building and the fire protection system will be converted to a dry manually actuated system. Wood frame facilities will retain a wet automatic system and will remain heated.

2.3.1.6 Final facility status report

A final report will be prepared which will document the history of the building and the physical and radiological condition of the facilities, provide as-is drawings of essential facility support systems, and provide S&M requirements and procedures.

2.3.2 Facility-Specific Deactivation Work Plan Activities

2.3.2.1 Building 3026-C

Building 3026 is a large (14,000 ft^2) wood frame structure with no secondary containment. The building is divided into two facilities, 3026-C (west half of the building) and 3026-D (east end). Building 3026-C contains four manipulator hot cells, four process hot cells, and several laboratories with high air-flow hoods. Deactivation of this facility is in progress and the following activities remain:

- Transfer Inventory - Approximately 3800 Ci of ^{3}H and 100 Ci of ^{85}Kr are to be packaged and removed from the facility.

- Dispose of cylinders. Numerous gas cylinders used in the ^{85}Kr program remain at ORNL. These are to be vented in accordance with allowable release limits, valve assemblies dismantled, and packaged as waste.

- Residual ^{3}H contamination is to be removed from Labs 7 and 16.

- Deactivate ^{85}Kr Columns 1 through 4. This activity involves the following: (1) deactivate all services to the ^{85}Kr thermal diffusion columns; (2) deactivate cooling tower servicing columns; (3) dispose of ^{85}Kr contaminated waste; and (4) deactivate all services to storage system.

- Deactivate the chilled water system. The chilled water system is to be drained, pipes and electrical service disconnected, and the compressor salvaged.

- Deactivate hot cells. In addition to the activities described in Sect. 2.3.1.1, Zn-Br-filled shield windows are to be drained and the Zn-Br disposed of as waste.

- Deactivate the piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Disconnect ductwork. The ductwork that ventilates Labs 7 and 16 from the central plant ventilation system is to be disconnected and blanked.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. This building is of wood frame construction and must be protected by an automated sprinkler system. The existing wet system will be retained and the facility will remain heated.

- Warning signs. Place a warning sign at the entry to the 3026C 2nd level South storage area to signal workers that the condition of the floor is poor and that there is to be no entry.

- Gauges and filters. Leave the differential pressure gauges and High Efficiency Particulate Air(HEPA) filters in place in the cell ventilation system.

- Abandon cell fire alarm system. Notify the Oak Ridge National Laboratory (ORNL) fire department that the cylinders are to be removed from the 3026D cell fire alarm system.

- Exempt hot drains from plugging. Seek exemption from FFA requirements to plug the drains and instead leave them in place.

2.3.2.2 Building 3026-D

Building 3026-D contains six manipulator hot cells currently used to store steel specimens remaining from metallurgical testing. The estimated 4000 lb of specimens are irradiated and contain approximately 150 Ci (Curies) of ^{60}Co. Deactivation of this facility will include the following activities:

- Deactivate hot cells. In addition to the activities described in Sect. 2.3.1.1, the irradiated metal specimens are to be removed from the hot cells and transferred to other ORNL facilities. The Zn-Br-filled shield windows are to be drained and the Zn-Br disposed of as waste.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. This building is of wood frame construction and must be protected by an automated sprinkler system. The existing wet system will be retained and the facility will remain heated.

2.3.2.3 Building 3028

Building 3028 is a three-story, steel-frame structure covered by metal siding and has a total floor area of approximately 4000 ft^2. The facility contains seven hot cells used primarily for the alpha powder [transuranics (TRU) isotopes in powder form] operations. All inventory has been removed, but six of the seven cells remain highly contaminated. Large areas of alpha contamination exist in the secondary containment area behind Cells 1 through 5. Deactivation of this facility is in progress and the following activities remain to be completed:

- Deactivate cells. In addition to the activities described in Sect. 2.3.1.1, the water-filled shielding tanks in front of Cells 1 through 5 will be drained. The chilled water system associated with these tanks will be deactivated. The charging area behind Cells 1 through 5 will be cleaned to remove potential airborne contamination.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. The building has an automated wet sprinkler system and will be converted to a dry manually actuated system.

2.3.2.4 Building 3029

Building 3029 is a single-story, steel-frame structure covered by corrugated metal siding with a total floor area of approximately 3000 ft^2. The facility contains four manipulator hot cells and four glove

boxes. The charging area behind Cell 3 is contaminated with ^{137}Cs from a spill during production operations. Deactivation of this facility will include the following activities.

- Deactivate cells as described in Sect. 2.3.1.1.
- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.
- ^{137}Cs contamination behind the cells must be cleaned up and lead shielding cleaned and removed.
- Deactivate glove boxes. The two ^{131}I glove boxes will be cleaned and sealed and left in the building. The ^{14}C and ^{99}Tc glove boxes will be removed and managed as SLLW.
- Prepare final facility status report as described in Sect. 2.3.1.6.
- The facility's automatic wet sprinkler system is to be converted to a manually activated dry system and the building's steam heating system deactivated.

2.3.2.5 Buildings 3030, 3118, and 3031

Buildings 3030 and 3031 were built as separate buildings. Building 3118 was constructed to enclose the area between the two facilities and to cover the access doors to the cells in the buildings; it has a floor area of 900 ft^2. Buildings 3030 and 3031 each contain a hot cell, a hood, and have a floor area of 825 ft^2. Building 3118 was used primarily as a storage shed and has areas of contamination on the floor. Deactivation of this facility is in progress and the following activities remain to be completed:

- Deactivate cells as described in Sect. 2.3.1.1.
- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.
- Repair roof. The built-up roof on the complex comprising Buildings 3030, 3118, and 3031 leaks and will be repaired.
- Prepare final facility status report as described in Sect. 2.3.1.6.
- Clean floors. The floors will be cleaned to remove transferable contamination.

2.3.2.6 Building 3032

Building 3032 is a steel framed structure covered with aluminum siding and has a total floor area of approximately 1000 ft^2. The facility houses 5 hoods in the laboratory on the north side of the building. Deactivation of the building will include the following activities. An ancillary facility, Building 3099, is located nearby.

- Deactivate Hoods - The hoods in this facility are in very poor condition with the steel enclosures being badly corroded. The hoods are to be dismantled and disposed of as solid low level radioactive waste.
- Deactivate piping , utilities, and alarms as described in Section 2.3.1.4
- Prepare final facility status report as described in Section 2.3.1.6.

2.3.2.7 Building 3033

Building 3033 is a steel-frame structure covered with aluminum siding and has a floor area of 1200 ft^2. The facility houses two separate radioisotopes processing systems for handling gaseous ^3H and ^{85}Kr. Deactivation of this facility will include the following activities.

- Deactivate ^3H system. The ^3H will be removed from the ^3H traps, the traps made inert, and packaged for disposal. The ^3H processing hood will be locked and sealed, and all hood support systems will be labeled and deactivated.
- Deactivate ^{85}Kr purification system. The charcoal traps and roughing pumps from the ^{85}Kr processing system will be removed, packaged, and disposed of as waste.
- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.
- Prepare final facility status report as described in Sect. 2.3.1.6.
- Maintain hot off gas system operational.

2.3.2.8 Building 3033-A

Building 3033-A is a steel-frame structure covered with aluminum siding and has a floor area of 242 ft^2. This facility has essentially been deactivated. Remaining tasks include:

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.
- Repair roof. The roof on the building leaks and will be patched.
- Prepare final facility status report as described in Sect. 2.3.1.6.

2.3.2.9 Building 3034

Building 3034 is a steel framed structure covered with aluminum siding and has a total floor area of approximately 1000 ft^2. With the exception of deactivating utilities, all deactivation tasks in this facility are complete. However, the facility is to be used for office space for IFDP support personnel until the completion of the project. At that time the utilities will be deactivated.

2.3.2.10 Building 3038–Alpha Handling Facility

Building 3038 is a masonry structure with a total floor area of 7250 ft^2. It is divided by concrete block walls into three separate facilities: Building 3038-E, 3038-M, and 3038–Alpha Handling Facility (AHF). The 3038-AHF contains five hot cells in one operating area and seven glove boxes in an adjacent room. The operating area is contaminated with alpha contamination. Deactivation of this facility will include the following activities.

- Deactivate cells. In addition to the activities described in Sect. 2.3.1.1, the water-filled, shielding tanks in front of the hot cells will be drained. The chilled water system associated with these tanks will be deactivated. The operating area in front of the hot cells will be cleaned to remove potential airborne contamination.

- Deactivate glove boxes. The seven glove boxes in the facility will be disposed of as described in Sect. 2.3.1.2.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. Cost estimates have demonstrated that it is less expensive to convert to a manually activated dry system and deactivate the building's steam heating system.

- Shutdown steam heat. Turn off building steam heat but provide measures for supplying steam to building 3037 and other buildings.

2.3.2.11 Building 3038-E

Building 3038-E contains eight hoods, ten glove boxes, and one manipulator hot cell in three connected rooms. The hoods and glove boxes contain transferable uranium and TRU isotopes contamination. Deactivation of this facility will include the following activities.

- Deactivate cell. The yttrium hot cell will be deactivated as described in Sect. 2.3.1.1.

- Deactivate glove boxes. The eleven glove boxes in the facility will be disposed of as described in Sect. 2.3.1.2. The rolling mill box in the north lab and the two inert glove boxes in the south lab will remain in the facility as their size would require them to be cut up to be removed from the building.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Deactivate hood as described in Sect. 2.3.1.3.

- Provide fire protection. Cost estimates have demonstrated that it is less expensive to convert to a manually activated dry system and deactivate the building's steam heating system.

2.3.2.12 Building 3038-M

The 3038-M facility is a 1300-ft^2 area in the center of Building 3038. ORNL's Radioactive Materials Shipping and Packaging (RAMSPAC) operations are currently located in this area. The area has a barricade behind which radioisotopes in liquid form were handled and packaged. The barricade consists of a shadow-shield wall that is open at the top. Confinement of radioactive materials is provided by continuous airflow over the wall. All inventory has been removed from the barricade area, but the area behind the wall is highly contaminated with a variety of radioisotopes. Deactivation of this facility will include the following activities.

- Deactivate barricade. All waste from the barricade area will be removed. The barricade area will be cleaned, and all service lines to it will be deactivated. Access to the barricade will be secured.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. Cost estimates have demonstrated that it is less expensive to convert to a manually activated dry system and deactivate the building's steam heating system.

2.3.2.13 Building 3047

Building 3047 is a three-story, steel-frame building with concrete block exterior and interior walls. Building 3047 is structurally linked to Building 3047-A (an office building) but since they have separate ventilation systems, the buildings are considered separate. Building 3047-A is not in the IFDP. Building 3047 houses four high-level, beta-gamma hot cells, one alpha handling hot cell, seven laboratories for handling low-level materials, two glove boxes, and a decontamination room. Deactivation of this facility will include the following activities.

- Deactivate chilled water system. The chilled water system (air conditioning) will be drained, pipes and electrical services disconnected, and the pumps salvaged.

- Deactivate glove boxes. The gadolinium press box and the ^{14}C glove boxes in the facility will be disposed of as described in Sect. 2.3.1.2.

- Deactivate hoods. The hoods in Rooms 105, 109, 208, 209, and 210 will be deactivated as described in Sect. 2.3.1.3

- Clean up vacuum pit. Vacuum system's surge tank will be decontaminated.

- Clean up filter house. Pieces of contaminated, high-efficiency particulate air filter media that are lodged on the control damper to the filter house in the west airlock will be removed.

- Deactivate hot cells. Hot Cells A, B, C, D, and the alpha cell in Room 110 will be deactivated as described Sect. in 2.3.1.1. In addition, the hot cell entry box in Room 110 will have water-shielding tanks drained and the box cleaned and disposed of. The sludge in the sump under Cell D will be removed.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. Cost estimates have demonstrated that it is less expensive to convert to a manually activated dry system and deactivate the building's steam heating system.

2.3.2.14 Building 3517

Building 3517 is a three-story, braced, steel-frame structure with metal deck roofs and 12-in. nonreinforced concrete masonry walls on the lower two stories. The building has a total floor area of approximately 18,000 ft^2. The facility contains eight manipulator hot cells and 16 process cells. The facility currently stores the IFDP inventory of surplus radioisotopes, which primarily consist of approximately 150,000 Ci of ^{137}Cs and 100,000 Ci of ^{90}Sr. This material is to be repackaged to meet waste acceptance criteria to be issued by the Waste Encapsulation Storage Facility (WESF), located in Richland, Washington, and shipped to this facility. Small quantities of Co, Eu, Gd are also stored in the building. Approximately 450 g of ^{244}Cm belonging to the Transuranium Production Program is also stored in the building. Four radio-thermoelectric generators (RTGs), which contain in excess of

1,400,000 Ci of ^{90}Sr, are included in the facilities inventory. Deactivation of this facility will include the following activities.

- Justify resumption of limited repackaging operations. Upon receiving waste acceptance criteria from WESF, determine the repackaging requirements and the extent of process operation that must be resumed to perform repackaging operations. Once the requirements are established, the options of using Building 3517 or some other ORNL facility will be evaluated. If the use of Building 3517 proves to be the best option, a justification for resumption of repackaging operations will be prepared.

- Upgrade facility. After the needs are evaluated, all necessary physical upgrades to the facility required to resume source repackaging operations will be performed.

- Store casks in high bay area until a suitable disposition alternative can be developed during D&D.

- Perform Operational Readiness Review (ORR). An ORR will be performed in support of the resumption of repackaging operations.

- Transfer ^{244}Cm. Seventeen containers of ^{244}Cm will be transferred to the Chemical Engineering Development Center at ORNL.

- Package Eu and Gd for retrievable storage. Surplus Eu and Gd material will be repackaged for retrievable storage and transferred to the solid waste storage area.

- Repackage ^{137}Cs. All ^{137}Cs sources will be repackaged to meet WESF criteria and transferred to WESF.

- Repackage ^{90}Sr. All ^{90}Sr sources will be repackaged to meet WESF criteria and transferred to WESF.

- Deactivate hot cells. Manipulator Hot Cells 10, 11, 12, 13, 14, 15, 16, and 18 will be deactivated as described in Sect. 2.3.1.1.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

- Provide fire protection. Cost estimates have demonstrated that it is less expensive to convert to a manually activated dry system and deactivate the building's steam heating system.

- Evaluate removal of non-structural lead from cells.

- Evaluate steam system to ensure adequate requirements for Liquid Low-Level waste (LLLW) system.

2.3.2.15 Building 7025

Building 7025 is a prefabricated, metal-sided building with a total floor area of 590 ft^2. The building contains a large (26 ft long) stainless steel hood that houses a ^3H target fabrication system. The facility also houses a hood in which a thin film evaporator was once installed. Deactivation of this facility will include the following activities.

- Deactivate ^{3}H system. The ^{3}H Target Fabrication Facility hood will be deactivated, all waste removed, and the hood cleaned and sealed.

- Deactivate piping, utilities, and alarms as described in Sect. 2.3.1.4.

- Prepare final facility status report as described in Sect. 2.3.1.6.

2.3.2.16 Actinides Facility

The Actinides Facility is a small area within Building 9204-3 located a the Y-12 site. Per the Memorandum of Agreement executed on October 1, 1994, between the DOE Office of Environmental Management, Office of Energy Research and the Office of Nuclear Energy, the IFDP will support the annual inspection of the Actinides facility. The facility is essentially deactivated and no further deactivation tasks are required.

3. WORK PLANS

3.1 WORK BREAKDOWN STRUCTURE

The WBS defines a hierarchy between elements of the IFDP and reflects the lowest level of work package necessary to complete the program. The WBS will be used as a program management tool to

- identify the scope of all work activities;
- plan and schedule work;
- prepare resource budgets to support work;
- develop spending profiles;
- develop subcontract documents; and
- collect technical, schedule, and cost performance data.

Figure 2 illustrates the WBS. A WBS dictionary further defines the scope of work by project participant. All participants will manage and schedule work, collect costs, and evaluate progress in accordance with the WBS at the work package level. Appropriate budget and reporting codes will be applied to ensure that roll-up capability within the WBS structure is protected.

3.2 PROJECT BASELINE SCHEDULE

The Energy Systems ER Program is responsible for the preparation and the maintenance of master project schedules. These master project schedules are developed in accordance with the scope defined within the ORNL WBS and contain all controlled milestones. The master project schedule is supported by a number of lower-level schedules created to match activities at levels 7, 8, or lower of the WBS. The sum of the lower-level schedules make up the baseline utilized by Energy Systems for progress determination and control of milestone accomplishment.

The top level IFDP schedule is shown in Figure 3. Schedules for each facility are shown in Appendix B (Project Schedules). As shown, the IFDP will be complete upon final deactivation of Building 3517 in FY 2000.

The project team established schedule objectives that address the major milestones incorporated into the schedule. These milestones provide points for progress tracking, decision-making, control, and reporting within the master project schedule and lower-level schedules. Project milestones for IFDP will include start and finish of deactivation of each facility and the production of a final facility report. Changes in the planned dates for controlled milestones must be approved in accordance with the DOE-ORO Baseline Control Procedure. All IFDP milestones are listed in Table 3.

2.10.2 Isotopes Facilities Deactivation Project
- 2.10.2.01 Project Integration
  - 2.10.2.01.01 Project Management
  - 2.10.2.01.02 Project Planning

- 2.10.2.02 Surveillance and Maintenance
  - 2.10.2.02.01 Utilities
  - 2.10.2.02.04 Building 3026 S&M
  - 2.10.2.02.06 Building 3028 S&M
  - 2.10.2.02.08 Building 3029 S&M
  - 2.10.2.02.10 Center Circle Facilities S&M
  - 2.10.2.02.12 Building 3038 S&M
  - 2.10.2.02.14 Building 3047 S&M
  - 2.10.2.02.16 Building 3517 S&M
  - 2.10.2.02.18 Building 7025 S&M
  - 2.10.2.02.20 Other S&M

- 2.10.2.04 Building 3026 Facility Deactivation
  - 2.10.2.04.01 Contamination Control
  - 2.10.2.04.02 Structural Stabilization
  - 2.10.2.04.08 RL Lights Removal
  - 2.10.2.04.10 Final Facility Report

- 2.10.2.06 Building 3028 Facility Deactivation
  - 2.10.2.06.01 Contamination Control
  - 2.10.2.06.02 Structural Stabilization
  - 2.10.2.06.10 Final Facility Report

- 2.10.2.08 Building 3029 Facility Deactivation
  - 2.10.2.08.01 Contamination Control
  - 2.10.2.08.02 Structural Stabilization
  - 2.10.2.08.10 Final Facility Report

- 2.10.2.10 Center Circle (3030 - 3034, 3118) Facility Deactivation
  - 2.10.2.10.01 Contamination Control
  - 2.10.2.10.02 Structural Stabilization
  - 2.10.2.10.07 Re-roof Buildings 3030, 3118, 3031
  - 2.10.2.10.10 Final Facility Report

- 2.10.2.12 Building 3038 Facility Deactivation
  - 2.10.2.12.01 Contamination Control
  - 2.10.2.12.02 Structural Stabilization
  - 2.10.2.12.04 Yttrium Cell Cleanup
  - 2.10.2.12.05 Glove Box & Hoods Removal
  - 2.10.2.12.06 Barricades Cleanup
  - 2.10.2.12.10 Final Facility Report

Fig. 2. Work Breakdown Structure.

2.10.2.14 Building 3047 Facility Deactivation
- 2.10.2.14.01 Contamination Control
- 2.10.2.14.02 Structural Stabilization
- 2.10.2.14.03 Hot Cells Cleanup
- 2.10.2.14.05 Glove Box & Hoods Removal
- 2.10.2.14.10 Final Facility Report

2.10.2.16 Building 3517 Facility Deactivation
- 2.10.2.16.02 Structural Stabilization
- 2.10.2.16.03 Hot Cells Cleanup
- 2.10.2.16.09 Inventory Transfer
- 2.10.2.16.10 Final Facility Report

2.10.2.18 Building 7025 Facility Deactivation
- 2.10.2.18.01 Contamination Control
- 2.10.2.18.02 Structural Stabilization
- 2.10.2.18.10 Final Facility Report

2.10.2.20 Other Facility Deactivation and Support
- 2.10.2.20.01 Other Support

Fig. 2. (Continued).

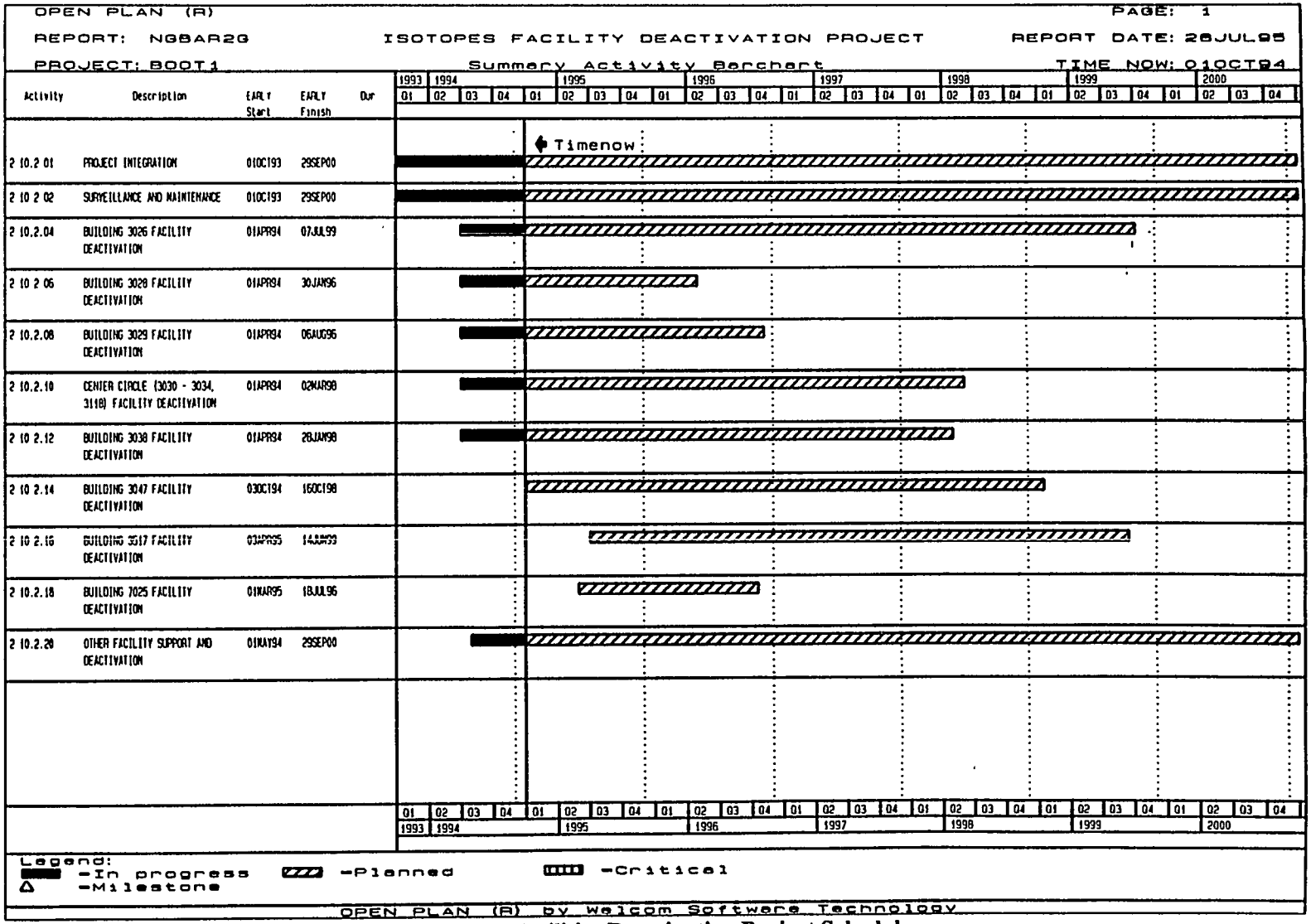

Fig. 3. Isotopes Facilities Deactivation Project Schedule.

Table 3. Isotopes Facilities Deactivation Project Milestones

Building 3026-C Deactivation Complete	10/01/98
Building 3026-D Deactivation Complete	07/0799
Building 3028 Deactivation Complete	01/30/96
Building 3029 Deactivation Complete	08/06/96
Building 3033-A Deactivation Complete	09/29/95
Building 3031 Deactivation Complete	11/14/95
Building 3034 Deactivation Complete	03/04/96
Building 3118 Deactivation Complete	03/19/96
Building 3033 Deactivation Complete	06/24/96
Building 3030 Deactivation Complete	07/17/96
Building 3032 Deactivation Complete	02/14/97
Building 3038-M Deactivation Complete	01/08/97
Building 3038-E Deactivation Complete	02/19/97
Building 3038-AHF Deactivation Complete	04/23/97
Building 3047 Deactivation Complete	10/16/98
Building 3517 Deactivation Complete	06/14/99
Building 7025 Deactivation Complete	07/18/96

The schedules will include activities to be performed by other DOE prime contractors. On a monthly basis, progress for ongoing activities and future projections will be provided by each prime participant and project team member and supplied to the appropriate Energy Systems Project Manager and Scheduler. This information will be used to update the project schedule and assist the Project Analyst in evaluating project status.

Schedule status will be reviewed by Energy Systems program management, project management, and DOE program management routinely during the normal monthly reporting process required by the monthly status report and progress tracking system.

3.3 COST BASELINE

The cost baseline for the project is a time-phased cost estimate to complete the deactivation activities and turn the facilities over to the D&D Program. The following were used to develop the cost estimate:

- define the project's technical and end-point criteria,
- identify and schedule the individual work elements required to meet the requirements,
- systematically organize the work elements in a WBS, and
- estimate the resources needed to complete the work elements in the WBS using a uniform set of estimating assumptions.

Total estimated IFDP costs are summarized in Table 4. Detailed cost estimates for each deactivation activity are contained in Appendix (Project Cost Estimates).

The project cost estimate is referred to as a baseline because it is integrated with the technical and schedule baseline and is subject to formal change control. This estimate is the sum of the estimates for the individual activities in the control accounts and developed on the automated cost estimating system.

Annual review of the work plan accommodates changes resulting from revised programmatic requirements, budget constraints, or unplanned conditions or changes. As project work proceeds, the total estimated cost and the total project cost are to be updated to reflect the current estimate at completion for both.

The IFDP cost estimate was based upon existing work rules and historical productivity and, therefore, represents conditions expected during the deactivation activities. The level of confidence in the estimate is similar to that expected at the end of the conceptual design phase of a major project, if the work is performed and controlled as described in this report.

The following are key planning assumptions used to prepare the cost estimate.

- D&D activities will not be performed for at least 10 years beyond the completion of deactivation activities.

- The project is not under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

- All of the deactivation activities are covered by existing ORNL National Environmental Policy Act (NEPA) documentation. Any additional NEPA documentation will be completed in parallel with other project activities with additional resources.

Table 4. Isotopes Facilities Deactivation Project Cost Summary

Arranged By: WBS
Fiscal Year Range 1995 - 2000

	Fiscal Year						
	1995	1996	1997	1998	1999	2000	Total
2.10.2.01 PROJECT INTEGRATION	478	499	515	464	482	316	2754
2.10.2.02 SURVEILLANCE AND MAINTENANCE	3077	3008	2477	2343	1384	631	12920
2.10.2.04 BUILDING 3026 FACILITY DEACTIV	314	295	185	1170	251	.	2215
2.10.2.06 BUILDING 3028 FACILITY DEACTIV	288	163	.	.	.	.	451
2.10.2.08 BUILDING 3029 FACILITY DEACTIV	97	504	.	.	.	.	601
2.10.2.10 CENTER CIRCLE 3030/3034.3118 F	392	777	84	222	.	.	1475
2.10.2.12 BUILDING 3028	229	510	649	215	.	.	1603
2.10.2.14 BUILDING 3047 FACILITY DEACTIV	500	.	843	707	16	.	2066
2.10.2.16 BUILDING 3517 FACILITY DEACTIV	443	349	1364	1726	590	.	4472
2.10.2.18 BUILDING 7025 FACILITY DEACTIV	80	155	.	.	.	.	235
2.10.2.20 OTHER FACILITY SUPPORT AND DEA	791	861	501	520	541	561	3775
Sub-Total	6689	7121	6618	7367	3264	1508	32567
Overhead	2715	2639	2691	2887	1077	447	12456
Sub-Total	9404	9760	9309	10254	4341	1955	45023
Contingency	270	422	0	3074	1301	586	5653
Grand Total	9674	10182	9309	13328	5642	2541	50676

- Waste tanks WC-10 and WC-2 will be available to support deactivation activities through FY 1998.
- Trained and qualified personnel are available to perform deactivation activities.
- Work inefficiencies are expected for radiation work involving respirators or supplied air.
- ORRs will be conducted by the project staff or by an appointed review committee. No other ORRs will be required.
- The only activity that has been identified as potentially requiring an ORR is the resumption of repackaging operations in Building 3517 (Sect. 2.2.3.12).
- Technical planning bases for the project will be implemented as described. Appropriate project contingency will be provided and identified.
- The IFDP will continue to fund S&M of a facility until the end of the fiscal year following the year in which deactivation is complete. At that time, the facility is transitioned into D&D (i.e. a facility deactivated in FY 1995 will be transitioned to D&D at the beginning of FY 1997).
- Budget will be provided as planned in the funding profile.

The cost estimate was compiled by Energy Systems Engineering from the estimates prepared by the ORNL organizations performing the work. The estimating methodologies and practices conform to the Energy Systems *Project Estimating and Scheduling Standard Operating Manual,* the DOE-ORO *Estimating and Cost Control Manual for Construction Projects,* and the *Cost Estimating Hand Book for Environmental Restoration Projects.* The estimate is an activity-based cost estimate.

The resource data used to prepare the cost estimate are derived from current cost data and staffing requirements for existing work elements that continue for the duration of the project and from technical work descriptions and schedules prepared for each deactivation activity.

The estimate for each work element was reviewed by knowledgeable plant staff for uniformity and reasonableness prior to acceptance into the cost estimate.

The resources were priced using labor rates developed from the existing financial system. The indirect costs, including steam and water use assessments, organization overheads, material procurement, and general and administrative burdens, were developed similarly.

Comparisons of the deactivation resource mix with the existing resource mix were made and the changes reconciled with work content differences. Where necessary, cost allowances were made based upon historical usage rates, including materials and MK-Ferguson construction forces.

3.4 PROJECT ORGANIZATION AND RESPONSIBILITIES

This project is managed by the ORNL ER Program and supported by an integrated team of Energy Systems and subcontract personnel. The following discussion provides functional descriptions of the key management and the support organization that makes up the IFDP.

3.4.1 ORNL Environmental Restoration Program

The ORNL ER Program is responsible for supporting the DOE-ORO project office with day-to-day technical management, coordination, control, and reporting of project activities identified in this work plan.

The IFDP Manager plans, coordinates, and directs project execution, including technical direction; development and administration of project criteria; and baseline system analysis, scheduling, budgeting, configuration management, and reporting. The IFDP Manager receives policy guidance and project instructions from the DOE-ORO Project Manager. The IFDP Manager reports to the ORNL ER Program Manager.

The IFDP Manager is responsible for the following.

- Define and administer the technical cost and schedule requirements for the project.
- Develop the project work plan and project management plan.
- Manage and control project baseline, as well as the timely identification and communication of real and potential problems to the DOE-ORO Project Manager.
- Provide the DOE-ORO project office with a clear and concise narrative report of project status with respect to established project baseline.

3.4.2 Chemical Technology Division

The Chemical Technology Division provides the facility management function for the IFDP under the direction of the ORNL ER Program. The roles and responsibilities of the Chemical Technology Division include the following.

- Provide facility management for all IFDP facilities to include occurrence reporting, safety documentation, maintenance, configuration control, and administrative control of all activities.
- Provide S&M for IFDP buildings, including 3026-C, 3026-D, 3028, 3029, 3030, 3031, 3033, 3033-A, 3034, 3038-E, 3038-M, 3038-AHF, 3047, 3118, 7025, and 3517, and all ancillary buildings, storage pads, filter houses, and attachments to these buildings.
- Identify and recommend S&M and deactivation activities and prepare estimates and task duration for activities to meet the IFDP programmatic objectives.
- Perform deactivation and cleanup activities associated with IFDP facilities, including supervision of maintenance, maintenance of facilities, cleanup of contamination and contaminated equipment, filter replacement, equipment maintenance, and waste handling.
- Provide emergency services for IFDP facilities including handling of rainwater in-leakage to waste systems, leaking roof problems, leaking steam and water lines, and other equipment failure.
- Provide maintenance of radioactive materials and other hazardous materials inventories and monitoring of inventoried materials (including maintenance and monitoring of satellite waste accumulation areas).

- Assist in the planning of D&D activities in these facilities.

- Assist in the special design of remote equipment and fixtures to facilitate radioactive material handling, contamination isolation, and cleanup.

3.4.3 Plant and Equipment Division

The roles and responsibilities of Plant and Equipment Division personnel include the following.

- Provide maintenance support for IFDP facilities to include electrical, pipe fitter, mechanical (millwright), special services such as contamination bonding and manipulator and manipulator boot repair, and labor and janitorial services.

3.4.4 Instrumentation and Controls Division

The roles and responsibilities of Instrumentation and Controls Division personnel include the following.

- Provide maintenance for RP instrumentation and other equipment specified in the OSRs and Limiting Conditions for Operations Document (LCDs) for the IFDP facilities. This requirement includes maintaining a data base of instruments required for safe operation of the building and routine maintenance of the instruments as well as nonroutine equipment (instrument) repair.

- Provide technical support on equipment specification and maintenance.

3.4.5 Office of Radiation Protection

The roles and responsibilities of RP personnel in IFDP facilities include the following.

- Provide RP services including instrument checks, routine surveillance, posting, surveillance of work activities, and instrument calibration and maintenance of RP instrumentation.

- Provide technical support on RP instrumentation specification and maintenance.

3.4.6 Center for Risk Management

The Center for Risk Management (CRM) will provide the IFDP with risk and cost analysis and decision support. The objective of this support is to help ORNL ER and the IFDP optimize decisions relating to facility S&M, deactivation, transition, and disposition. The CRM will conduct screening-level risk evaluations to determine and communicate baseline facility risks and evaluate current and life cycle IFDP costs to identify S&M cost savings. The CRM will also develop an FDDM to provide the IFDP with direct input regarding the cost and risk benefits and trade-offs associated with project alternatives in the project WBS and additional D&D alternatives as requested. It will include consideration of waste disposition alternatives and criteria through direct cooperation with the ER Waste Management Program.

4. SUPPORTING PLANS

4.1 SURVEILLANCE AND MAINTENANCE

The IFDP will place the facilities in a safe and environmentally sound condition in an economical manner. The S&M plan will ensure that the facilities are maintained in a safe condition during the post-deactivation surveillance period while awaiting the start of D&D activities. DOE Order 5820.2A, *Radioactive Waste Management,* Chapter V, "Decommissioning of Radioactively Contaminated Facilities," requires that an S&M program be developed and implemented with documented evidence that the checks and inspections are being conducted and the required maintenance is being performed to keep the facility in a safe condition pending the final disposition.

The *DOE Policy Memorandum for Acceptance of Facilities for ER Program* issued March 15, 1991, by L. F. Duffy requires IFDP facilities to be in a radiologically safe condition following deactivation. The following is the basis for the S&M plan.

- The facilities shall be in a physical condition adequate to contain and monitor any radioactive contamination. An "as left" radiation contamination survey of the facilities and surrounding areas will be included in the deactivation records.

- Security systems and procedures shall be adequate to prevent unauthorized entry.

- Special nuclear materials; reactor fuels; and solid and liquid radioactive, hazardous, and mixed waste shall be removed from the facility or the location, and controls shall be documented and approved for those materials for which an end condition cannot be determined. Any exceptions of nuclear and hazardous material remaining in the facility shall be identified and characterized by location, type, and quantity.

To meet the S&M requirements, the IFDP work plan must ensure that provisions are made to:

- sustain systems required for monitoring and emission control;
- sustain operation of systems required for protection of surveillance personnel, the general public and environment, and vital equipment;
- sustain systems to respond to emergency conditions expected in the facilities' deactivated state; and
- sustain systems required to prevent structural degradation.

This section presents a summary-level description of the expected contents of the plan. The plan will be expanded and detailed as the project proceeds.

4.1.1 Deactivated Facility Status

The facility status expected at the end of the project is described in Sect. 2.3.2. The status described is the assumed condition to be used in preparing the S&M plan.

4.1.2 Surveillance and Maintenance Plan

Based on prior deactivation experience, the post-deactivation S&M plan will require the following functions.

4.1.2.1 Radiation and environmental monitoring

Monitoring during the surveillance period includes the following.

- Radiation protection, to the extent required for worker protection during facility surveillance entries, will be in agreement with
  - — DOE Order 5480.11, *Radiation Protection for Occupational Workers*; and
  - — DOE Order 5480.6, *Radiological Control Manual.*
- Periodic radiation surveys will be conducted to confirm the baseline surveys and to detect any unexpected changes.

4.1.2.2 Radiological control

S&M of remaining facilities that provide radiological control are limited to the operation of the central ventilation system; the process off-gas system; and the heating, ventilation, and air conditioning (HVAC) system in facilities. Surveillance of system performance will provide assurance of proper confinement function.

4.1.2.3 Monitors and alarms

Continuous monitoring will be provided for the following.

- Electrical power distribution status.
- Central ventilation system monitoring of zone differential pressures, exhaust filter differential pressures, and temperature.

The monitoring system will have the capability to communicate with the Waste Operation Control Center at ORNL.

4.1.2.4 Facility and access control devices

S&M of the facilities and access control during the post-deactivation period include surveillance of the following:

- doors for security and access protection;
- external housekeeping to avoid accumulation of combustibles near the facilities;
- the exterior structure, roof, and access doors to verify no indication of potential or ongoing degradation of the structure or accesses;
- the interior to ensure that deactivated facilities conditions are retained and to reduce the risk of contamination spread due to intrusion by small animals or birds; and
- signs and restricted area posting/barriers to ensure that proper warnings and exposure controls remain in place for worker protection.

4.1.2.5 Emergency preparedness

S&M of remaining active facilities that provide emergency services include the following:

- fire alarm system, and
- backup power for the unmanned monitoring systems.

4.1.3 Surveillance Frequency

The post-deactivation plan will be developed during the project. The frequencies specified here are based on experience at similar DOE facilities during extended outages and commercial nuclear experience. To the greatest practical extent, all surveillance will be conducted without entering the confinement structure. When entries are required, workers will follow a predetermined path and use checklists to ensure that a single entry fulfills the internal inspection requirements.

4.1.3.1 Weekly surveillance

Surveillance will be performed weekly on the following:

- ventilation system differential pressure on unsealed buildings;
- personnel access control; and
- surveillance "walk thru" of Building 3047 and Building 3517.

4.1.3.2 Monthly surveillance

Surveillance will be performed monthly on the following:

- grounds housekeeping, and
- exterior signs and restricted area posting/barriers.

4.1.3.3 Quarterly surveillance

Surveillance will be performed quarterly on the following:

- fire alarm system,
- internal facilities inspection, and
- external facilities inspection.

4.1.4 Surveillance and Maintenance Costs

A major objective of the IFDP is to reduce S&M costs to a minimum during the period between deactivation and D&D. Estimates of current S&M costs and reductions following deactivation activities are included in the total estimated cost. As the detailed post-deactivation S&M plans are refined, these estimates will be revised and are anticipated to be lower.

4.1.5 Reporting

Notification and reporting of events will be in accordance with DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information,* as implemented by ORNL facility-specific procedures.

4.2 SAFETY DOCUMENTATION PLAN

4.2.1 Status of Existing Safety Documentation

All activities in IFDP facilities are controlled by appropriate safety documentation. Changes to facility or operations are evaluated by the Unreviewed Safety Question Determination (USQD) process (Sect. 4.2.3) before being implemented. IFDP operations are presently governed by the ORNL-approved Safety Analysis Reports (SARs), Safety Assessment (SA), or HSD. The OSRs currently in force were approved by DOE-ORO in 1991. Facilities that do not have OSRs operate under an ORNL-approved LCD. The current OSRs or LCDs update the facilities' operational status and identify controls needed for the facilities' limited missions of deactivation activities or storage of excess inventories of radioisotopes.

As deactivation activities proceed to the point hazards are adequately reduced, SARs and OSRs are retired and replaced with the lower-level safety documentation (HSD and LCD). The retirement of the SAR/OSR for Buildings 3026-C, 3026-D, 3028, 3029, 3033, 3033-A, and 7025 has been accomplished. The only SAR required in the long term is needed to address the hazards of radioactive material storage for the Fission Products Development Laboratory (FPDL). The SAR for FPDL, Building 3517, is being upgraded through the Energy Systems Safety Analysis Report Update Program (SARUP). The estimated cost of updating the Building 3517 SAR is $1,000K. A description of this update program and the status of the FPDL document is provided in Sect. 4.2.

Low-risk activities that do not represent significant hazard and are therefore not addressed specifically in the SARs or SAs are governed by problem safety summaries (PSSs), which are described in Sect. 4.2.4.

The specified safety documentation that exists for all IFDP facilities and that which is planned is presented in Table 5.

4.2.2 Description and Status of Safety Analysis Report Upgrade Program

The SARUP consists of five phases:

- Phase 0—continued operation evaluation,
- Phase I—hazard classification and qualitative analysis,
- Phase IA—updated OSRs,
- Phase II—quantitative accident analysis, and
- Phase III—complete DOE-approved SARs.

The primary aspect of the program is based on a risk prioritization of activities. In contrast with a serial approach that would update one (or a small group) of SARs and then update the next (or a small group), the program is designed to address all ORNL facilities simultaneously and proceed within a given phase and from one phase to the next based upon hazard and risk. In this manner, the most significant safety aspects of all facilities undergo today's analytic rigor and completeness in a more timely fashion, leaving those aspects of lesser hazard/risk significance to the later years of the program.

A graphic description of the SARUP is shown in Fig. 4. Phase 0, completed in early FY 1990, served to evaluate continued operations. Facilities covered in this phase were those judged to involve significant (moderate to high) hazards. Facility Safety Evaluation Teams (FSETs) were formed for each of these facilities to examine risks according to a checklist method. The team composition relied heavily on the participation of personnel from the operating divisions.

Results of these evaluations were presented to Plant Safety Evaluation Teams (PSETs) for acceptability. The PSETs (one per installation) consisted of technical and management representatives of both DOE-ORO and Energy Systems. Action plans based upon Phase 0 risk results were developed to reduce risks; these either have been completed or are ongoing. Recognition by FSET personnel of the benefits of Phase 0 was evident, especially the effective involvement of operating personnel with safety analysis and management.

Table 5. Facility safety documentation

Facility	Existing Safety Documentation		Planned Safety Documentation	
	Operating Controls	Analysis	Operating Controls	Analysis
3026-C	LCD	HSD	LCD	HSD
3028	LCD	HSD	LCD	HSD
3029	OSR	SAR	LCD	HSD
3030	N/A	SA	N/A	PSS
3031	N/A	SA	N/A	PSS
3033	LCD	HSD	LCD	HSD
3033-A	LCD	HSD	LCD	HSD
3038	OSR	SAR	LCD	HSD
3047	OSR	SAR	LCD	HSD
3118	N/A	PSS	N/A	PSS
3517	OSR	SAR	OSR	SAR
7025	LCD	HSD	LCD	HSD

[a]Problem Safety Summaries are prepared as needed but are not presently needed in all facilities.

Legend: LCD, Limiting Conditions Document; HSD, Hazard Screening Documents; OSR, Operational Safety Requirements; SAR, Safety Analysis Report; N/A, not applicable; SA, Safety Assessment; PSS, Problem Safety Summary.

In Phase I, facilities which involve insignificant hazards or for which standard industrial practices (as defined by national codes and standards) are adequate to define safe operating hardware and procedures are identified through a preliminary hazard screening process. These facilities will be required to maintain their operations within these standard industrial hazard control limits or to revise their preliminary HSD accordingly. They will not be subjected to further safety analysis. Those facilities that clearly pose significant hazards or that are questionable on this respect will undergo a more analytical hazard screening process. The outcome of this analysis will identify facility aspects which will undergo further qualitative analysis in Phase I as well as quantitative analysis in Phase II.

Phase IA has been established as a follow-on bridge between Phase I and Phase II. This intermediate phase was created primarily to provide for updating of existing OSRs to the extent supported by the technical bases developed during Phase I. Also, by identifying significant features of each facility, the safety-related configuration management and as-built needs will be identified. Finally, risk reduction action plans will be prepared when needs are identified.

Phase II of the program extends Phase I in a quantitative manner, resulting in an abbreviated safety analysis document that will include a facility description, the significant accident analysis, and the OSRs which comprise the heart of the safety analysis. This early focus on the fundamental elements of a given SAR for significant hazards is another key aspect of the program since it allows establishing the analytical basis for OSRs at the earliest possible date. It identifies further definition of configuration management and as-built needs. This phase of the program was completed in the FY 1992–93 time

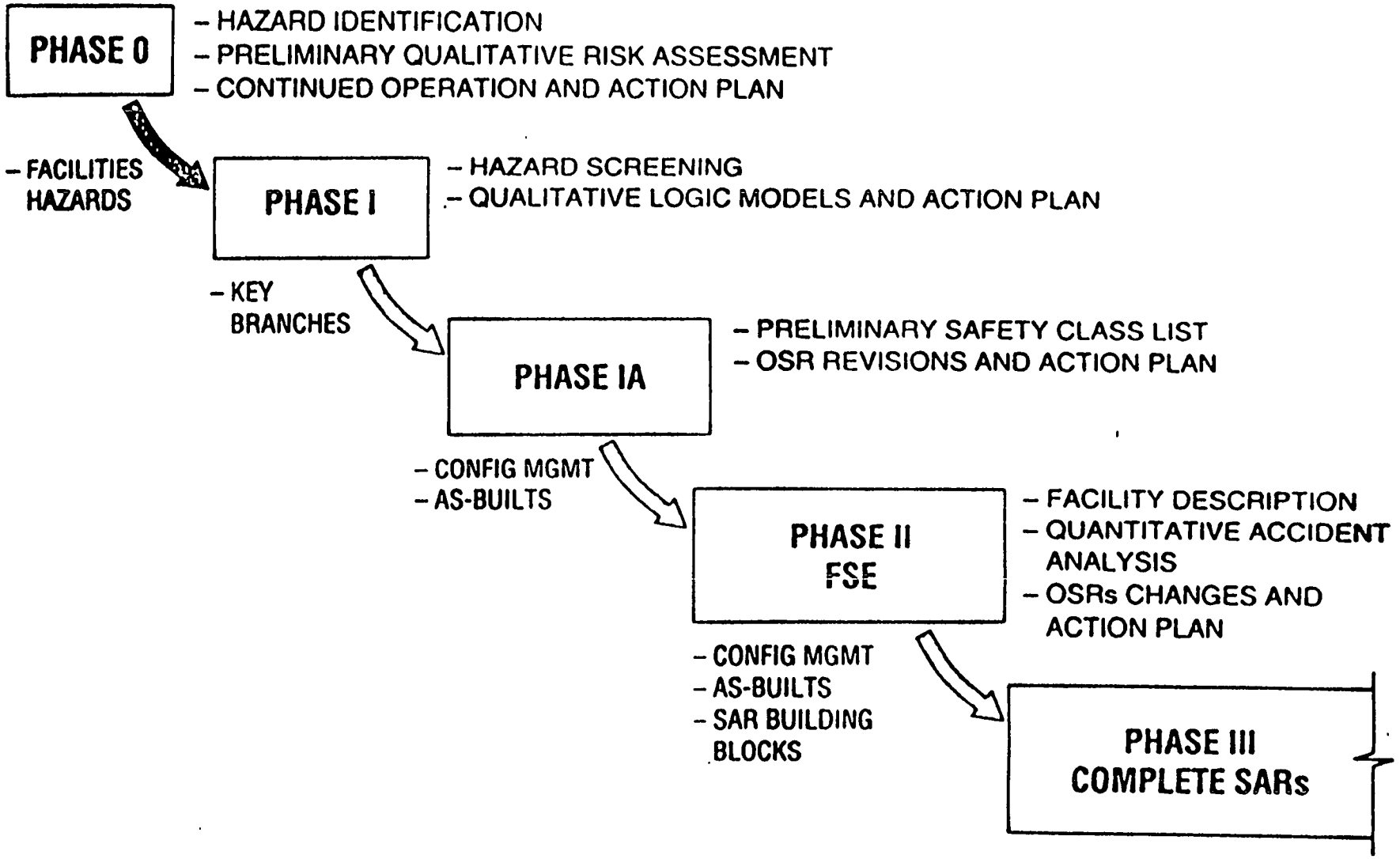

Fig. 4. Safety Analysis Report Update Program.

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frame. Full SARs will be produced in Phase III, with predicted completion dates occurring between FY 1995 and FY 1998.

During the time period in which the SARUP is being accomplished, there will be certain new facilities and facility modifications for which stand-alone SARs may be prepared. A transition plan will be developed for each of these efforts so that document consolidation is effected in a timely fashion.

Discussions with DOE-ORO have led to the conclusion that substantial amounts of information about each installation will be common to all safety documents for that installation. Rather than repeat this information in each safety document, generic documents will be prepared. These documents will describe meteorological conditions, demographic data, safety organizations, and other common features.

The SARUP described in this section is now being applied to the IFDP facilities. Phase 0, Phase I, and Phase IA of the process have been completed. Phase II and Phase III are required only for FPDL, Building 3517. These phases will begin in FY 1996.

4.2.3 Unreviewed Safety Question Determination Process and Status

The definition and basis for determining the existence of an unreviewed safety question are contained within DOE Order 5480.21. All changes to physical or procedural elements within IFDP facilities are reviewed to determine what impact, if any, will result from the anticipated change and to ensure that operational restrictions are provided as warranted.

The USQD review process is integrated into all aspects of the organization responsible for design, engineering, maintenance, inspection, operations, and assessment of the facilities and their activities.

The facility OSRs, SARs, LCDs, HSDs, and SAs (as appropriate) provide the "base line" for procedural and physical elements subject to the USQD process. Any of these elements that are altered to accommodate a project or activity not described in these or other safety analyses, or any changes to the OSRs or LCDs, would require an USQD.

Situations assumed to involve an USQD include:

- probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in a facility safety analysis could be increased;
- possibility for an accident or malfunction of a different type other than any evaluated previously in the facility safety analyses could be created; or
- any margin of safety defined in the OSR/LCD could be reduced.

Changes to facility physical elements, procedural controls, and new project activities or experiments are evaluated by the Facility Manager to determine if the requested change should be subject to the USQD process. A positive determination by the Facility Manager requires that a review of the activity be conducted by operations personnel, members of an FSET, and the System Safety Engineering Department, and that approval of the determination be made by the Facility Manager, the Division Director, and the Director of the Office of Operational Readiness and Facility Safety.

Members of the FSET are appointed by the head of the Radiochemical Technology Section (RTS). System Safety Engineering Department personnel are assigned to specific USQD reviews by the System Safety Engineering Department Manager.

The USQD is documented using the outline provided within DOE Order 5480.21. Copies of the determination are maintained in duplicate file points within the affected facility and the RTS office.

4.2.4 Description of Problem Safety Summary Report

PSSs are prepared for low-risk experiments not specifically discussed in the SAR or covered by specific procedures, and conducted within IFDP facilities.

The scope and administration of PSSs are described in the *Safety Manual for the Radiochemical Technology Section of the Chemical Technology Division.* An example of a problem safety outline is provided Fig. 5.

Every person (engineer, scientist, technician, and operator) working on a program or experiment within an IFDP facility is required to have read the PSS for that activity. A copy of a PSS is placed in a protective binder and located at the entry/exit to the work area involved.

Appropriate distribution of a PSS is conducted by the RTS Document Control Center where the record copies are retained.

4.3 QUALITY ASSURANCE

The RTS within the Chemical Technology Division has an established QA plan, QAP X-91-CT-006, that is implemented for activities conducted in and for facilities within the scope of the IFDP. Implementation of this plan ensures achievement of IFDP objectives in a safe, reliable, and predictable manner.

The RTS QA plan is responsive to the requirements of the Energy Systems QA plan, Y/QD-15, DOE Order 5700.6C, and Title 10 *Code of Federal Regulations* Part 830.120. This plan is prepared and approved in accordance with QA-3, "Procedure for QA Planning," of the *Chemical Technology Division Policies, Standards, and Procedures Manual.* The plan is a working document that requires updating as activity or project needs change.

The responsibilities and authorities for the QA program are defined in the draft IFDP Management Plan, ORNL/ER-230. The QA program is a management system that reflects management's strategy for accomplishing the objectives of the IFDP.

The RTS promotes the concept that quality shall be integrated into the work processes through each individual employee who has been properly trained, motivated, and empowered, and who is knowledgeable of the procedures, instructions, and other related administrative and technical documents that control the work.

RTS No._____

PROBLEM SAFETY SUMMARY

DATE:

PROBLEM NAME:

LOCATION:

1. PROBLEM LEADER AND RESPONSIBLE ALTERNATES

Give the names, home addresses, and plant and home telephone number of persons familiar with and responsible for the operation who may be contacted in case of emergency. For Section nuclear facilities requiring additional safety analysis review (e.g., hot cells and plutonium glove boxes), the operating personnel must be trained and qualified to carry out their assigned responsibilities (see DOE Order 5480.5).

Name	Address	Home Phone	Plant Phone

SIGNATURES:

_____ Person in Charge
Date

_____ Department Head
Date

_____ Safety Advisory Committee Chairman
Date

_____ Radiochemical Technology Section - Safety Officer
Date

_____ Radiochemical Technology Section Head
Date

Fig. 5. Example of Problem Safety Summary.

2. CHECKLIST FOR PRINCIPAL HAZARDS

Indicate the type of experimental or process hazards involved. Do not include routine hazards common to experimental work such as 110/220-V electric power, single high-pressure cylinders of inert gas, etc. This checklist should be included on the first or second page of the Safety Summary.

___Hazardous chemicals
___High-pressure equipment (>150 psi)
___High temperature (>250°C)
___High voltage (<220 V)
___Flammable gases
___Fibrous materials
___Radioactivity
___Other_____

3. PROCESS DESCRIPTION AND SHUTDOWN PROCEDURES

Give a short general description of the experimental or processing equipment; a flow sheet and a listing of important operating conditions are usually desirable. Describe, in particular, precautions necessary to ensure safe operation and given any hazardous aspects of the design. Describe instrumentation pertinent to safety. Give the emergency shutdown procedure, emphasizing any particular precautions necessary.

4. MATERIALS HANDLED

When hazardous materials are involved, data should be included on explosive limits, flammability, reactivity, toxicity, and physiological effects. Relate these restraints to particular precautions to be observed in material handling. Note symptoms of exposure and first aid for these hazardous materials. A Material Safety Data Sheet (MSDS) should be attached for each hazardous chemical. A chemical usage plan (see pp. 27-30 of the CTD Chemical Hygiene Plan) should be attached.

5. RADIATION HAZARD CONSIDERATIONS

When handling radioactive materials, the Health Physics Procedures Manual should be consulted (especially RP-2.16, Appendix A, B, and C). The activity and chemical form of the material used for each experiment or process should be specified. Any special facilities or handling precautions should be discussed, and attention should be given to an evaluation of the overall hazard (probability of dispersing the activity).

6. MINIMUM SAFETY REGULATIONS FOR PERSONNEL

When any formalization of the operation can be defined, this section should be used to spell out the particular safety rules important to the problem. These should include eye protection, protective apparel, smoking limitations, and radiation monitoring when the measures are of particular importance due to the hazards involved. Routine safety rules do not need to be listed.

7. UTILITIES AND GENERAL SAFETY FACILITIES

Consider the effect of this experimental program or process on the building ventilation, process (or potable) water, power, drains, etc. Particular attention should be given to the possibility of hazards spreading to other working areas. Note the adequacy of available fire-fighting equipment and communications.

8. WASTE DISPOSAL

Consider what types of waste will be generated (process wastewater, LLLW, hazardous, mixed, etc.) and how they will be handled.

9. QUALITY ASSURANCE

Make a QA assessment in accordance with ORNL QA Procedure, QA-L-2-100. Include results of assessment in this section.

Fig. 5. Example of Problem Safety Summary (continued).

4.4 WASTE MANAGEMENT

Waste generated during the IFDP will be managed in accordance with DOE Orders 5400.1, *General Environmental Protection Program*; 5400.3, *Hazardous and Radioactive Waste Program;* and 5820.2A, *Resource Conservation and Recovery Act* as amended. Waste minimization programs to control waste generation have been established for the IFDP.

This section describes the handling, treatment, and disposal of project waste and summarizes the techniques that are planned for waste minimization during the project.

4.4.1 Effluent

There are three liquid and three gaseous effluent discharges from IFDP facilities.

4.4.1.1 Gaseous effluent

ORNL has two central systems in the main plant area for handling waste gases: the cell ventilation system and the process off-gas system, which discharge to the Building 3039 stack. Waste gases that may contain radioactivity are treated at the source facility to reduce the radioactivity to acceptable levels before they are discharged to the central system. The form of the radioactivity determines the type of cleanup procedure used. Radioactive particulates are removed from air streams using high-efficiency particulate air (HEPA) filters.

The central cell ventilation systems, sometimes called the "high-volume, low-level" systems, are designed to handle the waste streams from hot cells and limited access areas. The average flow through the cell ventilation system is 155,400 std ft^3/min (98% of stack flow). There are five area systems, each of which is serviced by an electric blower with steam turbine backup. Emergency power is supplied to all cell ventilation fans (except the Oak Ridge Research Reactor); however, there is no treatment of cell ventilation gases at the Building 3039 stack facility. The buildings in this shutdown plan that are served by the central cell ventilation service are listed in Table 6, along with other buildings on the same blower.

The process off-gas system is designed to handle the off-gases from process equipment and laboratory experiments or under conditions where reduced pressure is required. It is a much smaller volume than the cell ventilation waste. The normal flow is 4000 std ft^3/min at a negative pressure of 42 in. w.g. The process off-gas waste stream is treated at the Building 3039 facility before discharge to the stack. The central treatment system includes a venturi scrubber to remove acid fumes, a demister, roughing filters, and HEPA filtration. The system has steam turbine backup in case of loss of power.

Buildings 3028, 3029, 3033, 3038, and 3047 are equipped with local ventilation systems that are designed to keep secondary containment areas at a negative pressure relative to the exterior of the building. The systems in Buildings 3028, 3033, and 3038 are on continuously, whereas the systems in Buildings 3029 and 3047 are tripped by alarms from monitrons or continuous air monitors in these facilities. The discharge from a local ventilation system is passed through two stages of HEPA filters and exhausted through stacks on the top of each facility. Building 3517 has a "continuously on" containment system that discharges through the building cells to the Building 3039 stack.

Various combinations of local ventilation systems with roof exhaust fans, the Building 3039 cell ventilation system, and/or the Building 3039 process off-gas system are used in the isotopes buildings in this shutdown plan. These are given in the descriptions of the individual buildings (Appendix A). Note

that cell ventilation air from alpha hot cells is exhausted to the Building 3039 process off-gas system, which provides secondary treatment.

Table 6. Building 3039 stack cell ventilation service for buildings in the Isotopes Facilities Deactivation Project

Blower	IFDP buildings serviced by blower	Other buildings sharing the blower
Isotopes area (48,000 std ft^3/min)	3028	3005
	3029	3098
	3030	
	3031	
	3033	
	3033-A	
	3038	
	3047	
3025, 3026 area (34,000 std ft^3/min)	3026	3025
3500 area (24,000 std ft^3/min)	3517	2531
		2537
		3505
		3506
		3507
		3525

There are no current plans to deactivate any of the ventilation systems serving IFDP facilities. There will be some decrease in flow to the central cell ventilation system due to the removal and disposal of glove boxes. However, it is not cost effective to take hot cells off of ventilation. This service is provided at no cost to these facilities, and major facility modifications would be required to terminate ventilation of hot cells. Even if IFDP facilities were removed from the central ventilation system, DOE would not see any reduction in cost as the system must continue to operate to service other ORNL facilities.

The local ventilation systems may be taken out of service pending the results of a life cycle cost/risk analysis to be performed on the options of deactivation versus continued operation. This analysis will be completed in FY 1995.

4.4.1.2 Liquid low-level waste system

Most of the isotopes facilities are equipped with "hot" drains located in hot cells, glove boxes, hoods, and occasionally floor drains that are connected to the ORNL LLLW system. Typically, waste that is collected in "hot" drains flows by gravity through pipes to underground collection tanks where the waste is neutralized, if necessary. The piping and tanks are known as the collection and transfer system (CAT). The waste accumulated in the collection tanks is transferred via underground piping to the LLLW evaporator facility (Building 2531), where it is concentrated in one of two evaporator units. The evaporator overheads are condensed and transferred to the process waste treatment plant (PWTP) for further treatment. The concentrated waste is stored in stainless steel tanks. The storage tanks are located

in below-grade, shielded-concrete vaults with stainless steel liners. Transfers are handled remotely. This system minimizes the radiation exposure to personnel.

The buildings in this shutdown plan which currently have hard-piped LLLW service are listed in Table 7. The table also lists the estimated discharge to these systems as a result of deactivation activities.

The CAT system in the Isotopes Circle area was constructed in the early 1950s, and most of the piping and collection tanks are singly contained. Current regulations require doubly contained piping and tanks and leak detection systems. The CATs that include WC-10 and WC-2 are under a FFA. The current FFA allows these systems to operate through FY 1994 for the limited purpose of deactivating facilities. This was based upon the original IFDP completion date. A request to extend this date to the end of FY 1998 has been made. A decision is expected before the end of FY 1994. When a facility is deactivated, all inputs to the LLLW system are to be plugged. If LLLW will be generated as a result of routine S&M after deactivation, provisions for bottling waste will be provided.

4.4.1.3 Process waste system

Process wastewater is water that is slightly or potentially contaminated (e.g., waste from some building sinks, floor drains, and steam condensate from heating coils). Many of the isotopes buildings have drains to the process waste system in addition to the "hot" drains. Process wastewater is collected by underground pipelines and pumped to one of two 350,000-gal tanks (2600 area) in preparation for processing through the PWTP (Building 3544). The wastewater is clarified and processed through an ion-exchange system for removal of ^{90}Sr and ^{137}Cs. The waste from the regeneration of the ion-exchange bed is sent to the LLLW system storage tanks.

The effluent from the PWTP is routed to the nonradiological wastewater treatment plant (NRWTP) (Building 3608). At the NRWTP, all waste is sent through dual-media filters, air-stripped for removal of volatile organics, and treated with granular activated carbon to remove nonvolatile organics and mercury. The final treatment tank is used for pH adjustment. The effluent is monitored prior to discharge to White Oak Creek. The outfall is a National Pollutant Discharge Elimination System–permitted discharge point.

The current plan for the process waste system is to minimize inputs from IFDP facilities. All drains from sinks, hoods, etc., will be plugged. Floor drains will remain open. In the event of a roof leak, this would allow the water to drain without leaving the building.

Table 7. Liquid low-level waste collection tank service for buildings in the Isotopes Facilities Deactivation Project

Building	Waste collection tank	Estimated IFDP volume (ft^3)
3026-C	WC-170	0
N/A	WC-18	500
3028, general	WC-10	3600
3028, Cell 7[a]	WC-2	0
3029	WC-10	2800
3030	WC-10	900
3031	WC-10	900
3033	WC-10	0
3033-A	WC-10	0
3038-E	Hot drains sealed	0
3038-M	Hot drains sealed	0
3038-AHF	WC-2	5500
3047	WC-10	22000
3118	No regular LLLW service; by removing plug access to WC-10	0
3517	S-223, S-324, and S-523[b]	50000
7025	No CAT service	0
3026-D	WC-16	15000

[a]Building 3028, Cell 7 has one hot drain routed to WC-2 and two hot drains to WC-10.
[b]Located in shielded cell; doubly contained pipeline to evaporator facility.

4.4.2 Solid Waste

The IFDP facilities generate two types of nonradioactive wastes: landfill material, such as office and packing trash, and hazardous waste. Five types of radioactive waste generated are TRU waste, TRU mixed waste, SLLW, low-level mixed waste, and high-activity waste. High-activity waste must be placed in retrievable storage. In addition, some scrap metal waste will be generated. Estimated waste volumes for each of these categories are listed in Table 8.

4.4.2.1 Landfill materials

This waste consists mainly of trash, non-recyclable waste paper, and other throwaway materials. This waste is transported from ORNL to the sanitary landfill at the Y-12 Plant.

Table 8. Solid waste volume estimates for deactivation of IFDP facilities (ft^3)

Waste type	Estimated volume (ft^3)
Landfill material	260
Hazardous material	267
Low-level solid	19,509
Low-level mixed solid	688
Transuranic	85
Mixed TRU	40
High activity	176
Scrap metal	235

4.4.2.2 Hazardous waste

Hazardous waste generated in IFDP facilities generally consists of fluorescent lamp ballasts, expired chemicals, solvent-wet rags, aerosol cans, waste oils, residual paint, asbestos insulation, light bulbs, florescent light tubes, and chemically contaminated equipment.

4.4.2.3 Low-level solid waste

SLLW generated in IFDP facilities is the largest quantity of waste materials generated. This material includes suspect waste which, at ORNL, is handled in the same manner as SLLW. The waste consists of blotter paper, wipes, cheesecloth, small laboratory equipment, glass bottles used in radioactive work and/or cells, plastics, and paper which are contaminated with beta/gamma-emitting radioactive materials. Low-level mixed solid wastes are SLLW which are co-contaminated with hazardous waste.

4.4.2.4 Transuranic waste

TRU waste is generally the same type of waste materials as SLLW with the exception that it is contaminated with low levels of alpha-bearing TRU materials. Mixed TRU wastes are hazardous waste materials which are co-contaminated with TRU radioactive materials.

4.4.2.5 High-activity waste

High-activity wastes are those non-TRU wastes which are of an activity level that they cannot be disposed of as SLLW. They must be packaged and placed in a shielded retrievable storage facility.

4.4.3 Waste Minimization

Waste minimization programs have been implemented in IFDP facilities. The following are waste minimization objectives for deactivation:

- avoid generating waste,
- minimize what is generated,
- recycle what is minimized, and
- treat what cannot be recycled.

These objectives are applied sequentially to the work.

Practical waste minimization efforts include eliminating characteristic hazardous waste, segregating wastes into compactable categories, compacting solid waste, and concentrating diluted waste. Key project waste minimization activities are described in the following sections.

4.4.3.1 Liquid effluent minimization

LLLW will be generated during deactivation primarily from cleanup activities, including flushing hot cells and glove boxes, removing potential airborne contamination, and removing transferable contamination in secondary containment areas. Volumes will be minimized by characterizing contaminants before and after flushing to ensure proper selection of cleaning agents and to determine when additional flushes are of little value. Alternate dry cleaning techniques (strippable coatings, ice blasting, etc.) will be evaluated for each task and will be used where practical.

4.4.3.2 Solid waste minimization

Deactivation activities will generate increased volumes of solid waste.

4.4.3.2.1 Hazardous waste minimization

Minimization of hazardous waste will be effected by the careful planning of work that generates this type of waste. Tasks requiring the use of hazardous chemicals will be planned so that minimum quantities are used and the smallest possible quantities ordered. Accurate inventories of these materials are kept so additional materials are not ordered when supplies are available. Asbestos abatement will be minimized. Asbestos will not be removed for the sole purpose of removing asbestos. It shall only be removed when it is required for completion of a deactivation task or if it is damaged and friable.

4.4.3.2.2 Radioactive waste minimization

Solid waste volumes will be minimized by incorporating the waste minimization objectives in the planning phase by segregating waste by type to prevent category crossover, and by using waste compaction and size reduction to reduce void space in the waste packages.

The generation of solid waste at IFDP facilities will be eliminated after completion of the project, except for the small amounts created by routine S&M activities.

4.5 NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTATION

The original Isotopes Facilities Shutdown Program (IFSP) was to be a 4-year program beginning in FY 1991 and ending in FY 1994. An internal ORNL review of the initial IFSP plans led to a determination that basic S&M and most deactivation activities of facilities was an ongoing activity and could continue without additional NEPA consideration. However, activities requiring the off site transfer of isotopes would be given further consideration. In February 1991, an Action Description Memorandum (ADM), which outlined the activities involved in the inventory consolidation, was prepared and transmitted to DOE-HQ for NEPA review. In July 1991, a Categorical Exclusion (CX) was granted for the inventory consolidation. The inventory consolidation effort began in August 1991.

In August 1993, the IFSP was presented with an opportunity to dispose of its inventory of ^{3}H-filled RL lights. DOE had negotiated a contract with a private company to purchase DOE's entire inventory of RL lights including those at ORNL. This was viewed as the last chance to remove the lights from ORNL. All possibilities of transferring the RL lights to another DOE site for either recovery or long-term storage had been exhausted. ORNL has no facility for recovery of the tritium or any other facility in which to store the RL lights. It was not clear if additional NEPA consideration was needed for the transfer of the lights; so to be conservative, an ADM was prepared and transmitted to DOE. In December 1993, DOE granted a CX for the transfer of the RL lights. Preparations for transfer began in January 1994, and the first transfer was made in May 1994. The last of the RL lights will be removed in FY 1995.

The remaining activity to be reviewed for NEPA considerations is the removal of the surplus inventory from Building 3517. Plans for the final disposition of the inventory are being finalized and will be completed in FY 1996. At that time, an ADM will be prepared and a CX requested.

4.6 ENVIRONMENT, SAFETY, AND HEALTH

ORNL ER Program policy is to provide a safe and healthful workplace for all employees, subcontractors, DOE prime contractors, and visitors, and to protect the environment. The accomplishment of this policy at ORNL is guided by the *Health and Safety Plan for the Environmental Restoration Program at Oak Ridge National Laboratory,* ORNL/ER-226.

The ORNL ER Program health and safety plan follows the format recommended by the EPA for remedial investigation and feasibility studies, as well as 29 CFR 1910.120 and DOE EM-40 guidelines for preparing documentation for performing tasks on hazardous waste sites, treatment, storage, and disposal facilities, and for responding to emergencies on hazard waste sites. The health and safety plan is also applicable to activities that are not considered to be performed on the Hazardous Waste Operations and Emergency Response (HAZWOPER) sites.

Activities sponsored by the ORNL ER Program may consist of, but are not limited to remedial action; construction; S&M; D&D; environmental sampling; environmental radiological surveys; well installation; well plugging and abandonment; geophysical surveys and mapping; technology development and testing; underground storage tank sampling, removal, or closure; liquid transfer from process holding tanks; and off-site activities.

Task-specific health and safety plans (TSHASPs) will be prepared on a project-specific basis to address in greater detail the hazards and controls associated with particular tasks. The TSHASP shall address all task-specific information including, but not limited to, the following: work site location, description of each task, work plan for accomplishing each task, anticipated hazards to health and safety,

prescribed methods for controlling hazards, monitoring requirements, personal protective equipment requirements, sanitation, decontamination, training and medical requirements, and emergency information.

A TSHASP shall be developed for ORNL ER projects involving activities on sites that fall under the HAZWOPER Program. A TSHASP or an approved (by ER ES&H Manager) equivalent document shall also be required for other activities that do not fall under the requirements of the HAZWOPER Program but may present hazardous or unsafe conditions for workers or the environment.

4.7 DOCUMENTATION AND RECORDS

Project documents, facility logbooks and operating procedures form part of the documentation pool required for providing objective evidence of quality. All documentation must be legible, retrievable, and in such a format as to be defensible in the ability to accurately reconstruct the performance of work.

Documentation and related objective evidence of quality shall consist of:

- the work plan;
- the QA plan;
- the health and safety plan (when required);
- facility maintenance and calibration logbooks;
- facility logbooks (to be maintained by the Facility Supervisor or representative);
- facility operating procedures; and
- training files.

All documentation must be completed in waterproof black ink, and corrections must be marked through with a single line, dated, and initialed. Handwritten documents must be legible. The information to be provided for each of these documents is described in ESP-102, "Field Quality Control."

4.7.1 Quality Records

Quality records will be authenticated as such by project management in consultation with the project QA coordinator. Quality records will include project documentation such as logbooks, field forms, and calibration records, as identified by this QA project plan.

All records generated on this project are subject to the requirements of ESS-QA-17.0, "Quality Assurance Records," and any associated requirements pertaining to the Administrative Record (AR) maintained by the ER Document Management Center (DMC). The Energy Systems AR staff will initiate and designate documents for inclusion in the AR files and ARs and submit these documents to the ER-DMC for retention.

Appendix A

DESCRIPTION AND HISTORY OF FACILITIES

ABSTRACT

This appendix presents information about the isotopes facilities that are to be (1) maintained in a safe condition under the existing maintenance and surveillance plan and (2) prepared for acceptance and transfer into the Surplus Facilities Management Program.

The site and the supporting Oak Ridge National Laboratory operational services that interface with the facilities are described briefly in Sect. A.1. A description of the individual facilities by building is presented in Sect. A.2.

A.1. SITE DESCRIPTION

Most of the facilities in the Isotopes Facilities Deactivation Project (IFDP) are located at the central Oak Ridge National Laboratory (ORNL) complex in Bethel Valley. ORNL is sited on the U.S. Department of Energy (DOE) Oak Ridge Reservation approximately 13 km (8 miles) from the population center of the city of Oak Ridge. The locations of isotopes areas within ORNL are shown in Fig. A.1. Most of the facilities in the IFDP are located in close proximity to the main administrative building (4500N) and research facilities. One facility, Building 7025, is located in the 7000 area about 2.2 km (1.4 miles) east of the main ORNL complex.

The Oak Ridge Reservation lies in an area between two mountain ranges. The Cumberlands rise to 910 m (3000 ft) or more 16 km (10 miles) northwest, while 113 km (70 miles) to the southeast the Great Smoky Mountains reach an altitude of some 2010 m (6600 ft). The area is part of the Valley and Ridge physiographic province. The reservation is a wooded complex dominated by a series of ridges and valleys tending northeast/southeast. It is bounded on three sides by the Clinch River, which is a tributary of the Tennessee River and is part of the water system controlled by the Tennessee Valley Authority.

The mountains on the east and the Cumberland Plateau on the west have a protecting and moderating influence on the region's climate. As a result, it is milder than the more continental climates found just to the west on the Plateau or on the eastern side of the Smoky Mountains. The prevailing winds follow the general topographic trend of the ridges: daytime, up-valley winds come from the southwest; nighttime, down-valley winds come from the northeast. The Smoky Mountains to the southeast provide general sheltering; severe storms such as tornadoes or high-velocity windstorms are rare. Similarly, the mountains divert hot, southerly winds that develop along the southern Atlantic coast. The average monthly temperature ranges from about 3.5°C (38°F) in winter to 25°C (77°F) in summer. The 38-year annual average precipitation (water equivalent) is 1.36 m (53.5 in.), including approximately 0.25 m (9.8 in.) of snowfall, with monthly precipitation peaking in January and February.

The population (1980 census) of the city of Oak Ridge is 28,000. Except for the city of Oak Ridge, the land near the Oak Ridge Reservation is predominantly rural, used largely for residences, small farms, and cattle pasture. Knoxville, the major metropolitan area nearest Oak Ridge, is located about 40 km (25 miles) to the east and has a population of approximately 183,000.

The central ORNL site is located in Bethel Valley between Chestnut Ridge on the north and Haw Ridge. Although the valley floor is highly developed within the central site area, the surrounding terrain is wooded. White Oak Creek passes to the south of the developed area and leaves the valley through a gap in Haw Ridge into Melton Valley. Experimental programs that require isolation are located at satellite sites in Melton Valley.

One of the buildings in this plan (Building 7025) lies at the extreme eastern end of the developed area in Bethel Valley. Most of the 7000 area consists of shops (e.g., maintenance) and stores receiving and warehouses. Building 7025 is located at the extreme eastern limit of this area. The only utilities supplied are water and electricity.

Building 9204-3 is located in the south-central part of the developed area at the Y-12 Plant. The Y-12 complex is situated in Bear Creek Valley adjacent to the city of Oak Ridge. Most of the Y-12 facilities lie on the valley floor between Pine Ridge on the north and Chestnut Ridge on the south.

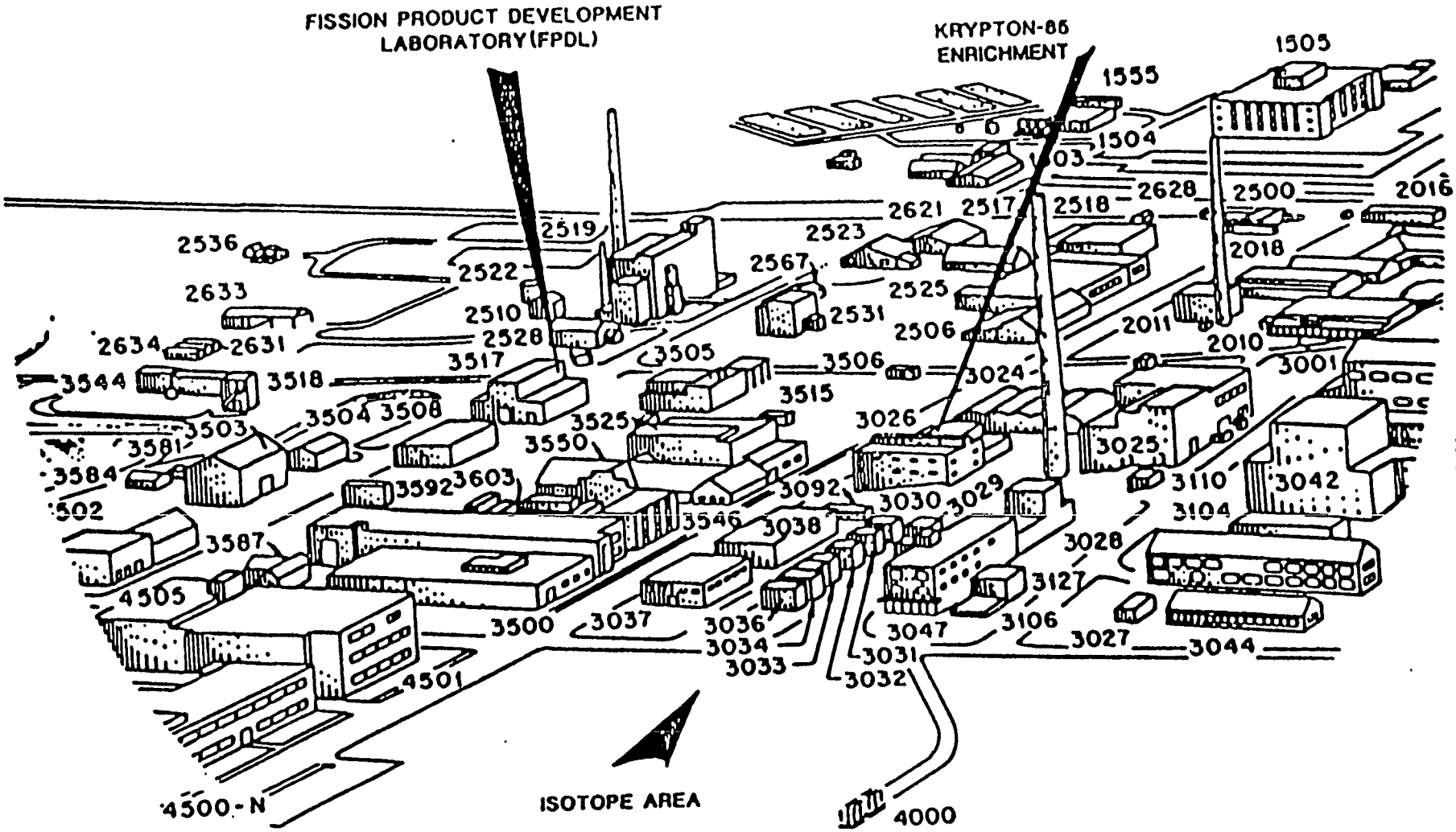

Fig. A.1. Location of Isotopes Facilities at ORNL.

A.2. DESCRIPTION OF FACILITIES

A.2.1 BUILDING 3026-C—KRYPTON-85 ENRICHMENT FACILITY

A.2.1.1 Description

Building 3026-C is a two-story wooden structure (22 ft high) located on Central Avenue to the west of the Isotopes Circle facilities. The building layout is shown in Fig. A.2. Ancillary facilities consist of offices, low- and high-level radioactivity laboratories, and a counting room. An instrument shop, operated by the Instrumentation and Controls (I&C) Division, is located in the southwest corner of Building 3026-C but is not related to facility operations. The facility shares a common wall and utilities with the adjacent Building 3026-D, Segmenting Hot Cell Facility. The two facilities are operationally independent. All areas of the building are protected by automatic fire sprinklers monitored at the ORNL Fire Department.

A tritium facility at the northwest corner of Building 3026-C is constructed of reinforced concrete. The small laboratories, counting room, and cell banks are also of reinforced concrete. With the exception of these concrete structures, the partitions and ceilings throughout Building 3026-C are wooden.

A.2.1.1.1 Cells

The two-story structure (i.e., high bay area) of Building 3026-C houses two banks of four hot cells each. These cells are constructed of reinforced concrete 2 ft thick (top, sides, and partitions) with a 4- by 6-ft floor space for each cell. The inside height of Bank 1 (Cell 4) and Bank 2 (Cells 2 and 4) is 10 ft, and the height of each of the other cells is 8 ft. The cells of Bank 1 on the west side are equipped with Zn-Br-filled viewing windows and master-slave manipulators. Access to each cell in Bank 2 is through a 2- by 2-ft doorway shielded by 7-in.-thick steel doors. Attached to the north side of Bank 2 (Cell 3) is a 3- by 6-ft by 7-ft-high structure, constructed of 2-in.-thick upper and lower hinged steel doors on the west side. The east-side doorways of Bank 2 cells are opened during part of the normal krypton diffusion operation; the shielding during this time consists of a 2-in.-thick lead glass viewing window permanently mounted in 2 in. of lead brick. Overhead access to Cells 2 and 4 of Bank 2 is through concrete roof blocks, which are removed for in-cell maintenance. There are no radioactive liquids generated in the thermal diffusion process. Floor drains in the cells discharge to the liquid low-level waste (LLLW) system, which is out of service.

On the west side of Bank 2, a shielded sampling station is equipped with a vacuum pump venting to cell ventilation, a sampling manifold, a cold trap, in-line rupture discs, and a surge tank.

Contamination in Buildings 3026-C is controlled by the building ventilation system, which moves air from areas of lesser contamination potential to areas of higher potential and exhausts the air through the cell ventilation system. Thus, the ventilation air in the facility flows from the operating room through the cell in-leakage openings into the cells from which it is discharged to the building cell ventilation header that connects to the 3039 stack system. To ensure inleakage to the cells, the interiors are maintained at 0.75 to 1.0 in w.g. negative pressure relative to the operating area. The cells and transfer and sampling stations are monitored continuously with preset differential pressure gauges that activate a local alarm and telemeter a signal to the Waste Operations Control Center (WOCC) (Building 3130). There are no backup monitors or gauges on this component of the facility.

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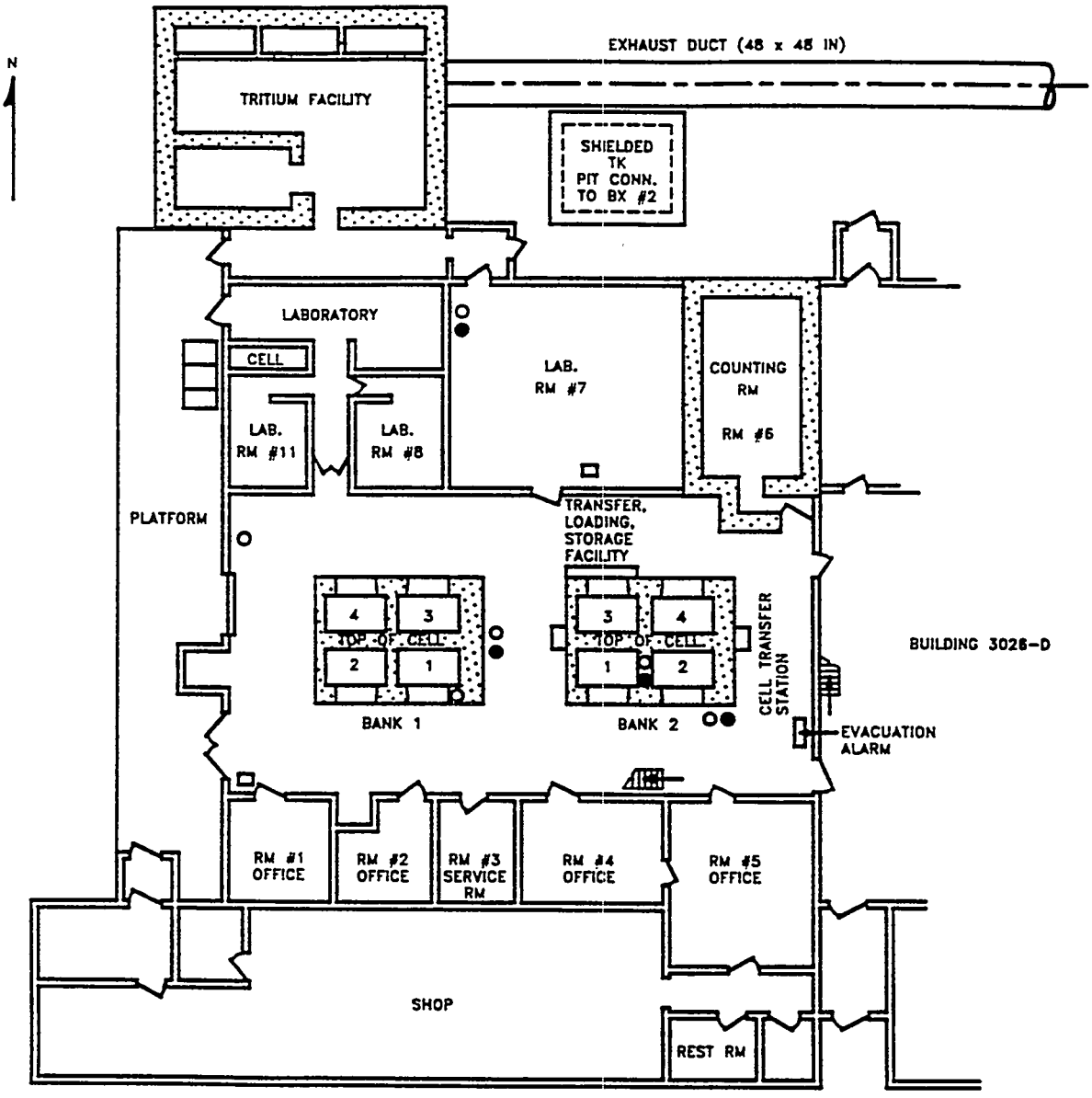

First Floor Building 3026-C

Fig. A.2. Floor plan of Building 3026-C.

Should ventilation disruption occur during off-operating shifts, the patrol operator on duty in the WOCC will notify assigned facility operating personnel. The 3039 stack system has an alternate ventilating fan and power source in case of mechanical failure of the system in use, and a diesel generator provides emergency power should an outage occur.

A.2.1.1.2 Laboratories

Ventilation of the three small laboratories in the Room 11 complex is provided by hood exhausts connected to the Building 3026-C ventilation duct to the 3039 stack. The duct from one of the hot hoods is provided with a high-efficiency particulate air (HEPA) filter. All laboratories are used for low-level radioactive work. Another hood exhaust is located in the northwest corner of the main 3026-C cell operating area. There is lead shielding on the south wall of Laboratory 11.

A.2.1.1.3 Tritium storage

Tritium is stored in the concrete tritium laboratory room on the north side of the building and in a hood in Room 7. A doorway on the south side of the concrete room is closed only by a steel grate, which is kept locked to control access when the laboratory is not attended. The laboratory provides storage space for tritium light sources. Unassembled tritium-filled tubes are also stored in a hood in Room 7.

Air flows into the tritium facility through the open door at the south side of the laboratory and through a ceiling duct. Air is exhausted to the 3039 cell ventilation system through a hood in the small room on the south wall and through vents on the north and west walls. The flow rate is approximately 1500 cfm. Air flows through the Room 7 hood at the rate of 300 cfm; it enters Room 7 through a roughing filter in the door, which leads to the operating area.

A.2.1.1.4 Instrument shop

The shop located in the southeast corner of Building 3026-C is unrelated to the operations of either 3026-C or 3026-D. It is separated from other activities in the buildings by at least two doors and can be entered or exited without entering the operating areas.

A.2.1.2 History

The building, which was constructed in 1943, was used primarily for about 5 years to develop methods of isolating fission products. After the war, the effort shifted to processing radioisotopes for research and medical purposes. The waste from processing irradiated reactor fuel elements for uranium and plutonium recovery in Building 3019 was piped directly to Building 3026-C. At Building 3026-C, it was processed to isolate short-lived isotopes. Some of the isotopes recovered were ^{129}I, ^{131}I, ^{79}Se, ^{107}Pd, and ^{147}Pm. The feed stream from Building 3019 would have contained fission products such as ^{137}Cs and ^{90}Sr as well as alpha-emitting actinides. The commercial isotopes program started in Building 3026-C.

The krypton system was installed in the east cell bank (Cell Bank 2) in the mid 1960s and is still functional but has not operated in over 2 years. Because of the long operational period, the system is highly contaminated with krypton, which is embedded in the organic gasketing material of the equipment.

By the early to mid 1960s the two front cells of the west cell bank (Bank 1) were being used by the Metals and Ceramics (M&C) Division. It is thought that irradiated reactor fuel elements were segmented in these cells. Cells were also originally used for source safety testing and, more recently, have been used for hot metallographic work. They have now been shut down.

Since 1974, Cells 3 and 4 of Bank 1 have been used exclusively for nuclear medicine research.

A.2.1.3 General Status

The krypton sales program operations in Building 3026-C were discontinued in 1991. Krypton loading equipment in Building 3026-C is still functional and will be used in the final disposal of all residual ^{85}Kr as part of the IFDP planned activity. The Health Sciences Research Division (HSRD) now uses only Cell 4 in Bank 1 (west), the Laboratory 11 complex, and the counting room for nuclear medicine research. The I&C Division operates a shop in the southwest corner of the building in which they repair and maintain monitoring equipment. I&C presently occupies offices in Room 5. The baseline assumption for the IFDP is that all activities will be terminated in Building 3026-C by September 30, 1994.

The general status of the building is summarized in Table A.1.

A.2.2 BUILDING 3026-D—SEGMENTING HOT CELL FACILITY

A.2.2.1 Description

Building 3026-D, east of and adjacent to 3026-C, is a three-story wooden structure. The principal structure within the building is a two-story, 5-ft-thick concrete cell block which is divided into two connecting radioactive material handling cells (hot cells) located in a north-south direction. The west face of the cell block is equipped with manipulators and Zn-Br_2-filled viewing windows. To the west of the cell block, located at floor level is a high-level radioactivity storage facility. This is connected to the south hot cell via a tunnel below the floor for transfer purposes.

The building also houses a Chemical Separation Laboratory in addition to the Segmenting Hot Cells Facility. Historically, the Chemical Separations Laboratory has served as a facility for the production of ^{32}P and ^{131}I; separation of numerous fission products; isolation of ^{99}T, ^{147}Pm, and ^{237}Np; and the isolation of ^{135}Xn for neutron cross-section determination. The Segmenting Hot Cells Facility was originally used to isolate large quantities of fission-produced ^{140}Ba for criticality testing purposes. The cells in the Segmenting Hot Cells Facility have been greatly modified since the discontinuance of the earlier ^{140}Ba process. They now provide facilities for the segmenting, examination, and assembly of irradiated metallurgical specimens.

Contamination in Building 3026-D is controlled by the design of the building ventilation system, which moves air within the building operating area from areas of lesser contamination potential to areas of higher potential and exhausts the air through the cell ventilation system. Established procedures in compliance with the ORNL Health Physics Manual are followed for operations in the facility.

A.2.2.2 Status

There are no ongoing operations in Building 3026-D other than the storage of irradiated metal specimens. The general status of the facility is shown in Table A.2.

Table A.1. Building 3026-C—general status of facility

Facility/area	Comments
Building	
Type	Wood.
Roof and exterior walls	Poor condition.
Building ventilation	Containment is by hot cells and hoods; no secondary containment. The building is not sealed; no air locks. Building ventilation air moves from the operating area through cell inleakage openings or hoods and is discharged to the 3039 cell ventilation system and stack; no HEPA filters. Cell Bank 2 handles only radioactive gas (krypton). May be roughing filters on two cells in cell Bank 1, but this could not be confirmed.
Liquid waste system	Cell floor drains and hood "hot" sinks drain to tanks W-17 and W-18.
Monitoring	Cells and transfer stations continuously monitored with preset differential pressure gauges that activate local alarms and telemeter a signal to the WOCC (Building 3130).
Other comments	In early days, facilities were used to process fission products, uranium, and plutonium and to segment irradiated reactor fuel elements. Technicium-99 is the most predominant residual contamination from past radioisotope processing. May also find residual contamination (e.g., alpha, ^{137}Cs).
	Facilities, utilities, and services are in fair condition; however, everything is currently operational.
	Asbestos insulation: some sound, some not sound.
	Relatively large quantities of contaminated lead shielding.
Cell Bank 1 (west)	
Cells 1 and 2	No operations. Used by ORNL M&C Division for hot metallographic work. It is thought that reactor fuel elements were segmented in these cells; cells are contaminated with ^{60}Co and ^{137}Cs.
Cells 3 and 4	Used for nuclear medicine research; short-lived radioisotopes.
Cell Bank 2 (krypton)	Operating facility; krypton (gas) inventory stored in Cells 1 and 3. After deactivation and removal of the inventory, equipment will be contaminated with krypton; thermal diffusion system in Cells 2 and 4 will be highly contaminated; slow release of residual krypton embedded in organic gasketing material to cell ventilation air.

Table A.1 (continued)

Facility/area	Comments
Laboratories	
Tritium facility and Laboratory 7	Large inventory of tritium (gas) contained in glass tubes from the tritium radioluminescent light program are stored in the tritium facility and in a hood in Laboratory 7; 74 tubes that originally contained about 7000 Ci of tritium are known to have been leakers.
	Tritium-contaminated equipment.
	"Hot" drain in the Room 7 hood and in the hood in the small room on the south wall of the main tritium room.
Laboratory 11 complex	Used by nuclear medicine for research and development work on radioisotopic tracers; HEPA filters on hoods.
	HEPA filter on exhaust from one hood.

Table A.2. Building 3026-D—general status of facility

Facility/area	Comments
Building	
Type	Wood.
Roof and exterior walls	Poor condition.
Building ventilation	Containment is by hot cells and hoods; no secondary containment. The building is not sealed; no air locks. Building ventilation air moves from the operating area through cell inleakage openings or hoods and is discharged to the 3039 cell ventilation system and stack through one stage of HEPA filters in the cell and one stage at the stack.
Liquid waste system	Cell floor drains and hood "hot" sinks drain to tanks W-16.
Monitoring	Cells and transfer stations are continuously monitored with preset differential pressure gauges that activate local alarms and telemeter a signal to the WOCC (Building 3130).
Other comments	Facilities, utilities, and services are in fair condition; however, everything is currently operational. Asbestos insulation: some sound, some not sound. Numerous areas of fixed contamination throughout the facility.
Chemical Separations Laboratory	No operations. General disrepair.
Hot Cells	
Cell A	No operations. Zn-Br windows are leaking.
Cell B	No operations, used for storage of 4000 lb of irradiated steel specimens containing an estimated 300 Ci of ^{60}Co.

A.2.3 BUILDING 3028—ALPHA POWDER FACILITY

A.2.3.1 Description

Building 3028 was constructed to separate ^{131}I and later modified to separate ^{133}Xe and other short-lived fission products from uranium-aluminum targets. The building was later expanded to include curium processing cells. It is a steel-frame structure covered by metal siding and is located in the northwest area of Isotopes Circle, directly west of Building 3047.

The building has a four-story central section with one-story cell operating areas on the east and west sides (Fig. A.3). The first floor covers 4000 ft^2, and the total volume of free space is 80,000 ft^3. Alpha powder handling operations were conducted on the east side in Cells 1, 2, 3, 4, and 5. On the west side, ^{147}Pm processing was conducted in Cell 6. Iodine-131 and other short-lived fission products operations were conducted in Cell 7 and the ^{133}Xe recovery and purification cubicle. After shutdown of the ^{131}I production capability, various mechanical and chemical processes were conducted in Cell 7 to produce radioisotopes upon customer demand. The fourth floor has been used only for storage in recent years.

Cells 1, 2, 3, and 4 are manipulator cells with one observation window each. They have steel tank walls and tops containing 2 ft of water for neutron shielding. The steel tanks are bolted together in series and are interconnected with an air-lock system. Each cell is lined with stainless steel, and all penetrations are seal-welded.

Cells 2 and 3 have back windows with glove ports. Cell 5 is a manipulator cell with the following features: a stainless-steel operating pan; 9.5-in. armored steel plate and 1-ft concrete north, south, and west walls and top; a small armored access port in the south wall and the viewing window in the west wall; a pass-through air lock to Cell 4; and a 3-ft east wall with a water-filled, armored-steel, rear-access door. Cell 6 has 7.5-ft-high stacked barytes walls, steel-clad lead access doors in the north and east walls, and lead shielding along the east wall. Cell 7 is a manipulator cell with the following features: 3-ft, high-density concrete south and west walls; a 1-ft east wall lined with 4-in. lead; north wall consisting of 2-ft concrete partition; top consisting of a stack of five sheets of 3.5-in. armor-plate steel; a roof plug access; and an armored, lead-lined access port in the west wall.

Cell windows for 1, 2, 3, and 4 are water-filled, safety-plate glass accessed from the exterior (cold side). Cell 5 has an oil-filled window that is accessed from the interior (hot side). Cell 6 is a process cell and has no window. Cell 7 has one mineral oil–filled, leaded-glass window that is accessed from the cold side. Replacement of the other window was started but was not finished due to lack of funding, and it has only a single pane of glass.

The operating cells provide the primary containment of radioactive materials, with secondary containment being the building itself. The cells operate at a minimum of -0.3 in. (normally 1 to 2 in. negative) w.g. to maintain containment. The building's outer surface is "cocooned" with polyurethane foam. All normal entries have air locks for lift trucks and personnel access and gasketed doors to minimize inleakage.

The building interior operates under containment (at least -0.3 in. w.g.) at all times. Building ventilation passes through a network of exhaust ducts to a series of roughing and HEPA filters in an unshielded filter house on the roof. The west end discharges to the isotopes area cell ventilation system and the 3039 stack. The east end [the Alpha Handling Facility (AHF)] is discharged to a short stack on the roof.

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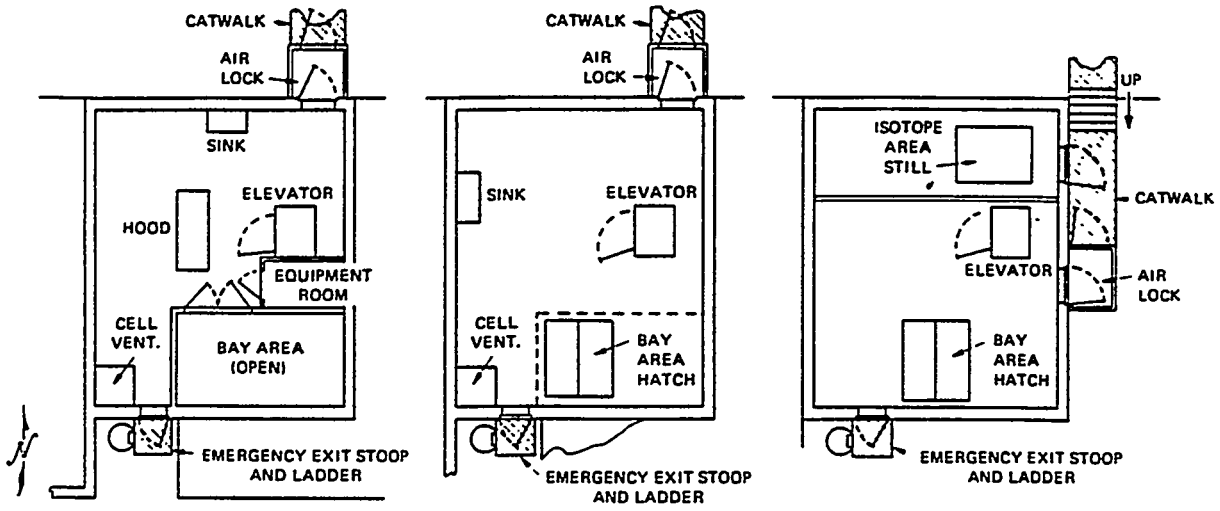
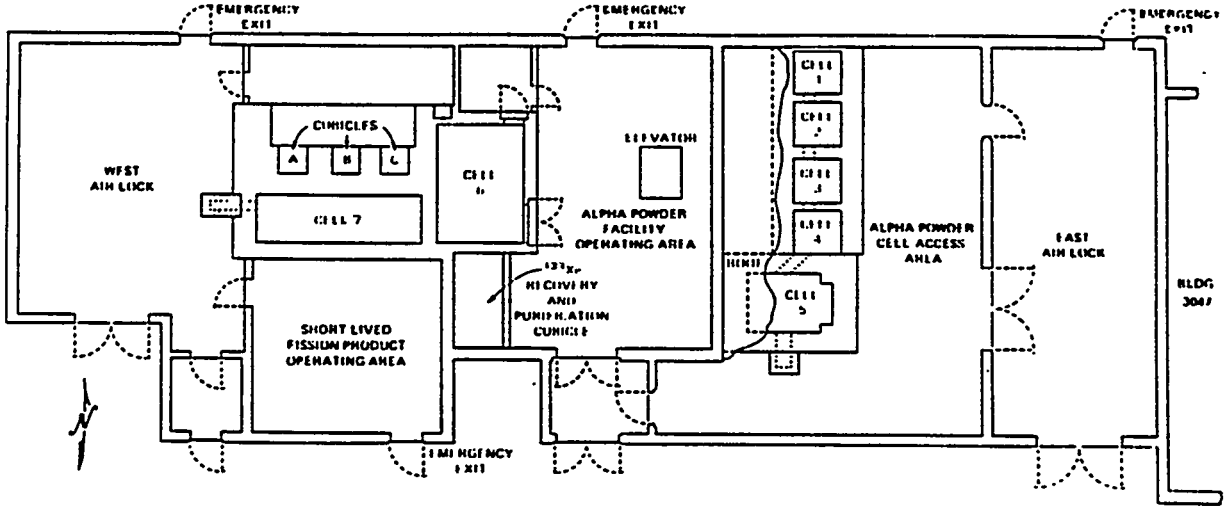


Second Floor Third Floor Fourth Floor

Upper Floors Building 3028



First Floor Building 3028

Fig. A.3. Floor plan of Building 3028—Alpha Powder Facility and Short-Lived Fission Product Facility.

The exhaust from Cells 5, 6, and 7 is double-HEPA filtered and discharged to the isotopes area cell ventilation system and 3039 stack.

A.2.3.2 History

The building was constructed about 1950 as part of the Isotopes Program. It originally housed the ^{131}I processing facility (now the Short-Lived Fission Product Cells) and the separation facility (a four-story ion-exchange column) for ^{147}Pm. The ^{131}I facility was converted to manipulator cells in the early 1960s and expanded to the Short-Lived Fission Product Facility. The ^{133}Xe facility was added at about that time. Products and processes developed for sale included ^{133}Xe, ^{131}I, and ^{99}Mo. The ^{133}Xe operation continued through 1980, and the Short-Lived Fission Product Program was discontinued in 1985.

The ion-exchange columns were removed in the early 1960s. The upper three floors were converted to target fabrication facilities in the mid to late 1960s. Target fabrication was a full-cost-recovery program at that time. Water-shielded cells were installed on the first floor in 1964 for the curium source fabrication program of Space Nuclear Systems. The curium fabrication program was not a full-cost-recovery isotopes program. The curium cells were partially decontaminated in the mid 1980s and the facility was redesignated as the Alpha Powder Facility, which brought it back into a full-cost-recovery isotopes program. In the late 1970s, the target facility moved to Building 3038 and the upper floors were occupied by Nuclear Medicine Research, which was funded by Energy Research (HSRD). They turned the laboratory facilities over to the Office of Risk Assessment (HSRD) in 1988. The major contamination in this building is left from the curium processing, the source fabrication work, and the ^{147}Pm processing.

A.2.3.3 General Status

The general status of Building 3028 is summarized in Table A.3. There are no operations in the building other than those required to maintain compliance with health and safety requirements.

A.2.4 BUILDING 3029—SOURCE DEVELOPMENT LABORATORY

A.2.4.1 Description

Building 3029 is located in the west-central area of the Isotopes Circle, southwest of Building 3047. The building is a single-story, steel-frame structure covered by corrugated metal siding. The floor area is 3,000 ft^2, and the total free-space volume is 33,000 ft^3. The building layout is shown in Fig. A.4.

The operating area contains four manipulator-type hot cells. Cells 1, 2, and 3 were used to process high-level beta/gamma sources; Cell 4 was used for short-lived materials and ^{192}Ir monitoring. The cell access area contains a ^{60}Co storage and irradiation area known as the ^{60}Co garden. The ^{60}Co garden has been emptied and is part of the isotopes facilities deactivation. Two laboratory hoods located in the southwest corner of the operating area are used for preparing both elemental $^{131}I_2$ and $CH_3\,^{131}I$. These hoods are equipped for use as glove boxes. There are two small glove boxes in the northeast corner of the cell access area.

Cell 1 and 3 can operate independently or in combination with Cell 2. Cell 2 is dependent on Cell 1 or 3 for transferring materials in or out of the cell. Cells 1 and 3 are lined with stainless steel and have 3-ft barytes concrete walls. Cell 3 also has 2 in. of lead shielding on the operator side. Cell 2 has a 3-ft barytes concrete wall on the operating side, 1 ft of steel on the cell access side, a stainless steel pan, and

Table A.3. Building 3028—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with metal siding.
Roof and exterior walls	General condition of building exterior is adequate; roof leaks.
Building containment and ventilation	Building sealed; air locks; building operates in a "contained" condition of at least 0.30 in. w.g. negative pressure with respect to outside atmosphere. Meeting building containment is a problem because of the poor condition of the roof; ventilation system on the east wing is run at near-full capacity and is just meeting requirement. Building ventilation; filter house with double HEPA filtration on roof; west end exhausts to isotope area cell ventilation system and 3039 stack; east end (alpha handling facility) exhausts to local fan and short stack on east end roof. Cell ventilation: (1) alpha cells, HEPA filtration, exhaust to process off-gas system, and 3039 stack; (2) Cells 5, 6, and 7, HEPA filtration, exhaust to isotope area cell ventilation system and 3039 stack.
Liquid waste system	Cell floor drains: Cells 1 to 4 drain to intermediate holding tank (W11) which is out-of-service. Other cells drain directly to the LLLW system. Building 3028 drains to tank WC-10, except Cell 7. Cell 7 has one drain to tank WC-2 and two drains to WC-10. There is some question as to whether the Cell 5 drain is connected.
Cask handling	Forklift (9800-lb capacity).
East Air Lock	Pit below the floor in southeast corner has filters for Building 3047 and part of the filters for Building 3028 process off-gas; pit contained 6 in. of water last time it was opened; floor above pit roped off as radiation zone. 500-gal waste tank that services the alpha cells located in pit under floor. The pump has not been checked in 6 years. Chilled water unit used to cool floor pans of alpha cells; is contaminated inside.

Table A.3 (continued)

Facility/area	Comments
Alpha Cells Charging Area	Area is highly alpha contaminated. All painted surfaces have contamination under them. Entrance into old cell ventilation duct should be sealed to prevent new ventilation system from pulling contamination from the duct. Off-gas filters for Cells 1 to 4 are located in ceiling of the cell charging area. Filters cannot be reached safely without scaffolding. Permanent scaffolding is needed for safety (rather than the temporary measures now used).
Cells	
Cells 1–4 (alpha)	Highly contaminated with alpha (Pu, Cm). Lighting and electrical services are in poor condition due to radiation damage. Liquid waste tank (needed for cell wash down) is out of service. Cell 1: empty. Cell 2: empty. Cell 3: contains waste. Cell 4: contains a welder.
Cell 5 (alpha and beta/gamma)	Contaminated with alpha and beta/gamma. Some question as to whether floor drain is connected to LLLW system.
Cell 6 (pipe cell)	Highly contaminated with ^{147}Pm. Cell must be entered periodically to change filters.

Table A.3 (continued)

Facility/area	Comments
Cell 7 (short-lived fission products)	Relatively clean; entered in 1986 to connect new cell ventilation system; no operation since that time. West cell window has only one pane of glass. Work started to convert west window to lead glass but stopped due to lack of funding. If off-gas safety system failed, it could pull single pane in, breaking containment. Filter system was never completed to give testable HEPA filters on Cell 7. Process off-gas from Cell 7 exhausts through HEPA filters to the area process off-gas system. It is assumed that the scrubber still contains contaminated dried salts.
Cubicle area	Contaminated; old equipment still there.
West Air Lock	Charcoal filter pit under floor; probably is contaminated; however, short-lived fission products were last processed in 1986 and those would have decayed.
Second, Third, and Fourth Floors	Empty. Second, third, and fourth floors and the elevator shaft have plutonium and ^{147}Pm contamination under the paint; paint is chipping and peeling.
Fourth Floor	Roof leaks.

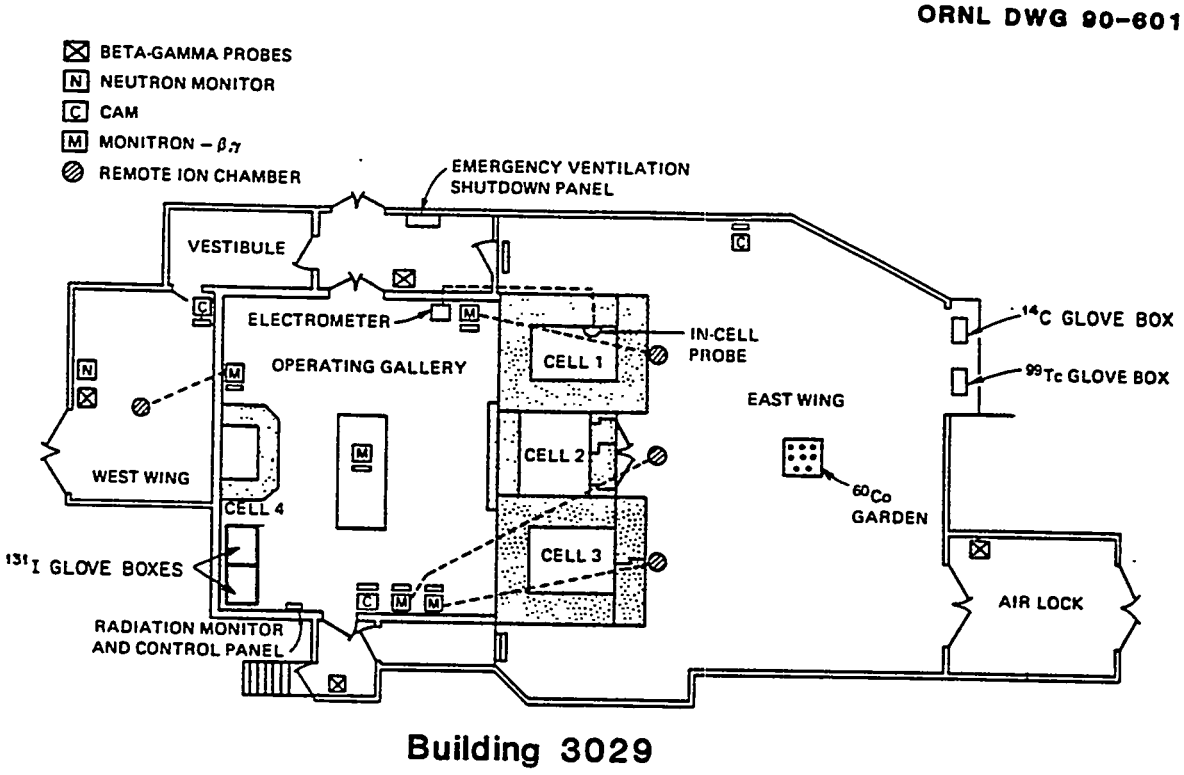


Fig. A.4. Floor plan Building 3029— Source Development Laboratory.

walls coated with a radiation-resistant sealant. Cell 4 is lined with stainless steel and has 2-ft barytes concrete walls and top.

Cells 1, 2, 3, and 4 have mineral oil–filled, lead-glass windows. Access to windows in Cells 1, 2, and 4 is from the cold side; in Cell 3, it is from the hot side.

The building's outer surface is sealed for air tightness by cocooning with polyurethane foam. All normal entries have air locks for lift trucks and personnel access and have gasketed doors to minimize inleakage. Building ventilation is provided by a roof-mounted exhaust fan with HEPA filters. In conjunction with dampered inlet and exhaust vents, it is operated to maintain a slight negative pressure in the building and to automatically place the system in a "contained" state when air monitors detect radioactivity.

The exhaust air from the cells is passed through a minimum of two sets of HEPA filters and discharged to the 3039 stack system.

A.2.4.2 History

Building 3029 was constructed in 1952 and originally contained a system of remotely operated barricades and a small manipulator cell (now called Cell 4). The facility was built as part of, and has always been used in, the Isotopes Program. Isotopes originally handled in the facility were ^{192}Ir (source fabrication) and small ^{60}Co sources. Cell 1 was built in 1955–56 to handle large quantities of ^{60}Co. Very little ^{60}Co source fabrication has been done since the late 1950s. Cell 3 was built in 1960–62 for ^{137}Cs source fabrication. Cell 2 was built by enclosing the space between Cells 1 and 3 and is used for waste handling and pass-through between the cells. Major building operations included ^{60}Co, ^{137}Cs, ^{90}Sr, and ^{192}Ir source fabrication.

A.2.4.3 General Status

The general status of Building 3029 is summarized in Table A.4. Current activities in the building are limited to removal of waste materials, transfer of ^{60}Co inventory to retrievable storage, and cleanup of the facility.

- Cell 1 is used to transfer samples from a shipping cask to a smaller transfer cask for the M&C Division. This work is performed about every 2 to 3 months.

- Iodine-131 is processed in Glove Box A in the southwest corner of the operating area. The iodine is used to test the High-Flux Isotopes Reactor (HFIR) filter system. This work is performed every 6 months.

- Cell 2 has waste that is being loaded out as manpower allows.

Table A.4. Building 3029—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with metal siding.
Roof	Needs maintenance every 2 to 6 years.
Exterior walls	Cocooned with polyurethane foam.
Building containment and ventilation	Building sealed; air locks; operates to maintain a slight negative pressure in the building relative to the environment and to automatically maintain the system in a "contained" state when air monitors detect radioactivity.
	Local area ventilation system; unshielded filter house with double HEPA filtration on the roof.
	Cell ventilation: HEPA filters and exhaust to 3039 stack.
Liquid waste system	Building sinks and floor drains: process waste system.
	Cell floor drains: drain to tank WC-10.
Cask handling	Forklift (9800-lb capacity).
Cells	Cells 1–3: used to process high-level beta/gamma sources (^{137}Cs, ^{90}Sr, and in the past ^{60}Co).
	Cell 4: short-lived radioisotopes, ^{192}Ir.
Cell 1	Cell 1 is a transfer cell and is fairly clean.
	No in-cell HEPA filters; filter house with double HEPA filtration on the roof.
Cell 2	Cell 2 is highly contaminated with beta/gamma radioactivity. Cell 2 contains waste.
	HEPA filters in the cell and double HEPA filters on the roof.
	Electrical system is deteriorating due to high radiation levels.

Table A.4 (continued)

Facility/area	Comments
Cell 3	Cell 3 was decontaminated to 20-mrem smears about 5 years ago. The contamination is mostly ^{90}Sr, but there is some ^{137}Cs.
	Cell 3 is ducted to Cell 2 and filtered through the Cell 2 filter house. Cell 2 filter house is running with the damper fully open. The new system was connected to the roof of Cell 3, but the cell was never entered to install in-cell filters. The Cell 3 filter house is locked out.
	No lights or electrical outlets due to radiation damage.
Cell 4	Cell 4 is fairly clean; it is used only for transfers.
	No in-cell HEPA filters; double HEPA filters in outside filter house.
Operating Gallery	
Iodine glove boxes (enclosed hoods)	These glove boxes are hoods that were converted to glove boxes for processing elemental $^{131}I_2$ and $CH_3\ ^{131}I$.
	Drain to Glove Box B leaks. Leakage is alpha contaminated. The area under the box is alpha contaminated and is sealed.
	No alpha-monitoring instruments in the building.
East Wing	
Cell access area	Area around the back doors of Cells 2 and 3 has high radiation readings. Lead shielding has been placed around the base of each cell. The background from this area causes the area to be zoned as a radiation zone. Radiation levels behind the lead bricks are 300 to 400 R/h. ^{137}Cs contamination has migrated. Cleanup will require the removal of floor concrete and perhaps some removal of door concrete and/or removal of cell door operating trolley.
	Contamination is leaking from under the Cell 3 door. Weekly cleanup is required. Smear counts usually 1000 to 1500 dpm.
^{60}Co garden	There is a ^{60}Co storage and irradiation facility (known as the ^{60}Co garden) located under the floor of the east wing. The garden presently contains no sources and is fairly clean.
^{14}C glove box	Contamination levels are not known but are considered to be high. Box is empty and has not been used for at least 5 or 6 years.

Table A.4 (continued)

Facility/area	Comments
^{90}Tc glove box	Used to weigh ^{99}Tc powder for shipment; slightly contaminated; all inventory has been removed.
^{99}Tc storage cabinets	All ^{99}Tc inventory has been removed. These are old lockable cabinets which were used for 99Tc storage remaining in the file.
West Wing	Storage well below the floor.

A.2.5 BUILDINGS 3030/3031/3118—RADIOISOTOPES PRODUCTION LABORATORIES C, D, AND H

A.2.5.1 Description of Facilities

Buildings 3030 and 3031, the Radioisotopes Production Laboratories, were designed for limited production and development processing of reactor-produced beta/gamma-emitting radioisotopes for industrial, medical, and research applications. Building 3118 was constructed by enclosing the space between Buildings 3030 and 3031 and covers the access doors to the cells in these buildings. These buildings are located in the west-central area of the Isotopes Circle and north of Building 3038.

A.2.5.1.1 Building 3030

Chemical processing of a wide variety of radioisotopes has been carried out in the single hot cell of Building 3030. Primarily, these were irradiated targets from the HFIR, the Oak Ridge Reactor facilities, and the 86-in. cyclotron.

Building 3030 is a steel-frame structure covered by corrugated aluminum siding. The single-story facility has a floor area of 825 ft^2. A manipulator-type hot cell is located on the middle of the east wall, as shown in Fig. A.5. Two laboratory hoods occupy the northeast section of the building. Since the building itself is not sealed, the manipulator cell and laboratory hoods constitute the primary means of containment. All high-level work was conducted in the hot cell. The hot cell has 2-ft concrete walls with 4 in. of lead brick shielding on the west (front) and south (side) cell walls and an unshielded top cover. The cell is provided with an oil-filled, lead- glass window. A stainless steel operating pan covers the floor and interior walls up to the level of the viewing window. A 27- by 15-in. gasketed steel door port is used for insertion and removal of equipment. An administratively controlled, padlocked steel door at the back of the cell allows access from Building 3118. This door is used mainly for transfer of shielded materials and large equipment. Personnel entry to the hot cell is allowed after decontamination has reduced radiation to a safe level.

The building operates at a slight negative pressure (nominally -0.15 in. w.g.) relative to the outside atmosphere. Since the siding is not sealed, the building cannot operate in a "contained" (<-0.3 in. w.g.) state.

A.2.5.1.2 Building 3031

Building 3031 was being prepared for a proposed ^{90}Y facility when the shutdown decision was made. Prior to that, the building had been used for processing ^{153}Gd, a medical radioisotope. The building is a single-story steel frame structure covered by corrugated metal siding with a floor area of 825 ft^2. It has one manipulator cell located in the middle of the west wall and hoods in the corners (Fig. A.6). The hot cell has 1-ft barytes concrete walls with 5-in. steel armor plate on the operating (east) face of the cell wall starting 2 ft 10 in. above the floor and an unshielded top cover. The cell is provided with a mineral oil–filled, lead-glass window. A stainless steel operating pan covers the floor and interior walls up to the level of the viewing window. Small steel doors on each side of the cell are used for insertion and removal of small equipment and containers. A thick steel double door at the back of the cell can provide access for large items from Building 3118 if needed. This door is padlocked against unauthorized use.

The building operates at a slight negative pressure (nominally -0.15 in. w.g.) relative to the atmosphere. The process of sealing the building for a proposed yttrium facility was started but not completed. As with Building 3030, Building 3031 cannot operate in a "contained" state.

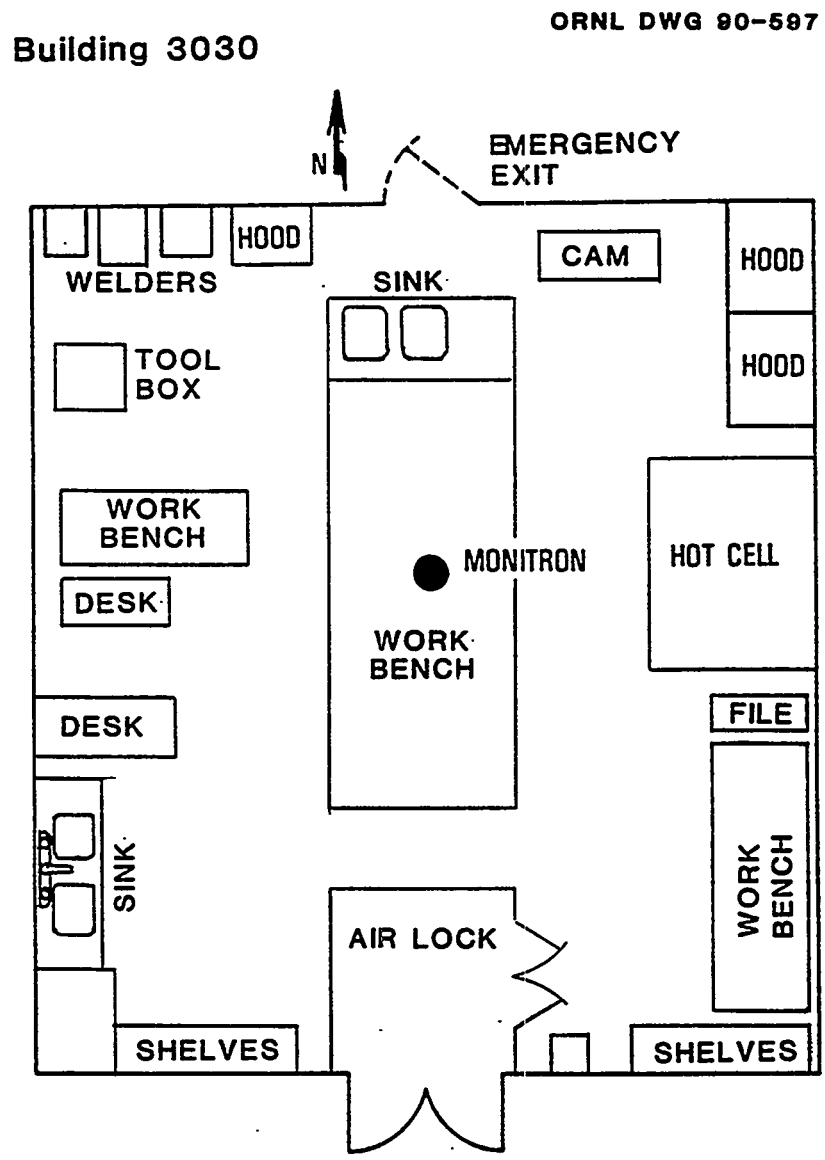


Fig. A.5. Floor plan of Building 3030—Radioisotope Development Facility.

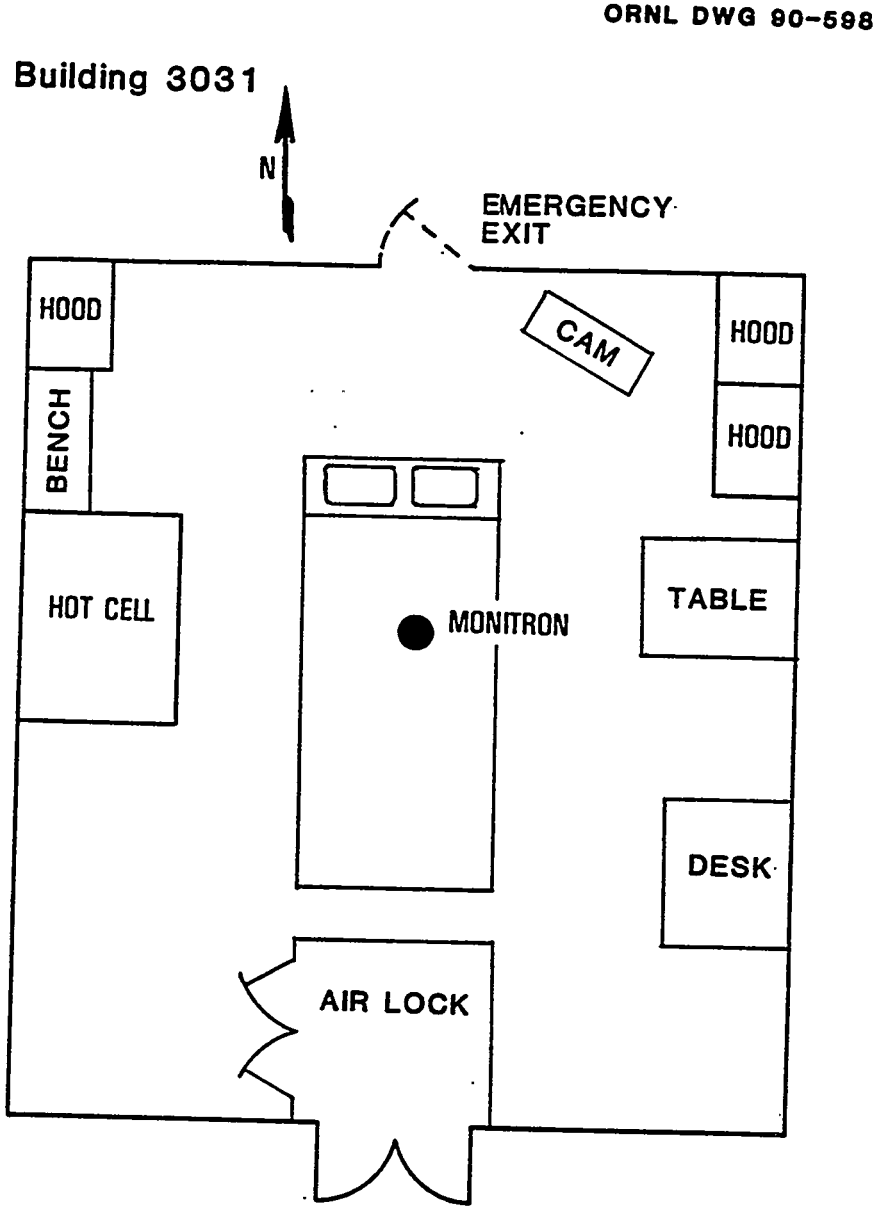


Fig. A.6. Floor plan of Building 3031—Radioisotope Development Facility.

A.2.5.1.3 Building 3118

Building 3118 is a steel-frame structure covered with corrugated aluminum siding that was erected by roofing and enclosing the space between Buildings 3030 and 3031. Building 3118 provides access to the rear entry doors for the hot cells in Buildings 3030 and 3031, cask storage of some old radioactive sources, and temporary holding of contaminated waste.

A.2.5.2 History

Buildings 3030 and 3031 were constructed to perform limited production and development work with radioisotopes used for industrial, medical, and research applications. The hot cell in Building 3030 has been used to process irradiated cyclotron and reactor targets to produce numerous unique radioisotopes such as (1) ^{56}Co recovery from an iron target, (2) ^{57}Co recovery from a nickel cyclotron target, (3) preparation of a purified ^{198}Au solution, (4) purification of ^{55}Fe, (5) separation of ^{234}Np from a uranium target, (6) processing of ^{75}Se, (7) preparation of purified ^{90}Sr nitrate, (8) processing of ^{119m}Sn, (9) purification of ^{237}U, (10) processing of ^{33}P, and (11) processing of ^{192}Ir.

The hot cell in Building 3031 was used in the final separation stage of gadolinium from europium targets. The ^{153}Gd processed here is used in nuclear medicine research to determine bone density for osteoporosis research and treatment evaluation.

Building 3118 is basically a shed covering the rear-entry doors to the hot cells in Buildings 3030 and 3031. It was added in the early 1960s.

A.2.5.3 General Status

The general condition of Buildings 3030, 3031, and 3118 is summarized in Tables A.5, A.6, and A.7 respectively. There are no current operations in Building 3030 or 3031. Building 3118 is used for forklift storage and temporary holding of contaminated waste as well as other storage. Building 3118 may be used for forklift storage and as a waste staging area during deactivation tasks.

Table A.5. Building 3030—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with metal siding.
Roof	Needs maintenance every 2 to 6 years.
Exterior walls	Siding is not sealed; leak in the wall when it rains.
Building ventilation	Operates at a slight negative pressure (nominally -0.15 in. w.g.); building is not sealed; air lock on front entry.
	Building ventilation provided by local system; exhaust to unshielded filter house (double HEPA filtration) on roof.
Liquid waste systems	Building sink and floor drains: process waste system. Cell floor drain: drains to tank WC-10.
Cell and Hoods	
Cell	Beta/gamma hot cell. In-cell roughing filter. Cell ventilation and process off-gas routed to concrete block, shielded, filter house in the alley north of Building 3030. Concrete block walls must be unstacked to service filters.
	Manipulator boots need replacing.
Hoods	Contaminated
Laboratory	Small quantities of ^{63}Ni and ^{103}Pd are present in the facility.
West Wall	Abandoned hot drains and hot off-gas lines under floor.

Table A.6. Building 3031—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with metal siding.
Roof	Needs maintenance; leaks.
Exterior walls	Cocooning process incomplete; exterior has been sprayed with a cocooning material.
Building ventilation and containment	Operates at a slight negative pressure (nominally -0.15 in. w.g.).
	Process of sealing building for a proposed yttrium facility was started but not completed. Ventilation system partially modified. Air lock installed at single entry door.
Liquid waste systems	Building sink and floor drains: process waste system.
Cell and Hoods	
Cell	Beta/gamma hot cell.
	Contamination levels are unknown, but recent history suggests low. Relatively "clean." One can of waste in cell.
	Cell ventilation exhaust has double HEPA filtration; no in-cell filter.
	Process off-gas with double HEPA filtration.
	No in-cell electrical service; electrical through access ports only.
Cell and Hoods	
One enclosed hood	Contamination level, 6000 dpm on exposed surfaces.
	Equipped with glove ports; lead shielding; drain to tank WC-10.
Two hoods	Contamination level below 2000/dpm on exposed surfaces.
	Higher levels suspected at exhaust areas.
	Each equipped with process waste drain.

Table A.7. Building 3118—general status of facility

Facility/area	Comments
Building	
Type	Metal shed on concrete pad.
Roof and walls	Acceptable for use.
Building ventilation	Building is not sealed; no air locks.
	No air conditioning.
Liquid waste system	Sink: process waste treatment.
	Floor drain that is plugged; drains to tank WC-10; must pull plug to use.
Stored materials	Forklift.
	Storage of waste materials prior to analyses. Storage of cask and other equipment (i.e., manipulators) used in adjacent facilities.

A.2.6 BUILDING 3032—RADIOISTOPE PRODUCTION LAB-E

A.2.6.1 Description

The Radioisotope Production Lab-E is housed in Building 3032, which is located in the central area of the Isotopes Circle, east of Building 3031. An ancillary facility, the Building 3099 storage pad is adjacent to the east side of Building 3032.

The building is a steel-frame structure covered with aluminum siding. The floor space is about 1200 ft^2 with a total volume of about 20,000 ft^3. The facility has a laboratory containing 5 hoods on the north side of the building and an office area on the south side of the building. An open passage connects the two areas as shown on Figure A.7.

The five hoods are contaminated with a variety of materials from old radioisotope processing a dn development work (including ^{241}Am and several shorter half-lived materials). Smears up to the 100k beta gamma and 10-20k alpha range have been obtained in these hoods. Radiation levels are very low, with hot spots being in the 10-100mrad/hr range. The hood structures are in poor condition and are rusted in several places.

A.2.6.2 History

A.2.6.3 General Status

The general status of Building 3032 is shown in Table A.8.

Table A.8. Building 3032—general status of facility

Facility/area	Comments
Building	General condition good, considering age of facility.
Type	Metal shed on concrete pad.
Roof	Good condition
Exterior walls	Cocooned with polyurethane foam.
Building containment and ventilation	Building not contained, operaties at normal atmospheric pressure.
	Hood ventilation is on the local ventilation system and exhausts to the atmosphere through HEPA filters.
Liquid waste systems	Drains in hoods to LLLW WC10 and process waste.
Hoods	
5 Hoods	Contamination levels of up to 100,000 dpm surfaces. Hoods are in deterioating condition.
	Hoods on common local ventilation with HEPA filters.

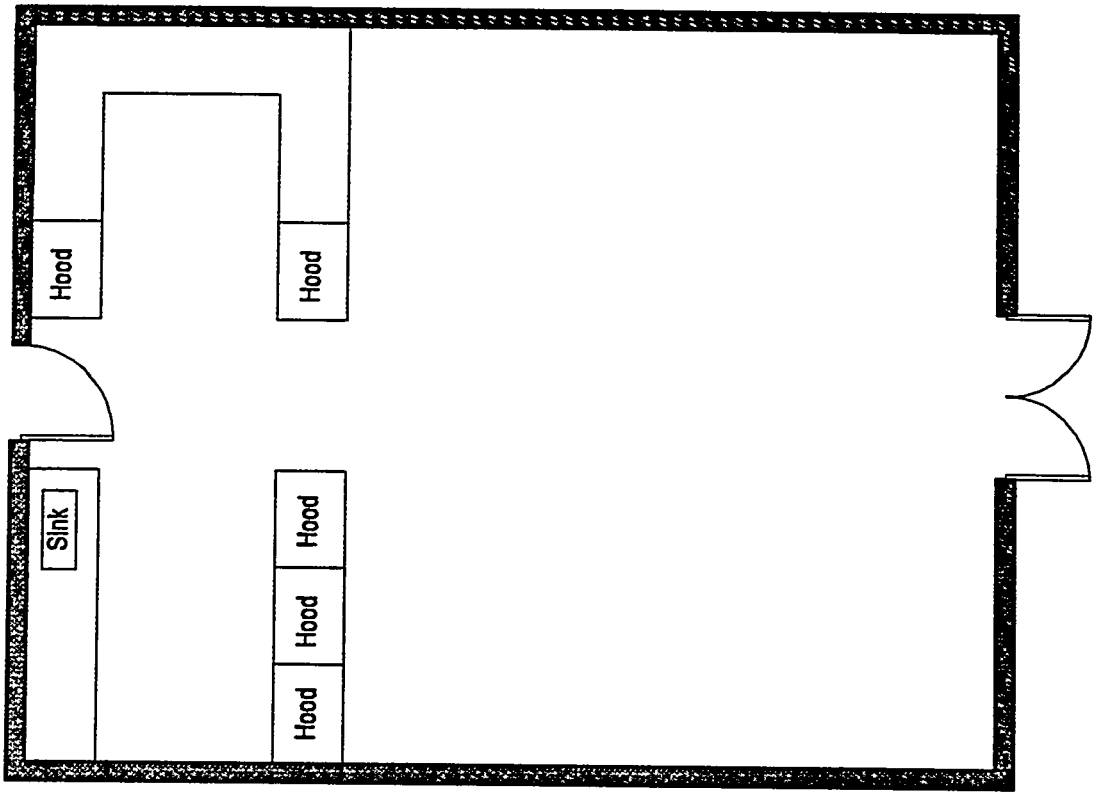


Fig. A.7. Floor Plan of Building 3032.

A.2.7 BUILDING 3033—TRITIUM AND KRYPTON PRODUCTION FACILITY

A.2.7.1 Description

The tritium and krypton production facility is housed in Building 3033, which is located in the central area of the Isotopes Circle, northeast of Building 3038. This building contains two separate radioisotopes processing systems for handling gaseous ^{3}H and ^{85}Kr.

The building is a steel-frame structure covered with aluminum siding. The floor space is about 1200 ft^2 with a total volume of about 20,000 ft. The outer surface of the building has been sealed by a cocooning process to make it as airtight as possible. Personnel and equipment entrances are gasketed. The building is maintained at a pressure of -0.3 in. w.g. or more relative to the outside atmosphere. The three areas of the building—the krypton process cell, the tritium process room, and the utility area—are shown in Fig. A.8.

The krypton process cell consists of a composite shielded enclosure made of 2.25-in.-thick steel plate overlaid with 1 in. of lead, supported by a 8-in.-thick by 2-ft-high concrete wall at the bottom. Part of the enclosure houses the in-process storage tanks and is made of stacked 4-in.-thick lead bricks. The main enclosure pressure is maintained at -1 in. w.g. relative to the room pressure.

The separation columns and carbon reactor are housed in a separate enclosure, which consists of a steel frame overlaid with 4 in. of lead brick. The permanent storage cubicle (Building 3093), which contains four charcoal-filled storage tanks, is located outside the building. It consists of a nonventilated 2-ft-thick reinforced-concrete enclosure. The krypton feed gas is located inside a 1-in.-thick steel plate enclosure, which is also outside the building. Process components contained in the enclosure are connected with 3/8-in. copper tubing shielded by 1-in. lead. Each of these enclosures (with the exception of the permanent storage which is not in service) is connected to the isotopes area cell ventilation system.

Tritium radiation consists of a relatively soft beta emission, which produces essentially no penetrating radiation hazard. The tritium is handled in a hood inside the tritium room. The hood is connected to the isotopes area cell ventilation system and is maintained at a nominal -0.5-in. w.g. relative to the tritium room.

A.2.7.2 History

Building 3033 was used to process ^{14}C, ^{85}Kr, and ^{3}H. Processing of ^{14}C was discontinued in 1975. No future ^{85}Kr processing in Building 3033 is planned. The last operations in Building 3033 consisted of two separate radioactive gas processing systems. Tritium operations involved the receiving of bulk tritium shipments from the Savannah River Plant, followed by purification, loading of shipping containers, and shipment to numerous customers worldwide. Krypton operations included the purification of ^{85}Kr (as received from the Idaho National Engineering Laboratory) in preparation for direct sale or as feed to the thermal diffusion columns in Building 3026-C. The processing of ^{3}H for sale to private industry was discontinued in 1990. The last ^{85}Kr campaign was conducted in September 1989.

The general status of the facility is summarized in Table A.9.

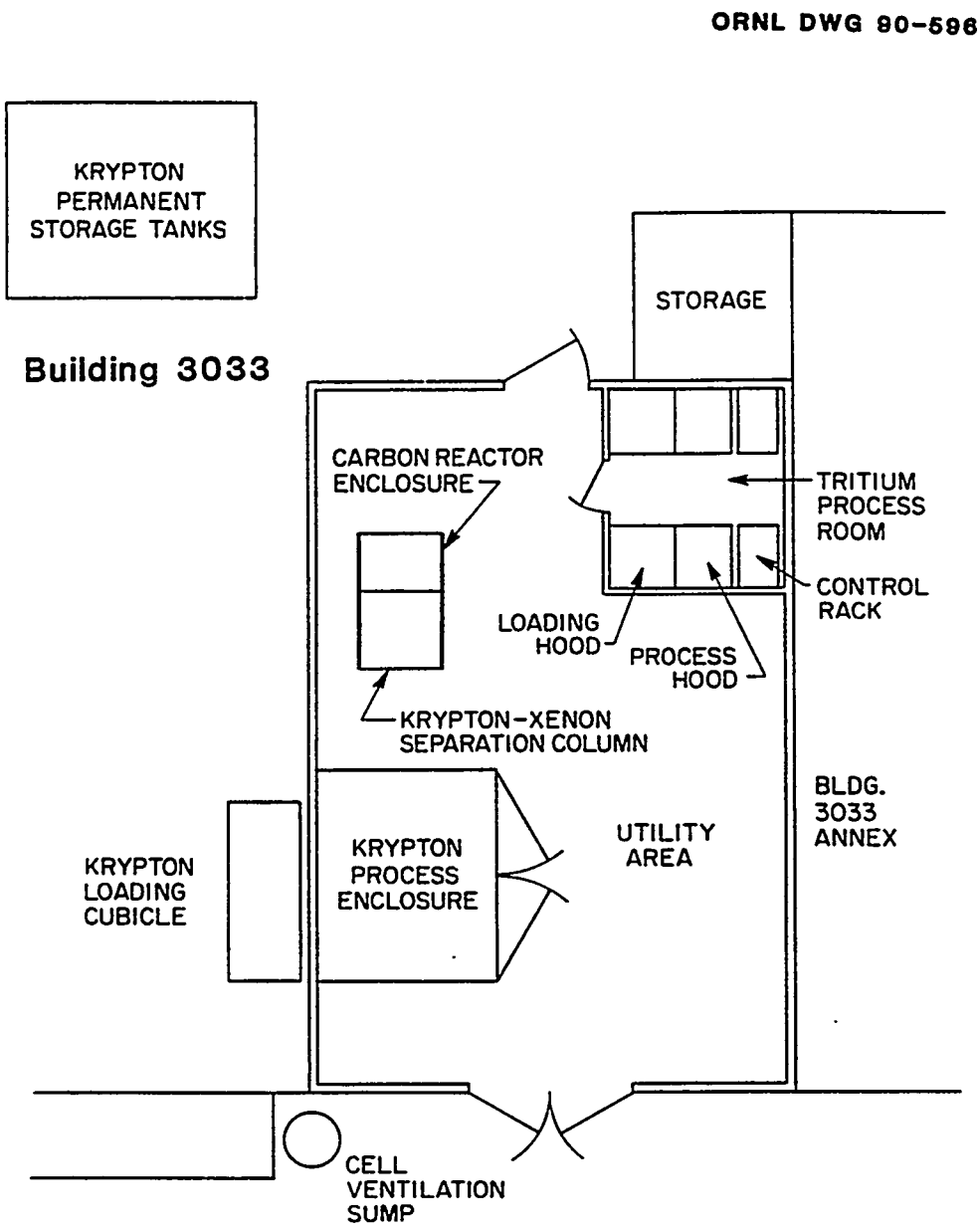


Fig. A.8. Floor plan of Building 3033—Tritium and Krypton Production Facility.

Table A.9. Building 3033—general status of facility

Facility/area	Comments
Building	General condition good, considering age of facility.
Type	Metal shed on concrete pad.
Roof	Replaced in 1988.
Exterior walls	Cocooned with polyurethane foam; need maintenance every 2 to 6 years.
Building containment and ventilation	Building sealed; building operates in a "contained" state to maintain a >0.3 in. w.g. negative pressure relative to the outside environment. (In practice, building operates at about 0.45 in. negative pressure.) Both building ventilation and cell ventilation are on the isotopes area cell ventilation system and exhaust to the 3039 stack. No HEPA filters are present because only radioactive gases are handled in the building.
Liquid waste systems	Processes do not generate liquid wastes. Cell drains to tank WC-10; drain kept open but has not been used in 17 years (or longer).
Cells and Hoods	
North hood system in tritium room	Uncontaminated; tritium has never been introduced to system; the two uranium traps have never been activated (i.e., never used for tritium storage).
South hood system in tritium room	All bulk tritium has been removed from the uranium traps. Tritium processing equipment remains highly contaminated with tritium. Tritium exchanges with water-oxide coating (HTO) on surface of the metal. Elemental tritium is also contained within the metal matrix of all metal parts of the system. Three uranium traps used for storing and purifying tritium. One trap was poisoned by an inleakage of air and taken out of service. All three traps are pyrophoric.
Krypton cell/system	Minimal contamination of deactivation equipment due to inert nature of krypton. Relatively new system.

A.2.8 BUILDING 3033-A—ACTINIDE FABRICATION FACILITY

A.2.8.1 Description

Building 3033-A (Annex) was used to house and contain the facilities for the production, loading, welding, and decontamination of neutron dosimeter materials as well as the weighing and packaging of milligram to gram quantities of actinide materials for research applications. The building does not contain a hot cell and was used only for low-level radioactive operations in glove boxes and one hood. Special nuclear materials were, at one time, stored in the building. Building 3033-A is located in the central portion of the Isotopes Circle, south of Building 3047. It is a metal structure erected by bridging the space between Buildings 3033 and 3034 and using their walls for support. Floor space is about 242 ft^2, with a free-space volume of about 718 ft^3. Personnel access is through gasketed, air-lock entries. The building layout is presented in Fig. A.9.

The building is maintained at a pressure of -0.25 in. w.g. relative to the outside atmosphere. The exhaust discharges to the 3039 stack via the isotopes area cell ventilation system. The air leaving Building 3033-A passes through roughing and HEPA filters, which are routinely tested.

A.2.8.2 History

Building 3033-A, which was constructed in approximately 1960, included two operating areas: a small one for ^{14}C production at the south end of the building operated by the Radioisotopes Department and the larger, main operating area for research materials preparations performed by Isotopes Research Materials Laboratory (IRML) personnel. In the early 1980s, IRML personnel decontaminated and decommissioned the ^{14}C facility, including removal of the underground dissolver tank, and converted this area for storage.

This building has been used almost exclusively for the preparation and distribution of highly enriched actinide isotopes (and for a period, ^{14}C) for the Isotopes Program. Among the operations performed were

- fabrication of ceramic oxide wires;
- loading of ceramic oxide wires, oxide powder, or metal into small metal capsules for use as in-core reactor neutron dosimeters;
- fabrication of monoenergetic gamma sources;
- weighing and packaging of milligram to gram quantities of actinide materials;
- preparation of nanogram to milligram actinide samples for alpha counting;
- decontamination of nuclear material shipping containers; and
- storage of radioactive materials.

Over the years, many other small special projects have been performed in this facility, including, for example, the packaging of actinide materials for disposal or shipment as a service to the Safeguards and Security Department.

A.2.8.3 General Status

All production operations in Building 3033-A were halted in January 1990 because of funding problems. All special nuclear materials once stored in this facility have been transferred to other ORNL or DOE sites or disposed of as waste. All glove boxes have been removed, and a general (first cut) decontamination of the building has been completed.

ORNL DWG 90-595

Building 3033-A

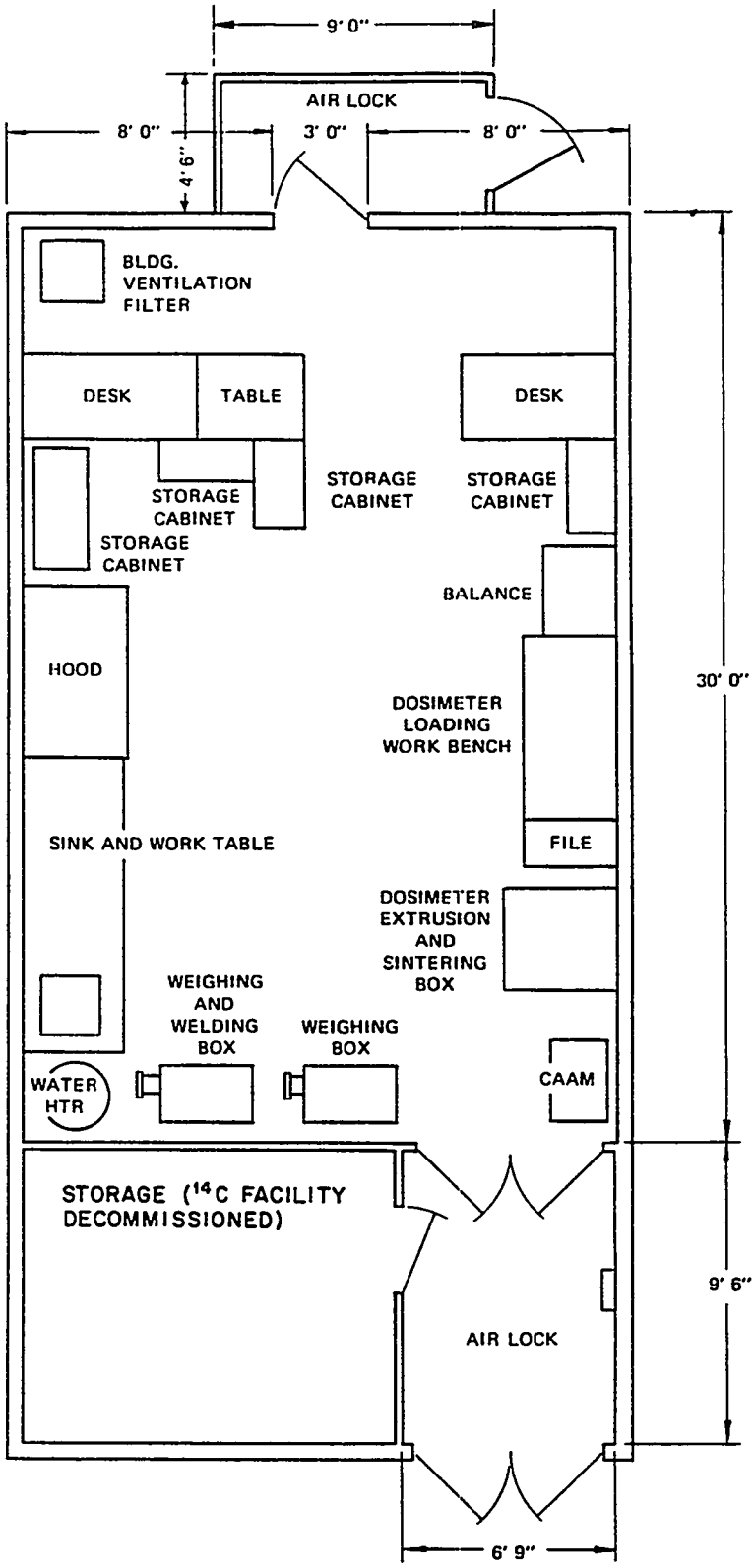


Fig. A.9. Floor plan of Building 3033-A—Actinide Fabrication Facility.

The general status of this facility is summarized in Table A.10.

Table A.10. Building 3033-A—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with metal siding; shares common load-bearing wall columns with adjacent buildings.
Roof	Leaks.
Exterior walls	Cocooned; need maintenance to seal leaks.
Building containment and ventilation	Building cocooned; air locks; leakage problems; building is maintained at a nominal negative pressure of 0.25 in. w.g. relative to the outside atmosphere. Building ventilation: roughing and HEPA filters (filter house inside building); exhaust to isotopes area cell ventilation system and 3039 stack. A contaminated off-gas manifold that once serviced the glove boxes in this facility still exists. The remaining system consists of an in-house filter box with dual series of HEPA filters valved so that one set may be isolated and bypassed during change-out; exhaust to isotopes area cell ventilation system and 3039 stack. Hood: HEPA filter, exhaust to isotopes area cell ventilation system and 3039 stack.
Liquid waste systems	Drain in hood, west wall (normally sealed): drains to tank WC-10. Laboratory sink, one hood drain, building floor drain: process waste treatment system.
Security	Facility locked when personnel are not present.

A.2.9 BUILDING 3034—RADIOISOTOPE AREA SERVICE

A.2.9.1 Description

The Radioisotope Area Service facility is housed in Building 3034, which is located in the east end of the Isotopes Circle, adjacent to Building 3033-H. This facility was used as a field shop for the Plant and Equipment Division in supporting past isotope production operations in other facilities. No handling of radioactive materials has occured in this building.

This building houses the central electrical distribution station for the Isotopes Circle area. A floor plan of the building is shown in Figure A.10.

A.2.10 BUILDING 3038—ISOTOPES RESEARCH MATERIALS LABORATORY, ISOTOPES SHIPPING, ISOTOPES TECHNOLOGY, AND ALPHA HANDLING FACILITY

A.2.10.1 Description

Recent uses of Building 3038 include the study of transuranic elements, fabrication of alpha- and neutron-emitting targets and sources, shipment of radioisotopes, and production of ^{90}Y for medical uses. The building, which is located on the southwest corner of Isotopes Circle, is a masonry and steel-frame structure with a total of floor area of 7250 ft^2 and a total free space volume of 130,000 ft^3. It is divided by concrete block interior walls into three separate facilities: 3038-E, 3038-M, and 3038-AHF.

The building rooms and equipment are maintained in a "contained" condition using the isotopes area cell ventilation and process off-gas systems and a local ventilation system. Various heating and cooling systems are provided in the different operating areas. The cell ventilation system exhausts air from the east area and equipment (including the manipulator cell) to an unshielded filter house on the roof, which discharges to the 3039 stack. The isotopes area process off-gas system provides exhaust for the manipulator cells in the AHF and the glove boxes in the AHF Annex with local HEPA filters prior to discharge to the ORNL process off-gas system. The local ventilation system provides room exhaust for Radioactive Materials Shipping and Packaging (RAMSPAC), the AHF, the AHF Annex, and the Isotopes Technology Low-Level Laboratory. The exhaust goes to a filter house on the roof where an exhaust fan draws air through the HEPA filters and discharges up a short roof stack. The filters in the various cells, glove boxes, and hoods are given in the description of the individual laboratories.

The east end is provided with an air lock for personnel access. The personnel access to the RAMSPAC area in 3038-M also has an air lock. Other personnel access entries and equipment access doors are <u>not</u> provided with air-lock capability, which results in upsets to the desired "contained" condition. The combination of local and process off-gas systems presents a potential for reversed flows and contamination if one of these systems should fail.

The drains in the east and middle sections of the building, which were once connected to the LLLW system, have been sealed to prevent use because of leaks in the underground transfer lines. This includes, in addition to the hot cell in 3038-E, hood and sink operations. There is no provision for wash down to decontaminate the hot cell or for cleanup of contamination in the barricade area. The hot drains for the alpha handling cells in the west end of the building are on the WC-2 tank system.

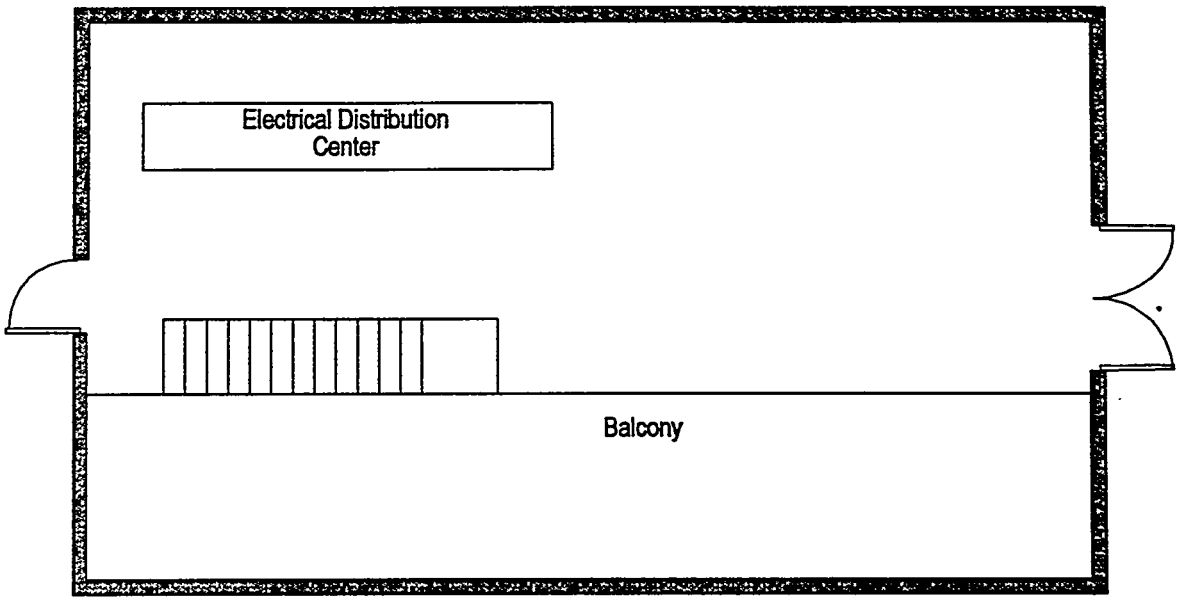


Fig. A.10. Floor plan of Building 3034—Radioisotope Area Service.

A.2.10.1.1 East-end laboratories

The east-end laboratories of Building 3038 contain glove boxes and hoods (Fig. A.11). The glove boxes contain equipment for the fabrication of radioactive targets and for the examination of materials by both destructive and nondestructive tests. The glove boxes and hoods have one stage of HEPA filtration in the box or hood, a second stage of HEPA filtration in the filter house on the roof, and then discharge to the cell ventilation system. Nonradioactive liquid wastes are discharged to the process waste system. There is no provision to valve off the process waste system in the east-end area. There is no LLLW system in the east-end facility. There is a storm drain for cooling water from diffusion pumps and electrical equipment that have no potential for radioactive contamination.

The principal radioactive materials in the east end are uranium, transuranic elements, and ^{147}Pm. Primary containment is provided by the glove boxes and hoods. The glove boxes are operated at a negative pressure $\geq$0.35 in. w.g. relative to the laboratory.

A.2.10.1.2 Radioactive Materials Shipping and Packaging

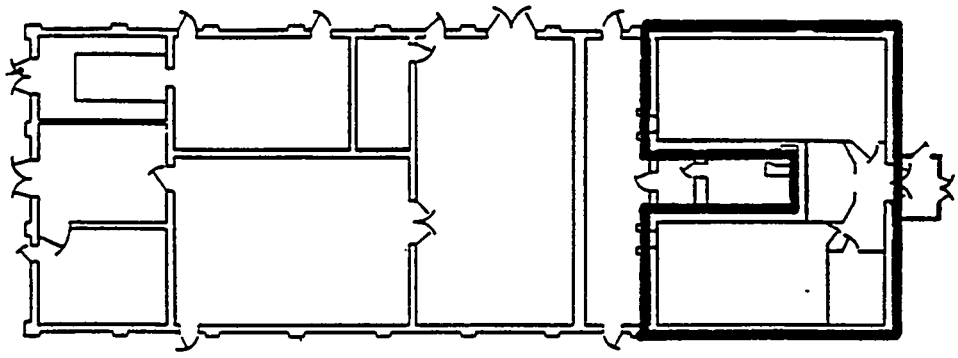
The RAMSPAC area is located in the central portion of Building 3038 and consists of a now-empty concrete barricade for storage of isotopes products, a remote pipefitting station, a canning and packaging station, an area for health physics inspection, and an area for labeling of packages (Fig. A.12). The barricade consists of a concrete wall with lead brick shielding stacked 2 ft high, two lazy-susan-type storage holders behind the shielded wall, a remote manipulator, and an overhead viewing mirror. The products were stored as liquids in glass bottles. The shipping area operates under the low-negative-pressure, high-air-flow principle. Air flow passes from the least hazardous areas over the barricade through a single stage of roughing filters followed by a single stage of HEPA filters on the roof and discharges to the atmosphere through a roof vent. There is no provision for wash down behind the barricade to clean up contamination known to exist because the hot drain has been sealed.

A.2.10.1.3 Laboratories

There are two laboratories: a process cell area in the east end of the building and a low-level laboratory in the west end located in Building 3038.

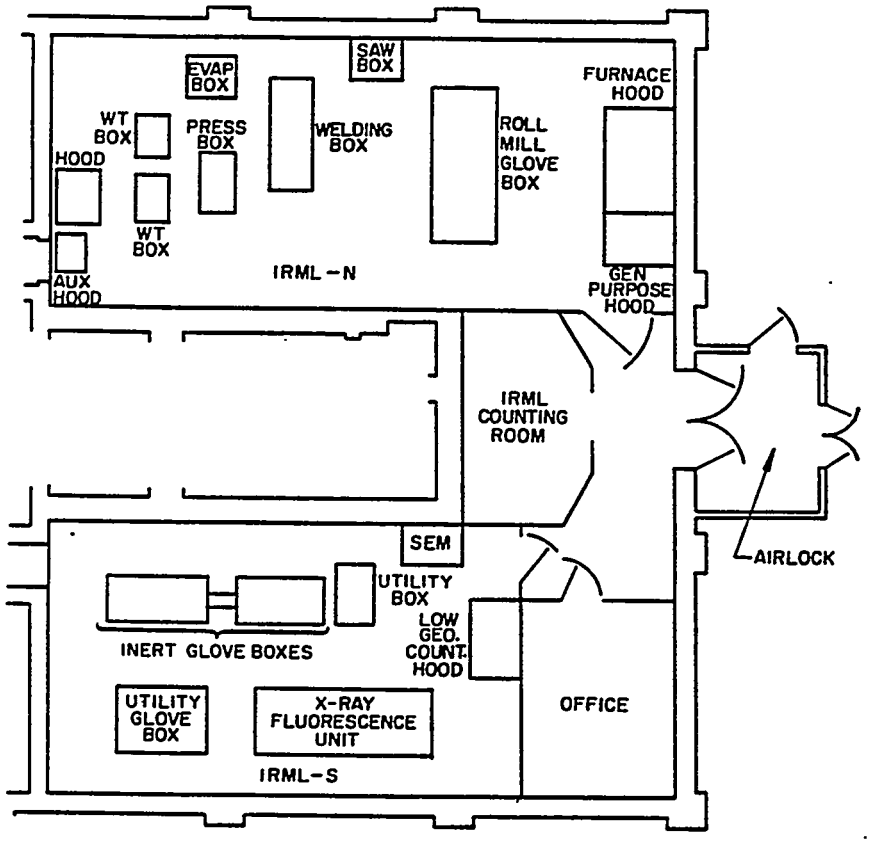
The process cell area has one manipulator cell (Cell 3), hoods, and a shielded counting room (Fig. A.13). The cell is constructed of 4-in. steel plate on all sides with a mineral oil–filled, leaded-glass viewing window and a 10-in.^{2} access port. It is supported on concrete pillars. This cell was used for separating ^{90}Y from ^{90}Sr and is highly contaminated. There is no provision for wash down since the hot drain was sealed. An empty shielded counting room is adjacent. There is single-stage roughing filtration in the cell. Exhaust from the cell, hoods, and room is routed to a filter house on the roof (double-stage HEPA filtration) and discharged to the 3039 stack.

ORNL DWG 90-594



Building 3038

ORNL-DWG 82-14970R



Building 3038-E

Fig. A.11. Floor plan of east-end laboratory in Building 3038.

ORNL DWG 90-593

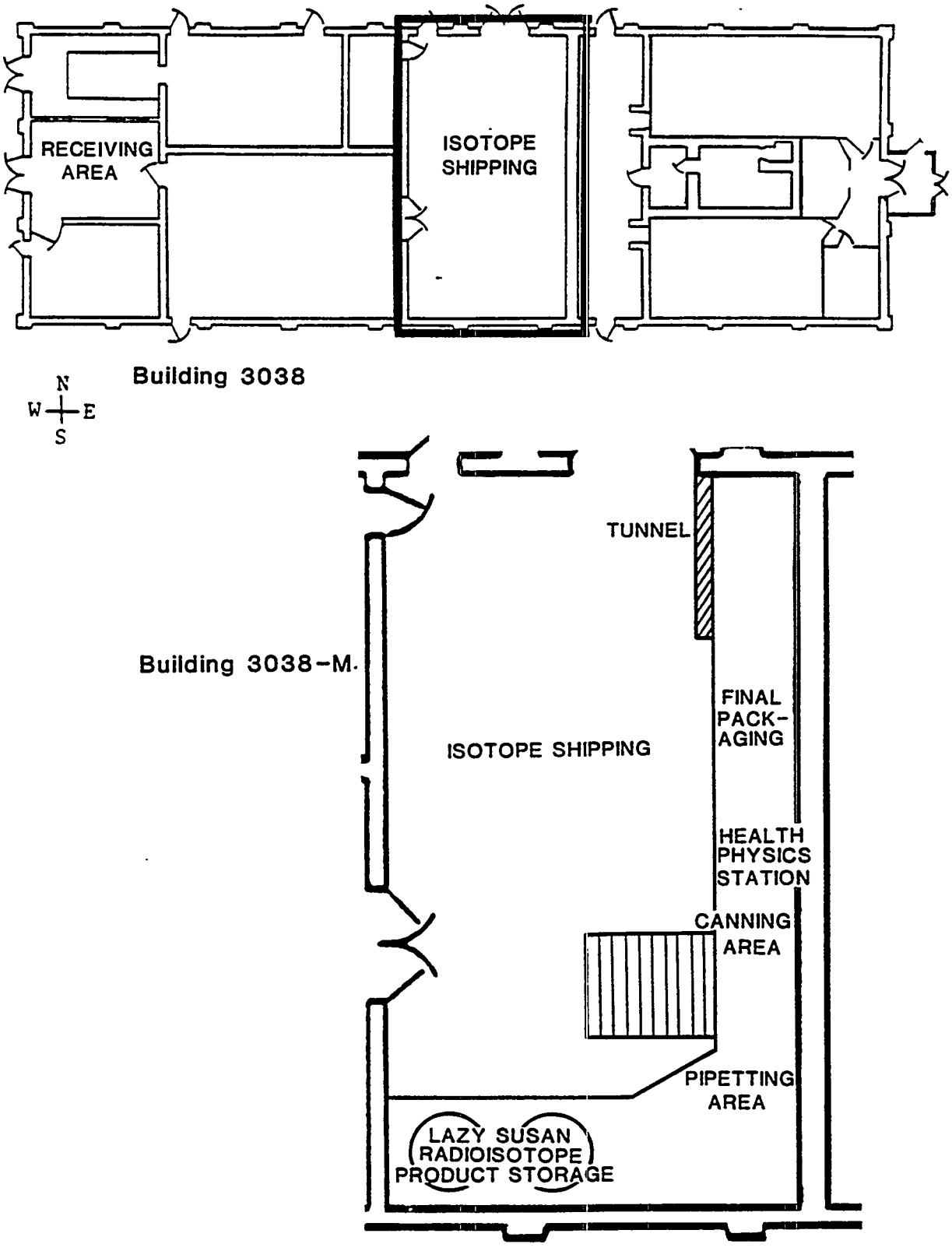


Fig. A.12. Floor plan of Radioactive Materials Shipping and Packaging in Building 3038.

ORNL DWG 90-592

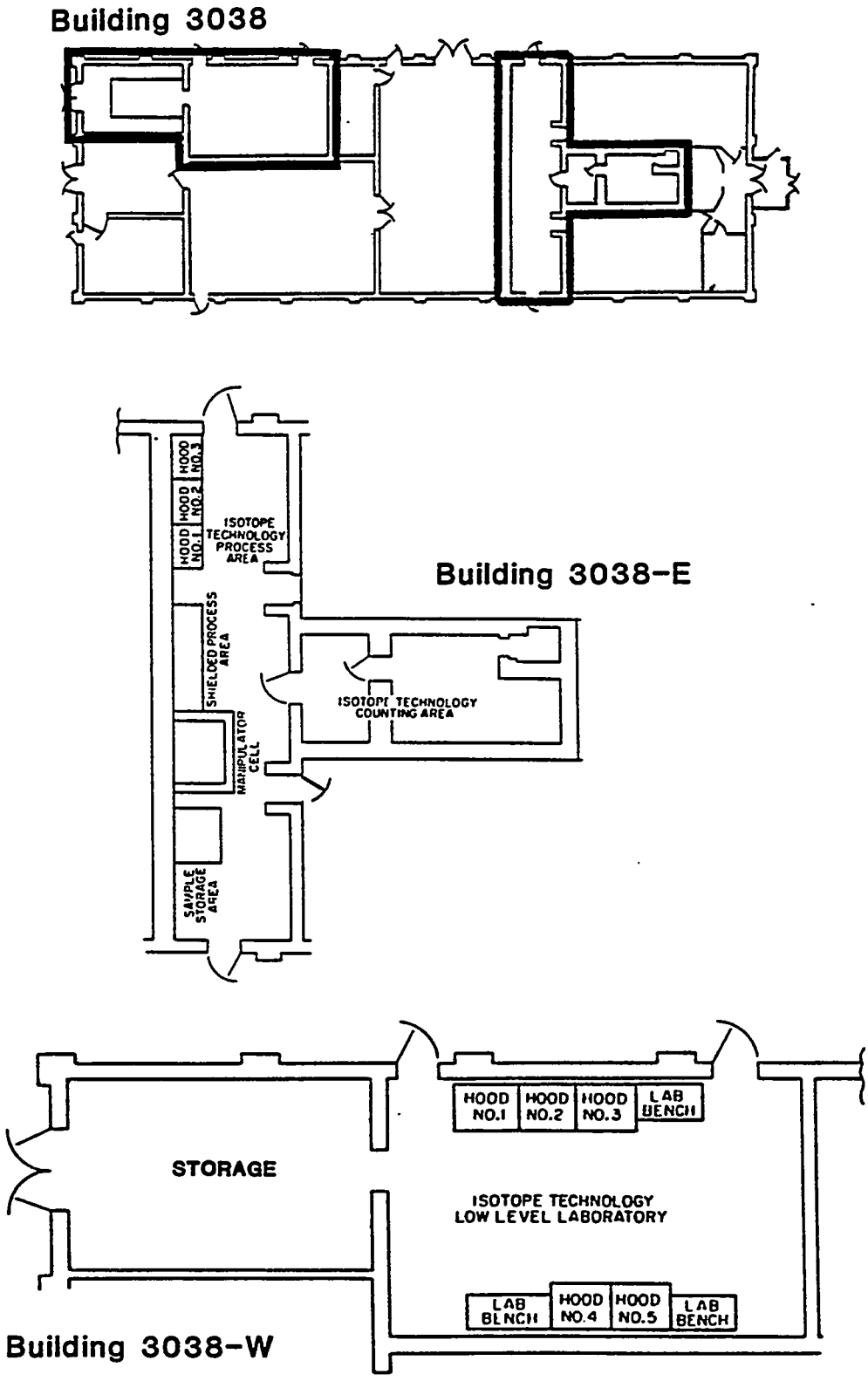


Fig. A.13. Floor plan of Isotope Technology Laboratories in Building 3038.

The low-level laboratory includes a laboratory bench, five hoods, and an adjacent storage room (Fig. A.12). The hoods and sinks drain to the process waste system. There is no way to valve off this system. The only radioactive materials handled in this laboratory were tracer-level quantities of alpha and beta-gamma materials. Room air exhausts to the local system with single-stage HEPA filtration and is discharged through the roof stack. The storage room presently serves as a satellite waste accumulation area for Resource Conservation and Recovery Act of 1976 waste.

A.2.10.1.4 Alpha Handling Facility

The AHF in the west end of Building 3038 consists of five hot cells. A separate room, the AHF annex, occupies the southwest corner of the building and includes seven glove boxes for weighing, packaging, and welding capsules. The floor plan of these two rooms is shown in Fig. A.14.

The hot cells are shielded by water-filled steel tanks. The operating face of each cell has 3 ft of shielding, is 6 ft wide by 8 ft high, and contains a viewing window and manipulator ports. Each cell is 10 ft deep. The cell tops are unshielded except for the liner. One foot of water shielding is provided between cells. The building wall, consisting of 1 ft of concrete, forms the back of the cells. These cells can be used as glove boxes by replacing the front shielding tank and manipulators with an approved window equipped with glove ports and a loadout station. The alpha cells drain to the WC-2 tank system.

The cells are ventilated by the process off-gas system. The maximum negative pressure available to the cells is limited to -4.0 in. H_2O (gauge) by a vacuum breaker in the off-gas header. There are single-stage HEPA filters in the cells and glove boxes and a second stage of HEPA filtration before discharge to the process off-gas system. Additional treatment is provided at the 3039 stack. The room air exhaust from the AHF and the AHF annex has single-stage HEPA filtration in the duct and a second stage in the filter house on the roof before discharge through a short roof stack.

A.2.10.1.5 Receiving area

This area serves as the receiving depot for all radioactive materials which are delivered to the central ORNL site (Fig. A.15). This activity will be moved to Building 3036.

A.2.10.2 History

Building 3038 was constructed to house all the radioisotopes shipping activities for ORNL. The building has been in operation since 1949. Originally, the entire facility was dedicated to radioisotopes shipping as follows: the east portion (3038-E) contained the analytical chemistry laboratory to perform analyses of short-lived radioisotopes prior to shipment; the middle section (3038-M) housed the radioisotopes handling and transfer barricade; and the west section housed the packaging, inspection, and shipping activities.

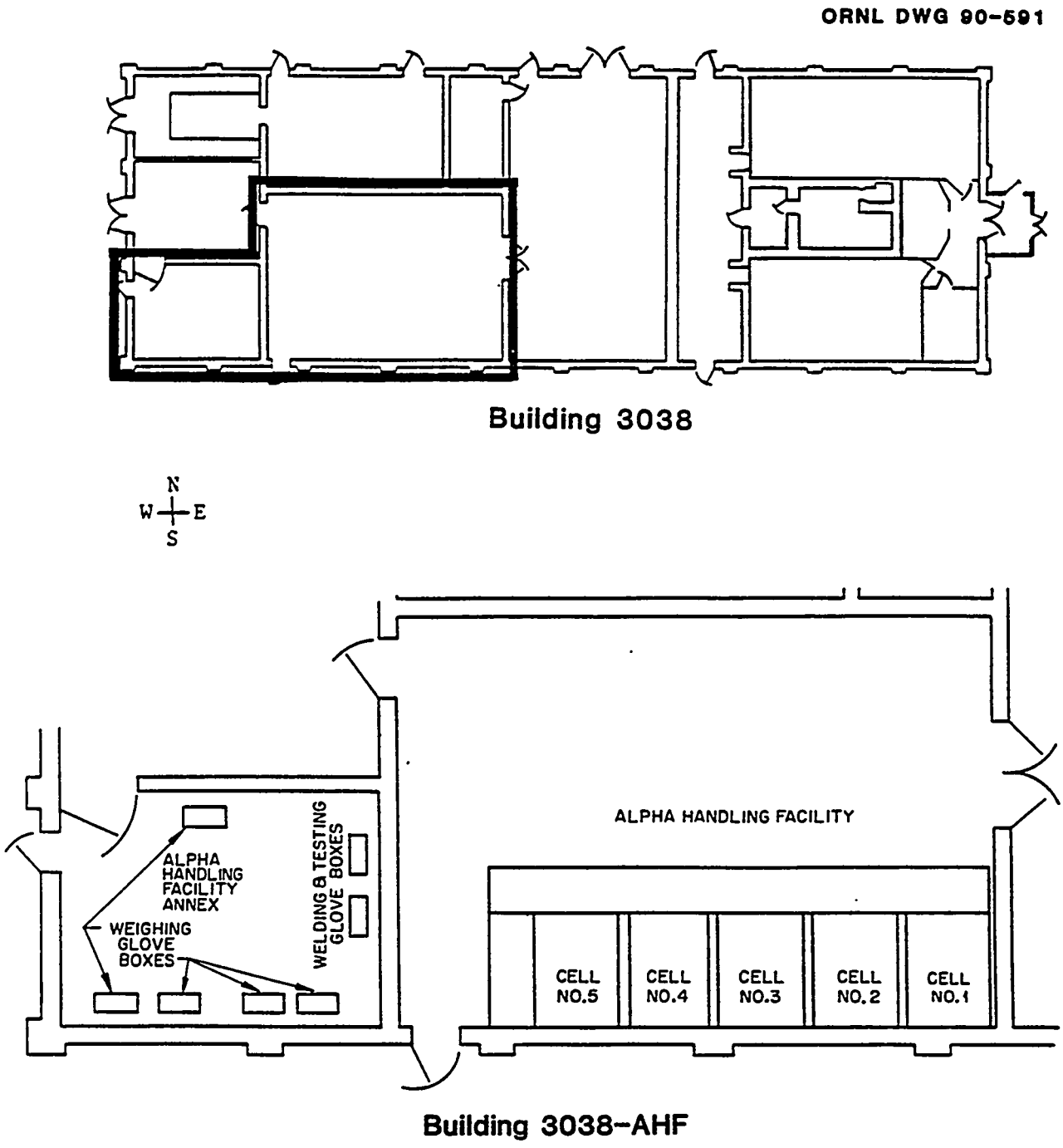


Fig. A.14. Floor plan of Alpha Handling Facility in Building 3038.

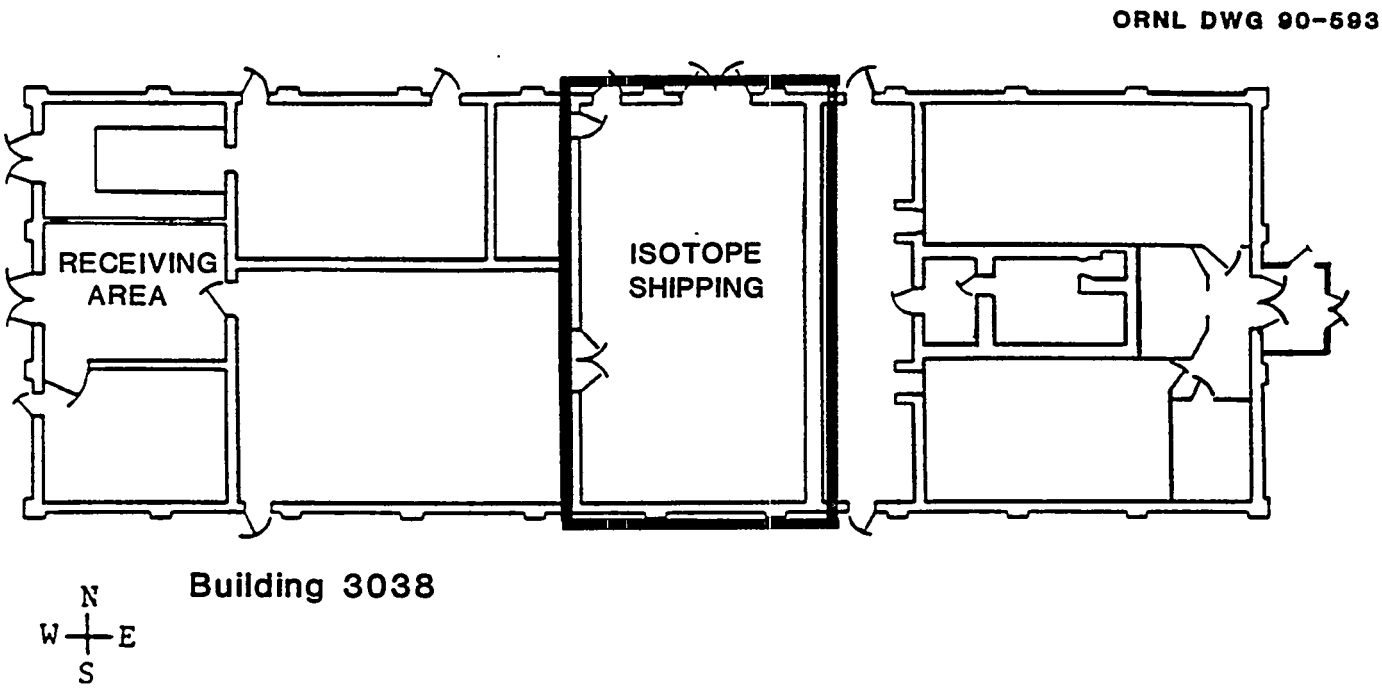


Fig. A.15. Floor plan of the Receiving Area.

As the volume of radioisotopes being shipped decreased in the 1960s, the shipping area was reduced. In 1968, the west portion was converted into the AHF by adding water-shielded hot cells and glove boxes for fabrication of targets.

The section of the building called 3038-M has always been the radioactive shipping operation for ORNL. Most of the shipments were for the isotopes sales program, but shipments of radioactive materials from other ORNL groups were also handled here. The glove boxes in the AHF annex were used for loading out of isotopes for sales.

The analytical chemistry laboratories supporting isotopes sales were located in the east end until 1976. When the analytical function was transferred to other ORNL facilities, the east end was converted into an isotopes production and development facility. In the late 1970s and early 1980s, a research program on plutonium alloys and compounds was conducted in the area which was funded by the DOE Office of Basic Energy Sciences. The same glove boxes were used in the mid 1980s to perform research with the Solid State Division on ^{147}Pm-doped crystals and glasses for laser development studies funded by Lawrence Livermore National Laboratory. With these two exceptions, all work in this end of the facility has been dedicated to isotopes efforts.

A.2.10.3 General Status

Packaging, shipping, and receiving are ongoing activities in Building 3038. However, the plan is to relocate these activities to other ORNL facilities. Yttrium-90 production was terminated on September 30, 1990. There are no operations in the east-end laboratories. Barricade operations are discontinued, and all existing inventory has been removed.

The general status of the facilities is summarized in Table A.11.

A.2.11 BUILDING 3047—RADIOISOTOPES DEVELOPMENT LABORATORY

A.2.11.1 Description

The Radioisotopes Development Laboratory, Building 3047, is a three-story steel-frame building with concrete block exterior and interior walls. It is located in the north-central area of Isotopes Circle. Building 3047 is joined to the Isotopes Technology Building, Building 3047-A. Because they have individual ventilation systems and are separated by at least two sets of double doors, they are considered separate buildings. (Building 3047-A, which contains administrative offices, is <u>not</u> part of the deactivation plan.)

The Radioisotopes Development Laboratory houses four high-level beta-gamma cells, one alpha hot cell, seven laboratories for handling low-level materials, a decontamination room, offices, and service areas. The building plan is shown in Fig. A.16.

Table A.11. Building 3038—general status of facility

Facility/area	Comments
Building	
Type	Main structural components are cast, reinforced concrete connected by girders with nonreinforced masonry walls. Building interior is subdivided by concrete block walls into separate facilities.
Roof and exterior walls	Good condition.

Facility/area	Comments
Building containment and ventilation	The building rooms and equipment are maintained in a "contained" condition; for the operating areas of the building, a minimum of 0.3 in. w.g. negative relative to the outside atmosphere is required. ORNL cell ventilation system: room air, glove boxes, hoods, and the $^{90}Y/^{90}Sr$ cell in the east area. Glove boxes and hoods in east area are equipped with single-stage HEPA filter on exhaust; single-stage roughing filter on $^{90}Y/^{90}Sr$ hot cell; no filters in duct from hoods. Exhaust air routed to unshielded filter house on roof equipped with parallel banks of testable HEPA filters (double-stage filtration) with bypass provisions during maintenance. Exhaust to 3039 stack. Local ventilation system: room air exhaust from 3038-M and 3038-W, and hood exhaust from Isotopes Technology Low-Level Laboratory. In the shipping area, ventilation air sweeps from the room over the barricade and through one stage of roughing filters before discharge to filter house on the roof. Room exhaust from the AHF and the AHF annex equipped with single-stage HEPA filters in the duct. Exhaust to filter house on roof equipped with parallel banks of testable HEPA filters (single-stage filtration). Discharge via short stack on roof. ORNL process off-gas system: Cells 1, 2, 3, 4, and 5 and glove boxes in AHF annex; HEPA filter in each cell and glove box. Exhaust passes through second stage of HEPA filters in the AHF before discharge to isotopes area process off-gas system; scrubber and additional HEPA filtration 3039 stack facility. Air locks: east end has air locks; personnel access to RAMSPAC also has an air lock; other access entries do <u>not</u> have air locks; leads to upsets in contained condition. Heating and cooling: several systems. Chilled water unit that serves AHF annex has contamination in it. System not in use.
Liquid waste systems	3038-E and 3038-M have no functioning "hot" drains; drains to LLLW system sealed to prevent use. Includes small hot cell in the west end, the barricade, and several bench and sink drains. 3038-W: alpha handling cells drain to WC-2 system; low-level laboratories on process waste system.
Monitoring	Facility Radiation and Contamination Alarm System, central system for building; monitored at the WOCC.

Table A.11 (continued)

Facility/area	Comments
East-End Laboratories	Nuclear materials stored in a locked safe in metal containers.
East-end, north laboratory	Rolling-mill box: highly alpha contaminated and weighs several tons. Requires the removal of several corner blocks of a nearby wall for adequate clearance if the glove box is removed Reduction distillation box: relatively new box (1 year old), highly contaminated with ^{244}Cm and ^{241}Am. Includes a cryogenic high-vacuum pump and oil–filled roughing pump. Press box: highly alpha contaminated and contains a hydraulic press connected to a hand pump outside the box. Can be disposed of at any time. Loading box: small Lexan box used for loading ^{147}Pm- doped crystals and glasses into quartz spectrophotometer cells. Box contains very slight beta contamination. East general-purpose hood: highly alpha contaminated and also contains some beta contamination. A high-vacuum system is mounted external to the hood with a feed-through into the hood for a bell jar. The damper on this hood must be operated manually. West general-purpose hood: highly alpha contaminated; also contains possible old, beta contamination. A rolling-mill drive train is mounted outside the hood to accommodate a small rolling mill in the hood.
East end, south laboratory	Weigh box: small, highly alpha-contaminated glove box containing an analytical balance for weighing Pu, Am, and Cm. Pu/Pm glove boxes: two glove boxes joined together by a gloved antechamber. The east box contains a high-temperature vacuum furnace mounted in the floor with an externally mounted, sealed vacuum system. Cooling water is supplied by a recirculating chiller system. Boxes were capable of operating on an inert-gas recirculation system. The west box once contained an elaborate high-temperature, vacuum experimental apparatus which has been stripped out. These boxes were used for Pu oxide and metal studies in the late 1970s and early 1980s. In the mid 1980s, they were used for ^{147}Pm-doping studies and are, therefore, highly contaminated with alpha and pure beta emitters. Unfortunately, the boxes would be very difficult to separate, making removal of the entire assembly very difficult.

Table A.11 (continued)

Facility/area	Comments
East-end, south laboratory	East hood: alpha and beta contamination is present from a variety of handling operations and from counting. Stainless steel vacuum chambers used for alpha counting extend through the floor of the hood and are evacuated by an oil-filled roughing pump. Potential for inadvertent spread of $^{90}Sr/^{90}Y$ contamination from adjacent ^{90}Y laboratory. Sole personnel access to ^{90}Y laboratory. Only contamination monitor for ^{90}Y personnel located in east foyer of IRML area, which could result in spread of $^{90}Sr/^{90}Y$ contamination before it was detected. Personnel monitors removed from ^{90}Y laboratory exit to east-end, south laboratory.
^{90}Y Laboratory	Manipulator cell: highly beta/gamma contaminated with $^{90}Sr/^{90}Y$; hot drain shutdown; no wash down provision; shine through manipulator boot opening on top of cell. Appendage to manipulator cell: used to store old cyclotron plates. Glove box: contaminated; no wash down provision. Three hoods: used for tritium trap decontamination; medical (short-lived) isotopes.
RAMSPAC	Barricade inventory removed. There is no drain (capped off) for decontamination of a known spill. The barricade area is open to the room air.
AHF	Five alpha cells: contaminated; contain no inventory; windows heavily clouded brown from microorganism growth. Hot drains: drain to tank WC-2. West wall: alpha glove boxes were once located there but have been removed.

Table A.11 (continued)

Facility/area	Comments
AHF Annex	Five boxes are highly alpha contaminated with actinide products (^{241}Am, ^{237}Np, and ^{238}Pu). Two glove boxes used for welding and inspection; no powder handling. Glove boxes constructed with rubber gaskets (rather than welded stainless steel construction).
Receiving Area	Chilled water unit contaminated.

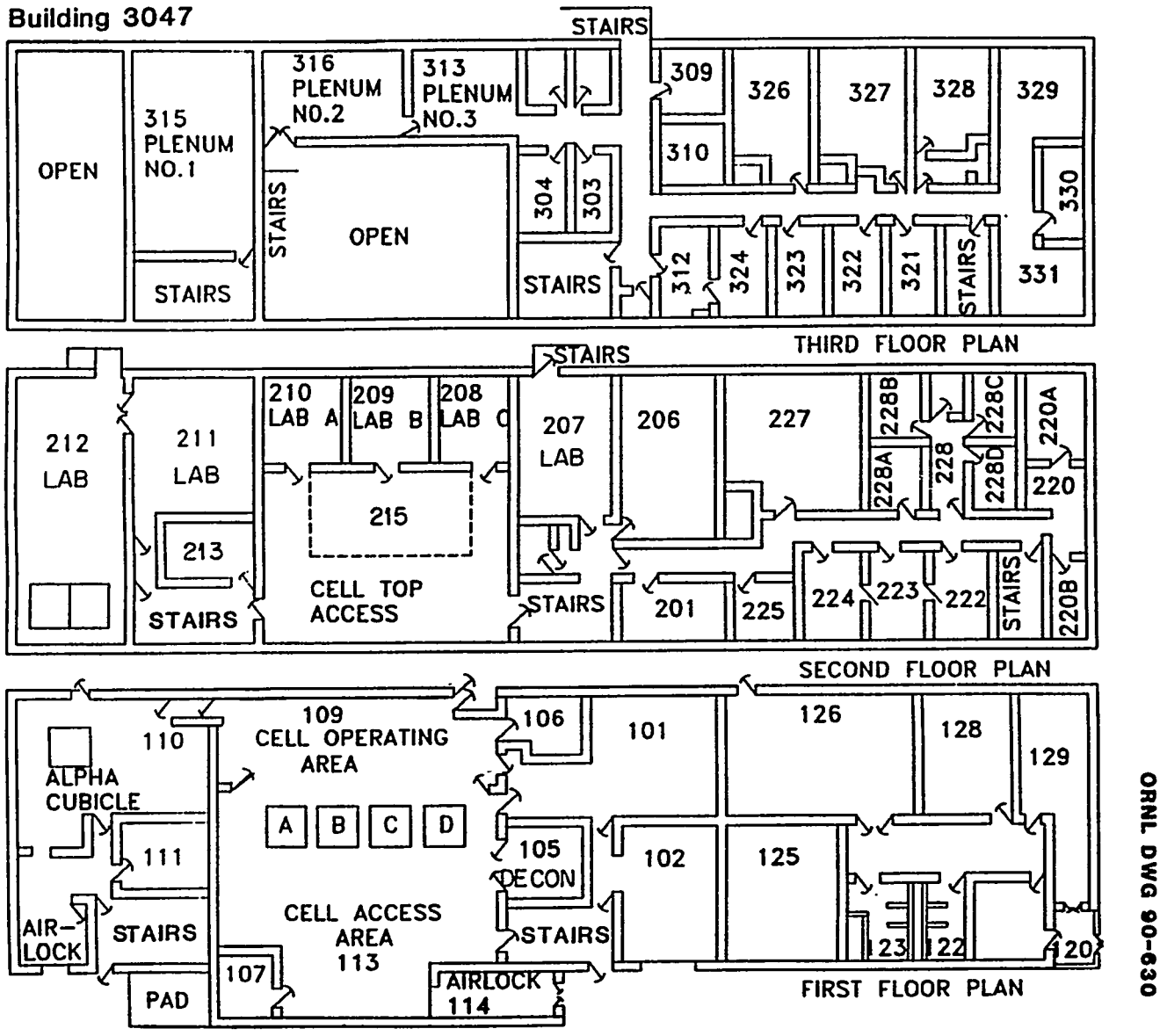


Fig. A.16. Floor plan of Building 3047—Radioisotopes Development Laboratory.

A.2.11.1.1 Beta-gamma cells and support areas

The four beta-gamma manipulator hot cells (Cells A, B, C, and D), the operating area (Room 109), the cell access area (via rear access doors into the cells; Room 113), and the decontamination room (Room 105) are located on the first floor in the center of the building. The cell access area (via roof hatches into the cells; Room 215) is on the second floor. The walls and tops of Cells A, B, and D are fabricated of 3 ft of barytes concrete. The roof plug and front and rear walls of Cell C are fabricated of 2 ft 3 in. of barytes concrete and 9 in. of steel plate. All interior walls between the cells are of 16-in.-thick laminated steel plate. Cell C has a 21-in.-thick laminated steel access door. The cells are lined with stainless steel. Each cell has a mineral oil–filled, lead-glass window arranged to give shielding equivalent to the cell walls. Windows are accessible for maintenance only from the hot side of the cell. Small quantities of materials and some equipment limited to less than 50 lb and 12 x 12 x 12 in. size can be transferred using a conveyor system, which terminates in loading/unloading cubicles at the east and west ends of the cell block. The transfer cubicles have a viewing window. Roof plugs in the top of the cells are located on the second floor to allow the movement of heavier equipment into and out of the cells. Equipment and materials may be transferred between Rooms 113 and 215 through a gasketed hatch. Steam, air, electrical, and water services are headed off the utilities services above the operating corridor and penetrate the cell operating face with an isolating valve or switch provided. Radioactive services (cell exhaust, hot drain, and process off-gas) penetrate the cell block through underground headers.

A.2.11.1.2 Alpha hot cell

A manipulator hot cell for handling alpha emitters is located in Room 110. The cell is shielded by water-filled, reinforced steel tanks that provide water shielding on all four sides and the top. The cell has a welded stainless steel liner and a water-filled viewing window. A glove box attached to the vacuum access port provides bag-in/bag-out capability for introducing/removing materials. The cell may be evacuated and operated under an inert atmosphere. The shield tank on the rear (west) side of the cubicle is movable to permit access to an opening equipped with a removable cover that contains glove ports and a viewing window.

A.2.11.1.3 Second-floor laboratories

There are six laboratories on the second floor: four are used for nuclear medicine research, one (Room 211) for ^{14}C, and one laboratory (Room 212) was in the process of renovation when the decision was made to shut down the facility.

A.2.11.1.4 Building containment and ventilation

The building is divided into three zones: the west-end (alpha) containment zone, the middle (beta-gamma) containment zone, and the east (office) zone, which does not have containment. Each zone has a separate ventilation system with individual blowers for each system.

The manipulator cells, glove boxes, and hoods constitute the primary containment of radioisotopes, with the designated "containment" areas within the building providing secondary containment. All entries to "contained" areas are provided with an air lock and are gasketed to minimize inleakage. There are also air locks between the alpha and the beta-gamma containment zones.

The west-end containment zone includes the three alpha laboratories—Rooms 110, 211, and 212. These laboratories are maintained in a "contained" condition of at least 0.30 in. w.g. negative pressure with respect to the outside atmosphere. Room air is filtered and recirculated with a limited discharge to

the atmosphere. The exhaust goes to a filter house on the roof where an exhaust fan draws air through HEPA filters (single-stage filtration) and discharges to a short stack on the roof.

The middle (beta-gamma) containment zone includes the hot cell operating and access areas (Rooms 109, 113, and 215), the decontamination room (Room 105), and three low-level laboratories (Rooms 208, 209, and 210). The middle section of the building operates at a small negative pressure relative to the outside atmosphere and automatically goes into containment (-0.3 in. w.g.) if the instrumentation detects radioactivity. Room air exhaust is routed to a filter house (single-stage HEPA filtration) on the roof and is discharged to a short roof stack.

The east end of the building does not have containment, and there are no filters on the room air exhaust to the atmosphere. This area includes offices, change rooms, service areas, and one low-level laboratory (Room 207).

Ventilation for the beta-gamma cells is provided by the isotopes area cell ventilation system and the 3039 stack. There are two stages of HEPA filters: one stage in each cell and a second stage in the shielded filter house on the south wall of the first floor. Ventilation for the alpha cell is provided by the process off-gas system. There are one stage of HEPA filtration in the alpha cell, a second set of HEPA filters in Room 110, and a scrubber and additional HEPA filters at the 3039 stack. The ventilation for hoods and glove boxes is outlined under the individual laboratories in Sect. 2.9.3.

2.11.2 History

Building 3047 was constructed in approximately 1962 and was used to conduct research and development and to produce radioisotopes.

2.11.3 General Status

Isotopes (Chemical Technology Division) activities are shut down, except for waste removal and transloading of radioactive material in the beta-gamma hot cells.

The general status of this facility is summarized in Table A.12.

Table A.12. Building 3047—general status of facility

Facility/area	Comments
Building	
Type	Steel frame with concrete block walls and interior partitions.
Roof and exterior walls	Good condition.
Building containment and ventilation	Three building areas: the west (alpha) containment zone, the middle (beta-gamma) containment zone, and the east (office) area, which does not have containment. Separate blowers for each zone. Air locks provided at entrances to containment zones and between the middle and west zones. West (alpha) containment zone: • includes Laboratories 110, 211, and 212; • operates continuously in a "contained" condition of at least 0.30 in. w.g. negative pressure with respect to outside atmosphere; • air is filtered and recirculated with limited room air exhaust; and • local system exhaust for room air to filter house on roof (single-stage HEPA filtration), discharge to short roof stack. Middle (beta-gamma containment zone: • includes cell operating area (Room 109), cell access area (Room 113), cell top access (Room 215), the decontamination room (Room 105), and three low-level laboratories (Rooms 208, 209, and 210); • operates under a small negative pressure with respect to outside atmosphere, is automatically placed into "containment" if instrumentation detects radioactivity; and • local system exhaust to filter house on roof (single-stage HEPA filtration), discharges to short roof stack.

Table A.12 (continued)

Facility/area	Comments
Building (continued)	East (office) wing, not "contained":
Building contamination and ventilation (continued)	• includes offices, change rooms, service areas, and one low-level laboratory (Room 207); and • not equipped for "containment," no filters on building air exhaust, local ventilation system.
	Beta-gamma cells: isotopes area cell ventilation system; single-stage HEPA filtration in cells, exhaust to filter house (single-stage HEPA filtration; total of two stages of filtration) on south wall of first floor and 3039 stack.
	Alpha hot cell: process off-gas system; in-cell single HEPA filtration, second set of HEPA filters in Room 110, exhaust to scrubber and additional filters at 3039 stack.
Liquid waste systems	Cell floor drains and some hoods: drain to tank WC-10.
	Some hoods: process waste system.
Monitoring	Facility Radiation and Contamination Alarm System: locally alarming monitors, central alarm panel for building; monitored at the WOCC.
First Floor	Cells are relatively "clean"; contamination levels below 3000 counts/min, average; radiation levels below 300 mR/h average; can open back doors of Cells A and B to transfer large items.
Cells A and B (beta-gamma cells)	Ventilation: isotopes area cell ventilation system; single-stage HEPA filtration in cell; exhaust to filter house (single-stage HEPA filtration; total of two stages) and 3039 stack.
	Hot drain to tank WC-10.
	HEPA-filtered process off-gas service.
	Electrical services.
	Lighting good.
	1-ton air hoist.

Table A.12 (continued)

Facility/area	Comments
First floor (continued)	
Cell C (beta-gamma cell) (continued)	Contamination and radiation levels assumed to be high (^{152}Eu, ^{154}Eu, ^{60}Co and ^{153}Gd).
	Ventilation: isotopes area cell ventilation system; single-stage HEPA filtration in cell; exhaust to filter house (single-stage HEPA filtration) and 3039 stack.
	Hot drain to tank WC-10.
	No electrical services.
	No lighting.
	Cell window cloudy; oil in window leaking.
	Air hoist (1-ton) nonfunctional.
Cell D (beta-gamma cell)	Highly contaminated with ^{60}Co contamination level below 30,000 counts/min radiation level range 1 to 900 R/h.
	Ventilation: isotopes area cell ventilation system; single-stage HEPA filtration in cell; exhaust to filter house (single-stage HEPA filtration) and 3039 stack.
	Hot drain to tank WC-10.
	HEPA filtered process off-gas service.
	Electrical services nonfunctional; through cell penetrations only.
	Lighting fixtures nonfunctional due to radiation damage; "drop cord" only.
	Cell window cloudy and leaking oil.
	Bottom of pit (cell ventilation sump) is located 14 ft below working area and contains sludge (900 R/h); current manipulators cannot reach into pit; need special tools and equipment.
	Air hoist (1-ton) nonfunctional.

Table A.12 (continued)

Facility/area	Comments
First Floor (continued)	
Alpha hot cell (Room 110)	Contamination level above 1,000,000 dpm; radiation level unknown. Ventilation: process off-gas system; in-cell single-stage HEPA filtration with bypass provision during maintenance; routed to second stage of HEPA filters in Room 110; exhaust to scrubber and additional HEPA filters at 3039 stack. Hot drain to tank WC-10. Glove ports in rear of cell. Entry box with electrical services attached; electrical not leaktight; use care to keep entry box dry during cell wash down. In addition, gaskets leak where entry box is attached to cell. Attached entry box can be vented through the alpha cell to the process off-gas system by opening the door (current practice) or to the cell ventilation system (valve presently closed).
^{53}Gd glove box (Hood ; Room 113)	[1]Used for ^{153}Gd powder pressing. Ventilation: glove box is a static glove box with no ventilation. Glove box is vented to hood through a single HEPA filter. Manipulators installed in lead-shielded box face.
One ^{153}Gd glove box hood (Room 113)	Contamination level below 200 dpm. Ventilation: isotopes area cell ventilation system; single-stage HEPA filtration on box; exhaust to filter house (single-stage HEPA filtration) and 3039 stack. Drain to process waste system. Electrical service. Lighting good.

Table A.12 (continued)

Facility/area	Comments
Decontamination facility	Shower: • contamination level below 200 dpm; and • drain to tank WC-10. Enclosed sink: • contamination level below 3500 dpm; • ventilation: isotope area cell ventilation system, exhaust to filter house (single-stage HEPA filtration) and 3039 stack; and • drain to tank WC-10. Sample hood: • contamination below 1000 dpm; • Ventilation: isotope area cell ventilation system, single HEPA filtration on hood, exhaust to filter house and 3039 stack; • drain to tank WC-10; • electrical service; and • lighting good.
Second-Floor Laboratories	
Room 207	Laboratory used for nuclear medicine research. Four hoods, three with process waste system drains and one with hot drain to tank WC-10. Ventilation: east (office) wing local ventilation system; no filters on room air exhaust; status of hoods could not be confirmed.
Room208	Laboratory used for nuclear medicine research. One enclosed hood with glove ports and hot drain to tank WC-10. One standard hood with process waste drain. Ventilation: middle (beta-gamma) containment zone; local ventilation system; room air and hoods exhaust to filter house with single-stage HEPA filtration and short roof stack.

Table A.12 (continued)

Facility/area	Comments
Second-Floor Laboratories (continued)	
Room 209	Laboratory used for nuclear medicine research. One enclosed hood with glove ports and hot drain to tank WC-10. One standard hood with process waste drain. Ventilation: middle (beta-gamma) containment zone; local ventilation system; room air and hoods exhaust to filter house with single-stage HEPA filtration and short roof stack.
Room 210	Laboratory used for nuclear medicine research. Three hoods: one with process drain, one with hot drain to tank WC-10, one three-fourths enclosed with no services. Ventilation: middle (beta-gamma) containment zone; local ventilation system; room air and hoods exhaust to filter house with single-stage HEPA filtration and roof stack.
Room 211	Equipment contaminated with ^{14}C; small quantity of ^{14}C stored in room. May be residual alpha contamination. Four modified glove boxes; two with hot drains to tank WC-10. Ventilation: west (alpha) containment zone; local ventilation system; room air and glove boxes exhaust to filter house (single-stage HEPA filtration) and short roof stack.
Room 212	Equipment storage. Ventilation: west (alpha) containment zone; local ventilation system; room air exhausts to filter house (single-stage HEPA filtration) and short roof stack.

A.2.12 BUILDING 3517—FISSION PRODUCT DEVELOPMENT LABORATORY

A.2.12.1 Description

Building 3517, the Fission Product Development Laboratory (FPDL), was constructed (1) to recover long-lived fission products (e.g., ^{90}Sr, ^{137}Cs, and ^{144}Ce) from aqueous wastes generated in reprocessing irradiated reactor fuel elements, (2) to purify feed materials from other DOE sites, and (3) to prepare radioactive sources. It is located in the central ORNL site, southwest of the Isotopes Circle facilities.

Building 3517 is a three-story, braced steel framework structure with metal deck roofs and 12-in. non-reinforced-concrete masonry walls on the lower two stories. The building is about 120 ft long (east-west), and the first two stories are about 60 ft wide (north-south) and 27 ft high. A third story, about 27 ft wide by 16 ft high, runs the length of the building east-west. This third story, referred to as the crane bay, supports a 20-ton bridge crane and services the top access plugs to Cells 1 through 15. The crane bay has aluminum siding.

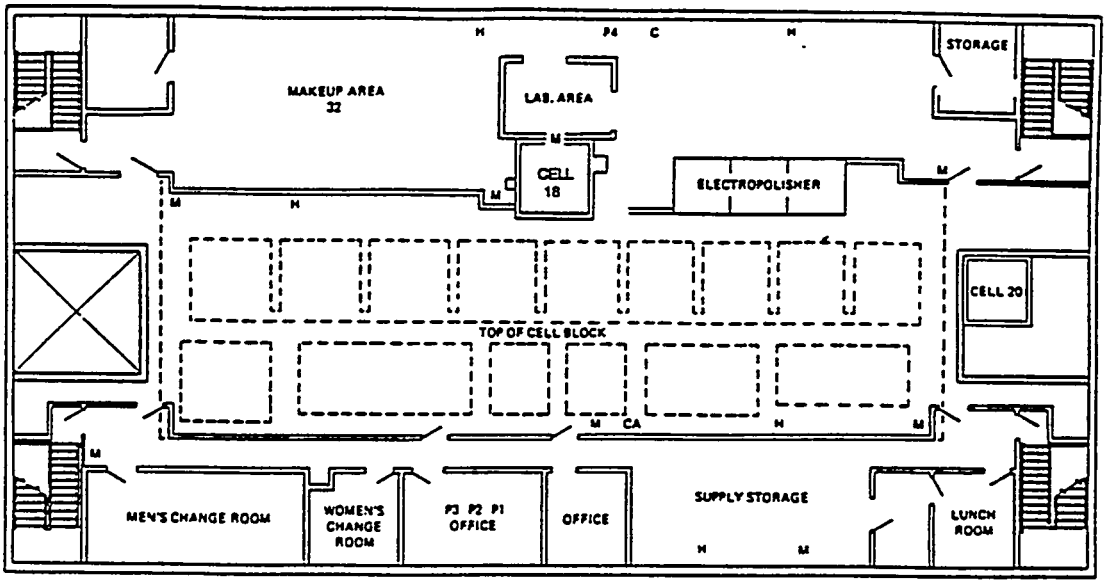
A.2.12.1.1 Cells

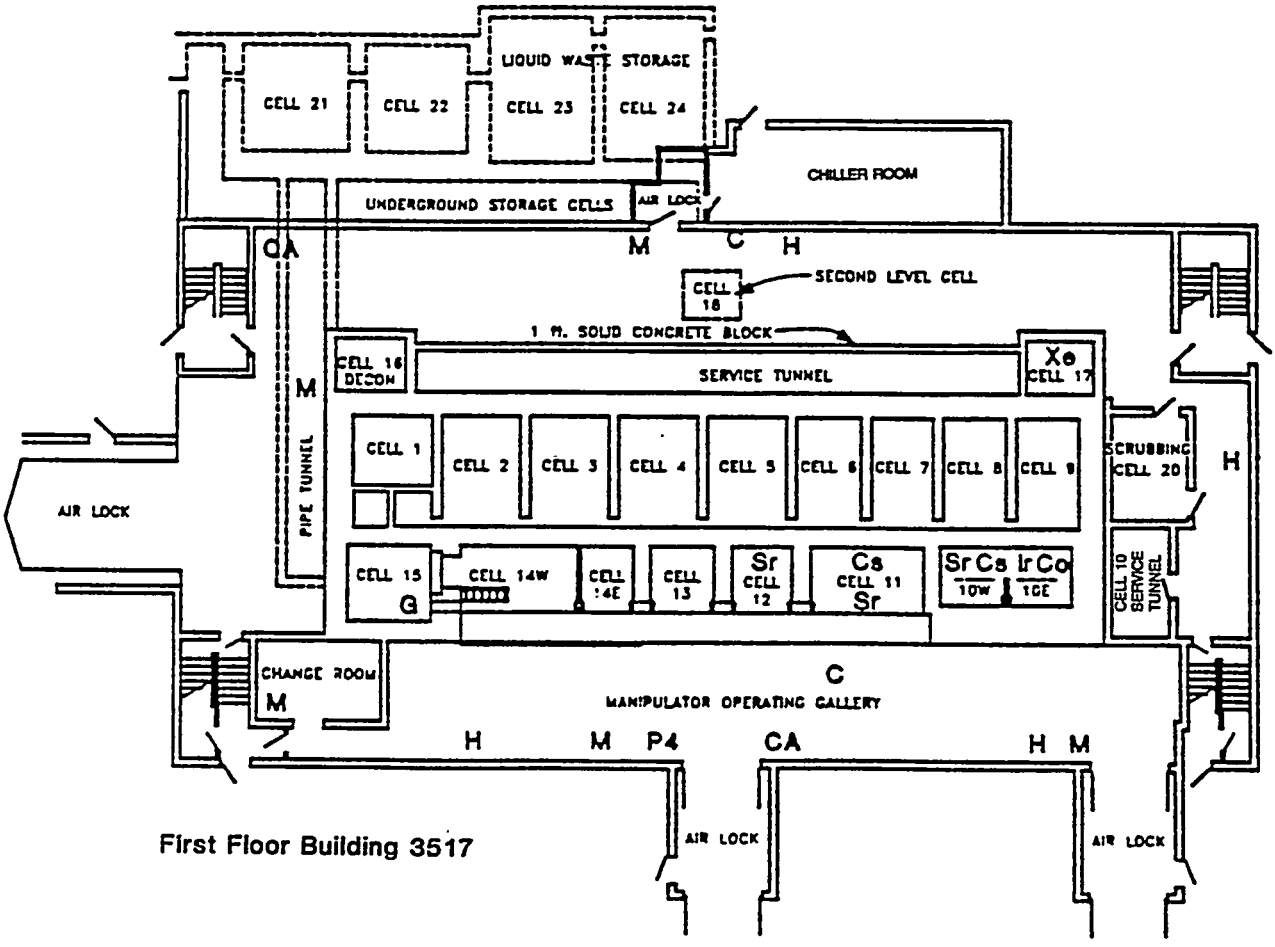
The FPDL contains manipulator and process cells for producing radioactive sources and associated operating, service, office, and personnel access areas. The general layout of the first and second floors is presented in Fig. A.17, and a description of the cells is given in Table A.13. The main cell block, Cells 1 through 15, is a double cell block located on the first level. These hot cells are massive, steel-bar reinforced concrete boxes with wall thicknesses of 3 and 4 ft. The access to the cells consists of removable reinforced concrete blocks in the tops of the cells. Each individual cell within the hot-cell structure is isolated by 2-ft-thick concrete walls. Both the hot cells and the building are founded either on rock or on graded gravel close to rock. The four tank farm cells, 21 through 24, are located underground adjacent to the building. There is no Cell 19; it was removed. The process cells, storage cells, and high-level manipulator cells are shielded from the nearest accessible area by the equivalent of 4 ft of ordinary concrete. The low-level manipulator cells and service areas have less shielding (Table A.12.). Cells 1 through 15 have stainless steel linings to facilitate decontamination. Cells 16 and 17, the service cells, and the tank farm cells have Amercoat coatings.

Cells 1 through 9 in the north row of the main cell block were process cells with no viewing windows. Except for the north side of Cell 1, which has been used for decontamination, these cells have been inactive since 1975. Some equipment has been removed, but Cells 4 through 7 still contain a variety of tanks, piping, samplers, services, and instrumentation. A service tunnel runs along the north side of the cell bank.

Cells 10 through 15, the south row of the main cell block, are manipulator cells for handling high-level beta-gamma radioisotopes. They are equipped with viewing windows. Cells 10 and 14 are divided by steel plate into Cells 10E and 10W and Cells 14E and 14M. The manipulator cells have interconnecting shielded doors to enable materials to be passed from one cell to another. All except the large door between Cells 14 and 15 can be operated from the manipulator operating gallery. The large door is handled by the overhead crane. (However, a small door between Cells 14 and 15 is operated from the manipulator gallery.) Cask transfers or transfers of large items in or out of the cell block are handled via the cell top plugs using the overhead 20-ton crane. Cell 10W has a water-cooled well for storage of radioisotopes capsules. The well is cooled with chilled water with backup from once-through process water. Radioisotopes processing was conducted in the manipulator cells until April 1989, when the facility was placed on standby.

Second Floor Building 3517 A-65





First Floor Building 3517

Fig. A.17. Floor plan of Building 3517—Fission Product Development Laboratory.

Table A.13. Building 3517—cell descriptions

Cell type	Cell No.	Dimensions (ft)			Minimum equivalent standard concrete shielding for walls (ft)[b]
		L[a]	W[a]	D[a]	
Process	1	9	12.5	12	3
Process	2	9	12.5	12	4.5
Process	3	9	12.5	12	4.5
Process	4	9	12.5	12	4.5
Process	5	9	12.5	12	4.5
Process	6	7.5	12.5	12	4.5
Process	7	7.5	12.5	12	4.5
Process	8	7.5	12.5	12	4.5
Process	9	7.5	12.5	12	4.5
Manipulator	10	7.5	7	14	4
Manipulator	11	13	8	11	4
Manipulator	12	7	8	11	4
Manipulator	13	7	8	11	4
Manipulator	14	6.5	8	12	4.5
Manipulator	15	10	4	16	2
Manipulator	16	8	6	14	1
Service	17	8	6	14	1
Manipulator	18	6	6.5	10.5	1.5
Service	20	6.5	7.5	12	1
Tank farm	21	25	12	14	4
Tank farm	22	25	12	14	4
Tank farm	23	30	12	14	2
Tank farm	24	30	12	14	2.5

[a]L = length; W = width; D = depth.
[b]Cells 1–9, 10W, and 11–13 have two layers of 2-ft-thick, reinforced-concrete blocks in the top of the cell; total thickness of top equivalent to 5 ft of concrete. Cell 10E has one layer of 4-ft-thick blocks; Cell 14, one layer of 3-ft-thick blocks; and Cell 15, one layer of 2-ft-thick blocks.

The building contains four additional cells:

- Cell 16—a manipulator cell used for decontaminating equipment,
- Cell 17—used for storage of fission product xenon,
- Cell 18—a manipulator cell (once an analytical cell but piping stripped out), and
- Cell 20—inactivated off-gas scrubber used when process Cells 1–9 were operational.

There is also a currently inactive glove box, which was installed for decontaminating equipment.

There are four underground cells adjacent to the building. Cells 21 and 22 at one time housed storage tanks for fission product solutions. Cell 21 is empty; the tanks and piping have been removed. Cell 22 still contains a tank (inactive) and associated piping. Cells 23 and 24 contain collection tanks for LLLW (Sect. A.2.10.1.3).

A.2.12.1.2 Building containment and ventilation

The building ventilation is operated in a "containment" mode (at least -0.3 in. w.g. relative to the outside atmosphere), and the cells are maintained at a pressure of at least -0.3 in. w.g. relative to the building pressure. The building is sealed and equipped with air-lock entries for personnel and a truck air lock. Air-lock doors are gasketed. Each operating area is enclosed and can be isolated from other areas of the building, except where piping and conduit come through floor and wall openings. Air flows from areas with lesser potential for contamination to areas of higher potential. Thus, ventilation air flows from the operating areas to the inleakage openings into the cells and the service tunnel. There are roughing filters on the inlets in the service tunnel and Cell 15. Ventilation exhaust flows in reinforced concrete ducts underground to a filter pit outside the building containing a set of testable HEPA filters, to an above-ground enclosure containing a second set of testable filters, and then through to the new filter house containing a third stage of testable HEPA filters. The exhaust is then discharged to the ORNL Building 3039 stack cell ventilation system. All of the exhaust fans are in the 3039 system. Additionally, there are in-cell HEPA filters on the manipulator cells, but these cannot be tested.

A.2.12.1.3 Liquid waste systems

Radioactive liquid waste drains from the cells and the electropolisher glove box are routed through a common header to stainless steel collection tanks, S-223, S-324, and S-523. These tanks are located in shielded underground storage vaults, Cells 23 and 24, located adjacent to the building. The wastes are jetted from the Building 3517 tanks to the ORNL low-level waste (LLW) evaporator facility through a doubly contained stainless steel line after it leaves the outside wall of the building. There is a short section of this line that is not doubly contained. Provisions are being made to beak test this line in accordance with the Federal Facility Agreement. These tanks are in good condition and are contained in a concrete vault; they are vented to the process off-gas system.

The process waste system receives normal effluent from building sinks and floor drains in operating areas, steam condensate traps, and emergency cooling water from the storage well in Cell 10W and provides disposal of nonradioactive liquids (except sanitary waste). The waste is monitored before it is discharged to the ORNL central process waste system. If radioactivity is detected at levels above the limits for process waste, the material is diverted to the LLLW system.

A.2.12.2 History

FPDL went on line in 1958 to separate kilocurie amounts of fission products from redox- and Purex-type waste streams. The fission product recovery program was successfully demonstrated during the first 2 years of operation, and kilocurie quantities were made available for worldwide distribution. Radioisotopes separated during the early days (late 1950s and early 1960s) included ^{144}Ce, ^{137}Cs, ^{90}Sr, ^{147}Pm, ^{106}Ru, and ^{99}Tc.

In the early 1960s, the advent of the Systems for Nuclear Auxiliary Power (SNAP) program increased the demand for ^{90}Sr heat sources, as well as the requirements for ^{137}Cs, and ^{144}Ce sources to megacuries. To meet this demand, fission product concentrates were shipped from the Hanford Atomic Products Operation to FPDL for preparation of the sources for the SNAP program. Under this program, there were three product streams, as follows:

- Semipure ^{137}Cs was purified, converted to cesium chloride powder, cold-pressed into pellets, and the pellets encapsulated.

- Purified ^{90}Sr was converted to strontium titanate, compacted by vacuum hot-pressing into pellets, and the pellets encapsulated.

- Cesium-144 was separated from a mixed rare-earth fraction by solvent extraction and converted to cerium oxide. The powder was cold-pressed and sintered and then sealed in a compatible container.

A total of 10 MCi of fission product material was processed at the FPDL during this operational period. At the conclusion of that program in 1975, the chemical processing cells were shut down and maintained in protective storage. Some initial decontamination was performed, but subsequent funding restrictions limited the scope of this effort. The initial program included the encapsulation and storage of approximately 500,000 Ci of ^{90}Sr titanate powder and hot chemical flushes of process equipment and piping within all nine process cells. Some equipment has been removed, but Cells 4 through 7 still contain processing tanks, piping, and equipment and are considered to be very high radiation areas.

Radioisotopes processing continued in the manipulator cells after 1975 at a reduced level of operation until April 1989, when the building was placed in standby. The principal operations during this period involved the production of ^{90}Sr and ^{137}Cs sources from separated product from Hanford.

Other special operations (various short-term periods) include (1) processing of ^{60}Co, ^{192}Ir, and ^{235}U; (2) ^{241}Am target preparation; (3) $^{152/154}Eu$ purification; and (4) separation of ^{99}Tc from crude concentrate received from the Paducah Gaseous Diffusion Plant.

A.2.12.3 General Status

No radioactive operations are being conducted in Building 3517 except the removal and disposal of some solid and liquid LLW. Daily surveillance is carried out. A programmed maintenance is being conducted. The general status of the facility is summarized in Table A.14. The estimated quantity of contaminated materials (excluding inventory) requiring removal/disposal is given in Table A.15.

A.2.13 BUILDING 7025—TRITIUM TARGET FABRICATION

A.2.13.1. Description

Building 7025 is located about 1.4 miles northeast of the central ORNL site. It is within the perimeter fence of the ORNL 7000 area but isolated from other buildings.
The structure is a prefabricated, metal-sided building with a total floor area of 590 ft^2 and a total free space volume of approximately 6000 ft^3.

The building was used for fabricating titanium tritide targets, for preparing metallurgical samples for helium embrittlement studies by diffusing tritium into the samples and allowing it to decay to helium, and for preparing thin films of ThO_2/UO_2 by vacuum evaporation. No aqueous wastes were generated by these processes.

The building layout is shown in Fig. A.18. The tritium equipment is housed in a 26-ft-long stainless steel hood which is exhausted by a 2000-ft^3/min fan. The tritium hood exhaust is not filtered because there are no solid radioactive species to be filtered. A high-vacuum evaporator system was used in the building for the preparation of uranium and thorium targets. The vacuum evaporator was operated in a HEPA-filtered hood for contamination control. Bench-top quantities were handled.

A forced-air exhaust system that runs continuously is located at the rear of the building. A forced-air input system for heating and cooling is located on the opposite side of the building. The two systems maintain a continuous, high-volume air flow through the building, preventing the buildup of any concentration of tritium gas in the occupied areas of the building in the event of any leakage or spill.

A.2.13.2 History

Building 7025, which is a Tennessee Valley Authority surplus building, was installed in the late 1960s to house a tritium target fabrication system. It was programmatically funded into the early 1980s by the Lawrence Livermore National Laboratory (LLNL) to produce titanium tritide accelerator targets for the Rotating Target Neutron Source facilities at LLNL. Since that time, tritium targets have been prepared for customers on a custom-order basis through the Isotopes Distribution Office. The tritium system has also been used to prepare metallurgical samples for helium embrittlement studies related to fusion energy materials research. Samples were prepared, primarily for ORNL's Metals and Ceramics Division, by diffusing ^3H into metallurgical samples and allowing it to decay to helium. After the desired helium loading was achieved, the remaining ^3H was removed from the samples. This process, known as the tritium trick process, was last performed for two groups of researchers in Germany and California during the fall of 1989.

As a result of overcrowding in Building 3550, the ThO_2/UO_2 evaporator was moved to Building 7025 in the late 1970s and has been used to prepare hundreds of oxide thin films for a variety of customers around the world.

Table A.14. Building 3517—general status of facility

Facility/area	Comments
Building	
Type	Steel frame, first two levels, masonry walls; crane bay, aluminum siding; hot cells, massive steel-bar reinforced concrete boxes.
Roof and exterior walls	Good condition.
Building containment and ventilation	Building sealed; air locks with gasketed doors; building operates in a "contained" state to maintain at least 0.3 in. w.g. negative pressure relative to the outside atmosphere; air flows from operating areas into the cells; cells exhaust through underground ducts to filter pit outside the building with single-stage HEPA filtration (testable); second-stage HEPA filtration (testable) in above-ground filter hours; third-stage HEPA filtration in new filter house; exhaust to 3039 stack.
Liquid waste systems	Cell floor drains and electropolisher glove-box drain: drain to stainless steel collection tanks (S-223, S-324, and S-523) located in shielded underground cells adjacent to building; wastes jetted to ORNL LLW evaporator facility as necessary. Building floor drains and sinks, steam condensate, and emergency cooling water for storage well: monitored at Manhole 209 before discharge to ORNL process waste system.
Monitoring	Facility Radiation and Contamination Alarm System: locally alarming monitors; central alarm panel for building; monitored at the WOCC.
Cask handling	20-ton bridge crane; truck air lock, and forklift trucks.
Process Cells	Cells 1–4 used to process ^{90}Sr (out of service); and Cells 5–8 used to process ^{137}Cs (out of service).
Cells 1, 2, 3, 8, and 9	High radiation area; contamination area. Cells stripped of tanks and lines; Cells 1 and 9 contain equipment; Cells 2, 3, and 8 are empty.
Manipulator Cells	
General comments for Cells 10–15	Very high radiation area; contamination area. Manipulator boots require frequent changes to maintain confinement.

Table A.14 (continued)

Facility/area	Comments
Manipulator Cells (continued)	
Cell 10E	Used as a transfer cell; material normally entered into manipulator cells and manufactured sources removed via Cell 10E top hatch using the overhead crane.
	Past experience manipulators were contaminated with ^{90}Sr when removed for maintenance.
	Removable plug in manipulator room wall to pass small items in.
	Electrically operated hoist (500 lb).
	Empty.
Cell 10W	Used as storage cell.
	Inventory: ^{90}Sr, ~22,000 Ci; ^{137}Cs, ~88,000 Ci; and ^{244}Cm, ~450 g.
	Past experience shows that manipulators were contaminated with ^{90}Sr when removed for maintenance.
	Water-cooled storage well for storage of radioisotope capsules; chilled-water cooling with backup from once-through process water.
	Air-operated hoist (1000 lb).
	Capsule welding machine.
Cell 11E and 11W	Highly contaminated with ^{90}Sr and ^{137}Cs. Past experience shows that manipulators were contaminated with ^{90}Sr and ^{137}Cs when removed for maintenance.
	East and west windows are cloudy.
Cell 12	Highly contaminated with ^{90}Sr and ^{137}Cs. Past experience shows that manipulators were contaminated with ^{90}Sr and ^{137}Cs.
	Window in good condition; water lines cut off; no electrical service; hot drain may be plugged with glass and/or lead shot, and/or trash but could not be confirmed.

Table A.14 (continued)

Facility/area	Comments
Manipulator Cells (continued)	
Cell 13	Highly contaminated with ^{137}Cs.
	Window leaking; hot drain may be plugged with glass and/or lead shot, and/or trash but could not be confirmed.
Cell 14E	Highly contaminated with ^{137}Cs; may find ^{137}Cs-glass.
	Window leaks and is cloudy; no electrical service.
	Left manipulator presently shielded with lead blankets around through tube opening. In 1979, manipulator repair, ^{137}Cs powder observed in pull bag and manipulator at high radiation readings. Manipulator will probably need to be pushed into cell and replaced.
Cell 14M and 14W	Used as waste transfer cell.
Cell 15	Used to load LLW out of the manipulator cell block. LLW is normally removed via cell top hatch using the overhead crane.
	Lower contamination.
	Electric hoist for operating small door between Cells 14 and 15.
Cell 16	Decontamination cell (inactive).
	Can be entered by personnel.
	Limited transferable contamination; may find alpha contamination in cracks.
Cell 18	Former analytical cell; all piping removed; still a very high radiation area; contamination area.
	Empty.
Service Cells and Service Tunnels	
Cell 17	Used for storage.
	Inventory of stored xenon isotopes contaminated with trace levels of ^{85}Kr; stored in gas cylinders.

Table A.14 (continued)

Facility/area	Comments
Service Cells and Service Tunnels (continued)	
Cell 20	Off-gas scrubber (inactive) used when all cells were operational.
	Roughing filters (operational) for cell ventilation system located in pump compartment.
	Pump compartment: general area of 200 mR/h.
	Scrubber compartment: very high radiation area.
Service tunnel (for process cells)	High radiation area; airborne radioactivity area; contamination area (but can work in area with protective equipment); almost all ^{90}Sr; airborne radioactivity generated with any activity in area; "hot" spot (8000 mR/H at 1 in.; 2000 mR/h at 1 ft); levels behind lead brick shielding could be much higher.
	Installed pipe, valves, and equipment are deteriorated.
	Insulation (probably asbestos) is loose.
	Many lights nonfunctional.
Service tunnel for Cell 10	Gamma radiation (300 mR/h at 1 in.) from overhead tank.
Cell21 (tank farm)	Empty.
	At one time, housed storage tanks (fission product solutions); tanks and piping removed.
Cell 22 (tank farm)	Inactive. Contains storage tank (S-122) and piping. At one time, used to store fission product solutions.
Operating and Service Areas	
Manipulator-operating gallery	Fixed contamination on cell face area; lead installed to cover nontransferable contamination and provide additional shielding.
	Most of dose rate is radiation from manipulator through tubes and hot spots covered with lead.
First level north	Chiller room and air lock: air lock floor contaminated (300 mR/h on contact) from past pipe leak; covered by lead sheet; chiller room floor contaminated; nontransferable.

Table A.14 (continued)

Facility/area	Comments
Operating and Service Areas (continued)	
High bay area	Radiation sources are penetrations and fixed contamination on floor; transferable contamination presently low but can change with any operation involving cell.
General	Spots of nontransferable contamination at various places.
Outside	
"Old" filter house and filter pit area	Filters inside house, 20 to 30 R/h. Top of house is high radiation area (gamma) due to less shielding on top than sides.
	Pit penetrations covered with lead shield.
Pump (solid waste)	Transfer pump for old product recovery from waste tank.
	No longer used; removal and disposal desirable.
	^{90}Sr-contaminated; base reads 2 R/h at 1 in.; sits in rusted box; plywood overpack. Box shields most of radiation.

Table A.15. Building 3517—estimated quantity of contaminated materials (excluding inventory) requiring removal/disposal

Location	Material/status	Estimated quantity (ft^3)
Cell 1	One vacuum hot press and other miscellaneous items	~100
Cell 2	Empty	—
Cell 3	Empty	—
Cell 4	Processing tanks and equipment	~430
Cell 5	Processing tanks and equipment	~430
Cell 6	Processing tanks and equipment	~430
Cell 7	Processing tanks and equipment	~430
Cell 8	Empty	—
Cell 9	Armor plate	~60
Cell 10E	Empty	—
Cell 10W	Canned waste, tools, and equipment	~7
Cell 11E	Empty	—
Cell 11W	Canned waste, tools, and lights	~7
Cell 12	Vacuum hot press, ejection press, equipment	~100
Cell 13	Press RAM, tools, and equipment	~7
Cell 14E	Contaminated lead and left manipulator	~30
Cell 14M	Contaminated lead (sheet and shot), vacuum pump	20
Cell 14W	Miscellaneous waste	~7
Cell 15	Drum rack	27
Cell 16	Ladder and bucket	7
Cell 17	Metal rack and wooden box	100
Cell 18	Empty	—
Crane bay area	Movable lift and miscellaneous items	160
Outside	Contaminated pump in rusted box with plywood overpack	100

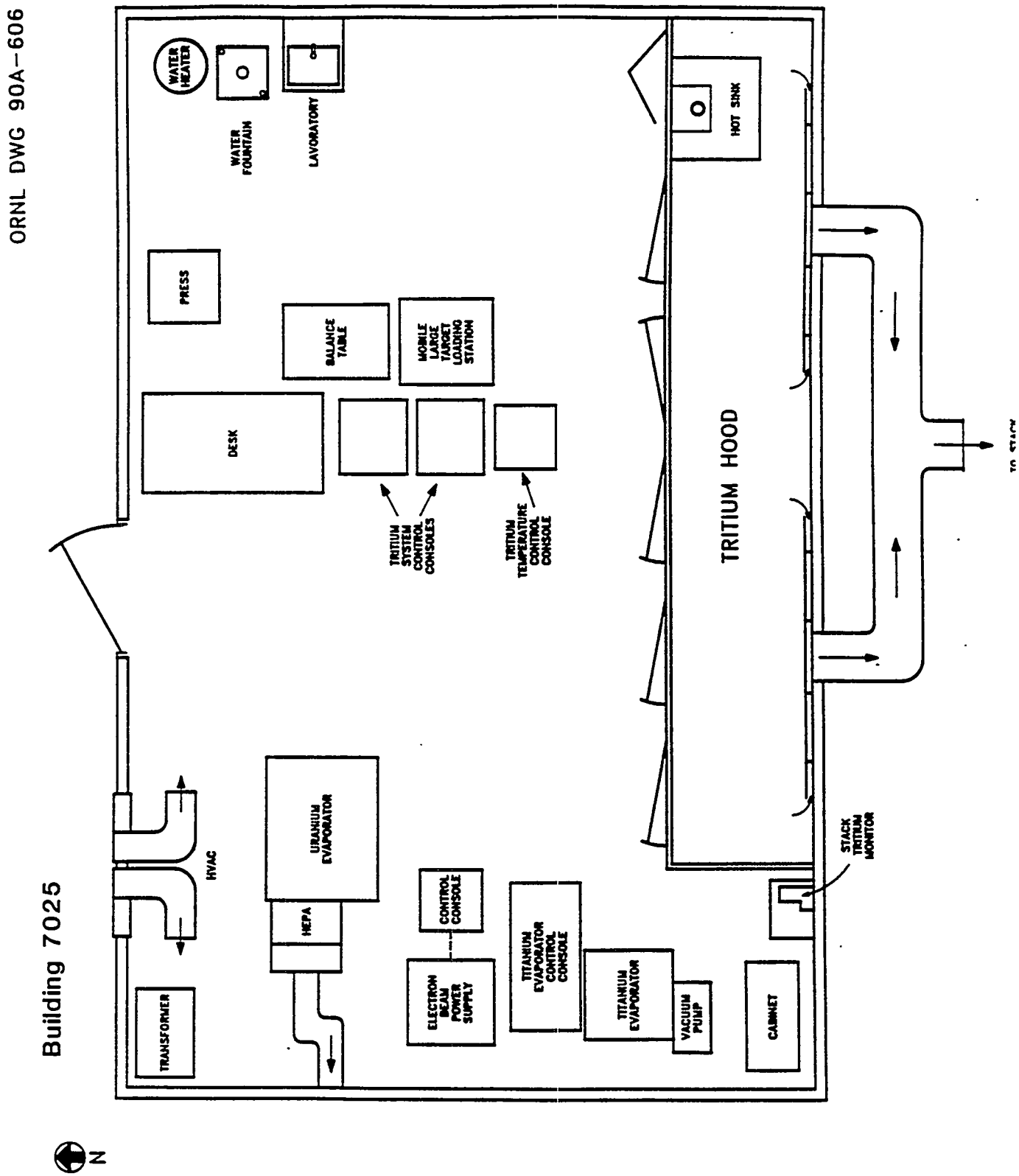


Fig. A.18. Floor plan of Building 7025—Tritium Rarget Fabrication.

A.2.13.3 General Status

All tritium processing activities in this facility were halted in October 1989. All bulk tritium and the uranium storage traps have been removed from Building 7025. The primary portions of the tritium processing manifold are highly contaminated with tritium.

Operation of the ThO_2/UO_2 high-vacuum system was continued until January 1990, when it was halted because of funding problems. The ThO_2/UO_2 system is in the process of being disassembled and disposed of as waste. A high-vacuum titanium evaporator system has been relocated to Building 9204-3.

The general status of Building 7025 is summarized in Table A.16.

A.2.14 BUILDING 9204-3—ACTINIDE AREA

A.2.14.1 Description

A small area, designated as the Actinide Area, within Building 9204-3 at the Y-12 site is included in the deactivation project. Building 9204-3 contains 114,600 ft^2 in a basement, first and second floors, and a mezzanine. Most of the building is devoted to isotopes production. The area of interest for the deactivation project is located at the east end of the second floor of the building. It consists of (1) the calutron operations area where the electromagnetic separation of actinide isotopes was performed and (2) components wash and service area where the actinide isotopes were removed from the calutron receivers and the calutron receivers were prepared for use (Fig. A.19). The calutron area is approximately 2700 ft^2, and the wash area is about 1800 ft^2. Most of Building 9204-3 is used for stable isotopes work and is planned to remain operational.

Table A.16. Building 7025—general status of facility

Facility/area	Comments
Building	
Type	Prefabricated metal.
Roof and exterior walls	Fair condition.
Building ventilation	Forced-air exhaust system that runs continuously; local stack at rear of building; forced air input system for heating and cooling is located on opposite side of building and operates continuously as a backup for ventilation (at reduced flow) in the event the exhaust fan should fail. HEPA filter on alpha hood. No filter on tritium hood because no solid radioactive particulates that could be filtered were handled (i.e., only gases).
Liquid waste systems	No liquid wastes generated by process. Lavatory sink bottled for disposal. Sanitary facilities at the 7000 Area. Hot drain in east end of tritium hood. Drains to underground tank (inactive) outside. The tank has been emptied.
Monitoring	Stack monitor for tritium operated by ORNL Environmental Monitoring Group. Smoke detectors monitored by ORNL fire department. No sprinkler system.
Hoods	
Tritium hood	The equipment and hood are highly contaminated with tritium. There will be a residual release of tritium, as the tritium imbedded in the equipment slowly diffuses from the metal.
Alpha hood	Contaminated with uranium and thorium; HEPA filter on hood.
Stored Materials	None

The actinide processing facility is in a contained area within the building. The components wash area operates at -0.15 in. w.g. and the other areas at -0.1 in. w.g. relative to the surrounding building areas. Glove boxes and enclosures have HEPA filters on the air inlet and prefilters and HEPA filters on the exhaust. Air is then routed through a common duct system to a second stage of HEPA filters. Exhaust fans are supplied with emergency power. Entries are provided with air locks. In addition to the two rooms on the deactivation list, the containment area also houses the actinide chemical processing area (a series of glove-box operations), change room, and locker room.

The actinide processing facilities have been on standby since 1980. The equipment and enclosures were cleaned and readily dispersable material removed when the facilities were placed in standby. The equipment has been maintained and, in general, is considered to be in good condition.

A.2.12.2 History

The electromagnetic separation facilities were originally constructed to separate uranium isotopes and recover uranium enriched in ^{235}U. With the successful operation of the gaseous diffusion process, the calutrons were phased out as a production operation for enriching uranium. About 1962, the area of Building 9204-3, now known as the actinide processing area, was modified to separate actinide isotopes for research purposes. This was new construction, except for the calutron itself. The calutron was modified so that only a portion of the machine was used to accommodate smaller samples. The actinide facility operated continuously until the mid-1970s, was in standby for a short time, was operated again in the late 1970s to isolate ^{242}Pu, and then placed in standby again in 1980. The facility has been maintained in such a condition that it could be restarted. Two glove boxes in the chemical processing area are still being used for weighing and packaging actinides. This part of the facility is planned to remain operational.

A.2.12.3 General Status

The actinide operations area and components wash and service area in Building 9204-3 were placed in standby in 1980. The general status of the facility is summarized in Table A.17.

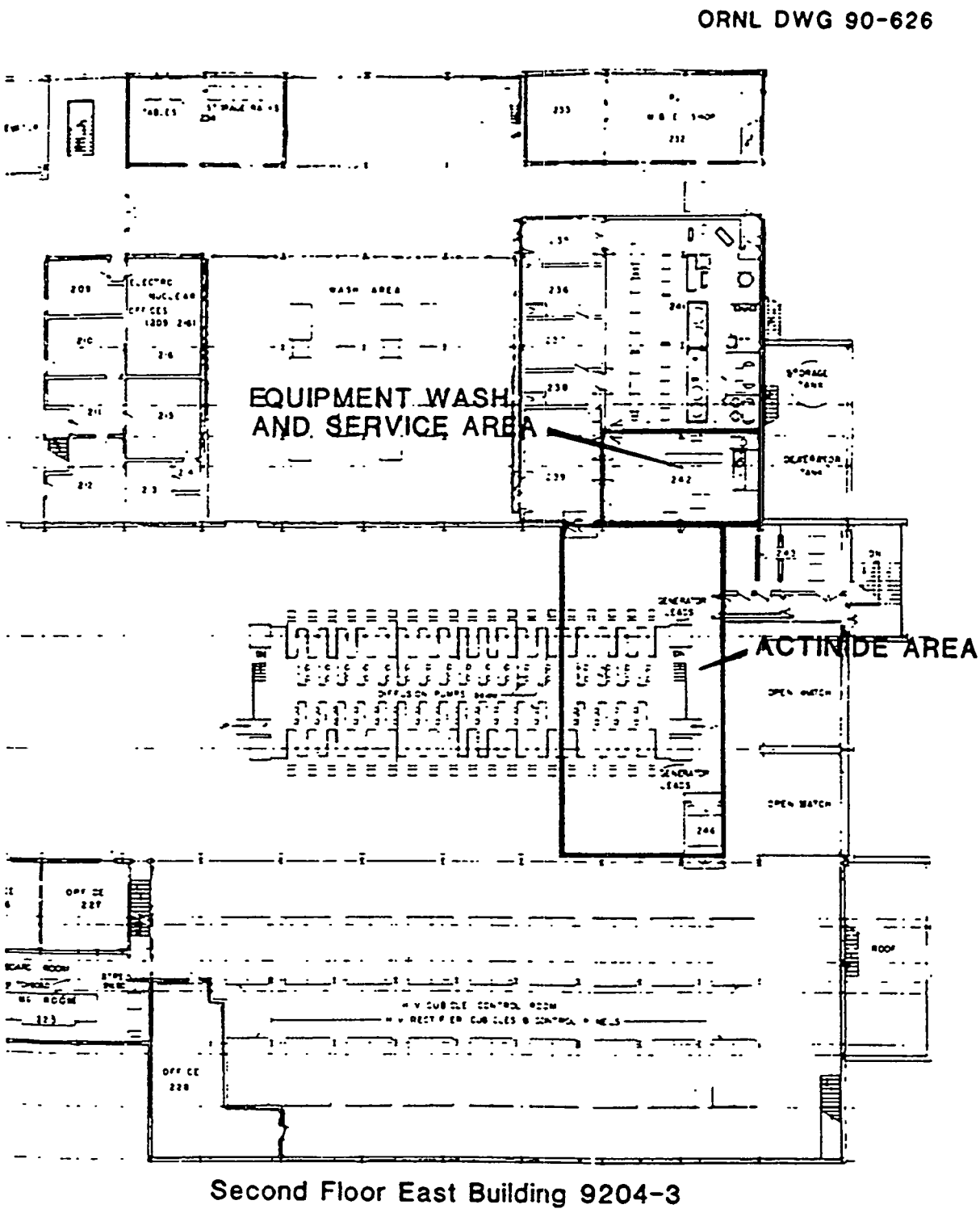


Fig. A.19. Floor plan of Actinide Area in Building 9204-3, second floor east, showing the calutron operations and the equipment wash and service areas.

Table A.17. Actinide area of Building 9204-3—general status of facility

Facility/area	Comments
Facility	
General condition	Small area within a building; most of building is planned to remain operational.
	Good condition; contaminated, but relatively clean (i.e., relatively free of dispersable materials).
Facility containment and ventilation	Rooms are inside a contained area within a building; air locks.
	Components wash area maintained at -0.15 in. w.g. and other areas at -0.1 in. w.g. relative to the surrounding building areas.
Liquid waste systems	No liquid waste is expected during shutdown.
	Actinide facility, when operated, was equipped with a dedicated liquid waste evaporator; condensate was monitored for radioactivity; if acceptable for discharge, it was routed to the waste tank that serves the building. No hot or process drains except to recovery system. No floor drains. Evaporator in standby.
	Building in general (current operations): liquid waste routed to waste tank; neutralized; transferred to Y-12 Plant tank farm.
Inventory	None.

Appendix B

PROJECT SCHEDULES

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ISOTOPES FACILITY DEACTIVATION PROJECT
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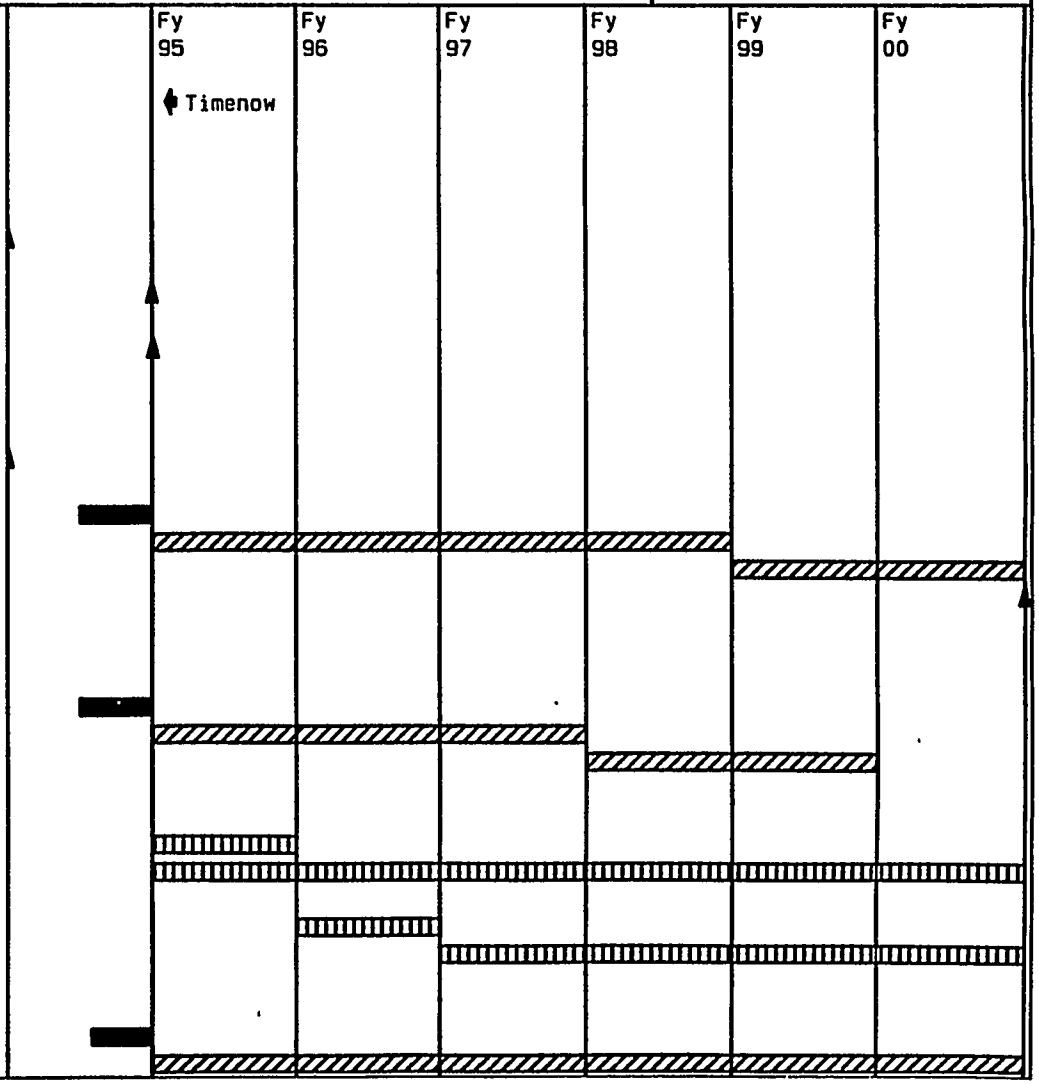
Activity	Description	Start	Finish	Dur	TF
A1	*PROJECT INTEGRATION*				
2.10.2.01	*PROJECT INTEGRATION*				
X000000000	ISOTOPES FACILITIES DEACTIVATION PROJECT START	01OCT93 A	01OCT93 A	0	0
X000000001	ISOTOPES FACILITIES DEACTIVATION FY94 FINISH	30SEP94 A	30SEP94 A	0	0
X000000002	ISOTOPES FACILITIES DEACTIVATION FY95 START	03OCT94	03OCT94	0	0
2.10.2.01.01	*PROJECT MANAGEMENT*				
X010000004	START SURVEILLANCE & MAINTENANCE/UTILITIES	01OCT93 A	01OCT93 A	0	1499
X010000021	PROJECT MANAGEMENT	01APR94 A	30SEP94 A	0	1001
X010000022	PROJECT MANAGEMENT	03OCT94	29SEP98	998	3
X010000023	PROJECT MANAGEMENT	01OCT98	27SEP00	498	2
X010000024	END OF ALL IFOP SURVEILLANCE & MAINTENANCE	29SEP00	29SEP00	0	0
2.10.2.01.02	*PROJECT PLANNING*				
X010000025	PROJECT PLANNING	01APR94 A	30SEP94 A	0	751
X010000026	PROJECT PLANNING	03OCT94	29SEP97	748	1
X010000027	PROJECT PLANNING	01OCT97	28SEP99	498	2
2.10.2.20.01	*OTHER ENGINEERING SUPPORT*				
X020000001	SUBCONTRACT SUPPORT FY95	03OCT94	29SEP95	249	0
X020000004	CENTRAL ENGINEERING SUPPORT FY95 THUR FY2000	03OCT94	29SEP00	1499	0
X020000002	SUBCONTRACT SUPPORT FY96	02OCT95	30SEP96	250	0
X020000003	SUBCONTRACT SUPPORT FY97 - 2000	01OCT96	29SEP00	1000	0
2.10.2.20.02	*AUDITS AND ASSESSMENTS*				
X010000030	AUDITS AND ASSESSMENTS	01MAY94 A	30SEP94 A	0	1499
X010000031	AUDITS AND ASSESSMENTS	03OCT94	28SEP00	1498	1



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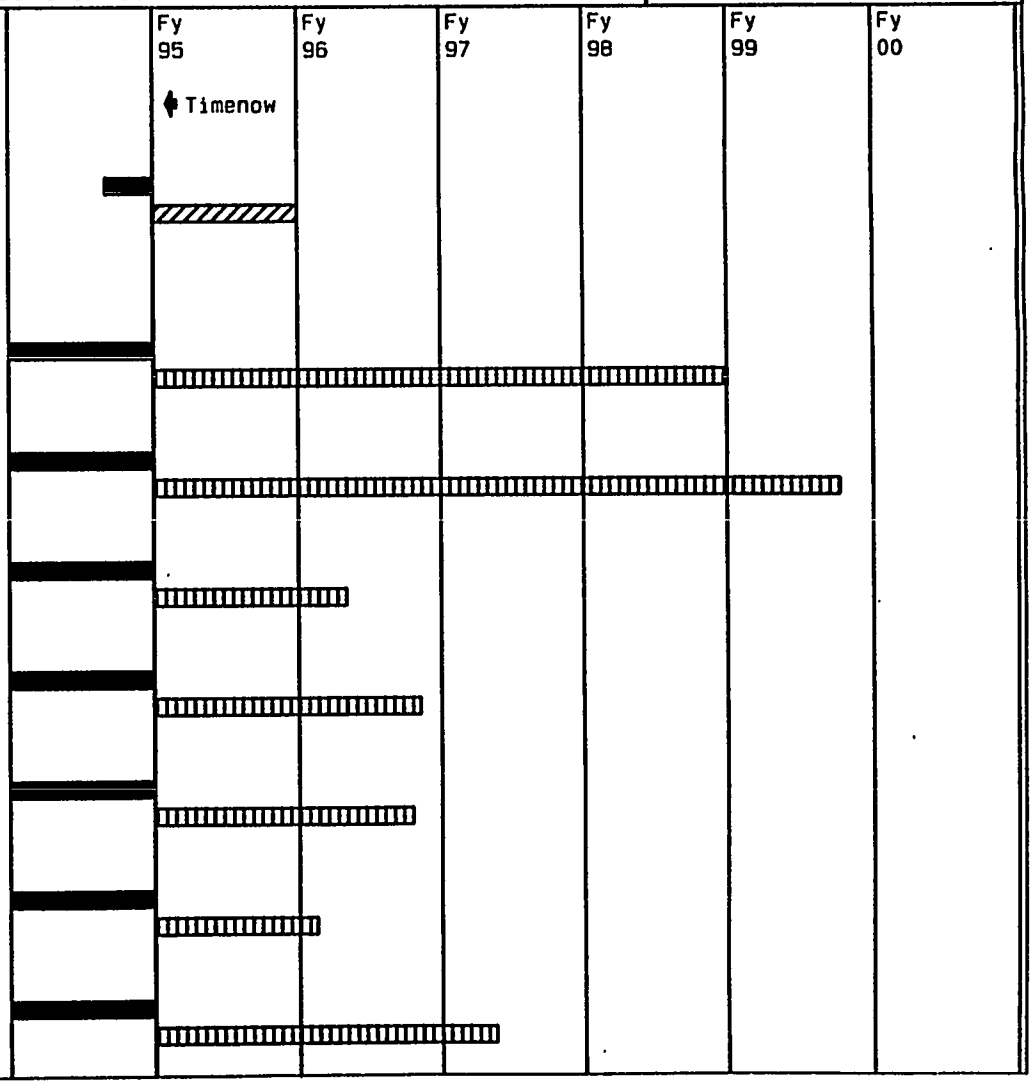
Activity	Description	Start	Finish	Dur	TF
2.10.2.20.02.01	*LIFECYCLE COST/RISK ANALYSIS*				
X010000028	LIFECYCLE COST/RISK ANALYSIS	01JUN94 A	30SEP94 A	0	1499
X010000029	LIFECYCLE COST/RISK ANALYSIS	03OCT94	29SEP95	249	1250
B1	*SURVEILLANCE & MAINTENANCE*				
2.10.2.02.01.04.02	*UTILITIES BUILDING 3026-C*				
X3026C0801	BUILDING 3026C UTILITIES	01OCT93 A	30SEP94 A	0	0
X3026C0802	BUILDING 3026C UTILITIES	03OCT94	01OCT98	1000	0
2.10.2.02.01.04.04	*UTILITIES BUILDING 3026-D*				
X302600801	BUILDING 3026D UTILITIES	01OCT93 A	30SEP94 A	0	0
X302600802	BUILDING 3026D UTILITIES	03OCT94	07JUL99	1189	0
2.10.2.02.01.06	*UTILITIES BUILDING 3028*				
X302800801	BUILDING 3028 UTILITIES	01OCT93 A	30SEP94 A	0	0
X302800802	BUILDING 3028 UTILITIES	03OCT94	30JAN96	330	0
2.10.2.02.01.08	*UTILITIES BUILDING 3029*				
X302900801	BUILDING 3029 UTILITIES	01OCT93 A	30SEP94 A	0	0
X302900802	BUILDING 3029 UTILITIES	03OCT94	06AUG96	461	0
2.10.2.02.01.10.02	*UTILITIES CENTER CIRCLE BUILDING 3030*				
X303000801	BUILDING 3030 UTILITIES	01OCT93 A	30SEP94 A	0	0
X303000802	BUILDING 3030 UTILITIES	03OCT94	17JUL96	447	0
2.10.2.02.01.10.04	*UTILITIES CENTER CIRCLE BUILDING 3031*				
X303100801	BUILDING 3031 UTILITIES	01OCT93 A	30SEP94 A	0	0
X303100802	BUILDING 3031 UTILITIES	03OCT94	14NOV95	281	0
2.10.2.02.01.10.06	*UTILITIES CENTER CIRCLE BUILDING 3032*				
X303200801	BUILDING 3032 UTILITIES	01OCT93 A	30SEP94 A	0	0
X303200802	BUILDING 3032 UTILITIES	03OCT94	14FEB97	592	0



OPEN PLAN (A)

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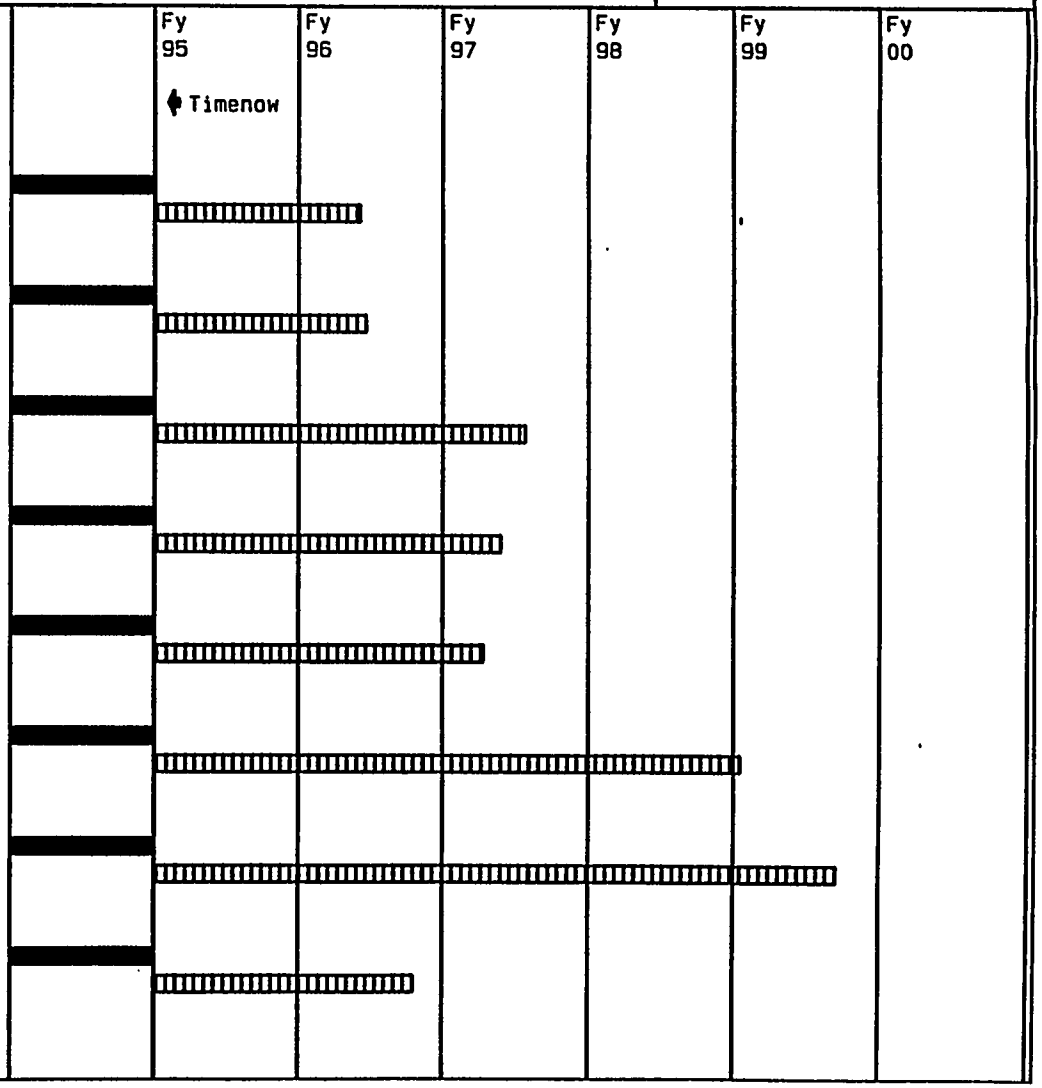
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.01.10.12	*UTILITIES CENTER CIRCLE BUILDING 3034*				
X303400801	BUILDING 3034 UTILITIES	01OCT93 A	30SEP94 A	0	0
X303400802	BUILDING 3034 UTILITIES	03OCT94	04MAR96	354	0
2.10.2.02.01.10.14	*UTILITIES CENTER CIRCLE BUILDING 3118*				
X311800801	BUILDING 3118 UTILITIES	01OCT93 A	30SEP94 A	0	0
X311800802	BUILDING 3118 UTILITIES	03OCT94	19MAR96	365	0
2.10.2.02.01.12.02	*UTILITIES BUILDING 3038-AHF*				
X3038A0801	BUILDING 3038-AHF UTILITIES	01OCT93 A	30SEP94 A	0	0
X3038A0802	BUILDING 3038-AHF UTILITIES	03OCT94	23APR97	639	0
2.10.2.02.01.12.04	*UTILITIES BUILDING 3038-E*				
X3038E0801	BUILDING 3038-E UTILITIES	01OCT93 A	30SEP94 A	0	0
X3038E0802	BUILDING 3038-E UTILITIES	03OCT94	19FEB97	595	0
2.10.2.02.01.12.06	*UTILITIES BUILDING 3038-N*				
X3038N0801	BUILDING 3038-N UTILITIES	01OCT93 A	30SEP94 A	0	0
X3038N0802	BUILDING 3038-N UTILITIES	03OCT94	08JAN97	566	0
2.10.2.02.01.14	*UTILITIES BUILDING 3047*				
X304700801	BUILDING 3047 UTILITIES	01OCT93 A	30SEP94 A	0	0
X304700802	BUILDING 3047 UTILITIES	03OCT94	16OCT98	1011	0
2.10.2.02.01.16	*UTILITIES BUILDING 3517*				
X351700801	BUILDING 3517 UTILITIES	01OCT93 A	30SEP94 A	0	0
X351700802	BUILDING 3517 UTILITIES	03OCT94	14JUN99	1174	0
2.10.2.02.01.18	*UTILITIES BUILDING 7025*				
X702500801	BUILDING 7025 UTILITIES	01OCT93 A	30SEP94 A	0	0
X702500802	BUILDING 7025 UTILITIES	03OCT94	18JUL96	448	0



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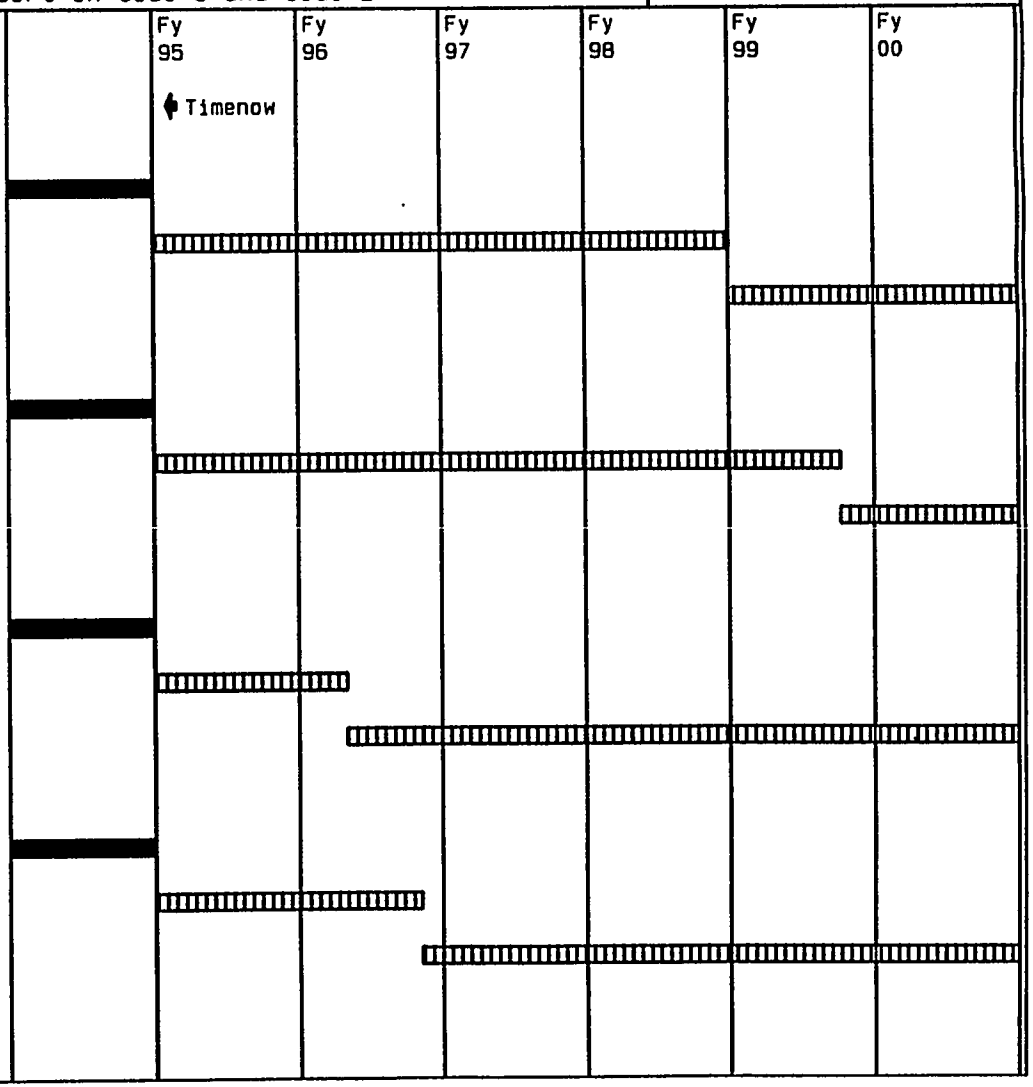
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.04.02	*BUILDING 3026-C S & M*				
X3026C0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3026C0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	01OCT98	1000	0
X3026C0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	02OCT98	29SEP00	499	0
2.10.2.02.04.04	*BUILDING 3026-D S & M*				
X3026D0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3026D0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	07JUL99	1189	0
X3026D0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	08JUL99	29SEP00	310	0
2.10.2.02.06	*BUILDING 3028 S & M*				
X3028D0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3028D0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	30JAN96	330	0
X3028D0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	31JAN96	29SEP00	1169	0
2.10.2.02.08	*BUILDING 3029 S & M*				
X3029D0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3029D0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	06AUG96	461	0
X3029D0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	07AUG96	29SEP00	1038	0



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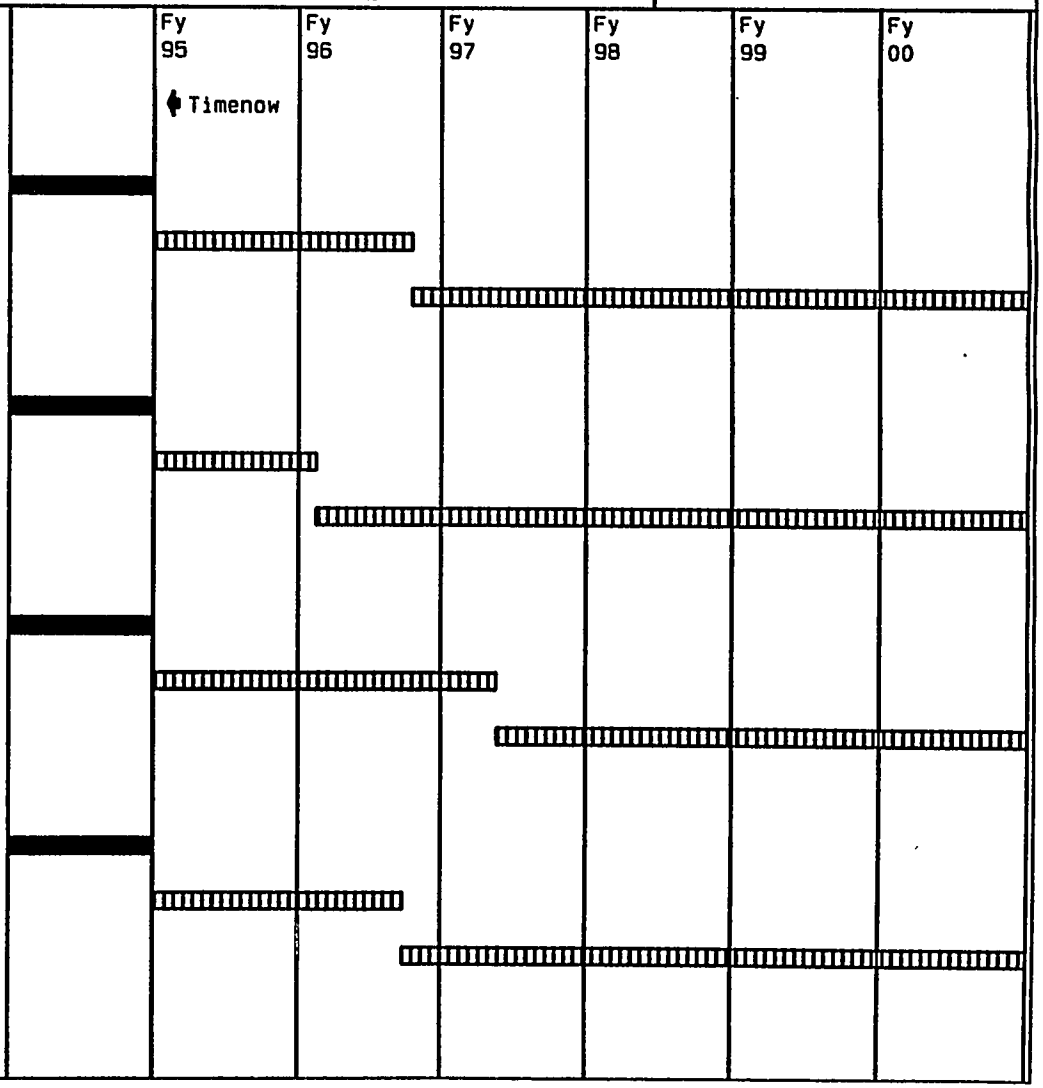
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.10.02	*CENTER CIRCLE BUILDING 3030 S & M*				
X303000810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X303000811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	17JUL96	447	0
X303000812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	18JUL96	29SEP00	1052	0
2.10.2.02.10.04	*CENTER CIRCLE BUILDING 3031 S & M*				
X030100810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X303100811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	14NOV95	281	0
X303100812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	15NOV95	29SEP00	1218	0
2.10.2.02.10.06	*CENTER CIRCLE BUILDING 3032 S & M*				
X303200810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X303200811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	14FEB97	592	0
X332000812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	17FEB97	29SEP00	907	0
2.10.2.02.10.08	*CENTER CIRCLE BUILDING 3033 S & M*				
X303300810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X303300811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	24JUN96	432	0
X303300812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	25JUN96	29SEP00	1067	0



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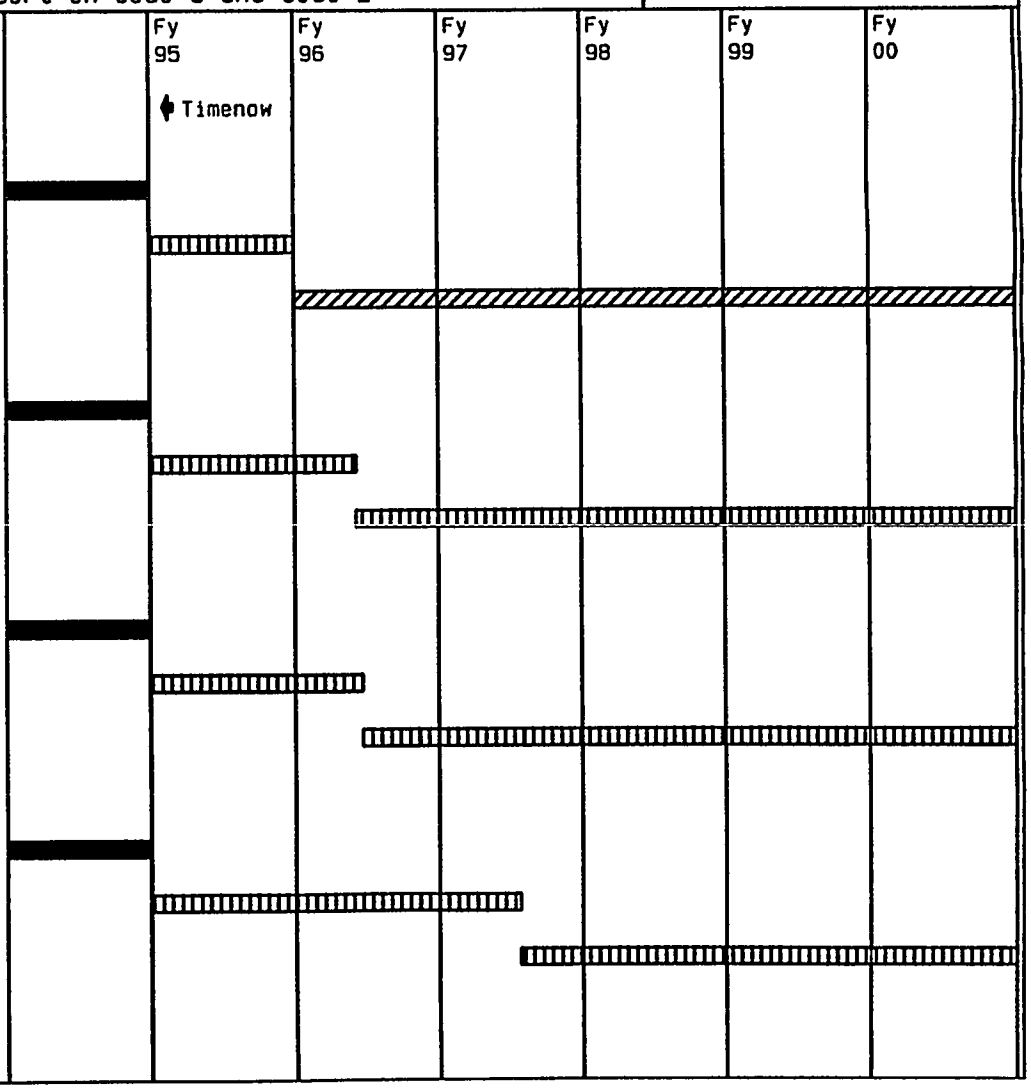
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.10.10	*CENTER CIRCLE BUILDING 3033-A S & M*				
X3033A0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3033A0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	29SEP95	249	0
X3033A0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	02OCT95	28SEP00	1249	1
2.10.2.02.10.12	*CENTER CIRCLE BUILDING 3034 S & M*				
X3034A0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3034A0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	04MAR96	354	0
X3034A0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	05MAR96	29SEP00	1145	0
2.10.2.02.10.14	*CENTER CIRCLE BUILDING 3118 S & M*				
X3118A0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3118A0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	19MAR96	365	0
X3118A0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	20MAR96	29SEP00	1134	0
2.10.2.02.12.02	*BUILDING 3038-NF S & M*				
X3038A0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3038A0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	23APR97	639	0
X3038A0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	24APR97	29SEP00	860	0



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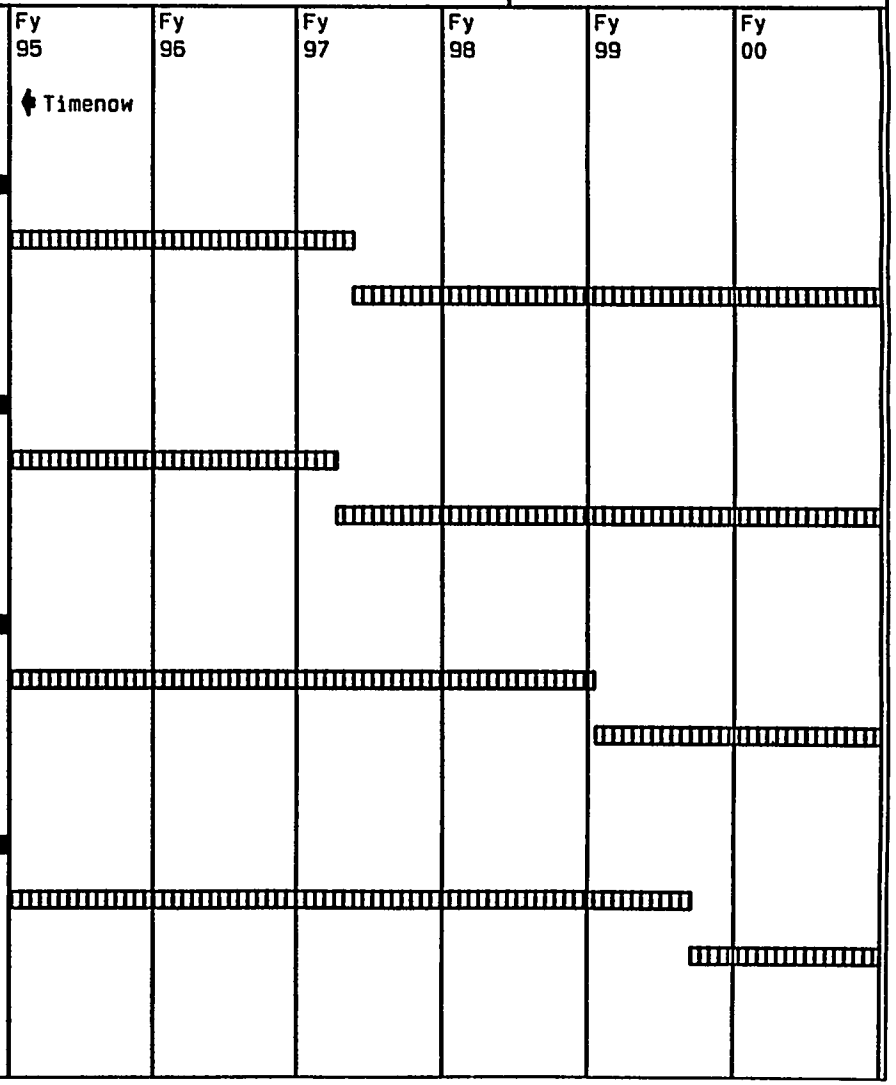
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.12.04	*BUILDING 3038-E S & M*				
X3038E0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3038E0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	19FEB97	595	0
X3038E0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	20FEB97	29SEP00	904	0
2.10.2.02.12.06	*BUILDING 3038-W S & M*				
X3038W0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3038W0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	08JAN97	566	0
X3038W0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	09JAN97	29SEP00	933	0
2.10.2.02.14	*BUILDING 3047 S & M*				
X3047O0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3047O0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	16OCT98	1011	0
X3047O0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	19OCT98	29SEP00	488	0
2.10.2.02.16	*BUILDING 3517 S & M*				
X3517O0810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X3517O0811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	14JUN99	1174	0
X3517O0812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	15JUN99	29SEP00	325	0



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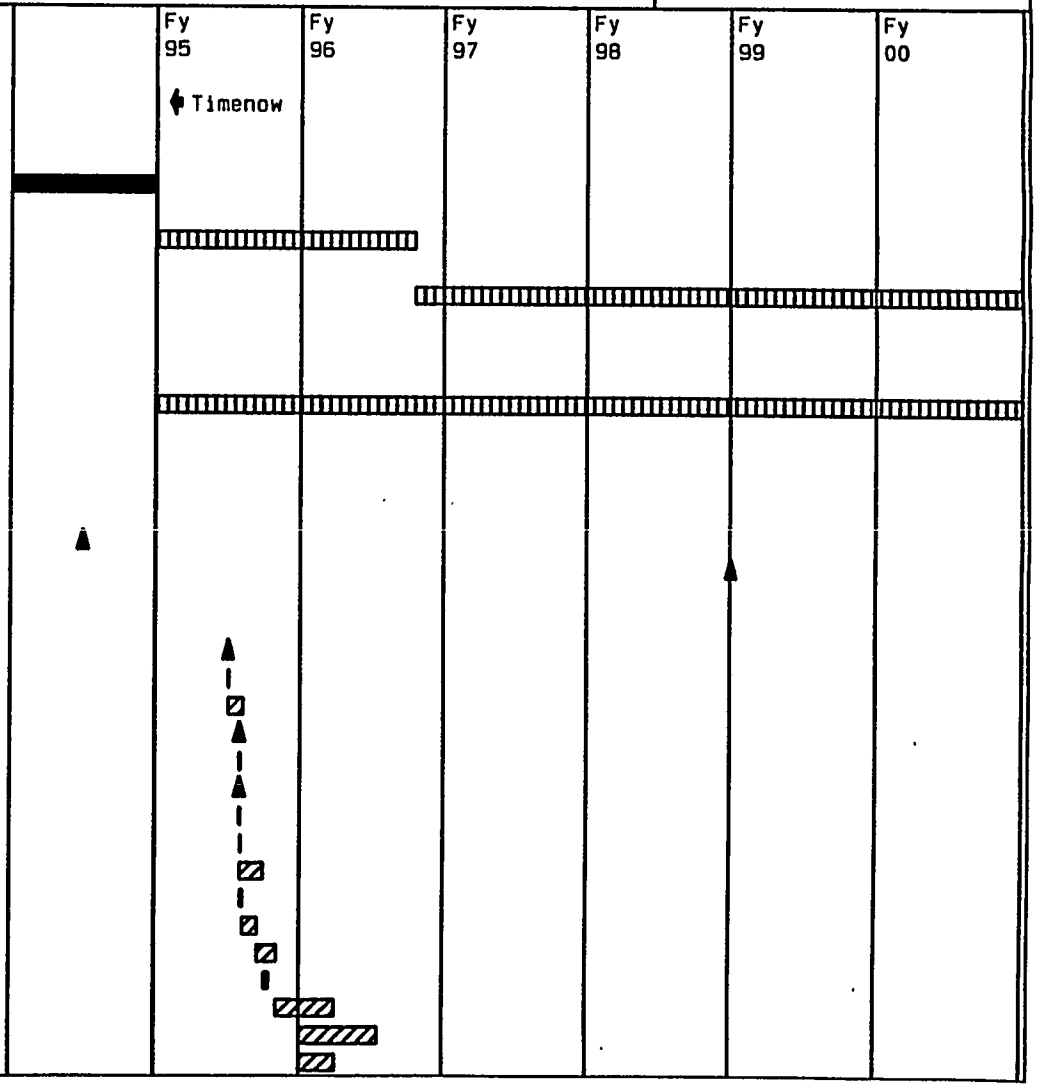
Activity	Description	Start	Finish	Dur	TF
2.10.2.02.18	*BUILDING 7025 S & M*				
X702500810	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	01OCT93 A	30SEP94 A	0	0
X702500811	SURVEILLANCE & MAINTENANCE (DURING DEACTIVATION)	03OCT94	18JUL96	448	0
X702500812	SURVEILLANCE & MAINTENANCE (AFTER DEACTIVATION)	19JUL96	29SEP00	1051	0
2.10.2.02.20	*OTHER SURVEILLANCE AND MAINTENANCE*				
X010000013	OTHER S & M	03OCT94	29SEP00	1499	0
C2	*BUILDING 3026-C*				
2.10.2.04	*BUILDING 3026 FACILITY DEACTIVATION*				
X3026C0000	BUILDING 3026-C DEACTIVATION START	01APR94 A	01APR94 A	0	676
X3026C0005	BUILDING 3026-C DEACTIVATION COMPLETE	02OCT98	01OCT98	0	0
2.10.2.04.01.02	*CONTAMINATION CONTROL - 3026-C*				
X3026C0095	START LAB 7 & 16 TRITIUM CLEAN-UP 0	03APR95	03APR95	0	714
X3026C0100	PROCURE WASTE CONTAINERS 7 & 16	03APR95	04APR95	2	714
X3026C0105	CLEAN TWO HOODS IN LAB 7	03APR95	10MAY95	27	714
X3026C0120	START CYLINDER DISPOSAL	01MAY95	01MAY95	0	533
X3026C0125	PROCURE LEAD DISPOSAL CONTAINR	01MAY95	02MAY95	2	533
X3026C0175	START KRYPTON COLUMNS 1,2,3,& 4 CLEAN-UP	01MAY95	01MAY95	0	570
X3026C0180	PROCURE WASTE CONTAINERS	01MAY95	02MAY95	2	570
X3026C0130	PROCURE CYLINDER DISPSL CONTNR	03MAY95	04MAY95	2	533
X3026C0185	PREPARE PROCEDURE	03MAY95	30JUN95	42	570
X3026C0135	TRNSFR XENON CYLNDRS FRN 3517	05MAY95	09MAY95	3	533
X3026C0140	DETERMINE METHOD OF DISPOSAL	10MAY95	15JUN95	26	533
X3026C0145	PREPARE KRYPTON CYLINDERS FOR DISPOSAL	16JUN95	03AUG95	33	533
X3026C0190	EVAL SYSTEM REMOVL RESIDL MATL	05JUL95	14JUL95	8	570
X3026C0150	UNLOAD KRYPTON & XENON CYLNDRS	04AUG95	27DEC95	99	533
X3026C0110	CLEAN LAB 16	02OCT95	16APR96	135	616
X3026C0195	CLEAN EQUIP IN KRYP CELLS 1-4	02OCT95	29DEC95	61	516



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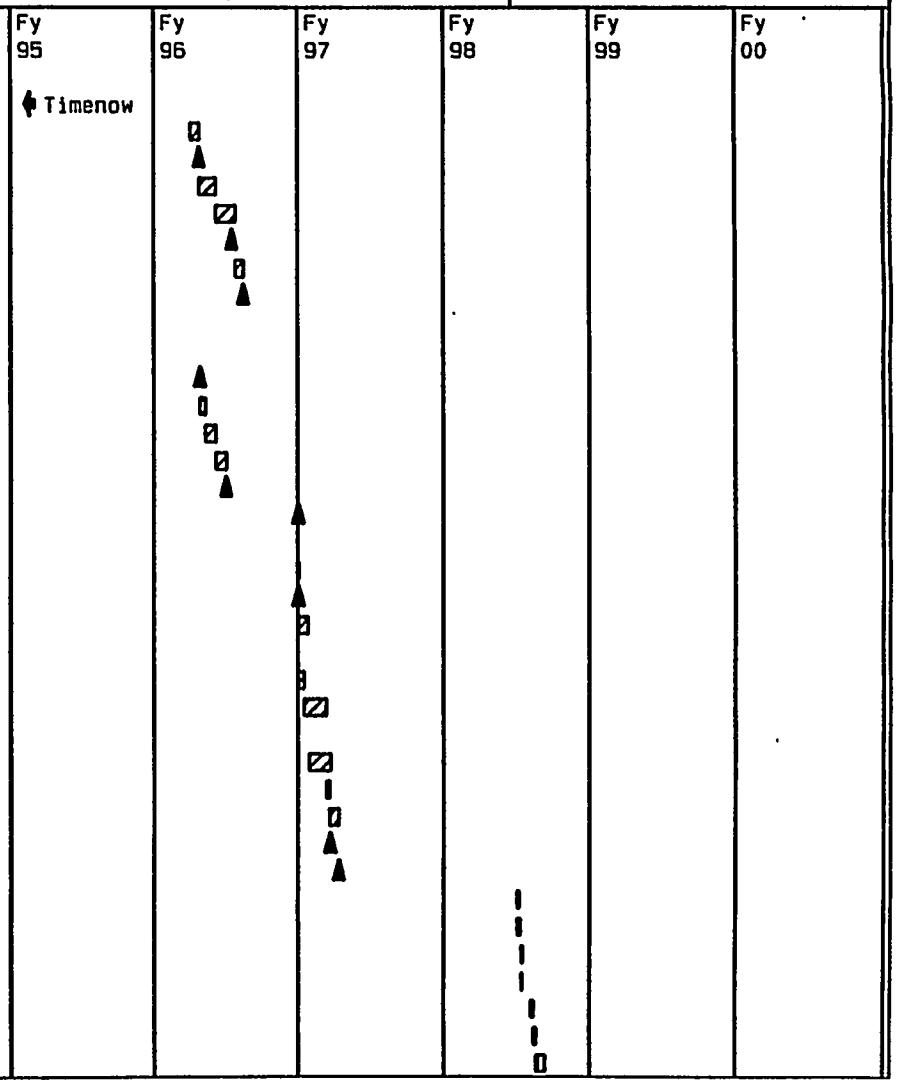
Activity	Description	Start	Finish	Dur	TF
X3026C0200	DISPOSE OF WASTE	02JAN96	23JAN96	15	516
X3026C0205	KRYPTON CLEANUP COMPLETE	23JAN96	23JAN96	0	516
X3026C0155	DISPOSE OF LEAD FROM CYLINDERS	24JAN96	05MAR96	30	516
X3026C0160	REMOVE VALVES	06MAR96	25APR96	36	516
X3026C0115	TRITIUN CLEANUP COMPLETE	16APR96	16APR96	0	616
X3026C0165	DISPOSE OF CYLINDERS	26APR96	16MAY96	15	516
X3026C0170	CYLINDER DISPOSAL COMPLETED	16MAY96	16MAY96	0	516
2.10.2.04.02.02	*. STRUCTURAL STABILIZATION - 3026-C*				
X3026C0245	CHILL WATER SYSTEM	25JAN96	25JAN96	0	556
X3026C0250	DRAIN CHILL WATER SYSTEM	25JAN96	07FEB96	10	556
X3026C0255	DISCONNECT REFRIGERATION COMPRESSORS	08FEB96	05MAR96	19	556
X3026C0260	DISCONNECT LINES FROM CELLS AND CAP	06MAR96	02APR96	20	556
X3026C0265	CHILL WATER SYSTEM CLEANUP COMPLETE	02APR96	02APR96	0	556
X3026C0210	START PIPING, UTILITY & ALARM DEACTIVATION	01OCT96	01OCT96	0	432
X3026C0215	PROCURE WASTE CONTAINERS	01OCT96	01OCT96	1	432
X3026C0270	START DUCTWORK DEACTIVATION	01OCT96	01OCT96	0	444
X3026C0275	EVALUATE AND RECOMMEND CELL EXHAUST DUCTWORK	01OCT96	25OCT96	19	444
X3026C0220	IDENTIFY AND DRAIN STAGNANT LIQUIDS	02OCT96	14OCT96	9	432
X3026C0225	DISCONNECT AND CAP ALL PIPING LINES TO 2 CELLS	15OCT96	09DEC96	38	432
X3026C0280	FABRICATE AND INSTALL BYPASS/BLANK	28OCT96	20DEC96	38	444
X3026C0230	DISPOSE OF WASTE	10DEC96	17DEC96	6	432
X3026C0235	IDENTIFY AND TAG ALL REMAINING LINES	18DEC96	10JAN97	15	432
X3026C0285	DUCTWORK DEACTIVATION COMPLETE	20DEC96	20DEC96	0	444
X3026C0240	UTILITY & ALARM DEACTIVATION COMPLETE	10JAN97	10JAN97	0	432
X3026C0400	PROCURE WASTE CONTAINERS	03APR98	06APR98	2	44
X3026C0405	EXCAVATE SUPPORT STEEL FOUNDATIONS	03APR98	09APR98	5	0
X3026C0410	POUR SUPPORT STEEL FOUNDATIONS	13APR98	14APR98	2	0
X3026C0440	DISPOSE OF WASTE	13APR98	13APR98	1	41
X3026C0415	ERECT STRUCTURAL SUPPORT STEEL	06MAY98	12MAY98	5	0
X3026C0420	ERECT ROOF SUPPORT STEEL	13MAY98	19MAY98	5	0
X3026C0425	INSTALL METAL ROOFING AND SIDING	20MAY98	10JUN98	15	0



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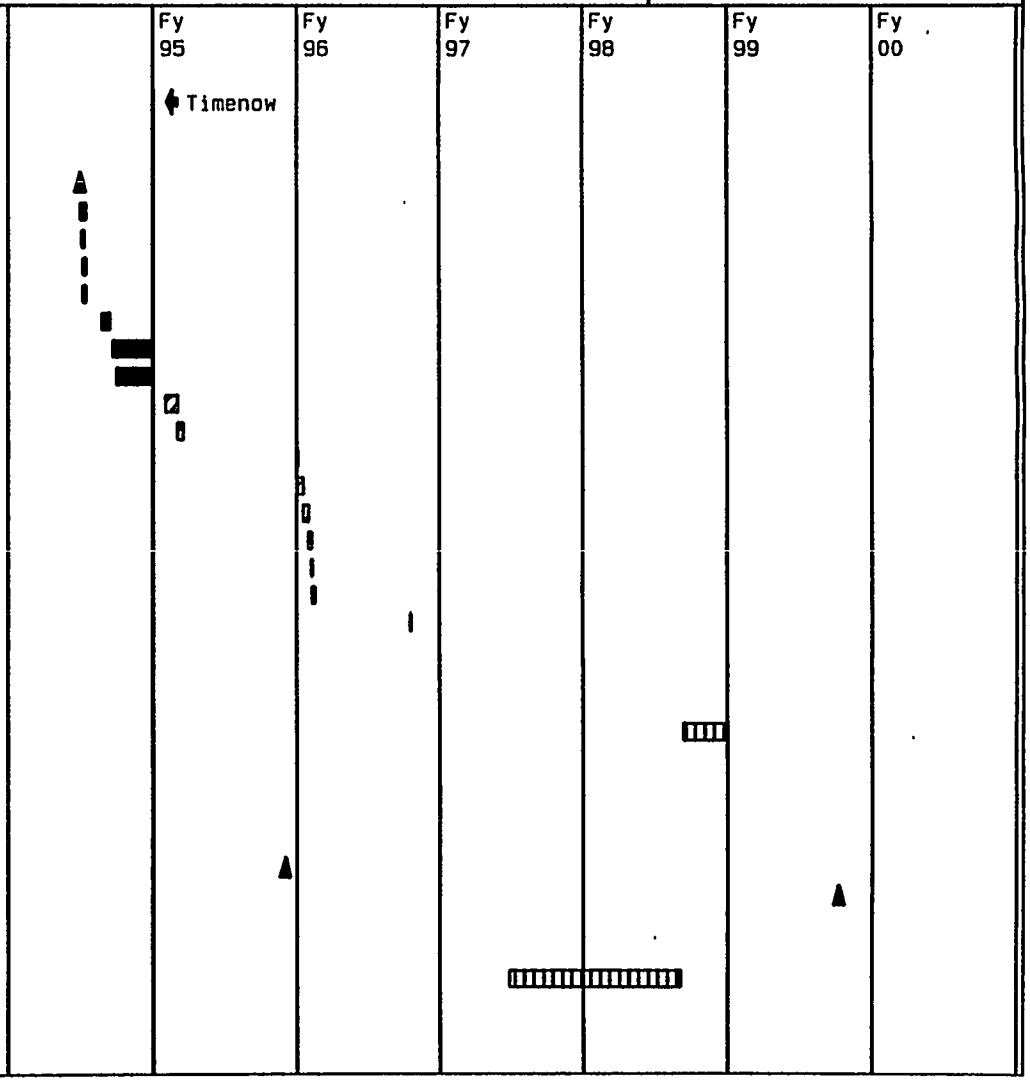
Activity	Description	Start	Finish	Dur	TF
2.10.2.04.08.02	*RL LIGHTS REMOVAL - 3026-C*				
X3026C0010	START RL LIGHT REPACKAGING	01APR94 A	01APR94 A	0	770
X3026C0015	PROCURE CONTAINERS/PACKAGES/(100 DRUMS)	01APR94 A	14APR94 A	0	770
X3026C0020	PREPARE LAB	05APR94 A	11APR94 A	0	770
X3026C0025	RANSPAC PANELS	08APR94 A	15APR94 A	0	770
X3026C0030	PACKAGE PANELS	08APR94 A	15APR94 A	0	770
X3026C0035	ALL PANELS SHIPPED (3 SHIPMENTS)	26MAY94 A	14JUN94 A	0	770
X3026C0040	PACKAGE WANDS (5 SHIPMENTS TO GO)	22JUN94 A	30SEP94 A	0	770
X3026C0045	RANSPAC WANDS	01JUL94 A	30SEP94 A	0	770
X3026C0065	INVENTORY LOOSE TUBES	02NOV94	01DEC94	20	770
X3026C0070	PACKAGE LOOSE TUBES	02DEC94	15DEC94	10	770
X3026C0050	ALL WANDS SHIPPED	02OCT95	02OCT95	1	552
X3026C0055	DISMANTLE LEAKING FIXTURES	03OCT95	16OCT95	10	552
X3026C0060	PACKAGE WASTE 1	17OCT95	30OCT95	10	552
X3026C0075	RANSPAC TUBES	31OCT95	07NOV95	6	552
X3026C0080	ALL TUBES SHIPPED	08NOV95	08NOV95	1	552
X3026C0085	WASTE PACKAGING	09NOV95	15NOV95	5	552
X3026C0090	WASTE DISPOSAL (MAY SHIP OFFSITE) UNDETERMINED	18JUL96	18JUL96	1	552
2.10.2.04.10.02	*FINAL FACILITY REPORT - 3026-C*				
X3026C0335	PREPARE AND ISSUE FINAL FACILITY REPORT	11JUN98	01OCT98	78	0
C3	*BUILDING 3026-D*				
2.10.2.04	*BUILDING 3026 FACILITY DEACTIVATION*				
X302600000	BUILDING 3026-D DEACTIVATION START	01SEP95	01SEP95	0	0
X302600005	BUILDING 3026-D DEACTIVATION COMPLETE	08JUL99	07JUL99	0	0
2.10.2.04.01.04	*CONTAMINATION CONTROL - 3026-D*				
X302600010	REMOVE INVENTORY	27MAR97	02JUN98	296	0



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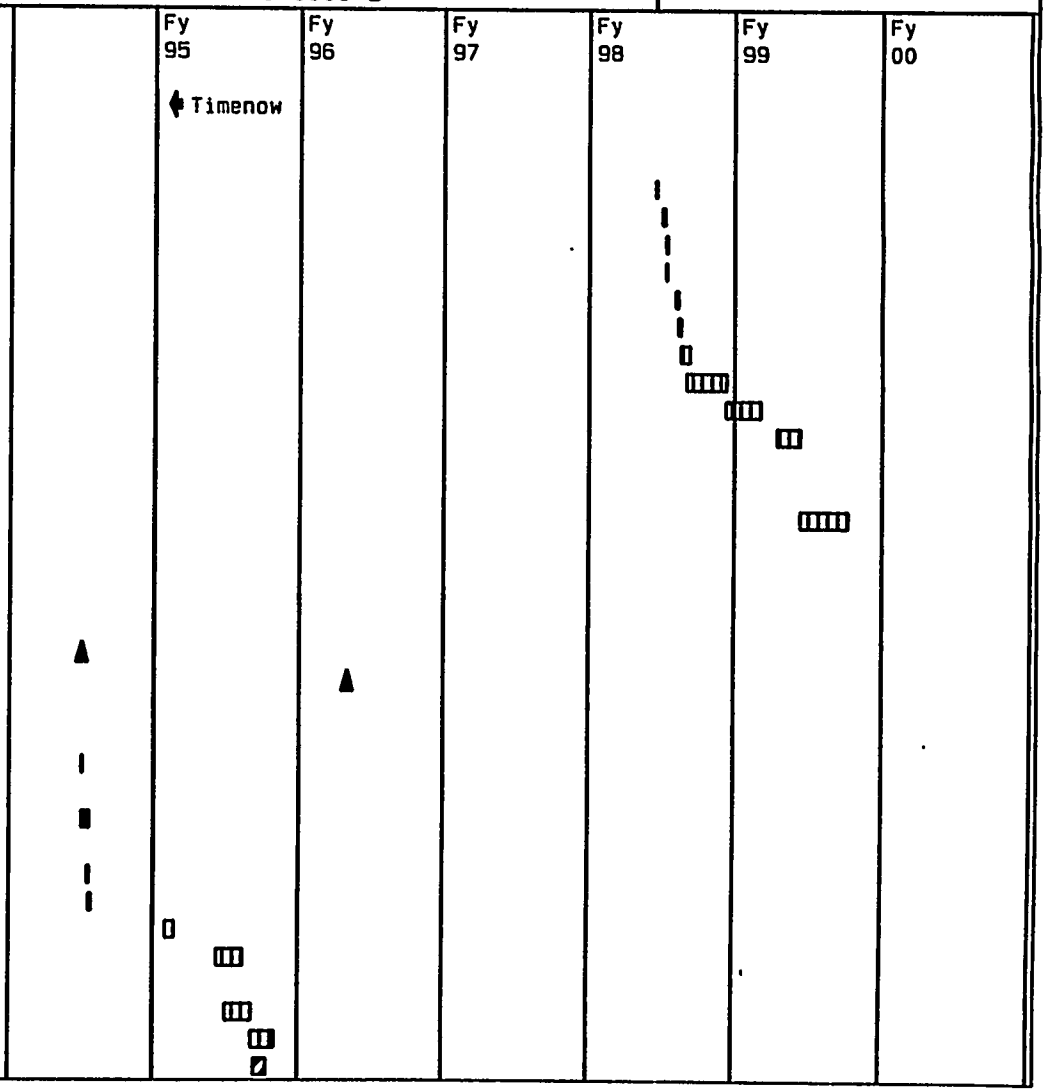
Activity	Description	Start	Finish	Dur	TF
2.10.2.04.02.04	*STRUCTURAL STABILIZATION - 3026-D*				
X302600400	PROCURE WASTE CONTAINERS	16MAR98	19MAR98	2	0
X302600405	EXCAVATE SUPPORT STEEL FOUNDATIONS	03APR98	09APR98	5	0
X302600410	POUR SUPPORT STEEL FOUNDATIONS	13APR98	14APR98	2	0
X302600440	DISPOSE OF WASTE	13APR98	13APR98	1	308
X302600415	ERECT STRUCTURAL SUPPORT STEEL	06MAY98	12MAY98	5	0
X302600420	ERECT ROOF SUPPORT STEEL	13MAY98	19MAY98	5	0
X302600425	INSTALL METAL ROOFING AND SIDING	20MAY98	10JUN98	15	0
X302600015	CLEAN CELLS	03JUN98	09SEP98	68	0
X302600020	DRAIN WINDOWS	10SEP98	04DEC98	60	0
X302600025	PIPING SERVICES	14JAN99	11MAR99	40	0
2.10.2.04.10.04	*FINAL FACILITY REPORT - 3026-D*				
X302600060	PREPARE & ISSUE FINAL FACILITY REPORT	12MAR99	07JUL99	80	0
01	*BUILDING 3028*				
2.10.2.06	*BUILDING 3028 FACILITY DEACTIVATION*				
X302600000	BUILDING 3028 DEACTIVATION START	01APR94 A	01APR94 A	0	21
X302600005	BUILDING 3028 DEACTIVATION COMPLETE	31JAN96	30JAN96	0	0
2.10.2.06.01	*CONTAMINATION CONTROL - 3028*				
X302600010	START CELL CLEANUP PROCESS FOR BUILDING 3028	01APR94 A	02APR94 A	0	330
X302600015	DETERMINE WATER SHIELDING NEEDS FOR CELLS 1-4	01APR94 A	20APR94 A	0	330
X302600020	SAMPLE WATER SHIELDING	15APR94 A	20APR94 A	0	330
X302600025	ANALYZE SAMPLES	20APR94 A	25APR94 A	0	330
X302600030	PROCURE WASTE CONTAINERS	01NOV94	21NOV94	15	0
X302600035	REPLACE ALL MANIPULATOR BOOTS, GLOVES, ETC	10MAR95	12MAY95	45	0
X302600040	REMOVE WASTE FROM CELLS 1-5	31MAR95	05JUN95	45	0
X302600045	REMOVE WASTE FROM CELL 6	06JUN95	02AUG95	40	0
X302600070	FABRICATE REAR CELL COVERS	12JUN95	11JUL95	20	126



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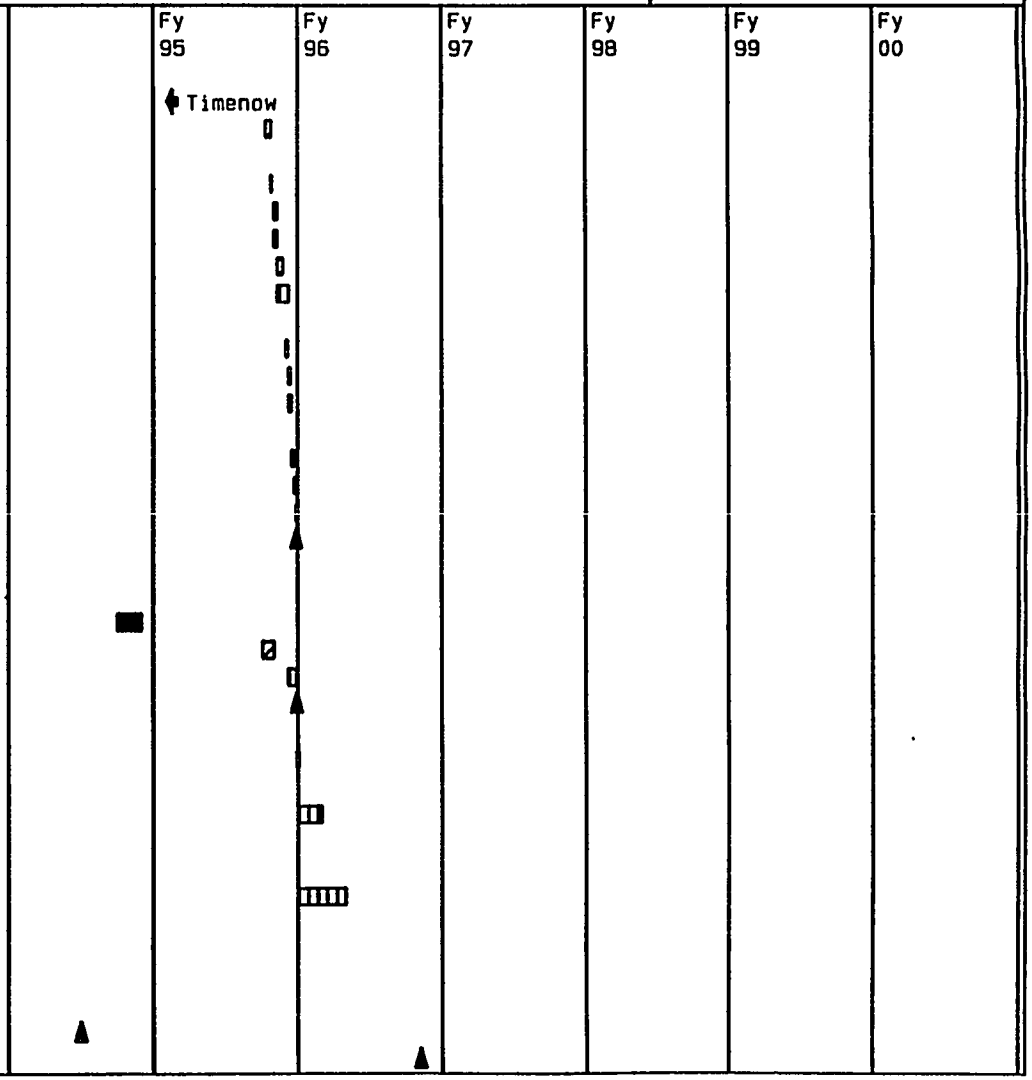
Activity	Description	Start	Finish	Dur	TF
X302800075	REMVE GLOVEPRT COVERS & REPLACE W/NEW REAR COVR	12JUL95	25JUL95	10	126
X302800080	DISPOSE OF GLOVEPORT COVERS	26JUL95	27JUL95	2	126
X302800035	CLEAN CELLS	03AUG95	09AUG95	5	107
X302800085	DRAIN SHIELDING TANKS TO PROCESS WASTE	03AUG95	09AUG95	5	0
X302800065	DISPOSE OF CELL CLEAN-UP WASTE	10AUG95	23AUG95	10	107
X302800090	DISCONNECT, DRAIN AND CAP ALL PIPING TO CELLS	10AUG95	07SEP95	20	0
X302800050	DISPOSE OF CELL WASTE	01SEP95	05SEP95	2	16
X302800095	DISPOSE OF PIPING WASTE	08SEP95	11SEP95	2	95
X302800100	SECURE MANIPULATOR & COVER FOR LONG TERM STORGE	08SEP95	14SEP95	5	0
X302800105	SECURE CELL ACCESS	15SEP95	21SEP95	5	0
X302800110	CHANGE CELL EXHAUST FILTERS	22SEP95	25SEP95	2	0
X302800115	DISPOSE OF FILTERS	26SEP95	27SEP95	2	0
X302800120	CELL CLEANUP COMPLETE FOR BUILDING 3028	27SEP95	27SEP95	0	0
2.10.2.06.02	*STRUCTURAL STABILIZATION - 3028*				
X302800190	SEAL EXTERIOR ACTIVITIES	01JUL94 A	31AUG94 A	0	212
X302800130	IDENTIFY AND LABEL PIPING SERVICES	05JUL95	01AUG95	20	25
X302800135	DISCONNECT AND DRAIN PIPING	07SEP95	27SEP95	15	0
X302800125	DEACTIVATE PIPING SERVICES TO CELLS/HOODS/BOXS	28SEP95	28SEP95	0	0
X302800140	PREPARE A MASTER PIPING LIST FOR D&D OPERATIONS	28SEP95	02OCT95	3	0
X302800185	FIRE PROTECTION ACTIVITIES	03OCT95	29NOV95	40	0
2.10.2.06.10	*FINAL FACILITY REPORT - 3028*				
X302800180	FINAL FACILITY REPORT	03OCT95	30JAN96	80	0
E1	*BUILDING 3029*				
2.10.2.08	*BUILDING 3029 FACILITY DEACTIVATION*				
X302900000	BUILDING 3029 DEACTIVATION START	01APR94 A	01APR94 A	0	203
X302900005	BUILDING 3029 DEACTIVATION COMPLETE	07AUG96	06AUG96	0	0



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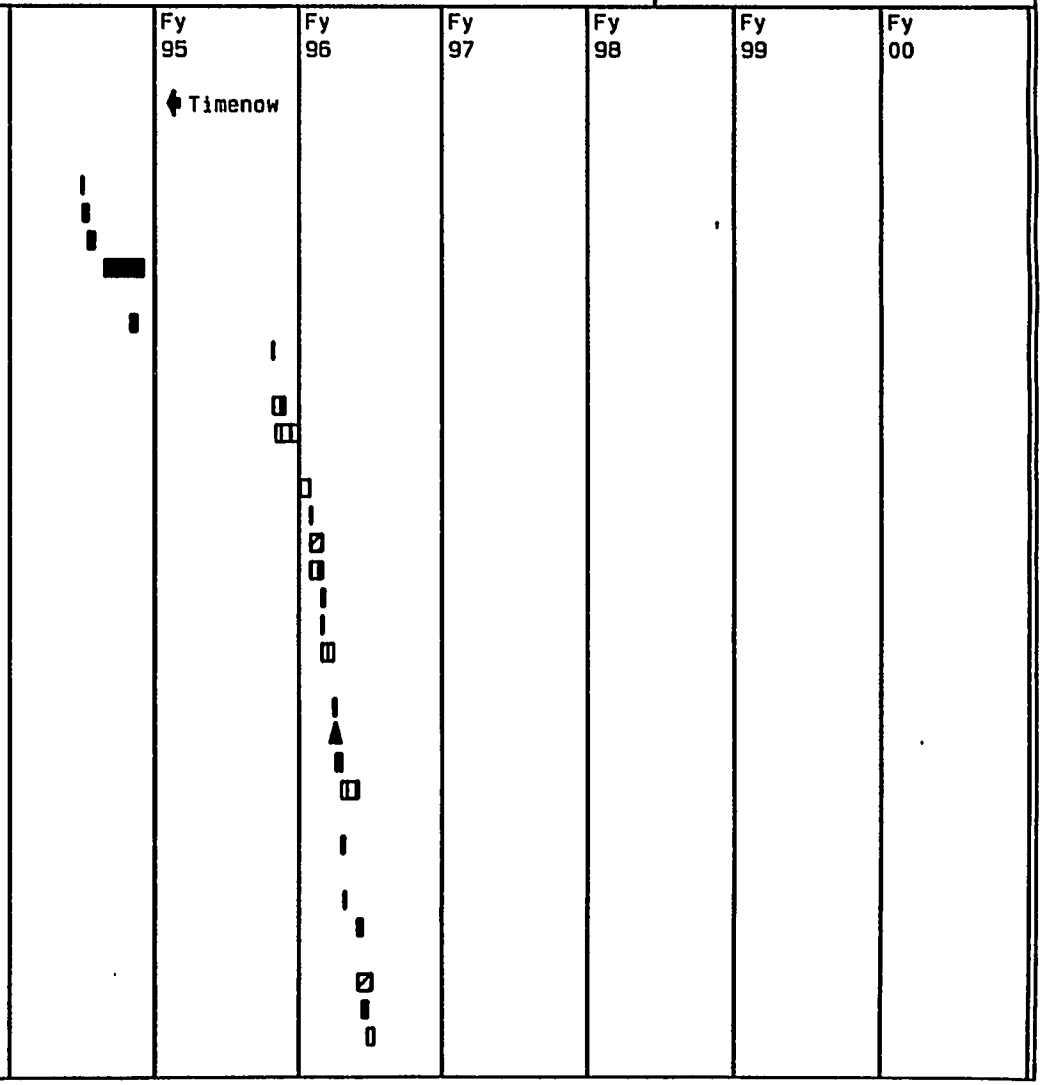
2.10.2.08.01	*CONTAMINATION CONTROL - 3029*				
X302900010	PROCURE WASTE CONTAINERS	01APR94 A	02APR94 A	0	461
X302900015	REMOVE COBALT AND SWAB STORAGE HOLES	03APR94 A	15APR94 A	0	461
X302900020	DESIGN 60Co STORAGE CAN	15APR94 A	30APR94 A	0	381
X302900025	TRANSFER 60Co TO RETRIEVABLE STORAGE (DRY RUN)	27MAY94 A	31AUG94 A	0	381
X302900030	REPLACE MANIPULATOR BOOTS AS REQUIRED	01AUG94 A	15AUG94 A	0	381
X302900085	PROCURE WASTE CONTAINERS FOR Cs-137 WASTE	27JUL95	27JUL95	1	0
X302900090	CLEAN CELL 3	28JUL95	24AUG95	20	0
X302900100	EVALUATE REPAIR REPLACEMENT REMOVAL OF TRUCKS	04AUG95	29SEP95	40	0
X302900095	REMOVE LEAD SHIELDING & CLEAN FLOOR AREA	02OCT95	27OCT95	20	0
X302900105	DISPOSE OF WASTE FROM FLOOR CEILING	30OCT95	31OCT95	2	190
X302900110	CLEAN LEAD	30OCT95	28NOV95	20	168
X302900120	REPAIR/REPLACE TRUCK UNDER CELL 3 DOOR	30OCT95	28NOV95	20	0
X302900115	DISPOSE OF LEAD	29NOV95	04DEC95	4	168
X302900125	DISPOSE OF WASTE	29NOV95	30NOV95	2	170
X302900130	OPEN CELL 3 DOOR & CLEAN UNDER DOOR/TRACK AREA	29NOV95	28DEC95	20	0
X302900135	DISPOSE OF WASTE FROM TRACK AREA	29DEC95	02JAN96	2	0
X302900145	Cs-137 WASTE CLEAN-UP COMPLETE	02JAN96	02JAN96	0	70
X302900140	REPAIR FLOOR AND TRACK REQUIRED	03JAN96	17JAN96	10	0
X302900035	REMOVE WASTE FROM CELLS (STILL NOT ALLOWED 5/19)	18JAN96	28FEB96	30	0
X302900050	DISCONNECT DRAIN & CAP ALL PIPING TO CELLS	18JAN96	24JAN96	5	133
X302900060	DISPOSE OF PIPING WASTE	25JAN96	26JAN96	2	133
X302900040	DISPOSE OF CELL WASTE (STILL NOT ALLOWED 5/19)	29FEB96	11MAR96	8	0
X302900045	CLEAN CELLS	29FEB96	03APR96	25	75
X302900075	CHANGE CELL EXHAUST FILTERS	12MAR96	25MAR96	10	0
X302900065	SECURE MANIPULATORS & COVER FOR LONG TERM STG	26MAR96	09APR96	10	0



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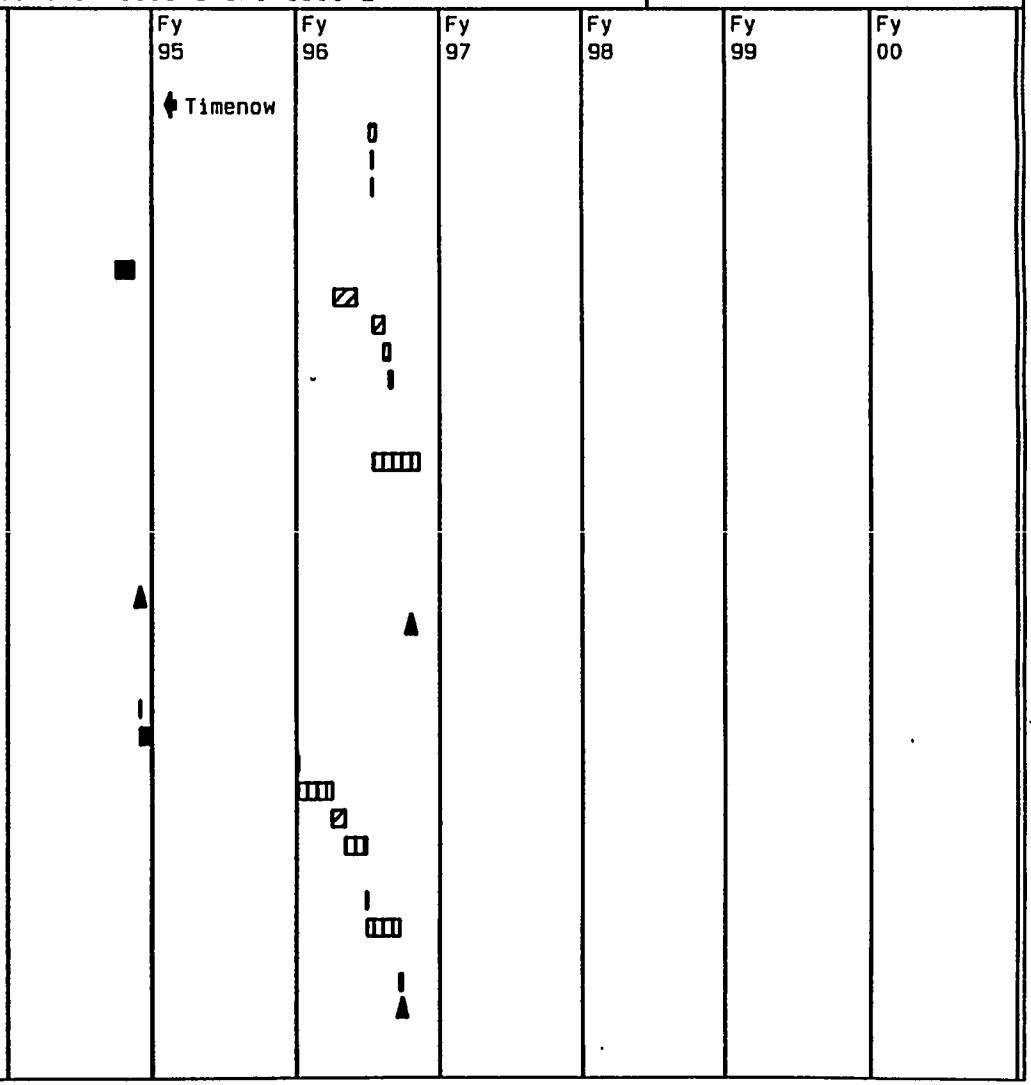
Activity	Description	Start	Finish	Dur	TF
X302900055	DISPOSE OF CONTAMINATED WASTE	04APR96	18APR96	10	75
X302900070	SECURE CELL ACCESS	10APR96	11APR96	2	0
X302900080	DISPOSE OF WASTE FILTERS	10APR96	11APR96	2	47
2.10.2.08.02	*STRUCTURAL STABILIZATION - 3029*				
X302900210	SEAL EXTERIOR ACTIVITIES	01JUL94 A	15AUG94 A	0	461
X302900205	FIRE PROTECTION ACTIVITIES	03JAN96	28FEB96	40	70
X302900150	IDENTIFY & LABEL ALL PIPING SERVICES	12APR96	09MAY96	20	47
X302900155	DISCONNECT & DRAIN PIPING	10MAY96	23MAY96	10	47
X302900160	PREPARE MASTER PIPING LIST	24MAY96	29MAY96	3	47
2.10.2.08.10	*FINAL FACILITY REPORT - 3029*				
X302900200	FINAL FACILITY REPORT	12APR96	06AUG96	80	0
F1	*CENTER CIRCLE BLDG 3030*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3116) FACILITY DEACTIVATION*				
X303000000	BUILDING 3030 DEACTIVATION START	01SEP94 A	01SEP94 A	0	249
X303000005	BUILDING 3030 DEACTIVATION COMPLETE	18JUL96	17JUL96	0	0
2.10.2.10.01.02	*CONTAMINATION CONTROL - 3030*				
X303000010	PROCURE WASTE CONTAINERS	01SEP94 A	01SEP94 A	0	249
X303000015	REMOVE WASTE MATERIAL CELL	02SEP94 A	30SEP94 A	0	249
X303000025	DISPOSE OF CELL WASTE	020CT95	030CT95	2	0
X303000030	CLEAN CELL	040CT95	28DEC95	58	0
X303000035	REPLACE CELL DOOR GASKET	29DEC95	29JAN96	20	118
X303000040	DISCONNECT & CAP ALL PIPING LINES TO CELL	30JAN96	25MAR96	40	0
X303000045	DISPOSE OF PIPING WASTE	26MAR96	27MAR96	2	76
X303000050	SECURE CELL ACCESS PORTS & CELL PENETRATIONS	28MAR96	17JUN96	56	0
X303000052	CHANGE CELL FILTERS	18JUN96	24JUN96	5	15
X303000054	CLEAN-UP/DEACTIVATION OF CELL COMPLETE	25JUN96	24JUN96	0	15



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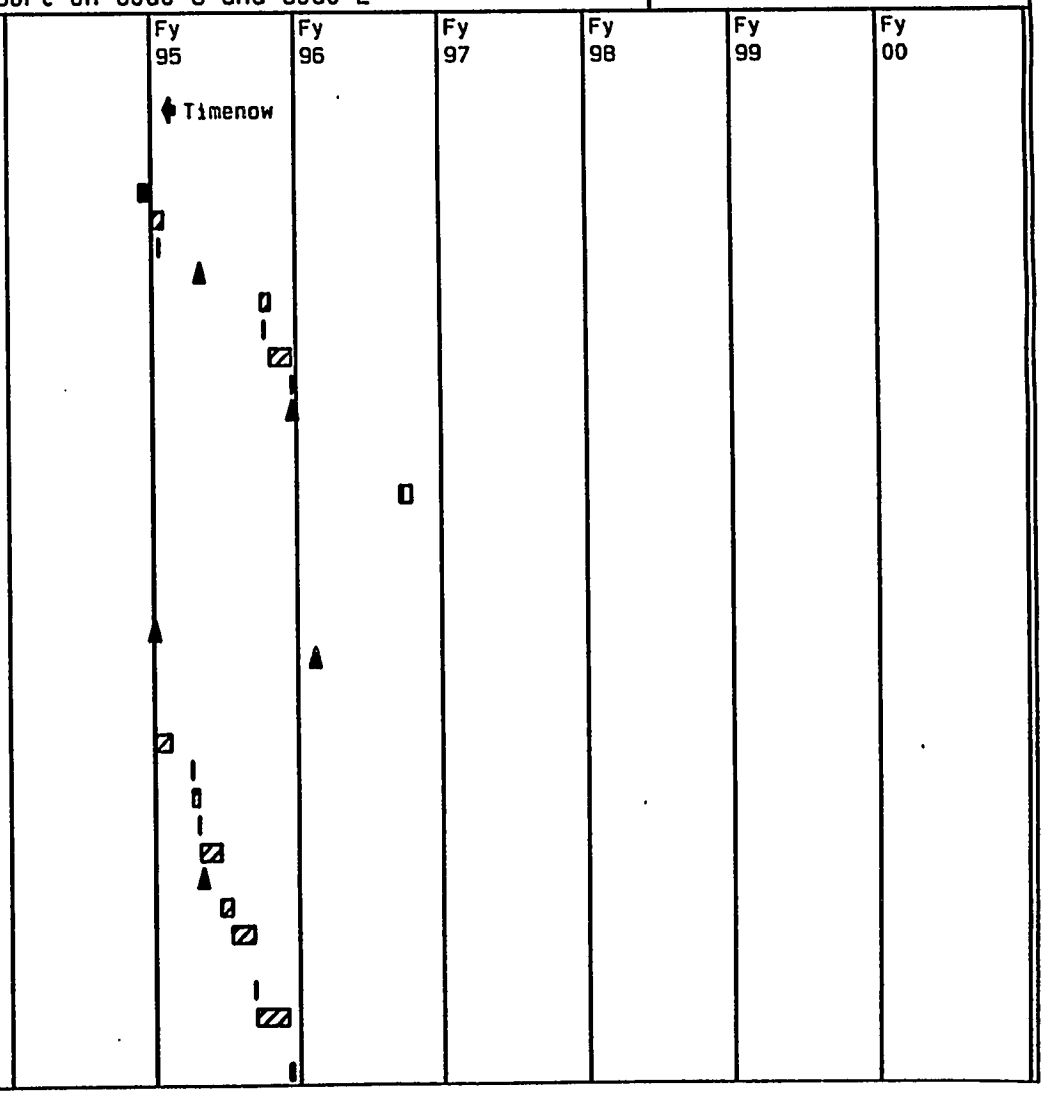
2.10.2.10.02.02	*STRUCTURAL STABILIZATION - 3030*				
X303000110	SEAL EXTERIOR ACTIVITIES	01SEP94 A	30SEP94 A	0	427
X303000055	CLEAN HOODS	03OCT94	31OCT94	21	371
X303000060	DISPOSE OF CONTAMINATED WASTE	18OCT94	19OCT94	2	434
X303000062	HOOD CLEAN-UP COMPLETE	30JAN95	27JAN95	0	368
X303000065	ID ALL PIPES, VALVES, ETC.	05JUL95	25JUL95	15	205
X303000070	PROCURE WASTE CONTAINERS	11JUL95	11JUL95	1	215
X303000080	DISCONNECT & CAP ALL SERVICE PIPING	26JUL95	18SEP95	38	205
X303000085	DISPOSE OF SERVICE PIPING WASTE	19SEP95	20SEP95	2	205
X303000090	DEACTIVATION OF SERVICES COMPLETE	21SEP95	20SEP95	0	205
2.10.2.10.10.02	*FINAL FACILITY REPORT - 3030*				
X303000105	FINAL FACILITY REPORT	18JUN96	17JUL96	20	0
F2	*CENTER CIRCLE BLDG 3031*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3118) FACILITY DEACTIVATION*				
X303100000	BUILDING 3031 DEACTIVATION START	03OCT94	03OCT94	0	73
X303100005	BUILDING 3031 DEACTIVATION COMPLETE	15NOV95	14NOV95	0	0
2.10.2.10.01.04	*CONTAMINATION CONTROL - 3031*				
X303100010	CLEAN HOODS	03OCT94	11NOV94	30	201
X303100027	PROCURE WASTE CONTAINERS	03JAN95	03JAN95	1	12
X303100030	REMOVE WASTE MATERIAL FROM CELL	04JAN95	18JAN95	10	12
X303100035	DISPOSE OF CELL WASTE	19JAN95	20JAN95	2	12
X303100015	CLEAN OUT CELLS	23JAN95	15MAR95	38	12
X303100012	CLEAN-UP OF CELL WASTE COMPLETE	30JAN95	30JAN95	0	201
X303100025	REPLACE CELL DOOR GASKET	16MAR95	12APR95	20	12
X303100036	DISCONNECT & CAP ALL PIPING LINES TO CELL	13APR95	07JUN95	38	12
X303100037	DISPOSE OF PIPING WASTE	08JUN95	09JUN95	2	12
X303100020	SECURE CELL ACCESS PORTS & MISC CELL PENETRATIONS	12JUN95	01SEP95	58	12
X303100039	CHANGE CELL FILTERS	05SEP95	11SEP95	5	12



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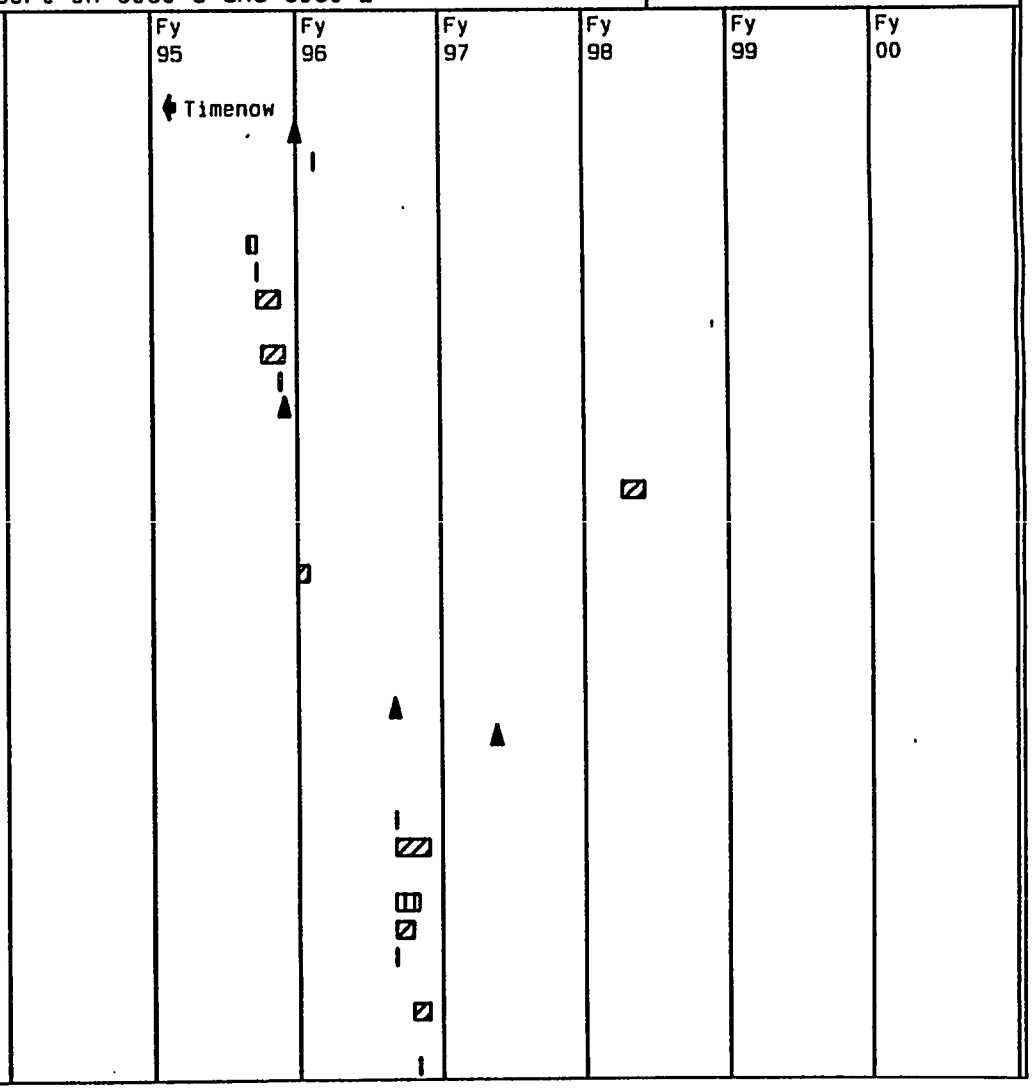
Activity	Description	Start	Finish	Dur	TF
X303100040	CLEAN-UP OF CELL WASTE COMPLETE	29SEP95	29SEP95	0	12
X303100011	DISPOSE OF HOOD WASTE	13NOV95	14NOV95	2	0
2.10.2.10.02.04	*STRUCTURAL STABILIZATION - 3031*				
X303100045	ID ALL VALVES, PIPES	01JUN95	21JUN95	15	0
X303100050	PROCURE WASTE CONTAINERS	22JUN95	22JUN95	1	33
X303100055	DISCONNECT & CAP ALL PIPING LINES TO CELL	23JUN95	17AUG95	38	33
X303100090	SEAL EXTERIOR ACTIVITIES	05JUL95	29AUG95	40	54
X303100060	DISPOSE OF PIPING WASTE	18AUG95	21AUG95	2	33
X303100065	DEACTIVATION OF SERVICES COMPLETE	30AUG95	30AUG95	0	33
2.10.2.10.07.04	*REROOF BUILDINGS 3031*				
X303100070	REROOF BUILDINGS 3030, 3031, & 3118	05JAN98	02MAR98	40	647
2.10.2.10.10.04	*FINAL FACILITY REPORT - 3031*				
X303100110	FINAL FACILITY REPORT	02OCT95	27OCT95	20	12
F3	*CENTER CIRCLE BLDG 3032*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3118) FACILITY DEACTIVATION*				
X303200000	BUILDING 3032 DEACTIVATION START	03JUN96	03JUN96	0	0
X303200005	BUILDING 3032 DEACTIVATION COMPLETE	17FEB97	14FEB97	0	0
2.10.2.10.01.06	*CONTAMINATION CONTROL - 3032*				
X303200025	PROCURE WASTE CONTAINERS	03JUN96	03JUN96	1	173
X303200030	DEMO CABINETS, PACK WASTE, CLEAN/WIPEDOWN BLDG	03JUN96	27AUG96	60	96
X303200205	CLEAN HOODS	03JUN96	30JUL96	40	0
X303200210	DESIGN BLANKS TO CAP OFF FLEX HOSE HOLE	03JUN96	16JUL96	30	31
X303200200	PROCURE CONTAINERS FOR ELECTRICAL/PIPING WASTE	03JUN96	03JUN96	1	90
X303200245	FABRICATE BLANKS TO CAP OFF FLEX HOSE HOLE	17JUL96	27AUG96	30	31
X303200215	DISPOSE OF CONTAMINATED WASTE	31JUL96	01AUG96	2	134



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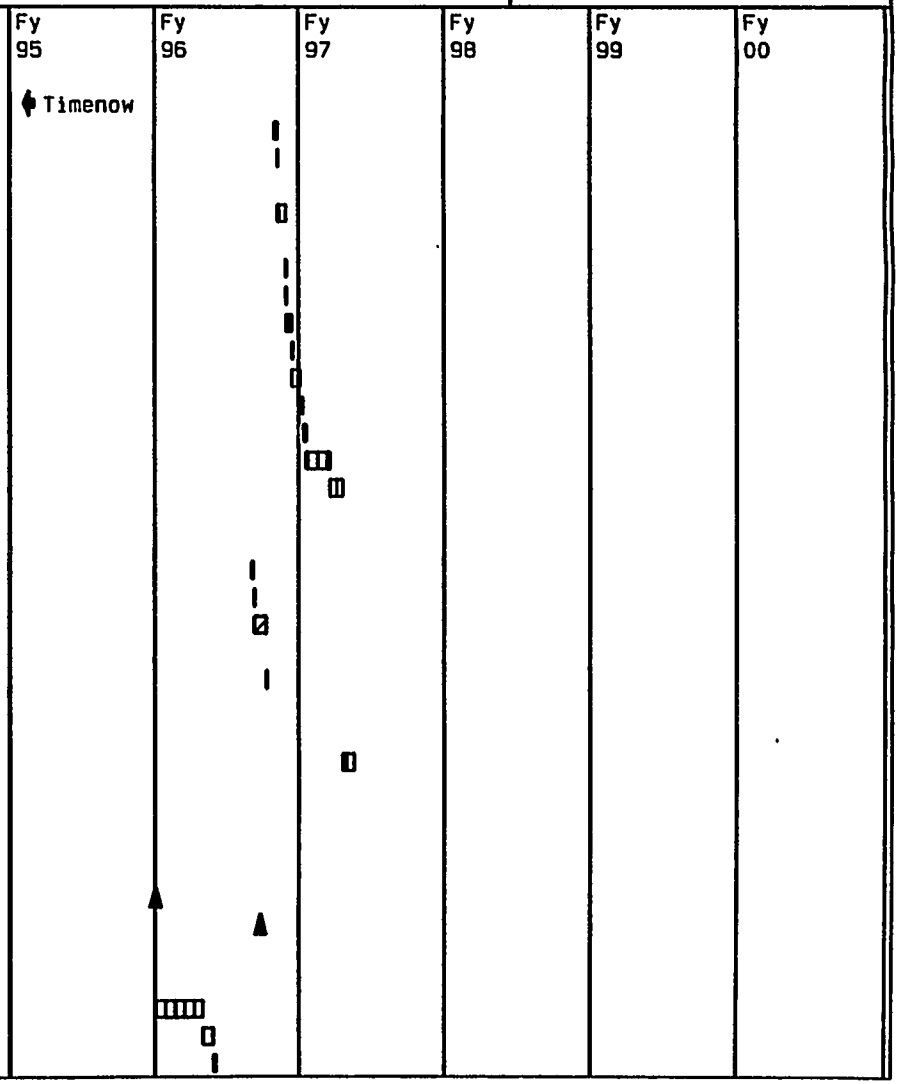
Activity	Description	Start	Finish	Dur	TF
X303200220	REMOVE PLEXIGLAS SHIELDING FROM HOODS	31JUL96	07AUG96	6	0
X303200225	DISPOSE OF PLEXIGLAS SHIELDING FROM HOODS	08AUG96	09AUG96	2	128
X303200230	STRIP ELECTRICAL SERVICES BACK TO PANEL BOX	08AUG96	28AUG96	15	0
X303200035	DISPOSE OF WASTE	28AUG96	29AUG96	2	114
X303200235	DISPOSE OF ELECTRICAL WASTE	29AUG96	30AUG96	2	113
X303200240	REMOVE ALL PIPING FROM HOODS	29AUG96	12SEP96	10	0
X303200250	DISPOSE OF PIPING WASTE	13SEP96	16SEP96	2	103
X303200255	DISCONNECT VENTILATION SERVICES	13SEP96	03OCT96	15	0
X303200260	REMOVE FLEX HOSES	04OCT96	10OCT96	5	0
X303200265	BLANK OFF HOLES AT PIPES	11OCT96	17OCT96	5	0
X303200270	REMOVE SINKS & COUNTER TOPS	18OCT96	16DEC96	40	0
X303200275	DISPOSE OF SINKS & COUNTER TOPS	17DEC96	16JAN97	20	0
2.10.2.10.02.06	*STRUCTURAL STABILIZATION - 3032*				
X303200145	ID ALL VALVES, PIPES	03JUN96	07JUN96	5	148
X303200150	PROCURE WASTE CONTAINERS	10JUN96	10JUN96	1	148
X303200155	DISCONNECT & CAP ALL PIPING LINES TO CELL	11JUN96	10JUL96	20	148
X303200160	DISPOSE OF PIPING WASTE	11JUL96	12JUL96	2	148
2.10.2.10.10.06	*FINAL FACILITY REPORT - 3032*				
X303200100	FINAL FACILITY REPORT	17JAN97	14FEB97	20	0
F4	*CENTER CIRCLE BLDG 3033*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3118) FACILITY DEACTIVATION*				
X303300000	BUILDING 3033 DEACTIVATION START	02OCT95	02OCT95	0	0
X303300005	BUILDING 3033 DEACTIVATION COMPLETE	25JUN96	24JUN96	0	0
2.10.2.10.01.08	*CONTAMINATION CONTROL - 3033*				
X303300010	CLEAN-UP OF INERT TRITIUM TRAPS	02OCT95	29JAN96	80	0
X303300015	KRYPTON CLEAN-UP	30JAN96	26FEB96	20	0
X303300020	ALARM DEACTIVATION	27FEB96	04MAR96	5	0



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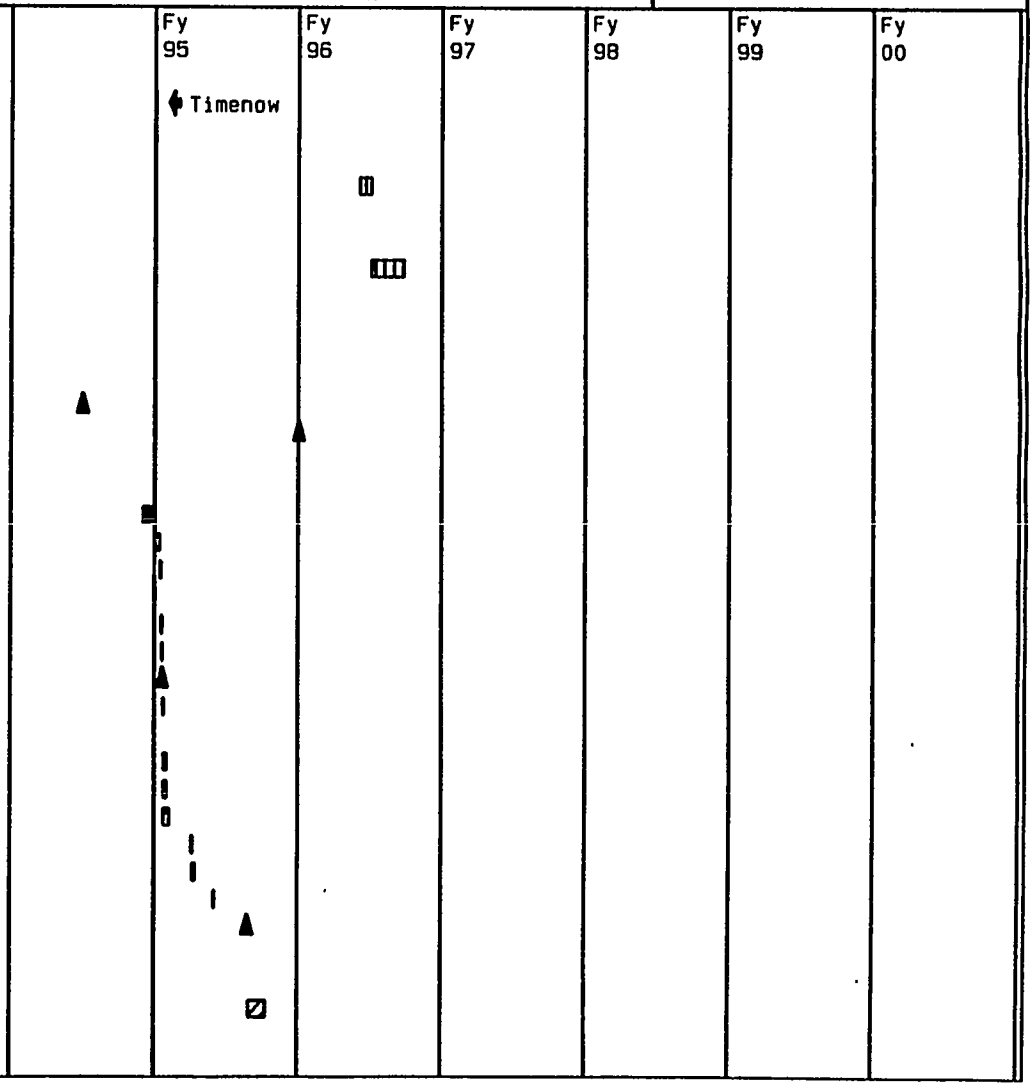
Activity	Description	Start	Finish	Dur	TF
2.10.2.10.02.08	*STRUCTURAL STABILIZATION - 3033*				
X303300065	SEAL EXTERIOR	05MAR96	01APR96	20	0
2.10.2.10.10.08	*FINAL FACILITY REPORT - 3033*				
X303300060	FINAL FACILITY REPORT	02APR96	24JUN96	58	0
F5	*CENTER CIRCLE BLDG 3033-A*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3116) FACILITY DEACTIVATION*				
X3033A0000	BUILDING 3033-A DEACTIVATION START	01APR94 A	01APR94 A	0	96
X3033A0005	BUILDING 3033-A DEACTIVATION COMPLETE	020CT95	29SEP95	0	1
2.10.2.10.01.10	*CONTAMINATION CONTROL - 3033-A*				
X3033A0010	CLEAN HOOD	01SEP94 A	30SEP94 A	0	96
X3033A010A	CLEAN HOOD	030CT94	130CT94	9	96
X3033A0015	DISCONNECT GLOVE BOX VENTILATION SERVICES	140CT94	170CT94	2	96
X3033A0020	PLACE GLOVE BOX INTO WASTE BOX	180CT94	190CT94	2	96
X3033A0025	TRANSFER GLOVE BOX TO SWSA	200CT94	210CT94	2	96
X3033A0030	GLOVE BOX AND HOOD CLEAN-UP COMPLETE	210CT94	210CT94	0	96
X3033A0040	PROCURE WASTE BOXES FOR DUCTWORK & PIPING WASTE	240CT94	240CT94	1	96
X3033A0045	REMOVE GLOVE BOX PIPING SYSTEMS	250CT94	310CT94	5	96
X3033A0050	REMOVE AND DISPOSE OF BUILDING WASTE	250CT94	310CT94	5	229
X3033A0055	REMOVE VENTILATION SYSTEM DUCTWORK	250CT94	07NOV94	10	222
X3033A0065	DISPOSE OF GLOVE BOX PIPING	03JAN95	04JAN95	2	96
X3033A0070	ALARM DEACTIVATION	05JAN95	11JAN95	5	96
X3033A0060	DISPOSE OF VENTILATION SYSTEM DUCTWORK	01MAR95	02MAR95	2	147
X3033A0075	DEACTIVATION OF SYSTEMS COMPLETE	26MAY95	26MAY95	0	1
2.10.2.10.02.10	*STRUCTURAL STABILIZATION - 3033-A*				
X3033A0035	SEAL ROOF AROUND AIR CONDITIONING UNIT	30MAY95	10JUL95	28	1



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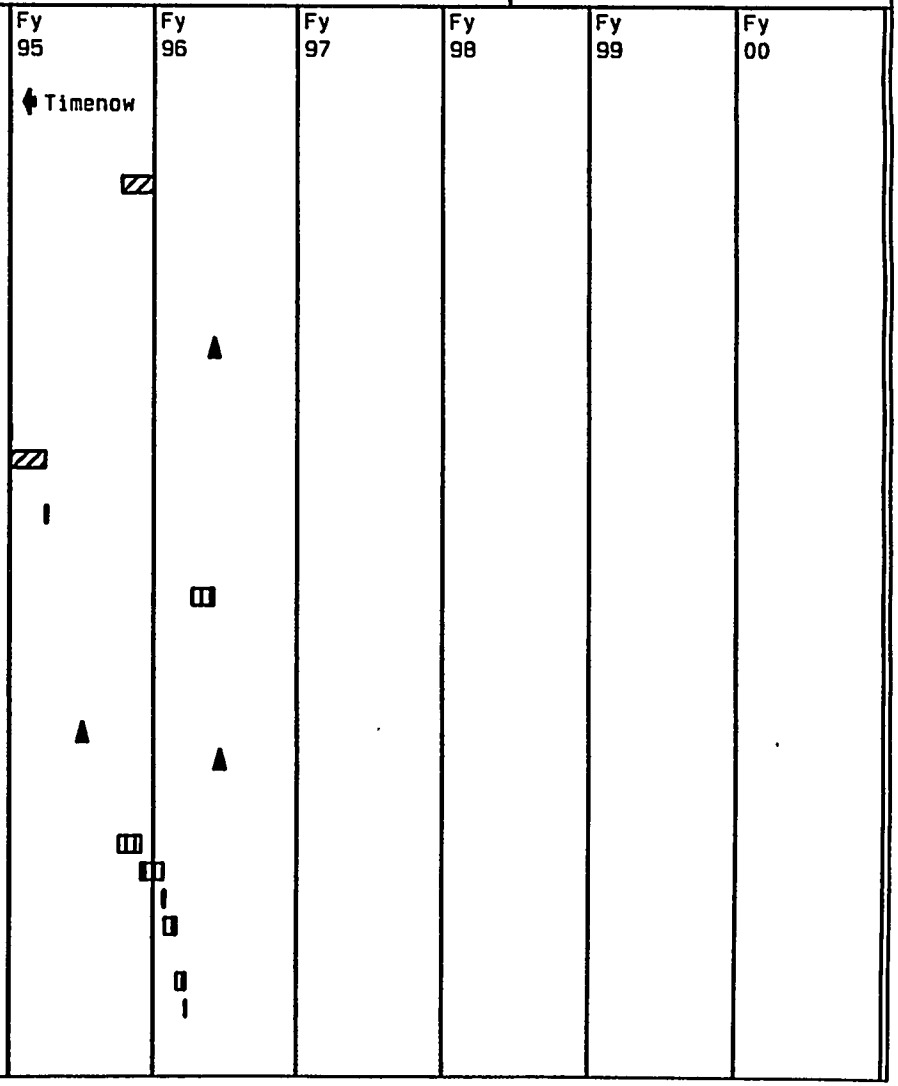
Activity	Description	Start	Finish	Dur	TF
2.10.2.10.10.10	*FINAL FACILITY REPORT - 3033-A*				
X3033A0110	FINAL FACILITY REPORT	11JUL95	29SEP95	58	1
F6	*CENTER CIRCLE BLDG 3034*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3118) FACILITY DEACTIVATION*				
X303400000	BUILDING 3034 DEACTIVATION START	A	30SEP94 A	0	254
X303400005	BUILDING 3034 DEACTIVATION COMPLETE	05MAR96	04MAR96	0	0
2.10.2.10.01.12	*CONTAMINATION CONTROL - 3034*				
X303400025	PROCURE WASTE CONTAINERS	03OCT94	03OCT94	1	351
X303400030	DEMO CABINETS, PACK WASTE, CLEAN/WIPEDOWN BLDG	03OCT94	29DEC94	60	254
X303400035	DISPOSE OF WASTE	30DEC94	03JAN95	2	292
2.10.2.10.10.12	*FINAL FACILITY REPORT - 3034*				
X303400100	DRAFT FINAL FACILITY REPORT	08JAN96	04MAR96	40	0
F7	*CENTER CIRCLE BLDG 3118*				
2.10.2.10	*CENTER CIRCLE (3030 - 3034, 3118) FACILITY DEACTIVATION*				
X311800000	BUILDING 3118 DEACTIVATION START	03APR95	03APR95	0	63
X311800005	BUILDING 3118 DEACTIVATION COMPLETE	20MAR96	19MAR96	0	0
2.10.2.10.01.14	*CONTAMINATION CONTROL - 3118*				
X311800008	CASK CLEAN-UP AND REMOVAL	05JUL95	29AUG95	40	0
X311800010	CLEAN FLOOR	30AUG95	24OCT95	39	0
X311800015	DISPOSE OF WASTE	27OCT95	30OCT95	2	0
X311800020	EVALUATE & RECOMMEND METHOD TO SEAL HOT DOORS	31OCT95	27NOV95	18	0
X311800025	SEAL HOT CELL DOORS	28NOV95	21DEC95	18	0
X311800035	ALARM DEACTIVATION	22DEC95	22DEC95	1	0



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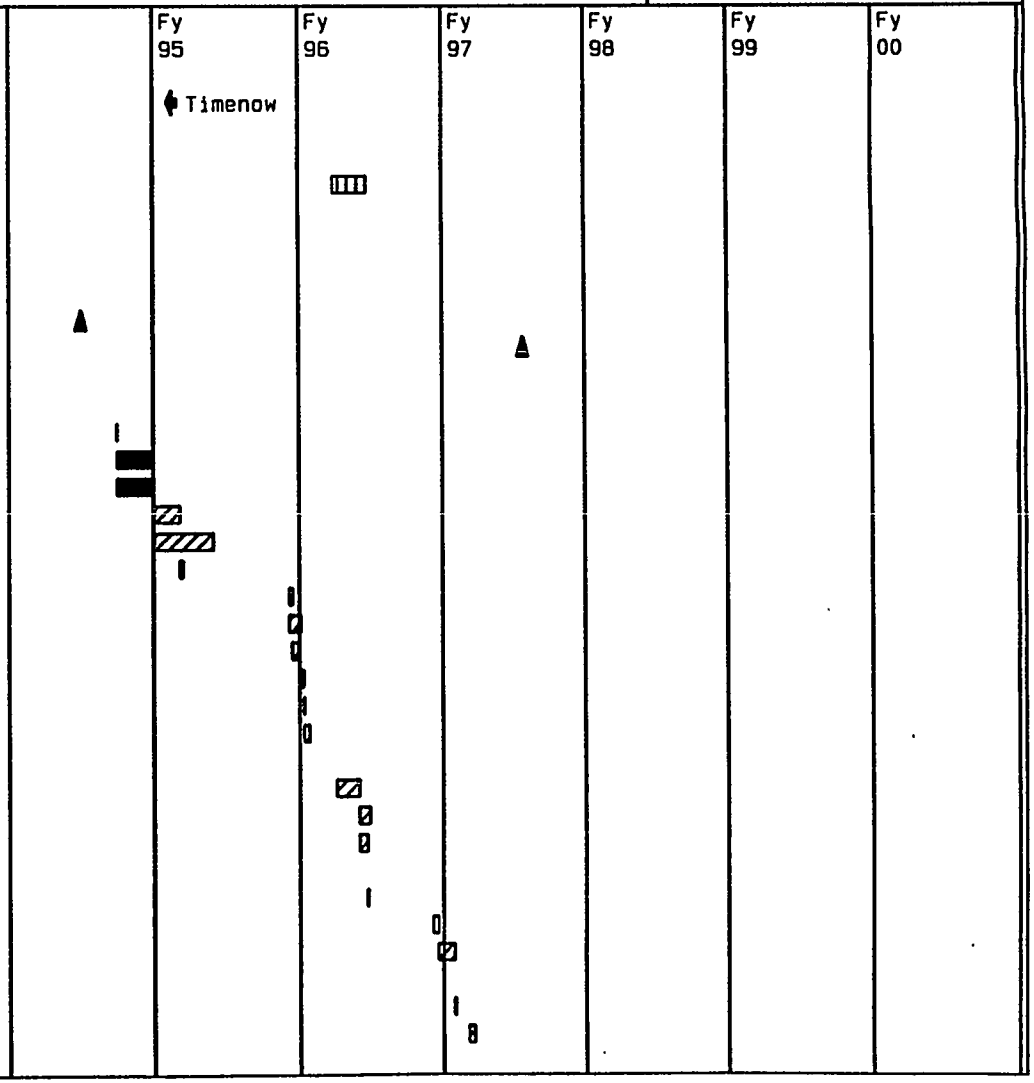
2.10.2.10.10.14	*FINAL FACILITY REPORT - 3118*				
X311B00075	FINAL FACILITY REPORT	27DEC95	19MAR96	58	0
62	*BUILDING 3038-AHF*				
2.10.2.12	*BUILDING 3038 FACILITY DEACTIVATION*				
X3038A0000	BUILDING 3038-AHF DEACTIVATION START	01APR94 A	01APR94 A	0	131
X3038A0005	BUILDING 3038-AHF DEACTIVATION COMPLETE	24APR97	23APR97	0	0
2.10.2.12.01.02	*CONTAMINATION CONTROL - 3038-AHF*				
X3038A0010	PROCURE WASTE CONTAINERS	01JUL94 A	01JUL94 A	0	639
X3038A0015	REMOVE WASTE FROM CELLS	01JUL94 A	30SEP94 A	0	634
X3038A0020	CLEAN CELLS	01JUL94 A	30SEP94 A	0	231
X3038A015A	REMOVE WASTE FROM CELLS	03OCT94	06DEC94	45	569
X3038A020A	CLEAN CELLS	03OCT94	27FEB95	100	131
X3038A0025	DISPOSE OF CELL WASTE	07DEC94	13DEC94	5	589
X3038A0050	SAMPLE WATER SHIELDING	06SEP95	12SEP95	5	0
X3038A0055	FABRICATE CELL COVERS	06SEP95	03OCT95	20	373
X3038A0060	ANALYSIS SAMPLES	13SEP95	26SEP95	10	393
X3038A0070	INSTALL NEW GLOVEPORT COVERS	04OCT95	10OCT95	5	373
X3038A0080	DISPOSE OF GLOVEPORT COVERS	11OCT95	12OCT95	2	381
X3038A0085	DETERMINE WATER SHIELDING NEEDS FOR CELLS 1-4	11OCT95	24OCT95	10	373
X3038A0045	WASH DOWN AND COMPLETE CELL CLEANUP	02JAN96	27FEB96	40	269
X3038A0030	DISPOSE OF CELL CLEAN-UP WASTE	28FEB96	26MAR96	20	269
X3038A0035	REPLACE ALL MANIPULATOR BOOTSGGLOVES(8 MANIPS)	28FEB96	19MAR96	15	272
X3038A0040	DISPOSE OF MANIPULATOR WASTE	20MAR96	21MAR96	2	272
X3038A0065	DRAIN SHIELDING TANKS TO PROCESS WASTE	03SEP96	16SEP96	10	0
X3038A0075	DISCONNECT, DRAIN & CAP ALL PIPING TO CELLS	17SEP96	28OCT96	30	29
X3038A0090	DISPOSE OF PIPING WASTE	29OCT96	30OCT96	2	118
X3038A0095	SECURE MANIPULATOR & COVER FOR LONG TERM STORAGE	04DEC96	17DEC96	10	5



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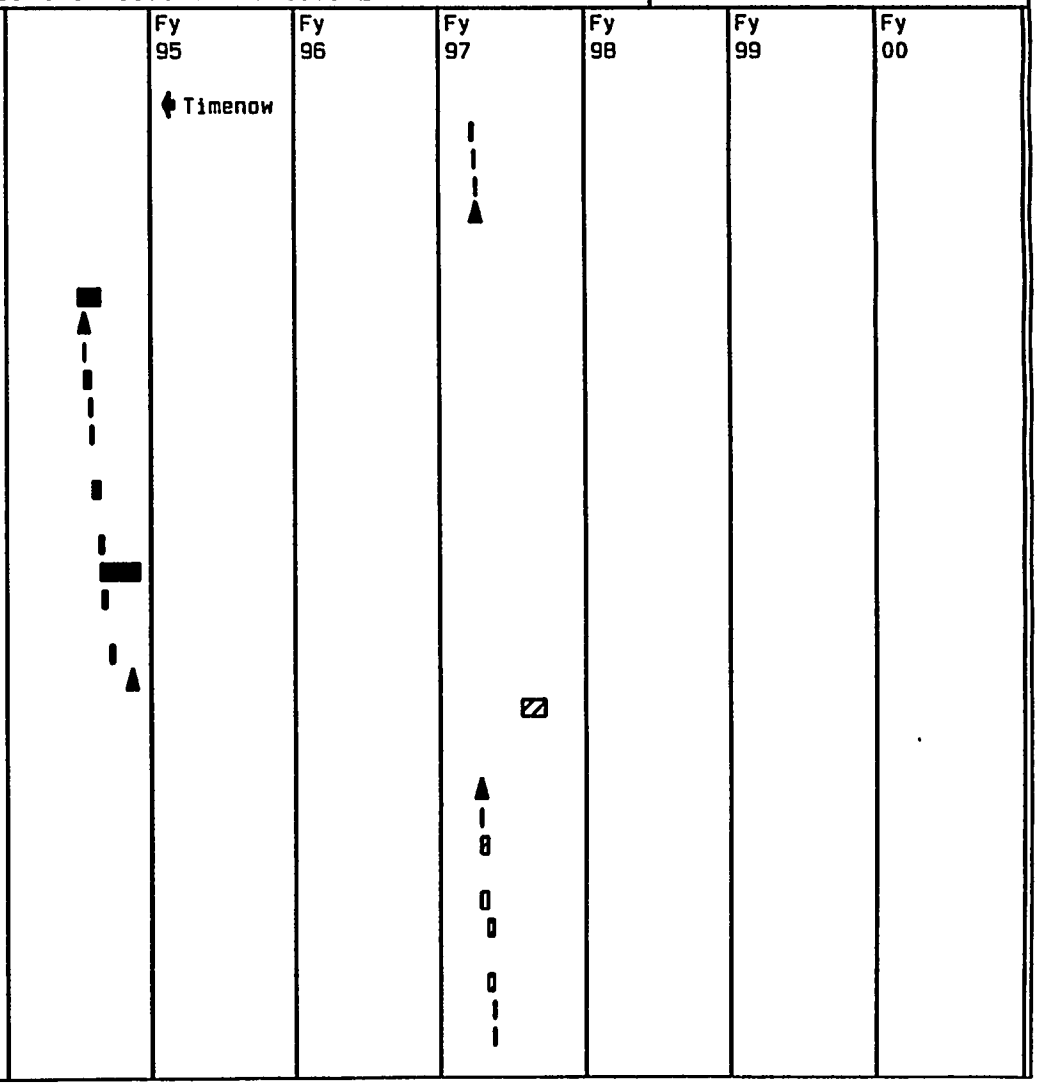
X3038A0100	SECURE CELL ACCESS	18DEC96	23DEC96	4	5
X3038A0105	CHANGE CELL EXHAUST FILTERS	26DEC96	27DEC96	2	5
X3038A0110	DISPOSE OF FILTERS	30DEC96	31DEC96	2	5
X3038A0115	CELL CLEAN-UP COMPLETE	31DEC96	31DEC96	0	5
2.10.2.12.02	*STRUCTURAL STABILIZATION - 3038-NHF*				
X3038A0190	DESIGN WASTE LINE REPAIRS	01APR94 A	25MAY94 A	0	639
X3038A0195	BEGIN REPAIR OF LEAKING DRAINS	15APR94 A	15APR94 A	0	639
X3038A0200	PROCURE WASTE CONTAINERS	15APR94 A	15APR94 A	0	639
X3038A0205	REMOVE LOOSE WASTE FROM CELLS	15APR94 A	30APR94 A	0	639
X3038A0210	DISPOSE OF WASTE	30APR94 A	02MAY94 A	0	639
X3038A0215	DETERMINE WATER SHIELDING NEEDS FOR CELLS 1-5	02MAY94 A	05MAY94 A	0	639
X3038A0220	CLEAN CELL TO LEVEL OF NO SHIELDING REQUIRE	08MAY94 A	23MAY94 A	0	639
X3038A0225	DRAIN SHIELD TANK	24MAY94 A	01JUN94 A	0	639
X3038A0230	REPAIR WASTE LINE	27MAY94 A	31AUG94 A	0	639
X3038A0235	REMOVE SHIELDING TANK FROM FRONT OF CELL 1	01JUN94 A	09JUN94 A	0	639
X3038A0240	DETERMINE LEAK LOCATION	20JUN94 A	28JUN94 A	0	639
X3038A0245	REPAIR LEAK COMPLETE	15AUG94 A	15AUG94 A	0	639
X3038A0290	FIRE PROTECTION ACTIVITIES	24APR97	19JUN97	40	780
2.10.2.12.05.02	*GLOVE BOXES & HOODS DEACTIVATION - 3038-NHF*				
X3038A0120	REMOVE GLOVE BOXES BUILDING 3038 NHF	09JAN97	09JAN97	0	73
X3038A0125	PROCURE WASTE CONTAINERS	09JAN97	09JAN97	1	0
X3038A0130	DEACTIVATE ELECTRICAL SERVICES TO GLOVE BOXES	10JAN97	24JAN97	10	48
X3038A0135	FABRICATE GLOVE PORT COVERS AS REQUIRED	10JAN97	24JAN97	10	0
X3038A0140	STRIP ELECTRICAL SERVICES BACK TO PANEL BOX	27JAN97	07FEB97	10	50
X3038A0145	REPLACE GLOVES	27JAN97	07FEB97	10	48
X3038A0150	DISPOSE OF ELECTRICAL WASTE	10FEB97	11FEB97	2	50
X3038A0155	REMOVE OR SECURE ANY LOOSE MATERIAL IN GLOVE	10FEB97	11FEB97	2	48



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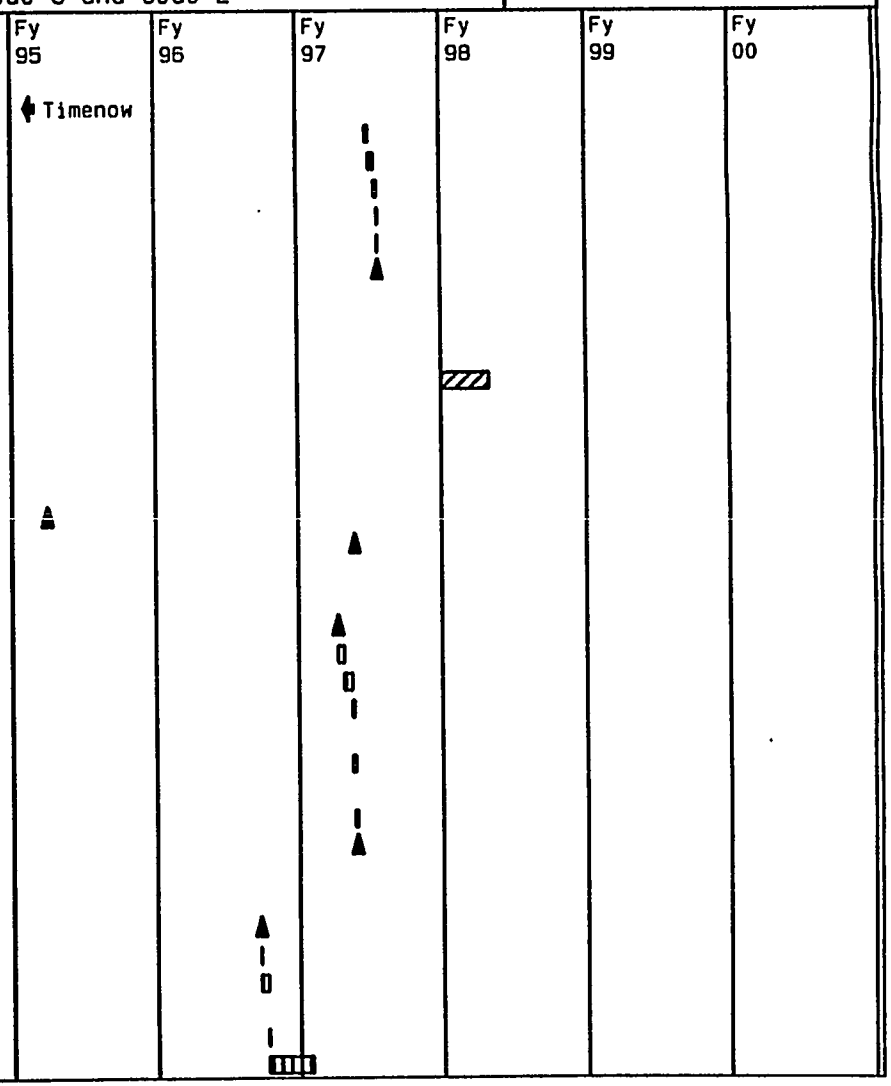
Activity	Description	Start	Finish	Dur	TF
X3038A0160	INSTALL GLOVE PORT COVERS ON GLOVE PORTS	24MAR97	31MAR97	5	0
X3038A0180	DISCONNECT & SEAL VENTILATION SERVICES	01APR97	14APR97	10	0
X3038A0165	PLACE GLOVE BOXES IN WASTE CONTAINERS	15APR97	21APR97	5	0
X3038A0170	DISPOSE OF GLOVE BOX WASTE	22APR97	23APR97	2	0
X3038A0175	DISPOSE OF GLOVE BOXES	22APR97	23APR97	2	0
X3038A0185	COMPLETE CLEAN-UP & REMOVAL OF GLOVE BOXES	23APR97	23APR97	0	780
2.10.2.12.10.02	*FINAL FACILITY REPORT - 3038-NF*				
X3038A0285	FINAL FACILITY REPORT	01OCT97	28JAN98	80	670
63	*BUILDING 3038-E*				
2.10.2.12	*BUILDING 3038 FACILITY DEACTIVATION*				
X3038E0000	BUILDING 3038-E DEACTIVATION START	30DEC94	30DEC94	0	0
X3038E0005	BUILDING 3038-E DEACTIVATION COMPLETE	20FEB97	19FEB97	0	0
2.10.2.12.02.04	*STRUCTURAL STABILIZATION - 3038-E*				
X3038E0160	PIPING SERVICES DISCONNECTED	08JAN97	08JAN97	0	0
X3038E0165	IDENTIFY & LABEL ALL PIPING SERVICES	08JAN97	22JAN97	10	0
X3038E0170	DISCONNECT DRAIN PIPING & REMOVE	23JAN97	12FEB97	15	0
X3038E0175	PREPARE WSTR PIPING LIST TO INC LOC OF DISCONTS	13FEB97	17FEB97	3	821
X3038E0180	ID TAG VERIFICATION ALL PIPES, VALVES, ETC	13FEB97	19FEB97	5	0
X3038E0185	ALARM DEACTIVATION	18FEB97	24FEB97	5	821
X3038E0190	UTILITY DEACTIVATION COMPLETE	24FEB97	24FEB97	0	821
2.10.2.12.04.04	*YTTRIUM CELL CLEANUP - 3038-E*				
X3038E0080	YTTRIUN CELL CLEAN-UP	21JUN96	21JUN96	0	0
X3038E0085	PROCURE WASTE CONTAINERS	21JUN96	21JUN96	1	164
X3038E0090	REPLACE ALL MANIPULATOR BOOTS AS REQUIRED	21JUN96	08JUL96	10	0
X3038E0095	DISPOSE OF WASTE BOOTS	09JUL96	10JUL96	2	78
X3038E0100	REMOVE WASTE FROM CELL	09JUL96	29OCT96	80	0



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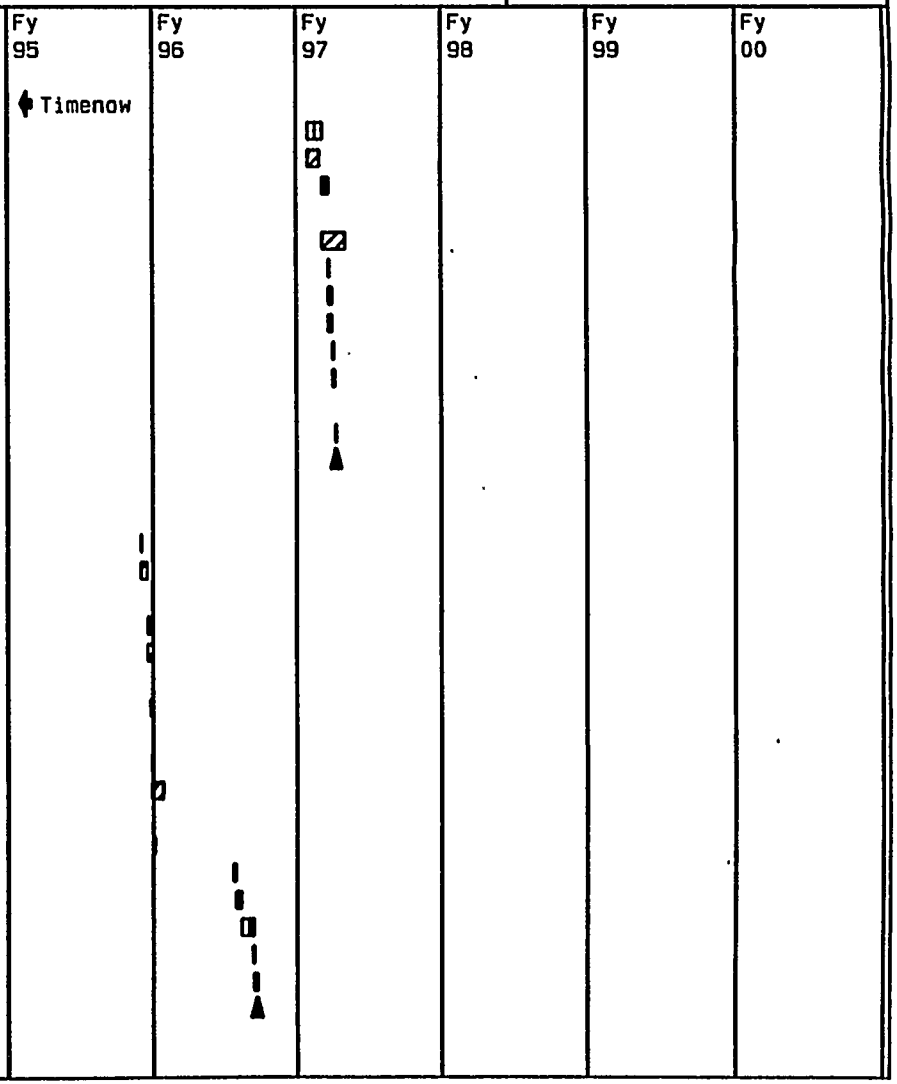
Activity	Description	Start	Finish	Dur	TF
X3038E0105	CLEAN CELL	30OCT96	04DEC96	24	0
X3038E0110	DISPOSE OF CELL WASTE	30OCT96	26NOV96	20	55
X3038E0115	DISCONNECT, DRAIN, CAP ALL PIPING TO CELL	05DEC96	18DEC96	10	0
X3038E0120	DISPOSE OF CONTAMINATED WASTE	05DEC96	29JAN97	36	15
X3038E0125	DISPOSE OF PIPING WASTE	19DEC96	20DEC96	2	39
X3038E0130	UPDATE PIPE DRAWINGS	19DEC96	27DEC96	5	36
X3038E0135	CHANGE IN CELL EXHAUST FILTERS	19DEC96	27DEC96	5	0
X3038E0140	DISPOSE OF WASTE FILTERS	30DEC96	31DEC96	2	34
X3038E0145	SECURE MANIPULATORS & COVER FOR LONG TERM STAG	30DEC96	03JAN97	4	0
X3038E0150	SECURE CELL ACCESS	06JAN97	07JAN97	2	0
X3038E0155	YTTRIUN CELL CLEAN-UP COMPLETE	07JAN97	07JAN97	0	0
2.10.2.12.05.04	*GLOVE BOXES & HOODS DEACTIVATION - 3038-E*				
X3038E0010	PROCURE WASTE CONTAINERS	01SEP95	01SEP95	1	126
X3038E0015	DEACTIVATE ELECTRICAL SERVICES TO GLOVE BOXES	01SEP95	15SEP95	10	126
X3038E0020	REPLACE GLOVES	18SEP95	22SEP95	5	126
X3038E0025	STRIP ELECTRICAL SERVICES BACK TO PANEL BOX	18SEP95	29SEP95	10	344
X3038E0030	REMOVE OR SECURE ANY LOOSE MATERIAL GLOVE BOXS	25SEP95	26SEP95	2	126
X3038E0035	DISPOSE OF GLOVE BOX WASTE	27SEP95	28SEP95	2	347
X3038E0040	DISCONNECT & SEAL/PLUG GLOVE BOX PIPE SERVICES	27SEP95	24OCT95	20	126
X3038E0045	DISPOSE OF ELECTRICAL WASTE	02OCT95	03OCT95	2	344
X3038E0055	INSTALL GLOVE PORT COVERS ON GLOVE PORTS	22APR96	26APR96	5	0
X3038E0050	DISCONNECT & SEAL VENTILATION SERVICES	29APR96	10MAY96	10	0
X3038E0060	PLACE GLOVE BOXES IN WASTE CONTAINERS	13MAY96	10JUN96	20	0
X3038E0065	REMOVE WALL	11JUN96	12JUN96	2	0
X3038E0070	DISPOSE OF GLOVE BOXES & WASTE	13JUN96	20JUN96	6	0
X3038E0075	CLEAN-UP AND REMOVE GLOVE BOXES COMPLETE	20JUN96	20JUN96	0	0



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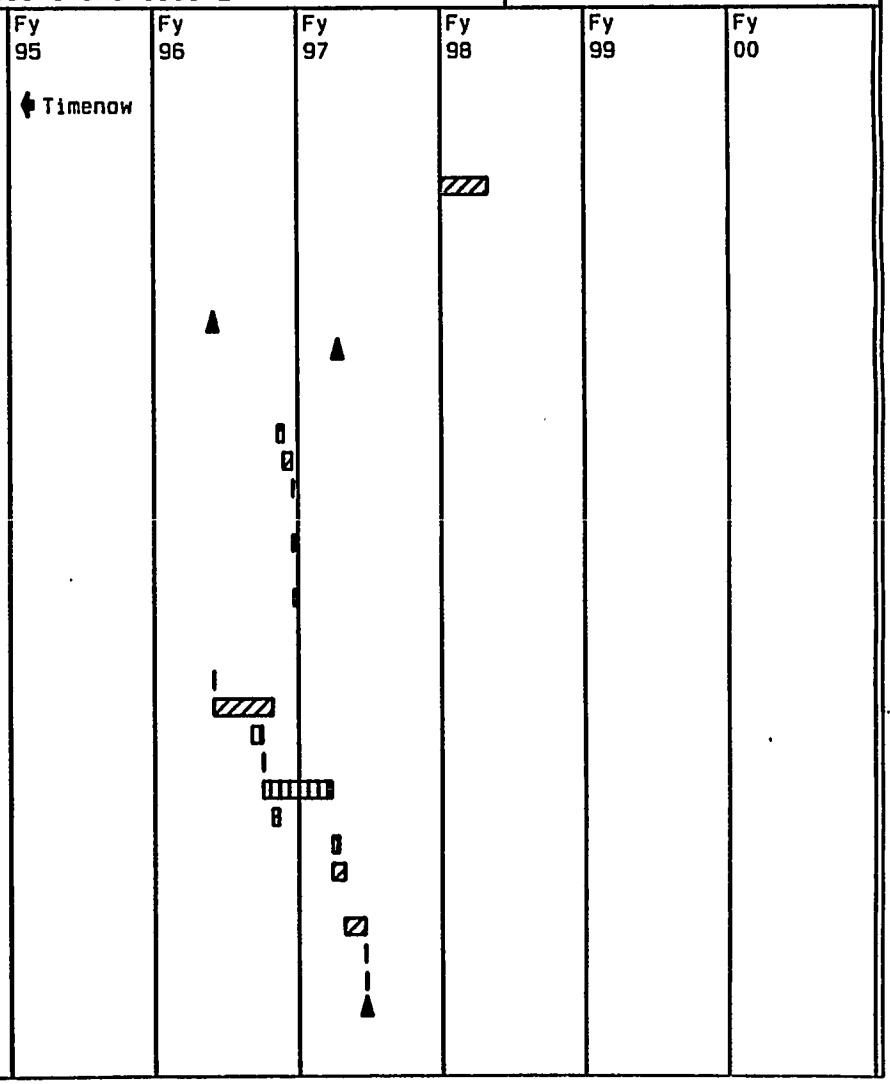
Activity	Description	Start	Finish	Dur	TF
2.10.2.12.10.04	*FINAL FACILITY REPORT - 3038-E*				
X3038E0230	FINAL FACILITY REPORT	01OCT97	28JAN98	80	670
G4	*BUILDING 3038-N*				
2.10.2.12	*BUILDING 3038 FACILITY DEACTIVATION*				
X3038N0000	BUILDING 3038-N DEACTIVATION START	28FEB96	28FEB96	0	0
X3038N0005	BUILDING 3038-N DEACTIVATION COMPLETE	09JAN97	08JAN97	0	0
2.10.2.12.02.06	*STRUCTURAL STABILIZATION - 3038-N*				
X3038N0040	IDENTIFY & LABEL ALL PIPING SERVICES	09AUG96	22AUG96	10	70
X3038N0045	DISCONNECT DRAIN PIPING AND REMOVE	23AUG96	13SEP96	15	70
X3038N0050	PREPARE MASTER PIPING LIST&INCL LOC OF DISCONT	16SEP96	18SEP96	3	70
X3038N0055	ID TAG VERIFICATION ALL PIPES, VALVES, ETC.	16SEP96	20SEP96	5	73
X3038N0060	ALARM DEACTIVATION	19SEP96	25SEP96	5	70
2.10.2.12.06.06	*BARRICADES CLEANUP - 3038-N*				
X3038N0010	PROCURE WASTE CONTAINERS	28FEB96	28FEB96	1	66
X3038N0020	DESIGN BARRICADE ACCESS CLOSURE	28FEB96	25JUL96	103	70
X3038N0015	REMOVE ALL WASTE FROM BARRICADE	03JUN96	28JUN96	20	0
X3038N0025	DISPOSE OF BARRICADE WASTE	01JUL96	02JUL96	2	128
X3038N0030	CLEAN BARRICADE	01JUL96	20DEC96	120	0
X3038N0035	FABRICATE BARRICADE ACCESS CLOSURE	26JUL96	08AUG96	10	70
X3038N0065	DISPOSE OF CLEANING WASTE	23DEC96	08JAN97	10	0
X3038N0070	DISCONNECT,DRAIN & CAP ALL PIPING TO BARRICADE	23DEC96	23JAN97	20	803
X3038N0075	SECURE BARRICADE ACCESS	24JAN97	17MAR97	37	803
X3038N0080	EXCHANGE BARRICADE EXHAUST FILTERS	18MAR97	18MAR97	1	803
X3038N0085	DISPOSE OF WASTE FILTERS	19MAR97	20MAR97	2	803
X3038N0090	UTILITY AND PIPING DEACTIVATION COMPLETE	20MAR97	20MAR97	0	803



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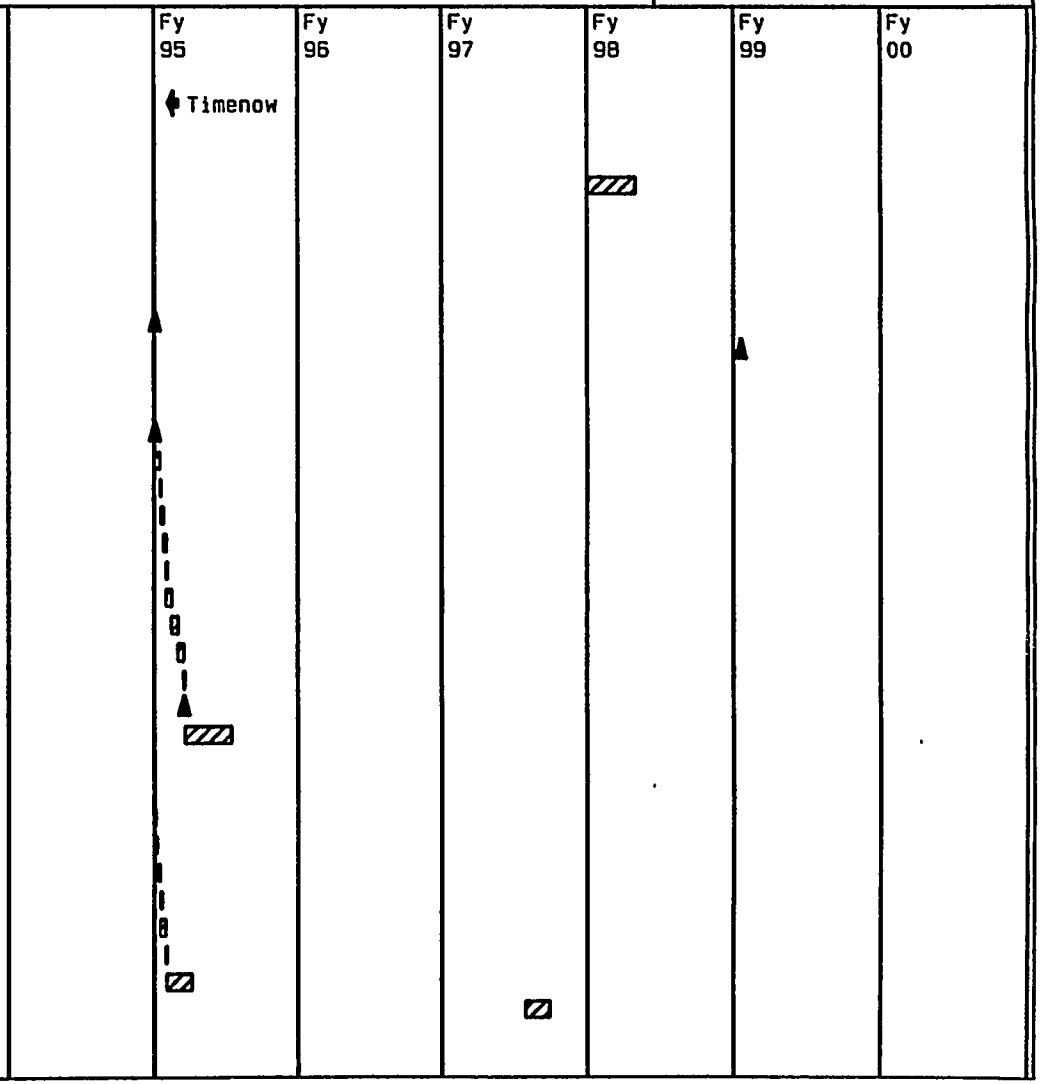
Activity	Description	Start	Finish	Dur	TF
2.10.2.12.10.06	*FINAL FACILITY REPORT - 3038-M*				
X3038M0165	FINAL FACILITY REPORT	01OCT97	28JAN98	80	670
M1	*BUILDING 3047*				
2.10.2.14	*BUILDING 3047 FACILITY DEACTIVATION*				
X304700000	BUILDING 3047 DEACTIVATION START	03OCT94	03OCT94	0	0
X304700005	BUILDING 3047 DEACTIVATION COMPLETE	19OCT98	16OCT98	0	0
2.10.2.14.01	*CONTAMINATION CONTROL - 3047*				
X304700290	VACUUM PIT CLEANUP	03OCT94	03OCT94	0	0
X304700295	REMOVE & REPAIR VACUUM PIT STEAM EJECTOR	03OCT94	14OCT94	10	878
X304700300	PROCURE WASTE CONTAINERS	17OCT94	17OCT94	1	878
X304700305	PUMP OUT VACUUM PIT	18OCT94	24OCT94	5	878
X304700310	FLUSH DRAIN LINES	25OCT94	31OCT94	5	878
X304700315	DISPOSE OF WASTE	01NOV94	02NOV94	2	988
X304700320	CUT AND BLANK OFF LINES TO VACUUM PIT	01NOV94	14NOV94	10	878
X304700325	CLEAN HOUSE VACUUM SURGE TANK	15NOV94	30NOV94	10	878
X304700330	CLEAN COOLING WATER CIRCULATING TANK	01DEC94	14DEC94	10	878
X304700335	DISPOSE OF CONTAMINATED WASTE	15DEC94	16DEC94	2	878
X304700340	VACUUM PIT CLEAN-UP COMPLETE	16DEC94	16DEC94	0	878
X304700345	FILTER HOUSE CLEAN-UP	19DEC94	13APR95	80	878
2.10.2.14.02	*STRUCTURAL STABILIZATION - 3047*				
X304700010	PROCURE GLYCOL DISPOSAL DRUMS	03OCT94	03OCT94	1	913
X304700015	DRAIN CHILL WATER SYSTEM	03OCT94	07OCT94	5	909
X304700020	PUT GLYCOL SOLUTION INTO DRUMS	10OCT94	14OCT94	5	909
X304700025	DISPOSE OF GLYCOL SOLUTION	17OCT94	19OCT94	3	998
X304700030	DISCONNECT LINES FROM CELLS AND CAP	17OCT94	28OCT94	10	909
X304700035	DISPOSE OF PIPING WASTE	31OCT94	01NOV94	2	909
X304700425	FIRE PROTECTION ACTIVITIES	02NOV94	03JAN95	40	909
X304700430	PIPING, UTILITIES & ALARM DEACTIVATION	28APR97	26JUN97	43	247



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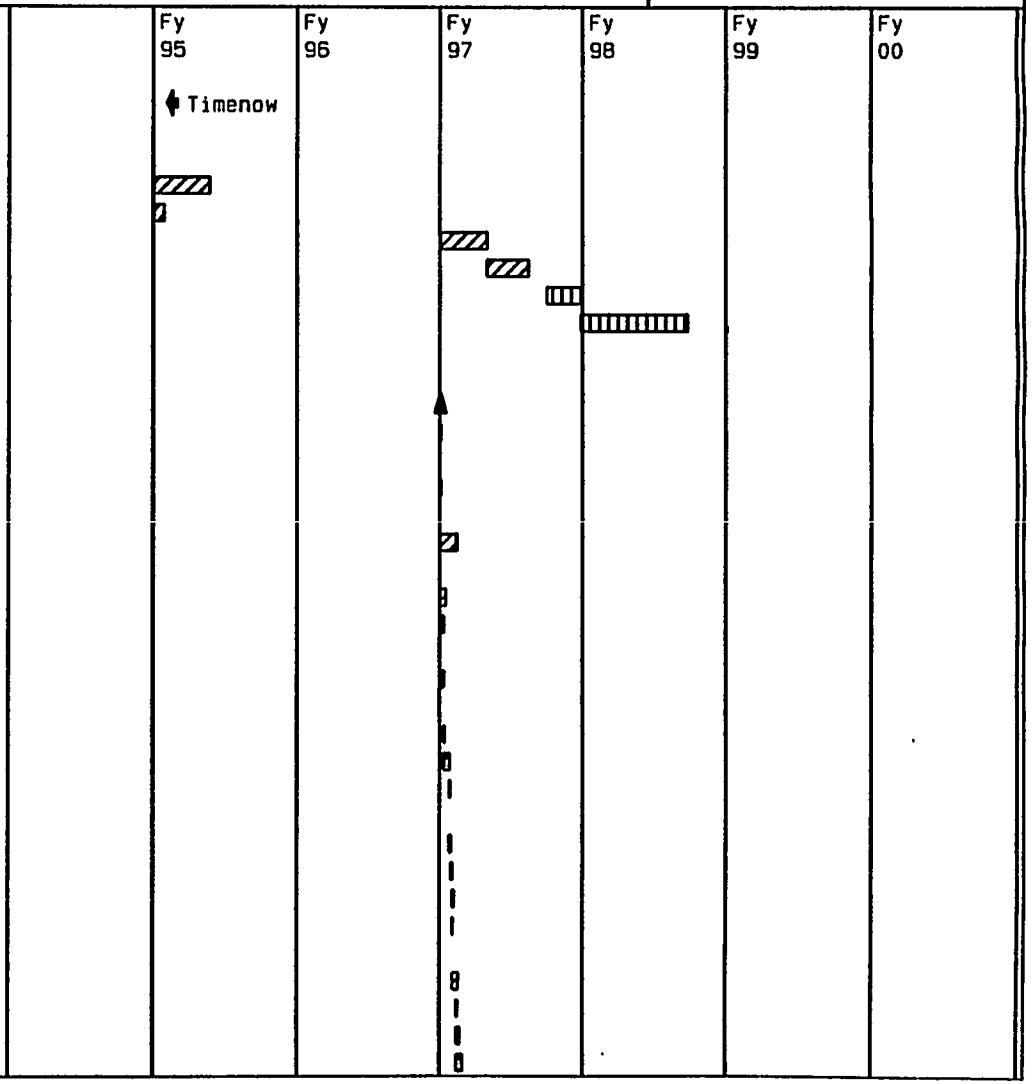
Activity	Description	Start	Finish	Dur	TF
2.10.2.14.03	*HOT CELLS CLEANUP - 3047*				
X304700365	CELL D CLEAN UP	03OCT94	20FEB95	95	437
X304700370	CELL D SUMP SLUDGE	03OCT94	28OCT94	20	911
X304700350	CELL A CLEAN-UP	01OCT96	27JAN97	79	33
X304700360	CELL C CLEAN-UP	28JAN97	13MAY97	75	33
X304700355	CELL B CLEAN-UP	01JUL97	25SEP97	60	0
X304700375	ROOM 110 CLEAN UP	26SEP97	23JUN98	185	0
2.10.2.14.05	*GLOVE BOXES & HOODS DEACTIVATION - 3047*				
X304700040	C-14 GLOVE BOX CLEAN-UP & REMOVAL	01OCT96	01OCT96	0	479
X304700045	COORDINATE WASTE REMOVAL W/SWSA/PROCURE CONTAINER	01OCT96	01OCT96	1	511
X304700050	DEACTIVATE ELECTRICAL SERVICES TO EQUIPMENT & GB	01OCT96	02OCT96	2	479
X304700055	DESIGN BRACKETS TO ATTACH 2 FURNACES/1 DISSOLVER	01OCT96	11NOV96	30	462
X304700145	CLEAN HOOD IN ROOM 109	01OCT96	14OCT96	10	509
X304700060	STRIP ELECTRICAL SERVICES BACK TO PANEL BOX	03OCT96	09OCT96	5	505
X304700065	REMOVE ALL SMALL EQUIPMENT (STANDS, GLASSWARE)	03OCT96	09OCT96	5	479
X304700070	BAG OUT & DISPOSE OF SOLID WASTE	10OCT96	11OCT96	2	503
X304700075	CLEAN GLOVE BOXES INNER SURFACES	10OCT96	23OCT96	10	479
X304700080	ADVISE TANK FARM OF LIQUID WASTE & RECORD LLW LOG	24OCT96	24OCT96	1	494
X304700085	REMOVE LEAD SHIELD FROM DISSOLVER TANK	24OCT96	28OCT96	3	479
X304700090	DISMANTLE & CLEAN LEAD SHIELD	29OCT96	31OCT96	3	479
X304700095	BAG OUT & DISPOSE OF MIXED WASTE	01NOV96	04NOV96	2	487
X304700155	PROCURE WASTE CONTAINERS FOR RM 109 HOODS	01NOV96	01NOV96	1	488
X304700160	CLEAN HOODS IN LAB 209	01NOV96	14NOV96	10	477
X304700100	TRANSPORT GLOVE BOX #4 TO SWSA	12NOV96	12NOV96	1	481
X304700105	ATTACH 2 FURNACES TO GLOVE BOX FLOOR	12NOV96	18NOV96	5	475
X304700110	FABRICATE BRACKETS	12NOV96	25NOV96	10	462



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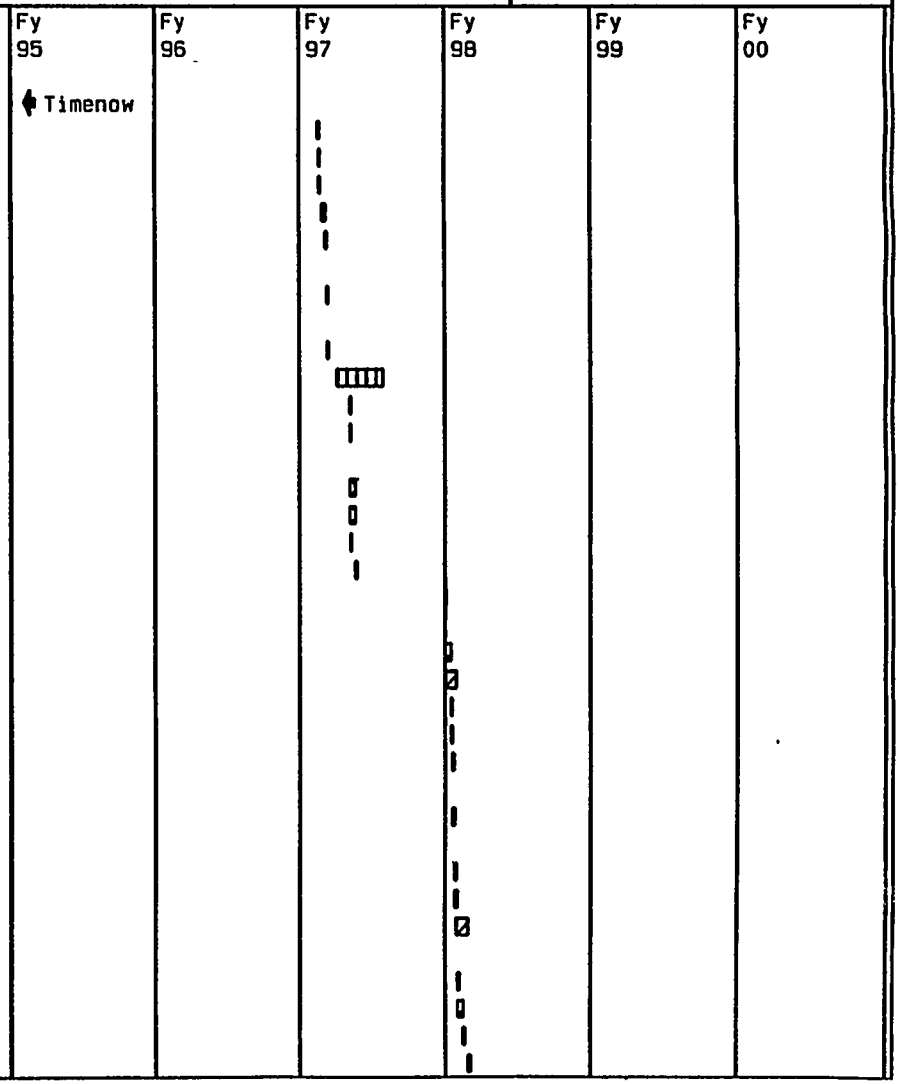
Activity	Description	Start	Finish	Dur	TF
X304700165	DISPOSE OF CONTAMINATED WASTE LAB 209	15NOV96	18NOV96	2	477
X304700115	PLACE #3 GLOVE BOX INTO WASTE BOX	19NOV96	19NOV96	1	475
X304700120	TRANSPORT GLOVE BOX #3 TO SWSA	20NOV96	20NOV96	1	475
X304700125	ATTACH DISSOLVER TO GLOVE BOX FLOOR	26NOV96	04DEC96	5	462
X304700130	DISCONNECT #4 GLOVE BOX VENTILATION SERVICES	05DEC96	06DEC96	2	462
X304700140	PROCURE CONTAINERS FOR ELECTRICAL/PIPING WASTE	09DEC96	09DEC96	1	462
X304700150	DISPOSE OF CONTAMINATED WASTE	10DEC96	11DEC96	2	462
X304700380	GAD PRESS GLOVE BOX	02JAN97	25APR97	80	0
X304700170	PROCURE WASTE CONTAINERS	03FEB97	03FEB97	1	426
X304700175	PROCURE CONTAINERS FOR ELECTRICAL/PIPING WASTE	03FEB97	03FEB97	1	336
X304700180	CLEAN HOODS IN LAB 210	03FEB97	14FEB97	10	426
X304700185	CLEAN HOODS IN LAB 208	03FEB97	14FEB97	10	325
X304700190	DISPOSE OF CONTAMINATED WASTE LAB 210	04FEB97	05FEB97	2	426
X304700195	DISPOSE OF CONTAMINATED WASTE LAB 208	17FEB97	18FEB97	2	325
X304700200	PROCURE CONTAINERS FOR ELECTRICAL/PIPING WASTE	01OCT97	01OCT97	1	209
X304700205	CLEAN HOOD ROOM 105	01OCT97	14OCT97	10	170
X304700210	DESIGN BLANK TO CAP OFF FLEX HOSE HOLE	01OCT97	28OCT97	20	170
X304700215	DISPOSE OF CONTAMINATED WASTE ROOM 105	15OCT97	16OCT97	2	250
X304700220	REMOVE PLEXIGLAS SHIELDING FROM HOOD 105	15OCT97	16OCT97	2	176
X304700225	DISPOSE OF PLEXIGLAS SHIELDING FROM 105 HOOD	17OCT97	20OCT97	2	248
X304700230	STRIP ELECTRICAL SERVICES BACK TO PANEL BOX	17OCT97	23OCT97	5	176
X304700235	DISPOSE OF ELECTRICAL WASTE	24OCT97	27OCT97	2	243
X304700240	REMOVE ALL PIPING FROM ROOM 105 HOOD	24OCT97	30OCT97	5	176
X304700245	FABRICATE BLANK TO CAP OFF FLEX HOSE HOLE	29OCT97	25NOV97	20	170
X304700250	DISPOSE OF PIPING WASTE	31OCT97	03NOV97	2	238
X304700255	DISCONNECT VENTILATION SERVICES	31OCT97	13NOV97	10	176
X304700260	REMOVE FLEX HOSE	14NOV97	17NOV97	2	176
X304700265	BLANK OFF HOLE AT PIPE	26NOV97	01DEC97	2	170



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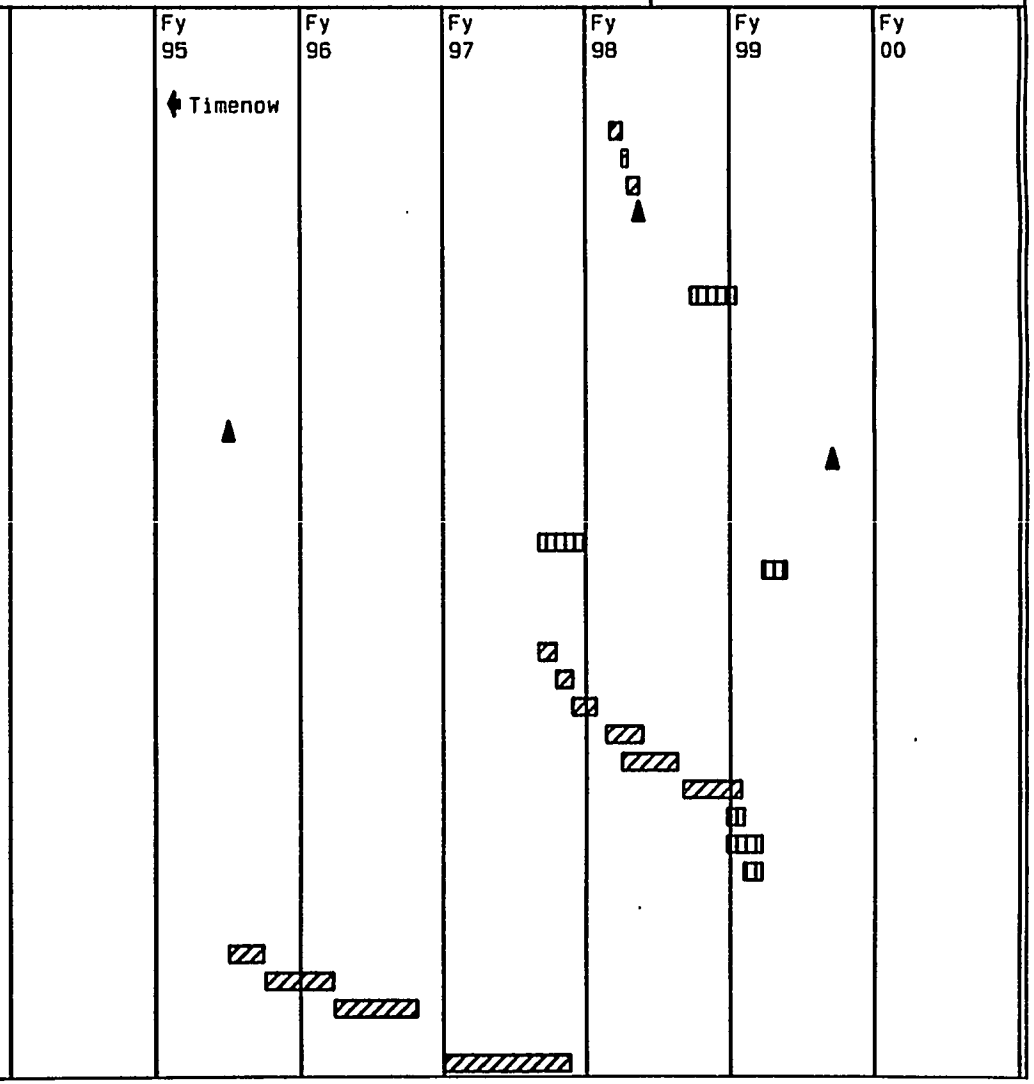
Activity	Description	Start	Finish	Dur	TF
X304700270	REMOVE SINK & COUNTER TOP	02DEC97	31DEC97	20	170
X304700275	DISPOSE OF SINK & COUNTER TOP	02JAN98	15JAN98	10	170
X304700280	ALARM DEACTIVATION	16JAN98	13FEB98	20	170
X304700285	HOODS CLEAN-UP AND DEACTIVATION COMPLETE	13FEB98	13FEB98	0	170
2.10.2.14.10	*FINAL FACILITY REPORT - 3047*				
X304700420	FINAL FACILITY REPORT	24JUN98	16OCT98	80	0
11	*BUILDING 3517*				
2.10.2.16	*BUILDING 3517 FACILITY DEACTIVATION*				
X351700000	BUILDING 3517 DEACTIVATION START	03APR95	03APR95	0	0
X351700005	BUILDING 3517 DEACTIVATION COMPLETE	15JUN99	14JUN99	0	0
2.10.2.16.02	*STRUCTURAL STABILIZATION - 3517*				
X351700100	PIPING UTILITIES & ALARM DEACTIVATION	02JUN97	24SEP97	80	0
X351700095	FIRE PROTECTION	21DEC98	18FEB99	40	0
2.10.2.16.03	*HOT CELLS CLEANUP - 3517*				
X351700060	CELL 14 W CLEAN-UP	02JUN97	15JUL97	30	37
X351700065	CELL 14N CLEAN-UP	16JUL97	26AUG97	30	37
X351700070	CELL 14 E CLEAN-UP	27AUG97	24OCT97	42	37
X351700075	CELL 11 E & W CLEAN-UP	20NOV97	19FEB98	60	37
X351700080	CELL 15 CLEAN-UP	29DEC97	19MAY98	98	37
X351700050	CELL 13 CLEAN-UP	03JUN98	26OCT98	101	37
X351700040	CELL 10E CLEAN-UP	22SEP98	03NOV98	31	0
X351700055	CELL 12 CLEAN-UP	22SEP98	18DEC98	62	0
X351700045	CELL 10W CLEAN-UP	04NOV98	18DEC98	31	0
2.10.2.16.09	*INVENTORY TRANSFER - 3517*				
X351700020	Cm-244 TRANSFER	03APR95	28JUN95	61	769
X351700010	JUSTIFICATION FOR REPACKAGING	05JUL95	22DEC95	120	602
X351700025	PACKAGE Co, Eu, Gd, FOR RETRIEVABLE STORAGE	27DEC95	24JUL96	145	602
X351700015	FACILITY UPGRADES, ALARM DEACTIVATION	01OCT96	18AUG97	220	455



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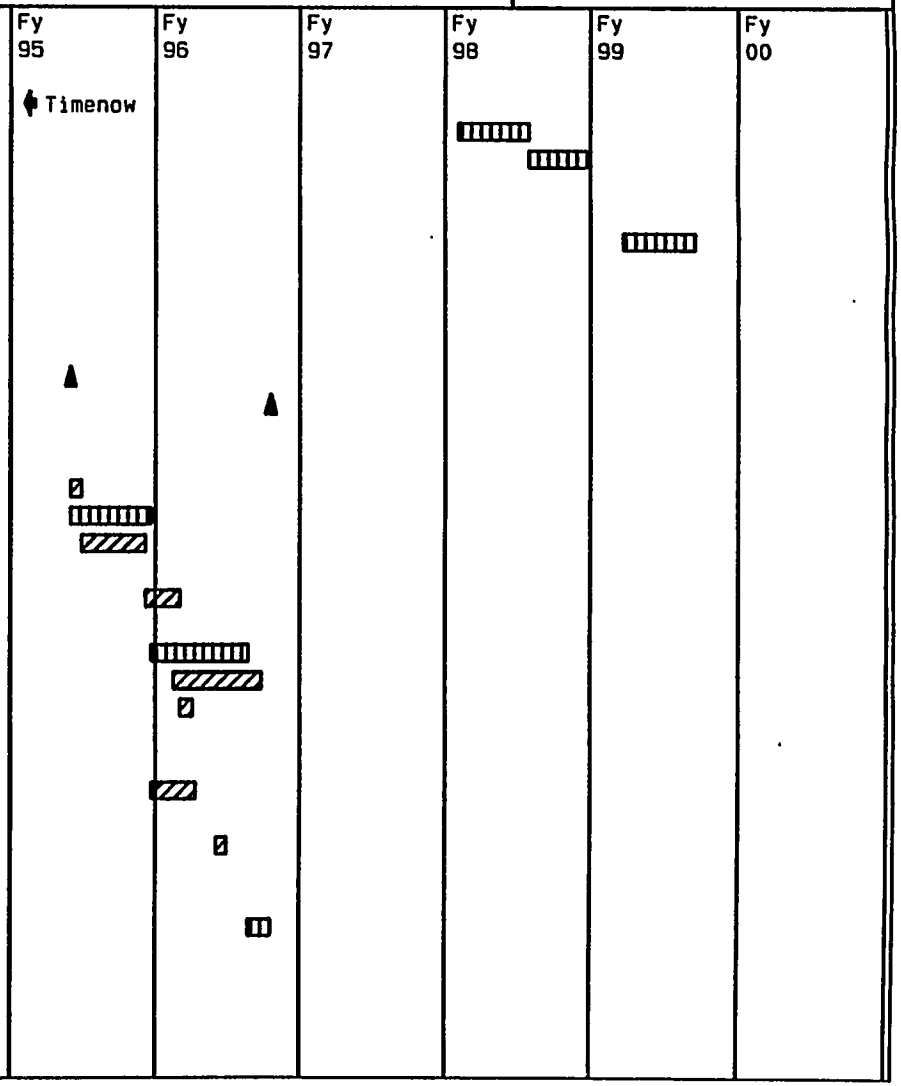
Activity	Description	Start	Finish	Dur	TF
X351700030	RE-PACKAGE Cs-137 SOURCES	03NOV97	28APR98	120	0
X351700035	RE-PACKAGE Sr-90 SOURCES	29APR98	21SEP98	100	0
2.10.2.16.10	*FINAL FACILITY REPORT - 3517*				
X351700090	FINAL FACILITY REPORT	21DEC98	14JUN99	120	0
J1	*BUILDING 7025*				
2.10.2.18	*BUILDING 7025 FACILITY DEACTIVATION*				
X702500000	BUILDING 7025 DEACTIVATION START	01MAR95	01MAR95	0	0
X702500005	BUILDING 7025 DEACTIVATION COMPLETE	19JUL96	18JUL96	0	0
2.10.2.18.01	*CONTAMINATION CONTROL - 7025*				
X702500007	"HOT SHEAR WORK"	01MAR95	28MAR95	20	100
X702500010	TRITIUM SYSTEM CLEAN-UP	01MAR95	19SEP95	140	0
X702500025	DISPOSE OF UNNECESSARY EQUIPMENT IN LG. SHED	29MAR95	05SEP95	110	100
X702500035	CLEAN OUT & DISPOSE OF EQUIPMENT IN SMALL SHEDS	06SEP95	30NOV95	60	100
X702500030	DISPOSE OF ALL EQUIPMENT & CABINETS	20SEP95	23MAY96	170	0
X702500045	REMOVE SINK & UNDERGROUND TANK	15NOV95	25JUN96	152	15
X702500040	DISPOSE OF THE TWO SMALL SHEDS	01DEC95	02JAN96	20	100
2.10.2.18.02	*STRUCTURAL STABILIZATION - 7025*				
X702500020	UTILITY, WATER SYSTEM, & ALARM DEACTIVATION	20SEP95	09JAN96	75	95
X702500015	REPAIR ROOF AND WALLS	04MAR96	29MAR96	20	38
2.10.2.18.10	*FINAL FACILITY REPORT - 7025*				
X702500055	FINAL FACILITY REPORT	24MAY96	18JUL96	37	0



Appendix C

PROJECT COST ESTIMATES

FISCAL YEAR SUMMARY
Project Number: 1
ISOTOPE DEACTIVATION PROGRAM

Project ESO Number.....PX000K01
Revision Number.....0
Last Update.....07/27/1995

Sort Order
1. WBS - Level 9

Approved by:

Project Estimator	Date
Estimating Manager	Date

Base Fiscal Year/Quarter: 94/3
STANDARD VALUE: C:\AES60\ERDEC94C.val EXPIRES: 03/15/1996
ESTIMATE FILE: C:\AES60\IFDP-RV1\IFDP-RV1.Est 07/27/1995
SCHEDULE FILE: IFDP-RV1
REPORT FILE: C:\AES60\IFDP-RV1\FY9.Out 07/28/1995 10:25:19 AES Version 6.0f

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year					Sub
		1995	1996	1997	1998	1999	Total
2.10.2.01.01	PROJECT MANAGEMENT	263	275	284	294	307	1423
2.10.2.01.02	PROJECT PLANNING	215	224	231	170	176	1016
2.10.2.02.01.04.02	UTILITIES	64	66	69	71	.	270
2.10.2.02.01.04.04	UTILITIES	63	66	68	71	56	324
2.10.2.02.01.06	UTILITIES	21	7	.	.	.	28
2.10.2.02.01.08	UTILITIES	20	18	.	.	.	38
2.10.2.02.01.10.02	UTILITIES	2	2	.	.	.	4
2.10.2.02.01.10.04	UTILITIES	8	1	.	.	.	9
2.10.2.02.01.10.06	UTILITIES	3	9	1	.	.	13
2.10.2.02.01.10.12	UTILITIES	7	2	.	.	.	9
2.10.2.02.01.10.14	UTILITIES	8	4	.	.	.	12
2.10.2.02.01.12.02	UTILITIES	34	35	20	.	.	89
2.10.2.02.01.12.04	UTILITIES	47	49	20	.	.	116
2.10.2.02.01.12.06	UTILITIES	12	12	3	.	.	27
2.10.2.02.01.14	UTILITIES	81	84	87	90	4	346
2.10.2.02.01.16	UTILITIES	118	124	128	133	97	600
2.10.2.02.01.18	UTILITIES	3	3	.	.	.	6
2.10.2.02.04.02	S&M 3026	99	104	107	112	23	445
2.10.2.02.04.04	S&M 3026	99	103	107	111	94	514
2.10.2.02.06	S&M 3028	62	30	14	15	15	136
2.10.2.02.08	S&M 3029	230	211	54	56	59	610
2.10.2.02.10.02	S&M CC	38	33	9	9	9	98
2.10.2.02.10.04	S&M CC	51	13	7	8	8	87
2.10.2.02.10.06	S&M CC	41	43	21	8	9	122
2.10.2.02.10.08	S&M CC	41	33	9	9	9	101
2.10.2.02.10.10	S&M CC	36	8	8	8	8	68
2.10.2.02.10.12	S&M CC	19	11	4	4	4	42
2.10.2.02.10.14	S&M CC	19	11	4	4	4	42
2.10.2.02.12.02	S&M 3038	160	167	112	38	39	516
2.10.2.02.12.04	S&M 3038	204	213	110	43	44	614
2.10.2.02.12.06	S&M 3038	83	86	37	19	20	245
2.10.2.02.14	S&M 3047	551	575	595	618	153	2492
2.10.2.02.16	S&M 3517	798	833	862	895	705	4093
2.10.2.02.18	S&M 7025	46	41	11	11	11	120
2.10.2.02.20	OTHER S&M	10	10	10	11	11	52
2.10.2.04.01.02	CONTAMINATION CONTROL	94	181	.	.	.	275
2.10.2.04.01.04	CONTAMINATION CONTROL	.	.	100	677	.	777
2.10.2.04.02.02	STRUCTURAL STABILIZATION	.	34	85	214	.	333
2.10.2.04.02.04	STRUCTURAL STABILIZATION	.	.	.	213	181	394
2.10.2.04.08.02	RL LIGHT PACKAGING	220	80	.	.	.	300
2.10.2.04.10.02	FINAL FACILITY REPORT	.	.	.	67	1	68
2.10.2.04.10.04	FINAL FACILITY REPORT	.	.	.	.	69	69

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year					Sub
		1995	1996	1997	1998	1999	Total
2.10.2.06.01	CONTAMINATION CONTROL	238	.	.	.	.	238
2.10.2.06.02	STRUCTURAL STABILIZATION	50	102	.	.	.	152
2.10.2.06.10	FINAL FACILITY REPORT	.	61	.	.	.	61
2.10.2.08.01	CONTAMINATION CONTROL	97	254	.	.	.	351
2.10.2.08.02	STRUCTURAL STABILIZATION	.	154	.	.	.	154
2.10.2.08.10	FINAL FACILITY REPORT	.	96	.	.	.	96
2.10.2.10.01.02	CONTAMINATION CONTROL	.	138	.	.	.	138
2.10.2.10.01.04	CONTAMINATION CONTROL	13	.	.	.	.	13
2.10.2.10.01.06	CONTAMINATION CONTROL	.	119	40	.	.	159
2.10.2.10.01.08	CONTAMINATION CONTROL	.	151	.	.	.	151
2.10.2.10.01.10	CONTAMINATION CONTROL	97	.	.	.	.	97
2.10.2.10.01.12	CONTAMINATION CONTROL	98	.	.	.	.	98
2.10.2.10.01.14	CONTAMINATION CONTROL	37	93	.	.	.	130
2.10.2.10.02.02	STRUCTURAL STABILIZATION	38	.	.	.	.	38
2.10.2.10.02.04	STRUCTURAL STABILIZATION	65	.	.	.	.	65
2.10.2.10.02.06	STRUCTURAL STABILIZATION	.	16	.	.	.	16
2.10.2.10.02.08	STRUCTURAL STABILIZATION	.	26	.	.	.	26
2.10.2.10.02.10	STRUCTURAL STABILIZATION	4	.	.	.	.	4
2.10.2.10.07.04	RE-ROOF BUILDS 3030,3118,3031	.	.	.	222	.	222
2.10.2.10.10.02	FINAL FACILITY REPORT	.	42	.	.	.	42
2.10.2.10.10.04	FINAL FACILITY REPORT	.	65	.	.	.	65
2.10.2.10.10.06	FINAL FACILITY REPORT	.	.	43	.	.	43
2.10.2.10.10.08	FINAL FACILITY REPORT	.	42	.	.	.	42
2.10.2.10.10.10	FINAL FACILITY REPORT	41	.	.	.	.	41
2.10.2.10.10.12	FINAL FACILITY REPORT	.	42	.	.	.	42
2.10.2.10.10.14	FINAL FACILITY REPORT	.	42	.	.	.	42
2.10.2.12.01.02	CONTAMINATION CONTROL	154	102	36	.	.	292
2.10.2.12.02.02	STRUCTURAL STABILIZATION	.	.	197	.	.	197
2.10.2.12.02.04	STRUCTURAL STABILIZATION	.	.	32	.	.	32
2.10.2.12.04.04	Y CELL CLEAN UP	.	101	184	.	.	285
2.10.2.12.05.02	GLOVE BOX & HOOD REMOVAL	.	.	96	.	.	96
2.10.2.12.05.04	GLOVE BOX & HOOD REMOVAL	75	146	.	.	.	221
2.10.2.12.06.06	BARRICADES CLEANUP	.	161	104	.	.	265
2.10.2.12.10.02	FINAL FACILITY REPORT	.	.	.	72	.	72
2.10.2.12.10.04	FINAL FACILITY REPORT	.	.	.	72	.	72
2.10.2.12.10.06	FINAL FACILITY REPORT	.	.	.	72	.	72
2.10.2.14.01	CONTAMINATION CONTROL	199	.	.	.	.	199
2.10.2.14.02	STRUCTURAL STABILIZATION	247	.	76	.	.	323
2.10.2.14.03	HOT CELL CLEAN UP	54	.	498	437	.	989
2.10.2.14.05	GLOVE BOXES & HOODS REMOVAL	.	.	270	171	.	441
2.10.2.14.10	FINAL FACILITY REPORT	.	.	.	99	16	115
2.10.2.16.02	STRUCTURAL STABILIZATION	.	.	234	.	182	416

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year					Sub
		1995	1996	1997	1998	1999	Total
2.10.2.16.03	HOT CELL CLEAN UP	.	.	110	361	176	647
2.10.2.16.09	INVENTORY TRANSFER	443	349	1020	1365	.	3177
2.10.2.16.10	FINAL FACILITY REPORT	.	.	.	.	231	231
2.10.2.18.01	CONTAMINATION CONTROL	79	103	.	.	.	182
2.10.2.18.02	STRUCTURAL STABILIZATION	1	10	.	.	.	11
2.10.2.18.10	FINAL FACILITY REPORT	.	42	.	.	.	42
2.10.2.20.01	OTHER SUPPORT (LMES ENGINEERI	404	716	351	364	379	2214
2.10.2.20.02	AUDITS AND ASSESSMENTS	139	145	150	156	162	752
2.10.2.20.02.01	LIFECYCLE COST/RISK ANALYSIS	248	.	.	.	.	248
Sub-Total		6591	7119	6618	7370	3262	31060
Overhead		2715	2639	2691	2887	1077	12009
Sub-Total		9406	9758	9309	10257	4339	43069
Contingency		270	422	0	3074	1301	5067
Grand Total		9676	10180	9309	13331	5640	48136

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year 2000	Total
2.10.2.01.01	PROJECT MANAGEMENT	316	1739
2.10.2.01.02	PROJECT PLANNING	.	1016
2.10.2.02.01.04.02	UTILITIES	.	270
2.10.2.02.01.04.04	UTILITIES	.	324
2.10.2.02.01.06	UTILITIES	.	28
2.10.2.02.01.08	UTILITIES	.	38
2.10.2.02.01.10.02	UTILITIES	.	4
2.10.2.02.01.10.04	UTILITIES	.	9
2.10.2.02.01.10.06	UTILITIES	.	13
2.10.2.02.01.10.12	UTILITIES	.	9
2.10.2.02.01.10.14	UTILITIES	.	12
2.10.2.02.01.12.02	UTILITIES	.	89
2.10.2.02.01.12.04	UTILITIES	.	116
2.10.2.02.01.12.06	UTILITIES	.	27
2.10.2.02.01.14	UTILITIES	.	346
2.10.2.02.01.16	UTILITIES	.	600
2.10.2.02.01.18	UTILITIES	.	6
2.10.2.02.04.02	S&M 3026	24	469
2.10.2.02.04.04	S&M 3026	24	538
2.10.2.02.06	S&M 3028	16	152
2.10.2.02.08	S&M 3029	61	671
2.10.2.02.10.02	S&M CC	10	108
2.10.2.02.10.04	S&M CC	8	95
2.10.2.02.10.06	S&M CC	9	131
2.10.2.02.10.08	S&M CC	10	111
2.10.2.02.10.10	S&M CC	9	77
2.10.2.02.10.12	S&M CC	4	46
2.10.2.02.10.14	S&M CC	4	46
2.10.2.02.12.02	S&M 3038	41	557
2.10.2.02.12.04	S&M 3038	46	660
2.10.2.02.12.06	S&M 3038	20	265
2.10.2.02.14	S&M 3047	137	2629
2.10.2.02.16	S&M 3517	184	4277
2.10.2.02.18	S&M 7025	12	132
2.10.2.02.20	OTHER S&M	12	64
2.10.2.04.01.02	CONTAMINATION CONTROL	.	275
2.10.2.04.01.04	CONTAMINATION CONTROL	.	777
2.10.2.04.02.02	STRUCTURAL STABILIZATION	.	333
2.10.2.04.02.04	STRUCTURAL STABILIZATION	.	394
2.10.2.04.08.02	RL LIGHT PACKAGING	.	300
2.10.2.04.10.02	FINAL FACILITY REPORT	.	68
2.10.2.04.10.04	FINAL FACILITY REPORT	.	69

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year 2000	Total
2.10.2.06.01	CONTAMINATION CONTROL	.	238
2.10.2.06.02	STRUCTURAL STABILIZATION	.	152
2.10.2.06.10	FINAL FACILITY REPORT	.	61
2.10.2.08.01	CONTAMINATION CONTROL	.	351
2.10.2.08.02	STRUCTURAL STABILIZATION	.	154
2.10.2.08.10	FINAL FACILITY REPORT	.	96
2.10.2.10.01.02	CONTAMINATION CONTROL	.	138
2.10.2.10.01.04	CONTAMINATION CONTROL	.	13
2.10.2.10.01.06	CONTAMINATION CONTROL	.	159
2.10.2.10.01.08	CONTAMINATION CONTROL	.	151
2.10.2.10.01.10	CONTAMINATION CONTROL	.	97
2.10.2.10.01.12	CONTAMINATION CONTROL	.	98
2.10.2.10.01.14	CONTAMINATION CONTROL	.	130
2.10.2.10.02.02	STRUCTURAL STABILIZATION	.	38
2.10.2.10.02.04	STRUCTURAL STABILIZATION	.	65
2.10.2.10.02.06	STRUCTURAL STABILIZATION	.	16
2.10.2.10.02.08	STRUCTURAL STABILIZATION	.	26
2.10.2.10.02.10	STRUCTURAL STABILIZATION	.	4
2.10.2.10.07.04	RE-ROOF BUILDS 3030,3118,3031	.	222
2.10.2.10.10.02	FINAL FACILITY REPORT	.	42
2.10.2.10.10.04	FINAL FACILITY REPORT	.	65
2.10.2.10.10.06	FINAL FACILITY REPORT	.	43
2.10.2.10.10.08	FINAL FACILITY REPORT	.	42
2.10.2.10.10.10	FINAL FACILITY REPORT	.	41
2.10.2.10.10.12	FINAL FACILITY REPORT	.	42
2.10.2.10.10.14	FINAL FACILITY REPORT	.	42
2.10.2.12.01.02	CONTAMINATION CONTROL	.	292
2.10.2.12.02.02	STRUCTURAL STABILIZATION	.	197
2.10.2.12.02.04	STRUCTURAL STABILIZATION	.	32
2.10.2.12.04.04	Y CELL CLEAN UP	.	285
2.10.2.12.05.02	GLOVE BOX & HOOD REMOVAL	.	96
2.10.2.12.05.04	GLOVE BOX & HOOD REMOVAL	.	221
2.10.2.12.06.06	BARRICADES CLEANUP	.	265
2.10.2.12.10.02	FINAL FACILITY REPORT	.	72
2.10.2.12.10.04	FINAL FACILITY REPORT	.	72
2.10.2.12.10.06	FINAL FACILITY REPORT	.	72
2.10.2.14.01	CONTAMINATION CONTROL	.	199
2.10.2.14.02	STRUCTURAL STABILIZATION	.	323
2.10.2.14.03	HOT CELL CLEAN UP	.	989
2.10.2.14.05	GLOVE BOXES & HOODS REMOVAL	.	441
2.10.2.14.10	FINAL FACILITY REPORT	.	115
2.10.2.16.02	STRUCTURAL STABILIZATION	.	416

ISOTOPE DEACTIVATION PROGRAM

FISCAL YEAR SUMMARY
$1 = $1000

07/28/1995

Arranged By: WBS
Fiscal Year Range 1995 - 2000

		Fiscal Year 2000	Total
2.10.2.16.03	HOT CELL CLEAN UP	.	647
2.10.2.16.09	INVENTORY TRANSFER	.	3177
2.10.2.16.10	FINAL FACILITY REPORT	.	231
2.10.2.18.01	CONTAMINATION CONTROL	.	182
2.10.2.18.02	STRUCTURAL STABILIZATION	.	11
2.10.2.18.10	FINAL FACILITY REPORT	.	42
2.10.2.20.01	OTHER SUPPORT (LMES ENGINEERI	393	2607
2.10.2.20.02	AUDITS AND ASSESSMENTS	168	920
2.10.2.20.02.01	LIFECYCLE COST/RISK ANALYSIS	.	248
Sub-Total		1508	32568
Overhead		447	12456
Sub-Total		1955	45024
Contingency		586	5653
Grand Total		2541	50677

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