MARTIN MARIETTA ENERGY SYSTEMS LIBRARIES
3 4456 0153632 6

ORNL/TM-10268

ornl

OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

The ORNL Surplus Facilities Management Program Maintenance and Surveillance Plan for Fiscal Year 1984

J. H. Coobs
T. E. Myrick

OAK RIDGE NATIONAL LABORATORY
CENTRAL RESEARCH LIBRARY
CIRCULATION SECTION
4500N ROOM 175
LIBRARY LOAN COPY
DO NOT TRANSFER TO ANOTHER PERSON
If you wish someone else to see this report, send in name with report and the library will arrange a loan.

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22161
NTIS price codes—Printed Copy: A08; Microfiche A01

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

ORNL/TM-10268

Contract No. W-7405-eng-26

OPERATIONS DIVISION

THE ORNL SURPLUS FACILITIES MANAGEMENT PROGRAM MAINTENANCE AND SURVEILLANCE PLAN FOR FISCAL YEAR 1984

J. H. Coobs, Program Manager
T. E. Myrick

Formerly Issued as ORNL/CF-83/56

Date Published - October 1986

NOTICE This document contains information of a preliminary nature. It is subject to revision or correction and therefore does not represent a final report.

Prepared for
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-840R21400

MARTIN MARIETTA ENERGY SYSTEMS LIBRARIES
3 4456 0153632 6

TABLE OF CONTENTS

Page

LIST OF FIGURES v

LIST OF TABLES vii

1.0 INTRODUCTION 1

1.1 The ORNL SFMP 1
1.2 M&S Program Objectives 6
1.3 Scope of the M&S Plan 6

2.0 PROGRAM DESCRIPTION 7

2.1 Structure and Responsibilities 7
2.2 M&S Requirements 10
2.2.1 Surveillance Requirements 10
2.2.1.1 Facility Surveillance 12
2.2.1.2 Radiological Surveillance 12
2.2.1.3 Safety Inspections 14
2.2.1.4 Security and Protection 14
2.2.2 Maintenance Requirements 15
2.2.2.1 Routine Maintenance 15
2.2.2.2 Major Repairs 15
2.2.3 Documentation 16

3.0 PROJECT SUMMARIES 17

4.0 PROGRAM DEVELOPMENT 20

4.1 Procedure Review 20
4.2 Document Control and Internal Audits 20
4.3 Facility Assessment 21

5.0 PROGRAM COSTS AND SCHEDULES 21

6.0 REFERENCES 23

APPENDIX A. PROJECT M&S ACTIVITY SUMMARIES 29

LIST OF FIGURES

		Page
Fig. 1.	ORNL Organizational Structure for the Surplus Facilities Management Program	2
Fig. 2.	Location Map for ORNL Surplus Facilities - Bethel Valley Area	4
Fig. 3.	Location Map for ORNL Surplus Facilities - Melton Valley Area	5
Fig. 4.	Operations Division Organizational Structure	8
Fig. 5.	SFMP Project Maintenance and Surveillance Responsibilities	9
Fig. 6.	ORNL Divisional Participation in the SFMP Maintenance and Surveillance Program	11
Fig. 7.	Facility Maintenance and Surveillance Schedules - Defense Program	24
Fig. 8.	Facility Maintenance and Surveillance Schedules - Commercial Program	25
Fig. 9.	Maintenance and Surveillance Program Milestones	26

LIST OF TABLES

		Page
Table 1.	ORNL Surplus Facilities Management Program Project Listing	3
Table 2.	Facility Groupings of M&S Activity Summaries	19
Table 3.	Maintenance and Surveillance Program Costs	22

THE ORNL SURPLUS FACILITIES MANAGEMENT PROGRAM MAINTENANCE AND SURVEILLANCE PLAN FOR FISCAL YEAR 1984

1.0 INTRODUCTION

The Surplus Facilities Management Program (SFMP) at Oak Ridge National Laboratory (ORNL) is part of the Department of Energy's (DOE) National SFMP, administered by the Richland Operations Office. The purpose and objectives of the national program are set forth in the current SFMP Program Plan[1] and include (1) the maintenance and surveillance of facilities awaiting decommissioning, (2) planning for the orderly decommissioning of these facilities, and (3) implementation of a program to accomplish the facility disposition in a safe, cost-effective, and timely manner. As outlined in the national program plan, participating SFMP contractors are required to prepare a formal plan that documents the maintenance and surveillance (M&S) programs established for each site. This report has been prepared to provide this documentation for those facilities included in the ORNL SFMP.

1.1 The ORNL SFMP

The Surplus Facilities Management Program was established at ORNL in 1976 in order to provide collective management of all of the surplus sites under ORNL control on the Oak Ridge Reservation. The Program is administered through the Nuclear Waste Programs Office at ORNL by Operations Division staff (see Fig. 1). Program guidance is provided by the Surplus Facilities Management Program Office (SFMPO) in Richland, Washington, through the Oak Ridge Operations (ORO) Office of DOE.

Some 46 facilities, classified into 12 defense- and commercial-waste related projects, are currently managed by the ORNL SFMP. A listing of these projects is given in Table 1. The SFMP oversees a variety of facilities, from abandoned waste storage tanks to large experimental reactors, located in both the main ORNL complex (Bethel Valley) and the nearby Melton Valley area, as shown in Figs. 2 and 3. Due to the operations conducted in the past at each site, the associated buildings, process equipment, piping, and surrounding environment have become contaminated with radioactivity, principally in the form of long-lived fission products (^{90}Sr, ^{137}Cs), activation products (^{60}Co), or actinides (^{244}Cm, ^{238}Pu). The extent of this residual contamination is dependent upon the operational history and shutdown procedures utilized at each facility. For many of the sites, the current radiological status and radionuclide inventory is not well known. Preliminary characterization studies are being performed as part of ORNL SFMP long-range planning activities in order to define these present conditions.

ORNL-DWG 83-10354

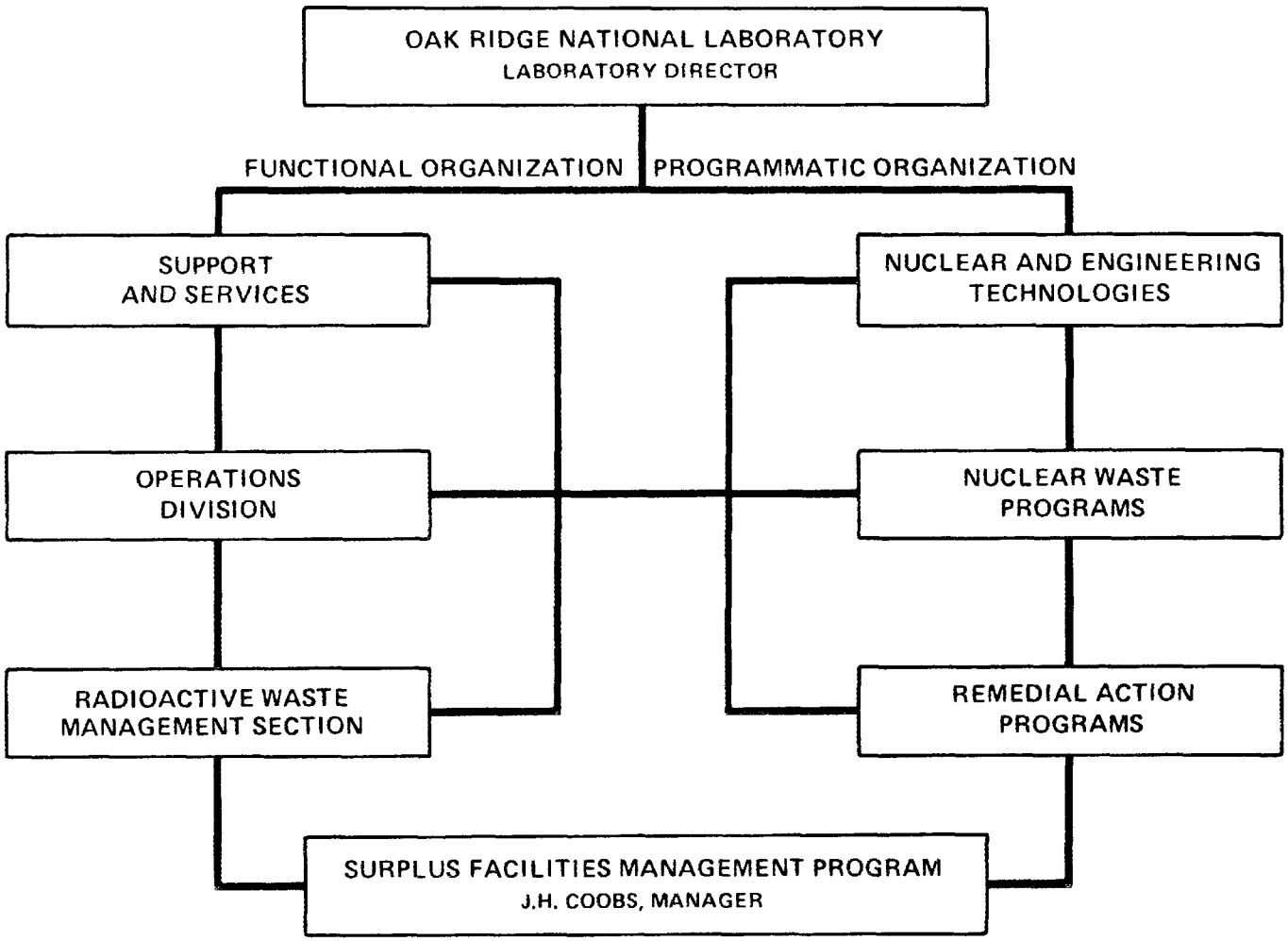


Fig. 1. ORNL Organizational Structure for the Surplus Facilities Management Program.

Table 1. ORNL Surplus Facilities Management Program Project Listing

Project*	Facility/Location
1. Metal Recovery Facility (D)	Bldg. 3505
2. Fission Product Development Laboratory (D)	Bldg. 3517
3. Waste Holding Basin (D)	Basin Site 3513
4. Old Hydrofracture Facility (D)	Shale Fracturing Batch Plant, Site 7852
5. Gunite Storage Tanks (D)	Tanks W-5 to W-10, Site 3507
6. Waste Storage Tanks (D)	Tanks WC-1, WC-15, WC-17, W-1, W-2, W-3, W-4, W-11, W-13, W-14, W-15, TH-1, TH-2, TH-3, TH-4
7. ORNL Graphite Reactor (D)	Bldg. 3001
8. Molten Salt Reactor Experiment (C)	Bldg. 7503
9. Low Intensity Test Reactor (C)	Bldg. 3005
10. ORR Experimental Facilities (C)	ORR-GCR A9-B9 Experiment ORR Molten Salt Loop ORR Maritime Ship Reactor Loop Pneumatic Tube Irradiation Facility ORR-GCR Loops I and II ORR Water-Air Heat Exchanger
11. Radioisotope Process Facilities (C)	Storage Garden 3033 Storage Garden 3026-D Carbon-14 Process System Waste Evaporator Facility Fission Product Pilot Plant Shielded Transfer Tanks
12. Homogeneous Reactor Experiment (C)	Bldg. 7500

*Projects listed as (D) are defense waste related and as (C) are commercial waste related.

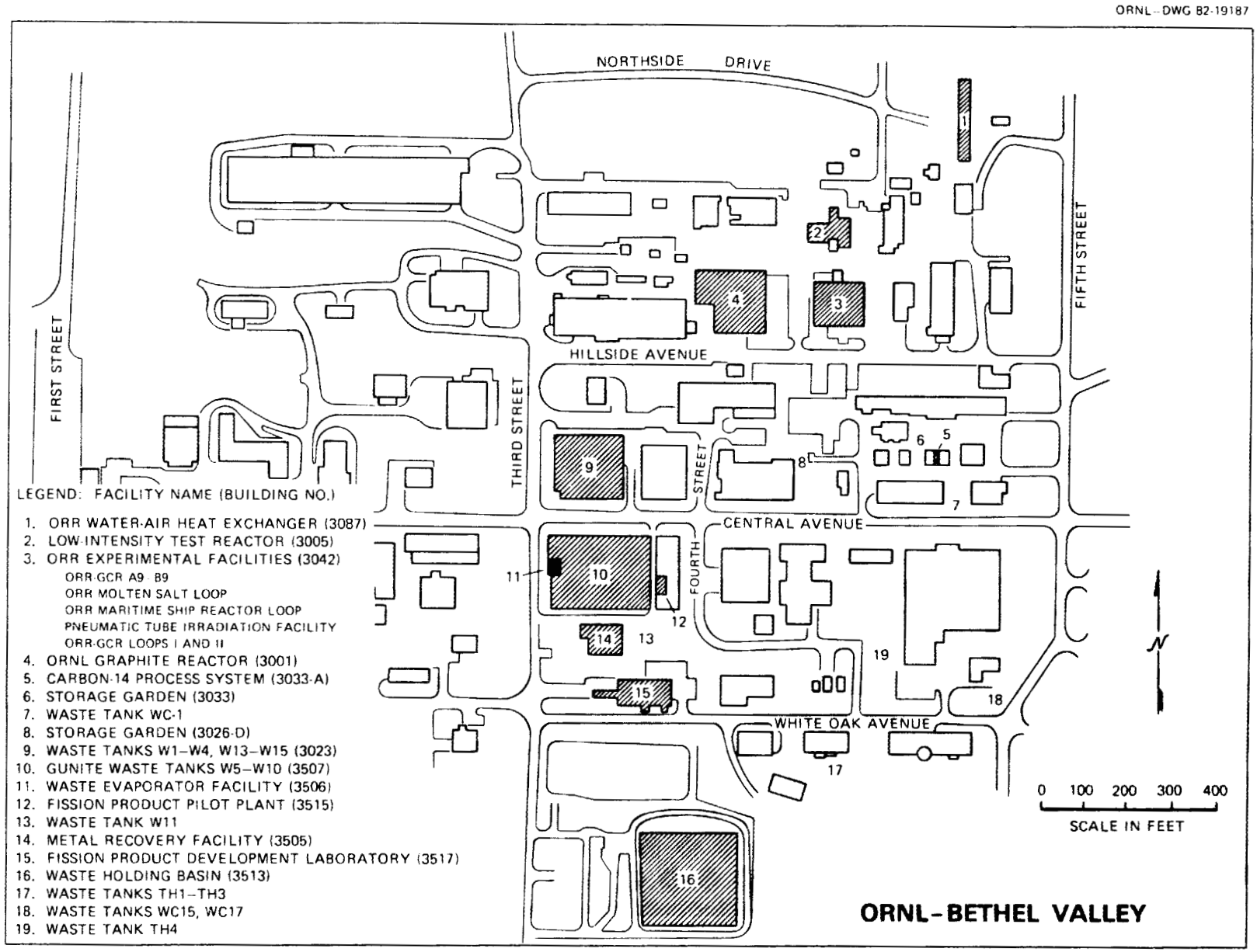


Fig. 2. Location map for ORNL Surplus Facilities - Bethel Valley area.

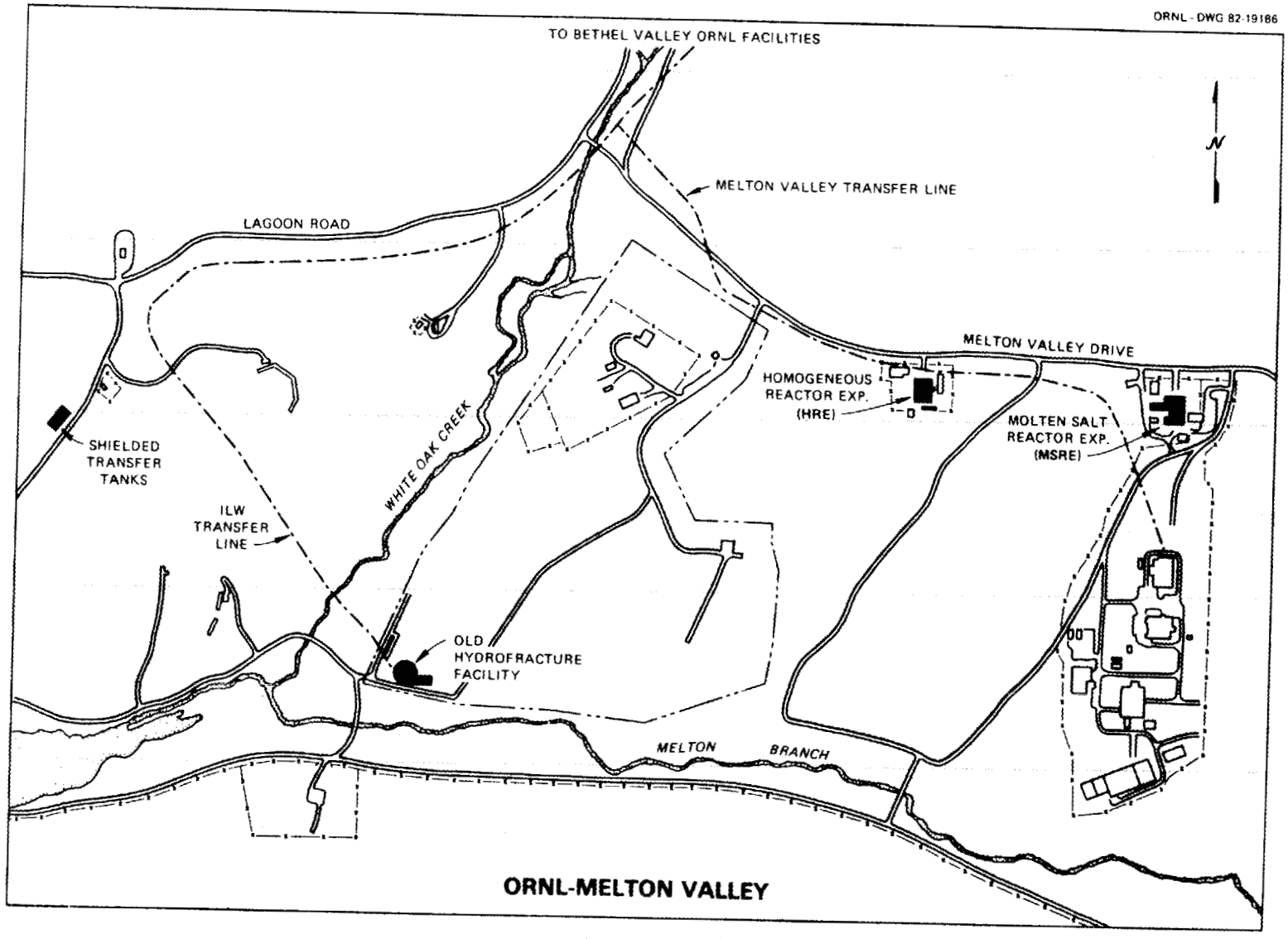


Fig. 3. Location map for ORNL Surplus Facilities - Melton Valley area.

The majority of the ORNL facilities managed by the SFMP have been inactive for 10-20 years. Because of this time lapse and the abandoned status of the sites, structural deterioration has occurred to varying degrees. This degradation has taken the form of metal corrosion, leaking roofs, accumulation of debris, etc., resulting in a general loss of facility operability. During this time, however, no significant loss of containment or release of radioactivity has occurred.

This Maintenance and Surveillance Plan is the first of two documents that describe the activities of the ORNL SFMP. This report provides documentation of only the M&S portion of the program, while the second report (the ORNL SFMP Long-Range Plan) will provide a comprehensive overview of the entire program, detailing the plans for long-term management and decommissioning of ORNL facilities. The latter document is expected to be published in September 1984.

1.2 M&S Program Objectives

The objectives of the ORNL SFMP Maintenance and Surveillance Program are as follows:

1. to ensure adequate containment of the residual radioactive materials remaining in the surplus facilities,

2. to provide safety and security controls to minimize the potential hazards to on-site personnel and the general public, and

3. to manage these facilities in the most cost-effective manner.

These objectives are met through the unified effort of the SFMP, facility operating personnel, ORNL health and safety staff, the Laboratory security forces, and program maintenance crews. Routine maintenance and surveillance is provided to assure that all SFMP facilities are maintained in accordance with ORNL procedures and applicable national standards.

1.3 Scope of the M&S Plan

This Maintenance and Surveillance Plan has been developed to address the M&S requirements for all ORNL SFMP facilities up to the time of initiation of decommissioning activities. This plan provides (1) an outline of the program responsibilities, interfaces, M&S guidelines and documentation requirements of the overall M&S program (Sect. 2.0 Program Description), (2) a summary of the operational history, physical and

radiological condition, occupancy, security provisions, current M&S activities and their associated costs, and estimated future major repairs and resource needs, for each SFMP facility (Sect. 3.0 Project Summaries), (3) presentation of SFMP plans for future development of the M&S Program (Sect. 4.0 Program Development), and (4) an integration of the individual facility M&S requirements into an overall program budget and schedule (Sect. 5.0 Program Costs and Schedule). This long-range planning document was designed to provide estimates of the projected resource needs for the M&S Program over a 10-year period. Such long-range estimates are useful for program planning purposes, although the confidence in the data beyond 3-5 years decreases.

The Maintenance and Surveillance Plan will be updated annually during the first quarter of each fiscal year as a part of the SFMP planning activities, in order to provide DOE with documentation of the current management philosophies and resource allocations. The updated plan will form the basis for the annual Field Task Proposal/Agreement submittals for budget requests concerning facility M&S.

2.0 PROGRAM DESCRIPTION

2.1 Structure and Responsibilities

As described briefly in Sect. 1.0, the ORNL SFMP is administered through the Operations Division by members of the Radioactive Waste Management Section. Currently, the SFMP staff consists of two full time personnel, the Program Manager, and an assistant. All program-related matters, including management of the M&S activities, are handled out of this office.

The maintenance and surveillance function is carried out by a multi-disciplinary team consisting of personnel from a number of ORNL support and research divisions. However, primary responsibility for the conduct of routine M&S for the SFMP facilities belongs to Operations Division (Op) staff. Within the Operations Division, six sections have been established to provide organization to the current operating programs (Fig. 4). Three of these sections (Isotopes, Reactor Operations, and Radioactive Waste Management) have been delegated the responsibility for the day-to-day management of SFMP facilities within their jurisdiction. As shown in Fig. 5, responsibility for the 12 surplus projects is fairly equally distributed among the participating sections. Project M&S responsibilities are further delegated within each section to facility supervisors. Project reporting lines are through the respective section offices to the SFM Program Office.

The facility supervisors are charged with the responsibility of providing adequate surveillance and maintenance of their respective facilities to assure compliance with the objectives of the M&S Program.

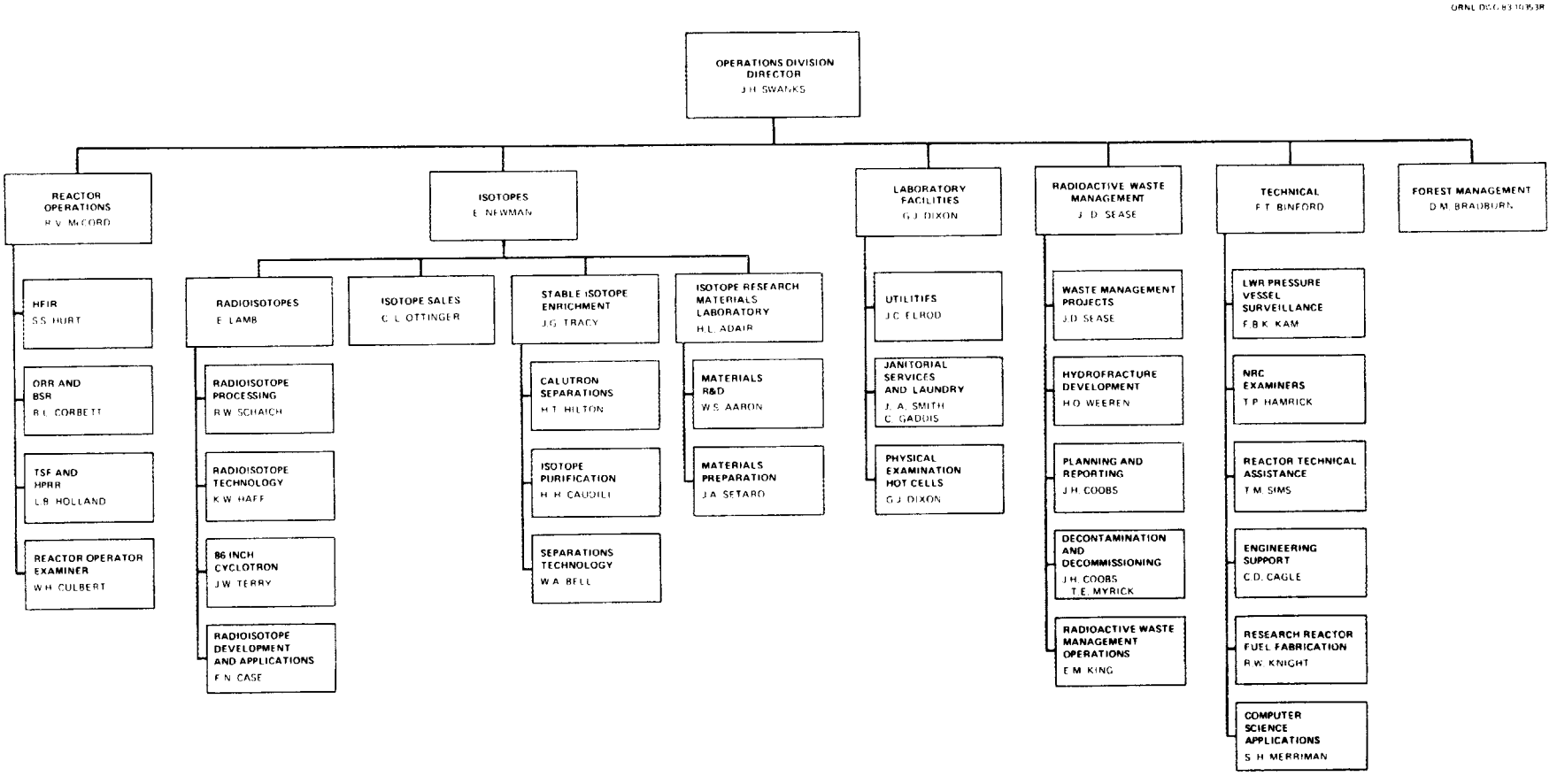


Fig. 4. Operations Division Organizational Structure.

ORNL-DWG 83-10351

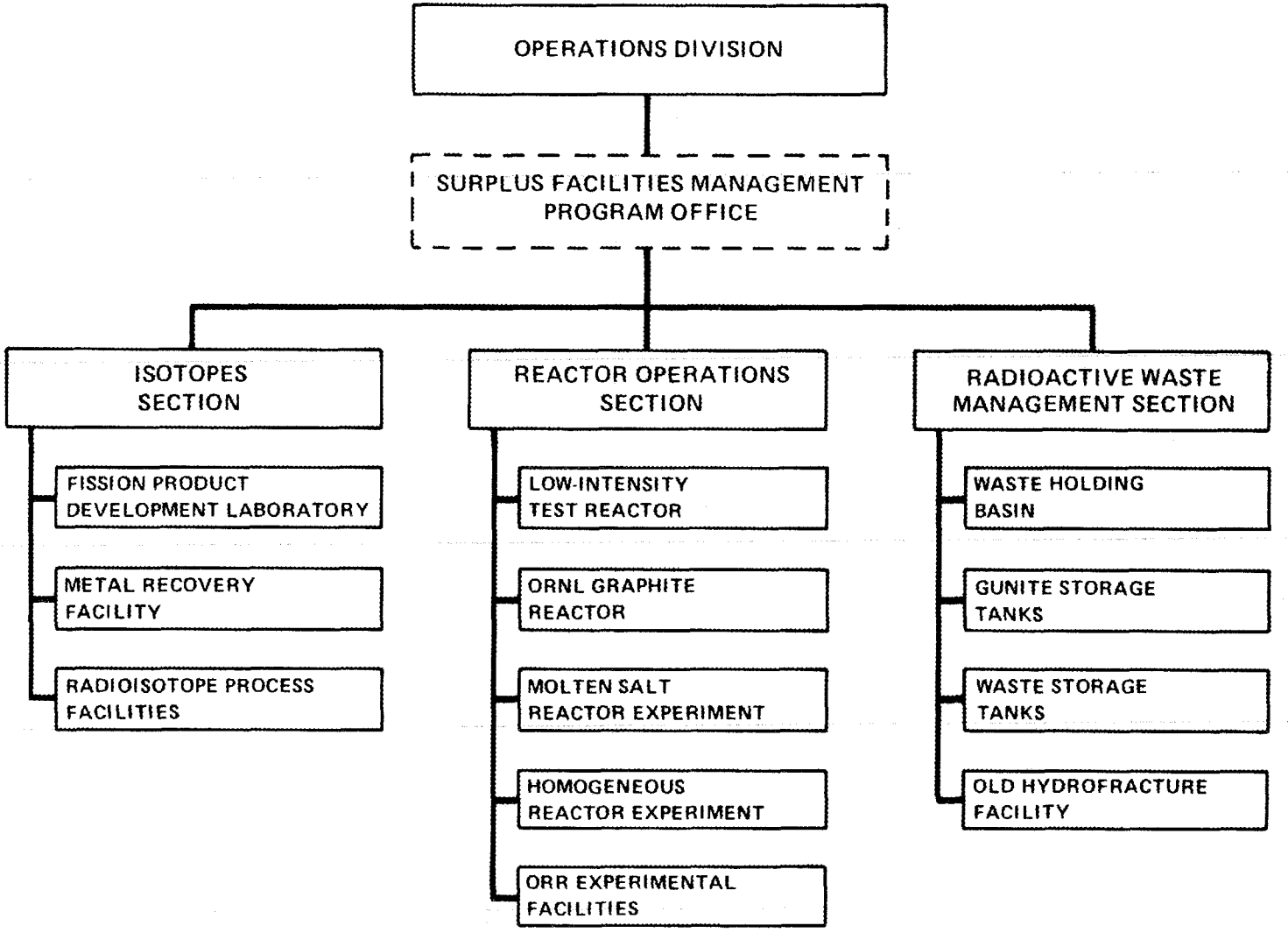


Fig. 5. SFMP Project Maintenance and Surveillance Responsibilities.

Surveillance needs have been determined based on the operational history of each site, the current facility conditions, and the occupancy of the building or area. Some facilities require continuous monitoring of ventilation streams and process liquid discharges, while others may need only periodic surveillance of exterior surfaces to assess the adequacy of the containment. Maintenance requirements for SFMP facilities include both routine repairs/equipment replacement (often based on surveillance reports) and major repairs of structurally deteriorating systems. Requests for maintenance manpower and resources are initiated by the appropriate facility supervisor.

In support of the SFMP M&S activities, seven other divisions actively participate, including

1. Industrial Safety and Applied Health Physics (ISAHP),
2. Laboratory Protection (LP),
3. Quality Assurance and Inspection (QA&I),
4. Plant and Equipment (P&E),
5. Instrumentation and Controls (I&C),
6. Analytical Chemistry (ACh), and
7. UCC/ND Engineering (ENG).

This support is provided either at the request of the facility operator or is conducted independently as part of the overall ORNL maintenance and surveillance program. For those activities conducted specifically for the SFMP, direct funding must be provided through the Program office. Those activities provided for as part of normal ORNL operation are funded through overhead, and do not require direct SFMP funds. A general breakdown of the level of participation provided by the support divisions is given in Fig. 6. As highlighted in this figure, the Operations Division assumes the lead role in all M&S activities.

2.2 M&S Requirements

Brief outlines of the maintenance and surveillance requirements for SFMP projects are presented in the following report sections. These discussions have been formatted to correspond with the M&S activities listed in Fig. 6, in terms of (1) surveillance requirements, (2) maintenance requirements, and (3) documentation. Details of the M&S activities conducted at each facility to fulfill these requirements are provided in Sect. 3.0.

2.2.1 Surveillance Requirements

Routine surveillance is provided at SFMP facilities in order to assure that each site remains in a radiologically safe condition. Such inspections are used to determine the operability of critical equipment, monitor the radiological conditions, check safety-related items, provide site security controls, and for surveillance of structural integrity.

ORNL–DWG 83-10352

DIVISION \ M&S ACTIVITY	SURVEILLANCE				MAINTENANCE		DOCUMENTATION
	FACILITY SURVEILLANCE	RADIOLOGICAL SURVEILLANCE	SAFETY INSPECTIONS	SECURITY AND PROTECTION	ROUTINE MAINTENANCE	MAJOR REPAIRS	ACTIVITY REPORTING
OPERATIONS	X	X	X	X	X	X	X
INDUSTRIAL SAFETY AND APPLIED HEALTH PHYSICS	X	X	X		X	X	X
LABORATORY PROTECTION			X	X			X
PLANT AND EQUIPMENT	X				X	X	X
QUALITY ASSURANCE AND INSPECTION	X						X
INSTRUMENTATION AND CONTROLS	X				X		X
ANALYTICAL CHEMISTRY		X					X
UCC/ND ENGINEERING						X	X

Fig. 6. ORNL Divisional Participation in the SFMP Maintenance and Surveillance Program.

Requirements have been established for these activities in four general areas: (1) Facility Surveillance, (2) Radiological Surveillance, (3) Safety Inspections, and (4) Security and Protection. Discussion of these requirements is given as follows.

2.2.1.1 Facility Surveillance

Periodic inspection of each SFMP facility must be conducted. The inspection frequency will be determined by the type of facility involved, the radionuclide containment provided, and the potential for personnel access to the site. As a minimum, facilities will be inspected annually. For those facilities with active containment, process, or monitoring systems, more frequent (daily, weekly, or monthly) inspections are provided.

Facility surveillance is normally carried out by the facility supervisor or his appointee as part of a routine inspection of his operating area. Such surveillance includes:

1. visual inspections of the building or site for structural or system failures, material degradation, liquid leaks, radiation monitor indications, burning odors, equipment irregularities, etc.,

2. routine checks on containment ventilation systems, in terms of pressure drop readings, observation of building or cell negative pressures, operability of auxiliary containment fans, etc.,

3. observation of liquid levels in sump areas, storage tanks, canals, and storage pools,

4. process equipment operability checks, including air compressors, water pumps, sump pumps, etc., and

5. other facility-specific needs, such as argon manifold checks, steam system checks, and manipulator inspections.

In addition to these operator surveillance activities, routine inspections of the radiation detection instrumentation, building exterior and roof conditions, overhead cranes, and testing of HEPA filtration systems are provided through the Laboratory-wide surveillance program. ORNL quality assurance requirements are met through these on-site inspections and routine QA audits.

2.2.1.2 Radiological Surveillance

The requirements for radiological surveillance can be broken down into two categories, (1) radiation/contamination surveys and (2) radioactive waste stream and environmental monitoring. The radiation surveys will be conducted by ISAHP staff regularly, on a schedule dictated by the type and levels of contamination, and the

facility design or layout. Waste stream and environmental monitoring of individual facilities are provided as part of the ORNL waste management control system.[2] Observation frequencies can range from continuous monitoring of ventilation streams, to monthly sampling of waste tank dry wells. Environmental monitoring of the ORNL site as a whole is provided through the comprehensive ORNL sampling and monitoring program.[3]

Radiation survey procedures have been established at ORNL[4] to provide adequate characterization and surveillance of radiation/contamination zones at the SFMP facilities. These procedures include:

1. daily smear and direct reading surveys of occupied surface contamination areas,

2. personnel monitoring during all operations within contamination/radiation zones,

3. weekly surveying (smear and/or direct) of accessible areas adjacent to contamination zones,

4. monthly, semi-annual, or annual surveys of areas of radiological concern that are remote from routine personnel access,

5. surveillance of all equipment or materials removed from an SFMP facility, and

6. inspection and calibration of health physics instrumentation (hand and foot monitors, continuous air monitors) on a routine schedule.

This routine surveillance is provided by ISAHP staff as part of their regular inspection of active and surplus facilities within each established survey area. Additional survey support is made available upon request of the SFMP facility supervisor, as the need arises.

The ORNL Waste Operations Control Center (WOCC) provides continuous surveillance of liquid and gaseous effluents released from all operating and some inactive facilities at the Laboratory. Data from remote instrumentation are transmitted to the WOCC for monitoring and recording of the operating characteristics of the liquid and gaseous radwaste system. A shift operator is on duty providing round-the-clock surveillance. In the event of an abnormal activity release or instrument malfunction, the shift operator alerts the appropriate supervision and the respective facility operator so that corrective action can be taken.

The WOCC monitors a variety of information, from atmospheric conditions to exit stack flow rates. However, for the inactive SFMP

facilities, only a few of which have radwaste discharges, the control center is primarily responsible for the surveillance of:

1. exhaust duct gaseous effluent radioactivity,
2. cell blower status,
3. process waste water (LLW) flow rates and radioactivity, and
4. intermediate level waste (ILW) collection tank inventories and transfers.

In addition to these continuous surveillance activities, periodic sampling and analysis of liquid effluents are conducted, primarily in the vicinity of the abandoned ILW storage tanks. Monthly dry well samples are obtained to give an indication of potential radionuclide migration into the groundwater around the tanks.

2.2.1.3 Safety Inspections

Safety inspections will be conducted on a routine basis for all SFMP facilities in order to identify existing and potential hazards to personnel, equipment, or other property. These inspections will be done in accordance with the ORNL Safety Policy, as defined in Procedure 1.1 of the ORNL Safety Manual.[5] The Operations Division assumes the lead role in these inspections, utilizing staff from other divisions (i.e., ISAHP, Laboratory Protection) as part of the inspection team. The semi-annual facility surveillance by the safety team involves general inspections of building conditions to identify unsafe work practices, fire hazards, etc. More frequent (weekly, monthly, or quarterly) inspections and testing of emergency systems, such as lighting or fire protection equipment, are conducted as appropriate.

In some instances, the Laboratory Director's Safety Review Committee may be directed to perform a comprehensive safety review and inspection of an SFMP facility. Such a review would be conducted to ascertain in more detail the potential risk to ORNL personnel from the current conditions, and recommend facility modifications or other actions to be taken. The results of this investigation would be used by the SFM Program to define the future resource requirements and any changes needed in routine surveillance activities.

2.2.1.4 Security and Protection

As a restricted government installation, ORNL is provided with comprehensive safeguards, security, and protection systems. These systems include exclusion fencing around the reservation perimeter, continuously manned guard posts, controlled access for sensitive and hazardous areas, fire alarm and protection systems, a continuously manned and fully equipped fire department, and a routine (random) security patrol. Because this complete protection is provided for ORNL as a whole, little additional security or protective measures are required for the SFMP facilities. Access to those facilities where potential hazards exist is further restricted by the facility operators who are

required to minimize nonroutine personnel entry. This is normally accomplished by maintaining abandoned buildings in a locked and secured condition, and providing adequate entry restriction and radiation hazard posting for all accessible areas.

2.2.2 Maintenance Requirements

The maintenance program for SFMP facilities encompasses both routine maintenance activities and needs for major repairs of structures or equipment. Guidance for these activities is provided through the Plant and Equipment Division's Procedures Manual.[6] The P&E Division Staff is responsible for conducting the majority of the program maintenance at ORNL, according to its own routine maintenance schedule or at the request of the facility supervisors. Funding for many routine maintenance items (grounds care, exterior painting, preventative equipment maintenance) is provided through ORNL overhead charges. Resources for other maintenance, major repairs, or improvements must be directly supplied by the SFMP.

2.2.2.1 Routine Maintenance

Preventative maintenance requirements and schedules are established by P&E for each SFMP facility based on the type of structures and equipment involved. Input from the respective P&E Field Engineer and the facility supervisor is used in identifying critical equipment or systems and determining the necessary maintenance frequencies. Routine and programmed maintenance activities include inspections, adjustments, lubrication, reconditioning, and other service to prevent equipment or structural failures and prolong material or equipment lifetimes.

Corrective maintenance is provided for equipment malfunction or breakdown, or when there is an indication of impending equipment failure. Equipment repair or equivalent replacement is conducted to satisfy the immediate service needs, and assure long-term operability. Users of facility equipment or systems are responsible for reporting operational failures or other concerns to the facility supervisor, who will in turn submit the appropriate request to the responsible P&E field engineer for action.

Modification maintenance, consisting of minor facility alterations or improvements, may be required to provide increased levels of containment or reduce safety hazards. Such modifications will normally be initiated by the facility supervisor, requiring some specialized P&E craft support. No specific SFM Program approval is required to carry out these minor alterations.

2.2.2.2 Major Repairs

In certain instances, major facility repairs or improvements may be necessary to correct material degradation problems, assure radionuclide

containment, or eliminate a significant safety concern. These improvements could include repair of leaking roofs, removal of deteriorating equipment, decontamination of recurring problem areas, and construction of temporary barriers. The scope of such projects can vary from routine construction jobs to complex tasks requiring multi-division participation, including engineering designs, safety reviews, and specialized construction forces. Because these projects can usually be anticipated and planned for, additional SFMP requirements exist to provide adequate management control over the costs and schedules.

Requests for major repairs must be submitted to the SFM Program Office for approval prior to initiation of detailed planning activities. Task plans, including cost and scheduling data, must be developed by the facility supervisor at least six months prior to the anticipated project start date. Long-range major repair needs should be forecasted as early as possible in order to assure adequate budget allocations. Project direction and control will be the responsibility of the facility supervisor, with routine status reporting required.

2.2.3 Documentation

Documentation of all maintenance and surveillance activities conducted at SFMP facilities is provided by the responsible division for each task. This reporting ranges from computer control cards submitted by field engineers or surveyors, to detailed engineering design packages for major repairs. Facility supervisors are required to maintain a file of all facility-related M&S activities which they initiated or controlled. Health physics records are archived by the ISAHP Division, and P&E program maintenance files are maintained on computer, with routine distribution to appropriate facility operators or division management. Quality Assurance and Inspection reports are also computer filed, with summaries distributed to division offices. The remaining M&S participants maintain permanent records of their activities, within the respective divisions.

No attempt has yet been made by the ORNL SFMP to centralize the collection of M&S documentation, due to the wide variety of reporting methods within the already established ORNL system. The facility-supervisor concept of facility M&S management provides for the most cost-effective control of the abandoned sites, with responsibility for assuring that the necessary M&S activities are being conducted falling on that individual. Periodic reviews of the scope of these activities and audits of the M&S records are performed to assure the SFM Program Office that adequate M&S is being conducted and documented. Monthly status reports are provided by the facility supervisors as input to the ORNL-SFMP monthly report to the DOE.

3.0 PROJECT SUMMARIES

Maintenance and surveillance activity summaries have been developed for all of the ORNL SFMP facilities and are presented in Appendix A. These summaries provide brief overviews of the facility history, current conditions, and give a listing of the M&S activities currently conducted. Manpower estimates and associated costs have been included for each activity. The facility-related costs are integrated for the entire program in Sect. 5.0.

The M&S activity summaries contain ten categories of information, defined as follows:

1. Facility Name - An ORNL-designated facility title, usually descriptive, that identifies the project.

2. Location - A building or site number as defined in the ORNL Building Directory. For those facilities where no ORNL number has been assigned, reference is made to locations relative to a numbered building. The facility is also identified as to its location in the Bethel Valley or Melton Valley portions of ORNL (see Figs. 2 and 3).

3. Service Dates - The period of time over which the facility was considered operational.

4. Facility Status - A listing of the current facility status in terms of operability, occupancy, and facility responsibility. The current facility supervisor is also identified.

5. Facility Description - A brief discussion of the facility operating history, physical description, current conditions, radiological hazards, and occupancy. In most cases, the information contained in this section is based on historical records of the facility operation. Preliminary characterizations of each of these facilities are being conducted as part of the SFMP long range planning activities. The results of the characterization efforts will be used to update this descriptive information in future revision of this plan.

6. Security/Protection Systems - A description of the security and protection systems provided at each facility. Such items include fire alarms and sprinklers, exclusion fencing, access restriction and radiation/contamination zone posting, and other control measures. The systems described are in addition to the Laboratory-wide security provided by perimeter fencing, guard stations, and fire-fighting equipment.

7. Surveillance Activities - An itemized listing of surveillance tasks conducted at each facility. Specific data are provided in terms of task titles, surveillance frequencies, ORNL division responsibilities, documentation requirements, and estimated manpower or resource needs. The task listings are general in nature, reserving the details of the procedures to the appropriate ORNL operating manuals. The division responsibilities are consistent with those discussed in Sect. 2.0. Surveillance documentation is provided in a variety of forms, including shift check sheets, memos-to-file, and computer printouts. Where appropriate, specific ORNL forms have been identified that are used in recording the survey reults; otherwise, the listing identifies the type of documentation used and the administrative unit that maintains the permanent file (i.e., WOCC records refers to the files maintained at the ORNL Waste Operations Control Center). Manpower and resource requirements are recorded in man-hours per year (mh/y) for individual tasks, and in dollar costs (FY 1984 dollars) for material needs. Those items that do not require direct SFMP funding have been highlighted.

8. Routine Maintenance - An itemized listing of routine maintenance activities for each facility, similar in scope and content to Item 7.

9. Anticipated Repairs/Improvements - A brief description of identified major repairs or other facility improvements scheduled for the planning period. These discussions outline the need for the repairs, the scope of the task (including an estimate of the resource needs) and the proposed year of expenditure.

10. Cost and Schedule - A summary of the surveillance costs, routine maintenance needs and major repairs requirements. This summary totals the manpower and dollar costs on an annualized basis and provides a schedule of these costs by year of expenditure through the planning period. Cost estimates beyond FY 1986 are in constant FY 1986 dollars.

The M&S summaries are presented in Appendix A according to their program category (Defense or Commercial) and project grouping, as given in Table 2. Facilities are treated separately unless they are closely associated (several tanks in a single tank farm) or are contained in a single structure (ORR-experimental facilities). Twenty-three summaries are provided covering the 46 SFMP facilities.

Table 2. Facility Groupings of M&S Activity Summaries

Appendix Section	Program Category	Project Grouping	Facility	Page No.
A.1	Defense Program	Isotope Group	Fission Product Development Laboratory	35
			Metal Recovery Facility	41
		Reactor Group	ORNL Graphite Reactor	47
		Radwaste Group	Waste Holding Basin	53
			Gunite Storage Tanks W-5 - W-10	59
			Waste Tank WC-1	65
			Waste Tanks WC-15, WC-17	69
			Waste Tanks W-1 - W4, W-13 - W-15	71
			Waste Tank W-11	77
			Waste Tanks TH-1 - TH-3	79
			Waste Tank TH-4	81
			Old Hydrofracture Facility	85
A.2	Commercial Program	Isotope Group	Storage Garden 3026-D	93
			Storage Garden 3033	95
			Carbon-14 Process System	97
			Waste Evaporator Facility	103
			Fission Product Pilot Plant	109
			Shielded Transfer Tanks	113
		Reactor Group	Molten Salt Reactor Experiment	117
			Low Intensity Test Reactor	123
			Homogeneous Reactor Experiment	129
			ORR Water-to-Air Heat Exchanger	135
			ORR Experimental Facilities	137

4.0 PROGRAM DEVELOPMENT

In an effort to improve the effectiveness and administrative control of the ORNL SFMP Maintenance and Surveillance Program, several improvements are being proposed for implementation in FY 1984. Specifically, these improvements include (1) a comprehensive review and updating of the M&S procedures for each facility, (2) development of an adequate document control system, and (3) implementation of a more frequent review/audit program. An additional long-range goal involves establishing a review committee that is responsible for assessment of the facilities on a periodic basis in order to determine the integrity and safety of the facilities and provide input on the project decommissioning priorities.

4.1 Procedure Review

Procedures have been established that define the M&S activities conducted at each of the ORNL SFMP facilities. However, these procedures have not received critical review or significant updating since the program inception in 1976. Such a review is necessary to assure that adequate surveillance is being conducted and that structures and equipment are being maintained properly. The review will be provided by the SFM Program Office and the facility supervisor, with the resulting procedures documented.

4.2 Document Control and Internal Audits

As discussed previously (Sect. 2.2.3), no program-wide M&S data collection system exists. Documentation and storage of pertinent information are provided by the responsible divisions through a variety of reporting modes. Rather than attempt to collect, analyze, and file this data at the program office level, we propose to place the responsibility for collection and review of this information on the facility supervisor. Annual reports on the M&S activities for each facility (or groups of facilities) would then be submitted by the supervisor for program review and filing. The annual reports would provide a listing and documentation record of the M&S activities conducted and brief discussion of the future needs at each site. In conjunction with this annual reporting, internal ORNL reviews/audits will be conducted on a routine basis by SFM Program staff to assess the needs and performance of the program participants. These reviews will be conducted semiannually and will periodically include on-site inspections of facilities and records.

4.3 Facility Assessment

Comprehensive analysis of the status of the SFMP facilities must be conducted to assure that adequate control is being maintained and to provide input on the establishment of decommissioning priorities. The frequency of these reviews could vary depending upon the type of facility involved, but as a minimum, facilities should undergo analysis every five years. To provide such a review, a multidisciplinary team would be employed that includes SFM Program staff, facility supervisors, and appropriate ORNL health and safety staff. On-site inspections, radiation surveys, sample collection and analysis, and brief safety assessments would be conducted to determine the status of each facility. The review committee report would identify problem areas, recommend any M&S procedural changes, and determine the need for decontamination or decommissioning actions.

Facility characterizations and analyses are currently under way as part of the ORNL long range planning activities. These data will form the baseline for comparison with the proposed comprehensive reviews. The Long-Range Plan is expected to be completed in September 1984, with subsequent facility reviews, initially scheduled at five-year intervals. More frequent reviews may be recommended for certain facilities, based on the results of the current characterization studies.

5.0 PROGRAM COSTS AND SCHEDULES

Based on the information provided in previous chapters, overall M&S Program costs have been developed. The annual resource requirements are presented in Table 3 for the planning period FY 1984 through FY 1993. The costs have been itemized by facility (or groups of associated facilities), within the appropriate defense or commercial program categories. Program management needs have been listed as a separate item. The estimated dollar amounts are based on year of expenditure through FY 1986, with out-year figures reported in constant FY 1986 dollars.

The M&S Program is structured to provide adequate control over all assigned facilities up to the initiation of project disposition activities (project stage). Currently, only two facilities (Fission Product Development Laboratory and Metal Recovery Facility) are in the project stage, and both are in the transition phase from protective storage to D&D operations. They will still require significant resources for M&S during the first few years of decommissioning - resources that up until now have been provided through the M&S Program. Detailed project plans are being developed for these facilities that will include estimates of the resource needs (including M&S) through

Table 3. Maintenance and Surveillance Program Costs

M&S Activities	Fiscal Year Projected Costs ($000)									
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
I. Defense Program										
A. Isotope Group										
1. Fission Product Development Laboratory	270	317	345	130	50					
2. Metal Recovery Facility	46	54	59	59	59					
Subtotal	316*	371*	404*	189*	109*					
B. Reactor Group										
1. Graphite Reactor	86	101	259	109	109	109	109	109	109	109
Subtotal	86	101	259	109	109	109	109	109	109	109
C. Radwaste Group										
1. Waste Holding Basin	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
2. Gunite Storage Tanks	12	14	16	16	16	16	16	16	16	16
3. Waste Storage Tanks	17	20	21	21	21	21	21	21	21	21
4. Old Hydrofracture Facility	12	14	16	16	16	16	16	16	16	16
Subtotal	42	49	54	54	54	54	54	54	54	54
DEFENSE PROGRAM TOTAL	444	521	717	352	272	163	163	163	163	163
II. Commercial Program										
A. Isotope Group										
1. Radioisotope Process Facilities	37	10	16	16	16	16	16	16	16	16
Subtotal	37	10	16	16	16	16	16	16	16	16
B. Reactor Group										
1. Molten Salt Reactor Experiment	82	96	104	104	118	104	104	104	104	118
2. Low-Intensity Test Reactor	32	37	40	40	40	40	40	40	40	40
3. Homogeneous Reactor Experiment	36	42	46	46	69	46	46	46	46	69
4. ORR-Experimental Facilities	66	19	21	21	21	21	21	21	21	21
Subtotal	216	194	211	211	248	211	211	211	211	248
COMMERCIAL PROGRAM TOTAL	253	204	227	227	264	227	227	227	227	264
III. Program Management										
A. Management and Control	25	30	32	32	32	32	32	32	32	32
B. Program Development										
1. Procedure Review	35					45				
2. Facility Assessment						130				
C. Special Projects	75	100	125	125	125	125	125	125	125	125
PROGRAM MANAGEMENT TOTAL	135	130	157	157	157	332	157	157	157	157
IV. M&S Program Total	832	855	1,101	736	693	722	547	547	547	584

*Projected resource needs could be provided through project D&D budget during these years.

project completion. If adequate funding can be provided for these two facilities through project funds, the ORNL M&S budget can be reduced. The magnitude of this potential decrement is highlighted in Table 3.

The remaining ORNL SFMP facilities will be analyzed and prioritized as part of the current long-range planning effort. Once the decommissioning schedules have been established (FY 1984), the M&S resource projections will be revised to reflect the initiation of facility disposition.

Schedules of the routine facility M&S activities are presented in Figs. 7 and 8. These schedules provide a summary of the information contained in Appendix A. As indicated in these figures, some facilities require little or no routine M&S, while others receive a great deal of attention. These schedules will be updated as the procedures review task is completed (see Sect. 4.0, Program Development). Overall M&S Program milestones for FY 1984 through FY 1991 are presented in Fig. 9.

6.0 REFERENCES

1. U.S. Department of Energy, Surplus Facilities Management Program - Program Plan FY 1983-1987, Richland Operations Office, RLO/SFM-82-2 (October 1982).

2. B. M. Eisenhower et al., Current Waste Management Practices and Operations at Oak Ridge National Laboratory - 1982, ORNL-5917 (September 1982).

3. T. W. Oakes et al., Methods and Procedures Utilized on Environmental Management Activities at Oak Ridge National Laboratory, ORNL/TM-7212 (March 1981).

4. Oak Ridge National Laboratory, "Procedures and Practices for Radiation Protection - Health Physics Manual," prepared by the Industrial Safety and Applied Health Physics Division, Revised 1982.

5. Oak Ridge National Laboratory, "Safety Manual," prepared by the Industrial Safety and Applied Health Physics Division, Revised 1981.

6. Oak Ridge National Laboratory, "Plant and Equipment Division Procedures Manual," prepared by the Plant and Equipment Division, Revised 1982.

ORNL-DWG 83-10700

	FISSION PRODUCT DEVELOPMENT LABORATORY	METAL RECOVERY FACILITY	GRAPHITE REACTOR	WASTE HOLDING BASIN	GUNITE STORAGE TANKS	WASTE TANK WC1	WASTE TANKS WC15, WC17	WASTE TANKS W1–W4, W13–W15	WASTE TANK W11	WASTE TANKS TH1–TH3	WASTE TANK TH4	OLD HYDROFRACTURE FACILITY
SURVEILLANCE ACTIVITIES												
ROUTINE INSPECTIONS	D, W	D, W, A	D, W, S	A	C, D	M	A	C, D, M	A	A	M	D, M
RADIOLOGICAL SURVEILLANCE	D, A, R	M, A	W	R	R			R				R
SAFETY INSPECTIONS	S	S	S	S								S
FIRE SAFETY INSPECTIONS	Q, A	Q, A	Q, A									Q
FILTER DOP TESTING	S, R	S, R	S, R		Q, R							
CRANE INSPECTIONS	A		A									
SECURITY PATROL	D	D	D	D	D							D
SPECIAL SURVEILLANCE	C, D, M Q, A	C	C, Q	C	C	M					M	M
MAINTENANCE ACTIVITIES												
ROUTINE MAINTENANCE	R	R	R	R	R	R	R	R	R	R	R	R
EXHAUST FILTER CHANGES	S, R	A	A, R		R							
HEATING/COOLING MAINTENANCE	Q, R	A, R	Q, R									
SPECIAL MAINTENANCE	Q, S, A	Q	S, R					R				

KEY

C – CONTINUOUS
D – DAILY
W – WEEKLY
M – MONTHLY
Q – QUARTERLY
S – SEMI-ANNUAL
A – ANNUAL
R – AS REQUIRED

Fig. 7. Facility Maintenance Surveillance Schedules - Defense Program.

ORNL-DWG 83-10355

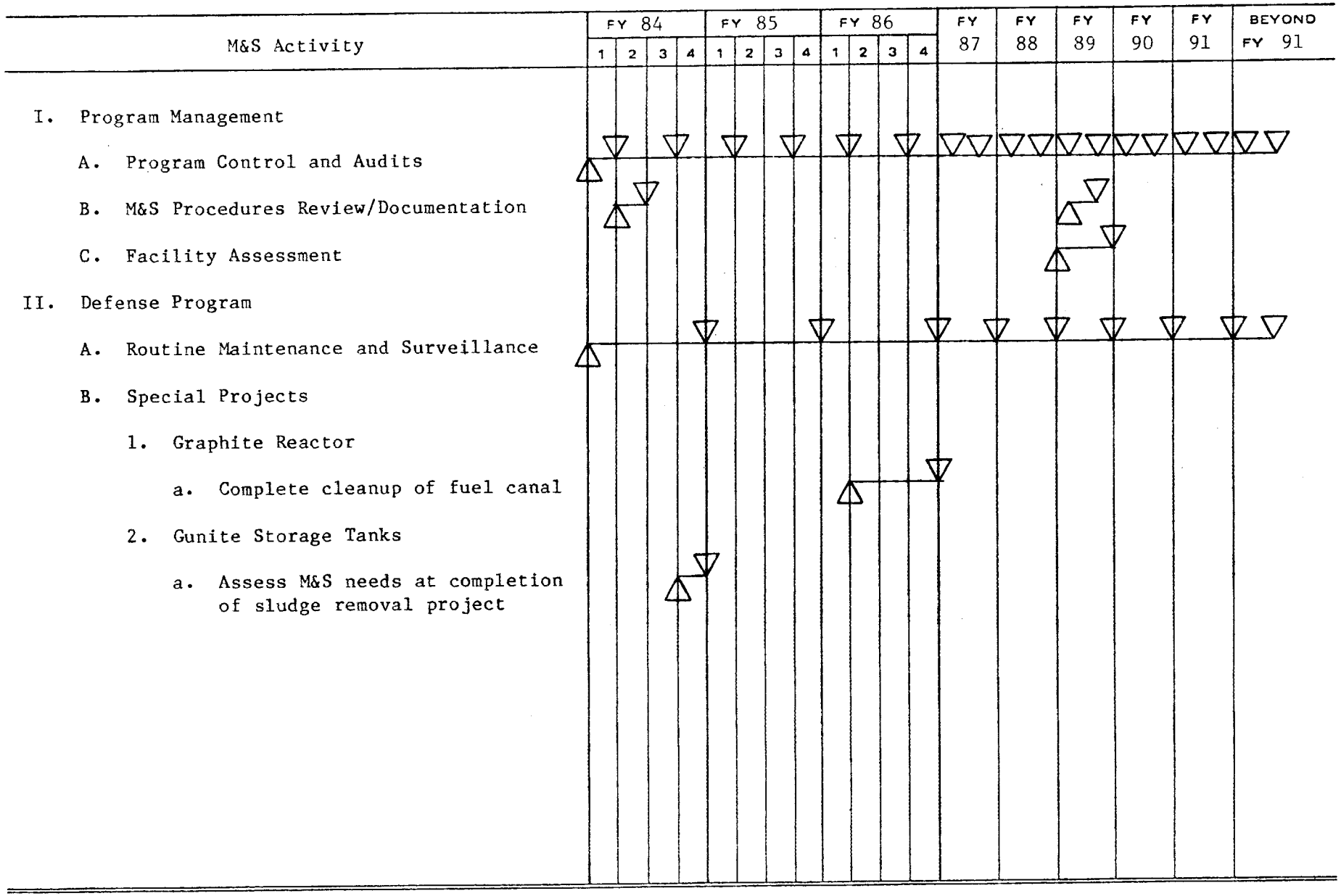
	STORAGE GARDEN 3026-D	STORAGE GARDEN 3033	C-14 PROCESS SYSTEM	WASTE EVAPORATOR	FISSION PRODUCT PILOT PLANT	SHIELDED TRANSFER TANKS	MOLTEN SALT REACTOR EXPERIMENT	LOW INTENSITY TEST REACTOR	HOMOGENEOUS REACTOR EXPERIMENT	ORR EXPERIMENTAL FACILITIES	ORR-HEAT EXCHANGER
SURVEILLANCE ACTIVITIES											
ROUTINE INSPECTIONS	A	A	Q	S	A	A	C, D, M, A	D	M	D	A
RADIOLOGICAL SURVEILLANCE			W, Q, R	R	A	A	M, R	W, R	M, R	W, Q, R	
SAFETY INSPECTIONS			S	S	S		S	S	S		
FIRE SAFETY INSPECTIONS			Q	Q			Q, A	Q, A	Q, A		
FILTER DOP TESTING			S, R				A, R	A	S, R		
CRANE INSPECTIONS							R	S, R	A		
SECURITY PATROL			D	D			D	D	D		
SPECIAL SURVEILLANCE			M				A	C			
MAINTENANCE ACTIVITIES											
ROUTINE MAINTENANCE	R	R	R	R	R	R	R	R	R	R	R
EXHAUST FILTER CHANGES							R		R		
HEATING/COOLING MAINTENANCE							Q, R	Q, R	Q, R		
SPECIAL MAINTENANCE			R				Q, S, A	Q, S	Q, S		

KEY

C – CONTINUOUS
D – DAILY
W – WEEKLY
M – MONTHLY
Q – QUARTERLY
S – SEMI-ANNUAL
A – ANNUAL
R – AS REQUIRED

Fig. 8. Facility Maintenance and Surveillance Schedules - Commercial Program.

Fig. 9. Maintenance and Surveillance Program Milestones



UCN-14127 (3 9-80)

MILESTONE BAR CHART

Fig. 9 (Cont'd)
Page 2

M&S Activity	FY 84				FY 85				FY 86				FY 87	FY 88	FY 89	FY 90	FY 91	BEYOND FY 91
	1	2	3	4	1	2	3	4	1	2	3	4						
III. Commercial Program																		
A. Routine Maintenance and Surveillance																		
B. Special Projects																		
1. C-14 Process System																		
a. Decontaminate and dismantle process hood																		
2. Shielded Transfer Tanks																		
a. Relocate Tank RD-C-44																		
3. ORR Experimental Facilities																		
a. Complete GCR Loop II cell dismantlement																		

APPENDIX A

PROJECT M&S ACTIVITY SUMMARIES

Listing of Facilities M&S Activity Summaries

	Page
A.1 Defense Program	
Fission Product Development Laboratory	35
Metal Recovery Facility	41
ORNL Graphite Reactor	47
Waste Holding Basin	53
Gunite Storage Tanks W-5 - W-10	59
Waste Tank WC-1	65
Waste Tanks WC-15, WC-17	69
Waste Tanks W-1 - W-4, W-13 - W-15	71
Waste Tank W-11	77
Waste Tanks TH-1 - TH-3	79
Waste Tank TH-4	81
Old Hydrofracture Facility	85
A.2 Commercial Program	
Storage Garden 3026-D	93
Storage Garden 3033	95
Carbon-14 Process System	97
Waste Evaporator Facility	103
Fission Product Pilot Plant	109
Shielded Transfer Tanks	113
Molten Salt Reactor Experiment	117
Low Intensity Test Reactor	123
Homogeneous Reactor Experiment	129
ORR Water-to-Air Heat Exchanger	135
ORR Experimental Facilities	137

A.1 DEFENSE PROGRAM

DEFENSE PROGRAM - Isotope Group

1. FACILITY NAME: Fission Product Development Laboratory (FPDL)

2. LOCATION: Building 3517 (Bethel Valley) 3. SERVICE DATES: 1958-1975

4. FACILITY STATUS: Approximately 75% of the facility is inactive and is maintained by the SFMP under Operations Division control (R. W. Schaich). The remainder of the facility is utilized for radioisotope production, radioactive waste handling, and decontamination activities, funded through other ORNL programs.

5. FACILITY DESCRIPTION:

(a) Operating History - The FPDL was originally designed and constructed to separate kilocurie quantities of ^{137}Cs, ^{90}Sr, ^{144}Ce, and ^{147}Pm from Redox- and Purex-type waste streams. The facility was modified in 1963 to allow production of megacurie amounts of ^{137}Cs, ^{90}Sr, and ^{144}Ce, primarily for use in the AEC's SNAP program. At the conclusion of this program (1975), the facility was placed in standby, and initial decontamination efforts undertaken. Since that time, a small portion of the facility has been reactivated for chemical separation and purification of fission products.

(b) Physical Description - The FPDL consists of 24 large-volume shielded concrete hot cells with associated manipulator galleries and service areas. The facilities are enclosed in a reinforced concrete, steel, and brick structure approximately 125 ft long, 62 ft wide, and 44 ft high. The associated tank farm cells are located adjacent to the building, extending about 14 ft below grade. The FPDL contains a cell ventilation and off-gas system, a process chilled water system, radiation and contamination monitoring systems, general building services (air conditioning, steam, water, argon), and a process waste and ILW collection system. Decontamination facilities consisting of a vibratory finisher and electropolishing unit are being installed for general plant use.

(c) Current Condition - The facility is structurally sound and in most areas, fully operable. Large quantities of surplus process equipment remain in the cells, with a variety of excess materials and supplies accumulating in the inactive manipulator cells. Due to the presence of operating programs utilizing the facility, the majority of the building is being maintained in working order.

(d) Radiological Hazards - The inactive manipulator cells and all of the process and tank farm cells are highly contaminated with ^{90}Sr and ^{137}Cs. Cell surfaces are known to exhibit beta-gamma radiation levels of 10-1000 R/h. Process equipment and piping, although previously flushed and partially decontaminated, are

expected to contain levels of up to 100 R/h. The high-bay area immediately over the cells is moderately contaminated and is maintained as a contamination zone, with appropriate access restrictions. The operating areas outside the cells and high-bay are uncontaminated, with constant surveillance and decontamination efforts conducted to maintain smearable levels of <500 dpm/100 cm^2 beta-gamma, and <30 dpm/100 cm^2 alpha activity.

(e) Occupancy - The FPDL is currently manned by a staff of approximately six full-time Operations Division personnel and a full time health physics surveyor. The operating programs in the FPDL utilize five of the manipulator cells and about 10% of the remainder of the facility for their purposes. The facility is centrally located in the main ORNL complex, near several operating facilities and a main traffic thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

The FPDL is within the ORNL Bethel Valley secured area, with building exterior doors locked at night. Building and grounds are posted on access restrictions and radiation/contamination zones. The facility is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

Beginning in late FY 1983, decontamination operations will begin at the FPDL. These activities will consist primarily of remote and hands-on decontamination of the high-bay and hot cells to levels allowing reuse, and will include removal of all excess equipment. The FPDL decontamination is expected to be completed in approximately six years. During this time, routine maintenance and surveillance must be continued. Some cost savings could be realized, especially in later years, by combining the M&S and project budgets, as recommended in Item 10.

Table 1. Surveillance Activities - Fission Product Development Laboratory

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	FPDL Shift Check Sheet (UCN-12530)	1,200 mh/y
(a) Visual of building	Daily			
(b) Waste tanks liquid levels	Daily			
(c) Radiation monitors	Daily			
(d) Cell 10 storage well	Daily			
(e) Cell ventilation - HEPA filters - Supply pressure - Pressure drops - Negative pressure	Daily			
(f) Chilled water units	Daily			
(g) Argon manifold reading	Daily			
(h) Tank farm cells liquid levels	Daily			
(i) Building containment negative pressure	Daily			
(j) Power usage	Daily			
(k) Off-gas negative pressure	Daily			
(l) Emergency lights/horn	Weekly			
(m) Filter pit sump	Daily			
2. Radiological Surveillance		ISAHP	Radiation Survey Data Sheet (UCN-9784)	400 mh/y
(a) Smear surveys of operating areas	Daily			
(b) Inspection of radiation monitors	Daily			
(c) Surveillance of maintenance jobs	As Required			
(d) Routine whole-body counting of operating personnel	Annual			

Table 1. (Continued)
Page 2

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
3.	Process Waste System				
	(a) Routine monitoring	Daily	Op	WOCC Records	100 mh/y
	(b) Sampling	Monthly	Op	WOCC Records	10 mh/y
	(c) Analysis	Monthly	ACh	WOCC Records	$1000
4.	Cell Ventilation Monitoring	Continuous	Op	WOCC Records	*
5.	Safety Inspection	Semi-Annual	Op	Op Memo	5 mh/y*
6.	Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	8 mh/y*
7.	Fire Sprinkler System Test	Annual	LP	Inspection Report of Sprinkler Systems	6 mh/y*
8.	HEPA Filters DOP Testing	Semi-Annual (or after replacement)	QA&I	Op Printout	32 mh/y*
9.	Routine Security Patrol	Daily	LP	Daily Security Report	*
10.	Manipulator Inspection	Quarterly	Op	Op Memo	50 mh/y
11.	Overhead Crane Inspection	Annual	QA&I	QA&I Memo	28 mh/y*
12.	Manipulator Electrical Ground Test	Annual	QA&I	QA&I Memo	2 mh/y*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Fission Product Development Laboratory

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1.	General Maintenance and Repair	As Required	Op/P&E	Op Records	2000 mh/y
2.	Cell Ventilation Exhaust Filter Replacement	Semi-Annual (or As Required)	Op	QA&I Printout	400 mh/y
3.	Health Physics Instrument Maintenance/ Calibration	Quarterly (or As Required)	ISAHP	Program Maintenance Records	200 mh/y
4.	Maintenance of Heating/Cooling Systems	Quarterly (or As Required)	P&E	P&E Report 1216	180 mh/y
5.	Maintenance of Overhead Bridge Crane	Semi-Annual	P&E	P&E Report 1216	20 mh/y
6.	Inactive Manipulator Maintenance	Quarterly	Op	Op Records	200 mh/y
7.	Maintenance Materials	Annual	Op	Op Records	$20,000
8.	Building Utilities	Annual	Op	Op Records	$10,000

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.9	$90K
Routine Maintenance	1.5	$150K
TOTAL	2.4	$240K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$20K
Utilities	$10K
TOTAL	$30K

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	90	105	115	50	10					
Maintenance	180	212	230	80	40					
Repairs/ Improvements										
TOTAL	270*	317*	345*	130*	50*					

*Project phase of facility decommissioning occurs during these years. Projected resource needs should be combined with project decontamination budget.

DEFENSE PROGRAM - Isotope Group

1. FACILITY NAME: Metal Recovery Facility (MRF)

2. LOCATION: Building 3505 (Bethel Valley) 3. SERVICE DATES: 1952-1960

4. FACILITY STATUS: Inactive/Occupied; Building controlled by Operations Division (R. W. Schaich)

5. FACILITY DESCRIPTION:

(a) Operating History - The MRF was a pilot and small scale production nuclear fuel reprocessing plant used for the processing of various waste solutions, scrap, and miscellaneous fuel elements for the recovery of uranium, plutonium, neptunium, and americium. The facility was shut down in 1960, after some 25 different processing campaigns, due to the lack of secondary containment.

(b) Physical Description - The MRF is a one-story metal-sided building, approximately 90 ft long by 70 ft wide by 24 ft high. The items of processing equipment that remain are contained in seven concrete or concrete block cells, which are secured and maintained under negative pressure, with ventilation through HEPA filters. The building also houses a makeup area, offices, storage area, control room, and an active shop. A below-grade concrete dissolver pit and fuel-handling canal are located inside and adjacent to the building, respectively, both with controlled access. Two associated underground concrete storage tanks (W19, W20) are located some 50 ft east of the building.

(c) Current Condition - The building structure is basically sound although gradually deteriorating with time. The major structural deficiencies are associated with the roof. It is of light construction and has developed a number of leaks, especially in areas near roof hatches and vents. The roof has already been repaired once. The building is cluttered with assorted equipment and debris, and portions of the control room and makeup area are being used for storage.

The canal and dissolver pit are filled with water. The level in the canal is known to rise and fall, indicating potential groundwater inflow. The waste tanks are empty and operable.

(d) Radiological Hazards - The process cells are internally contaminated, primarily along lower walls and inside process equipment. The majority of this activity is due to long-lived (TRU) alpha emitters, with generally low levels of beta-gamma activity present. Maximum levels of >500,000 dpm/100 cm^2 alpha and 400 mrad/h beta-gamma were measured in Cells D and G and Cell A, respectively. The remainder of the building contains only low-level contamination, with a few isolated areas of elevated alpha or beta-gamma activity. The canal and dissolver pit are significantly contaminated with TRU alpha and beta-gamma emitters,

resulting in elevated radionuclide concentrations in the contained water. The grounds surrounding the building are generally uncontaminated, with only isolated areas of surface contamination present.

(e) Occupancy - Only the shop area and locker room are currently occupied. The shop is maintained by the Plant and Equipment Division in support of the adjacent High-Radiation-Level Examination Laboratory. The MRF is located in a central area of the main ORNL complex, adjacent to several active facilities.

6. SECURITY/PROTECTION SYSTEMS:

The MRF is within the ORNL Bethel Valley secured area. Building exterior doors are locked, with chain link fencing surrounding the canal area. Building and grounds are posted on access restrictions and radiation/contamination zones. The facility is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

Beginning in FY 1984, decommissioning operations are expected to be undertaken at the MRF. These activities will consist of process equipment removal, cell, canal and dissolver pit decontamination, and associated facility modifications leading towards potential reuse of the building. The initial decontamination operations are planned for FY 1984 through FY 1988, with the potential for additional dismantlement or entombment tasks beyond that time. During this project phase, routine maintenance and surveillance must still be continued. Some cost savings may be realized, especially in later years, by combining the M&S and project budgets, as recommended in Item 10.

Table 1. Surveillance Activities - Metal Recovery Facility

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection	Daily	Op	FPDL Shift Check Sheet (UCN-12530)	200 mh/y
(a) Visual of building				
(b) Negative pressure in cells				
(c) HEPA filter pressure drop				
2. Canal Surveillance				
(a) Water level check	Weekly	Op	Op Records	50 mh/y
(b) Water sampling	Annual	Op	SFMP Memo	10 mh/y
(c) Sample analysis	Annual	ACh	Op Memo	$200
3. Radiological Surveillance		ISAHP	Radiation Survey Date Sheets (UCN 9784)	
(a) Routine smear surveys	Monthly			50 mh/y
(b) Surveillance of Maintenance Activities	As Required			40 mh/y
(c) Surveillance of Material Transfers	As Required			10 mh/y
4. Safety Inspection	Semi-Annual	Op	Op Memo	5 mh/y*
5. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
6. Fire Sprinkler System Test	Annual	LP	Inspection Report of Sprinkler Systems	5 mh/y*
7. HEPA Filters DOP Testing	Semi-Annual (or after replacement)	QA&I	Op Printout	4 mh/y*
8. Routine Security Patrol	Daily	LP	Daily Security Report	*
9. Process/Ventilation Stream Monitoring	Continuous	Op	WOCC Records	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Metal Recovery Facility

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1.	General Maintenance and Repair	As Required	Op/P&E	SFMP Memo	300 mh/y
2.	Cell Ventilation Exhaust Filter Replacement	Annual	Op	QA&I Printout	100 mh/y
3.	Health Physics Instrumentation Maintenance/Calibration	Quarterly	ISAHP	Program Maintenance Report	*
4.	Maintenance of Steam Heating System	Annual (or as required)	P&E	P&E Report 1216	*
5.	Maintenance Materials	Annual	Op	Op Records	$5000
6.	Building Utilities	Annual	Op	Op Records	$1000

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.2	$20K
Routine Maintenance	0.2	$20K
TOTAL	0.4	$40K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$5K
Utilities	$1K
TOTAL	$6K

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	20	24	26	26	26					
Maintenance	26	30	33	33	33					
Repairs/ Improvements										
TOTAL	46*	54*	59*	59*	59*	*	*	*	*	*

*Project phase of facility decommissioning occurs during these years (facility status beyond FY-88 will depend on the results of the decommissioning operations). Projected resource needs should be combined with project decontamination budget.

DEFENSE PROGRAM - Reactor Group

1. FACILITY NAME: ORNL Graphite Reactor (OGR)

2. LOCATION: Building 3001 (Bethel Valley) 3. SERVICE DATES: 1943-1963

4. FACILITY STATUS: Inactive/Occupied; Building controlled by Operations Division (B. L. Corbett); Facility open to public as a Registered National Historical Landmark

5. FACILITY DESCRIPTION:

(a) Operating History - The OGR was the first reactor constructed at ORNL, being placed in service in 1943, at a 1MW power level. In 1944, improvements in the cooling system and fuel cladding allowed the power level to be increased to an average level of 3.6 MW. The reactor was successfully operated for 20 years and was shut down in November 1963. In September 1966, the OGR was designated as a National Historical Landmark.

(b) Physical Description - The OGR was an air-cooled graphite-moderated and reflected, heterogeneous, natural-uranium-fueled reactor. The moderator assembly is a 24-ft cube of graphite blocks, with spaces allowed for experimental access, thermocouples, and fuel slugs. The fuel channels extend through the block for fuel loading and unloading operations as well as providing for coolant air flow. The assembly is surrounded by a 7-ft thick reinforced concrete shield. A subsurface water-filled canal was utilized in the handling of spent reactor fuel. This main reactor facility is housed in a 140 ft by 116 ft by 70 ft corregated metal structure.

Coolant air was supplied through underground concrete ducts to the inlet mainfold where it was routed through the fuel channels to the exhaust manifold. Exhaust air was then passed through underground concrete ducts to a filter house (Bldg. 3002) for roughing and HEPA filtration prior to exhaust through the fan house (Bldg. 3003) to a 200 ft concrete stack (Stack 3018).

(c) Current Condition - Boron steel rods were inserted into the reactor after shutdown to assure that the reactor could not go critical and all control and safety rods were disabled. The fuel was removed in 1966. The facility is structurally sound, although some level of building deterioration is occurring, particularly in the fuel canal and ventilation duct areas. A negative pressure is maintained within the reactor, and the exhaust is vented through the stack. The fuel canal is being utilized for storage of various radioactive materials.

(d) Radiological Hazards - Although the fuel has been removed from the OGR, the reactor is contaminated with fission products, traces of plutonium, ^{14}C, and ^{55}Fe. Exposure levels at the face of the graphite block are in the range of 2-4 R/h. The fuel discharge canal is contaminated with fission products, both in the canal water and absorbed into the concrete walls.

The concrete exhaust air ducts, filter house, and fan house are contaminated, primarily with ^{137}Cs and ^{90}Sr (80-500 mR/h). The remainder of the facility (offices and public areas in Bldg. 3001) is generally uncontaminated, with only a few isolated and restricted areas of elevated activity.

(e) Occupancy - Most of the office and workshop areas in Bldg. 3001 are occupied by personnel from the Operations Division, Plant and Equipment Division, and a few research groups. In addition, a large portion of the facility has been altered to allow public access to view the reactor face and ORNL visual displays. Maintenance of these occupied portions of the building is provided by other programs. The OGR is located in the northern portion of the main ORNL complex, adjacent to several active facilities.

6. SECURITY/PROTECTION SYSTEMS:

With the exception of the public viewing area, the OGR is within the ORNL Bethel Valley secured area. The building and grounds are posted on access restrictions and radiation/contamination zones. The facility is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

In order to reduce the spread of contamination into the OGR canal from the radioactive materials stored in it, these materials should be removed and disposed of in the ORNL Solid Waste Storage Area. This activity would consist of remote removal, packaging, and transport of the equipment and debris within the canal, and a general clean-up of the canal area. This work is proposed for FY 1986 and would require approximately $150,000.

Table 1. Surveillance Activities - ORNL Graphite Reactor

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	LITR - Bldg. 3001 shift check sheet (UCN 10593)	200 mh/y
(a) Visual of building	Daily			
(b) Waste container inspection	Daily			
(c) Elevator alarms	Weekly			
(d) Steam heater check (when applicable)	Daily			
(e) Containment negative pressure	Daily			
(f) Air blower check	Weekly			
(g) Auxiliary blower	Semi-annual			
(h) Exhaust duct visual	Weekly			
(i) Exit duct inspection	Semi-annual			
(j) Canal water level	Daily			
(k) Walkway inspection	Daily			
(l) Flow rate - isotope storage box	Weekly			
(m) Demineralizer Solubridge reading	Daily			
(n) Cation column radiation level	Weekly			
(o) Demineralizer pH, resistance and counts	Weekly			
(p) Radiation monitoring system check	Weekly			
2. Radiological Surveillance		ISAHP	Radiation Survey Data Sheet (UCN-9748); Air Monitoring Data Sheet (UCN-3367)	40 mh/y
(a) Canal area surveillance	Weekly			
(b) Inspection of radiation monitors	3 times a week			

Table 1. (Continued)
Page 2

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
3.	Instrumentation Inspection	Quarterly	I&C	I&C Records	20 mh/y*
4.	Ventilation Monitoring	Continuous	Op	WOCC Records	*
5.	Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*
6.	Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
7.	Fire Sprinkler System Check	Annual	LP	Inspection Report of Sprinkler System	6 mh/y*
8.	HEPA filter DOP Testing	Semi-annual (or after replacement)	QA&I	Op Printout	6 mh/y*
9.	Overhead Crane Inspection	Annual	QA&I	QA&I Memo	28 mh/y*
10.	Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - ORNL Graphite Reactor

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1.	General Maintenance and Repair	As Required	Op/P&E	Op Records	800 mh/y
2.	Exhaust Filter Changes	Annual (or As Required)	Op	QA&I Records	40 mh/y
3.	Regenerate Demineralizer	Semi-annual	Op	Op Records	12 mh/y
4.	Health Physics Instrument Maintenance/ Repair	As Required	ISAHP	Program Maintenance Records	100 mh/y
5.	Maintenance of Heating/Cooling Systems	Quarterly (or As Required)	P&E	P&E Report 1216	180 mh/y
6.	Maintenance of Overhead Bridge Crane	Semi-annual	P&E	P&E Report 1216	20 mh/y
7.	Maintenance Materials	Annual	Op	Op Records	$10,000
8.	Utilities	Annual	Op	Op Records	$6,000

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.12	$12K
Routine Maintenance	0.58	$58K
TOTAL	0.70	$70K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$10K
Utilities	$6K
TOTAL	$16K

Anticipated Major Repairs/Improvements	
Canal cleanup (Fy 1986)	$150K
TOTAL	$150K

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	12	14	15	15	15	15	15	15	15	15
Maintenance	74	87	94	94	94	94	94	94	94	94
Repairs/ Improvements			150							
TOTAL	86	101	259	109	109	109	109	109	109	109

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Holding Basin

2. LOCATION: Site 3513 (Bethel Valley) 3. SERVICE DATES: 1944-1977

4. FACILITY STATUS: Inactive, Pond controlled by the Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - The waste holding basin served as a liquid LLW receiving pond throughout most of its active service life. The pond received the slightly contaminated aqueous solutions arising from laboratory floor drains, steam and cooling water leakage, flush drains, etc., and contained the liquid until transferred to the LLW processing system or discharged to the environment. In the latter years of use, the pond received only the liquid effluent from the LLW treatment plant, serving as a settling basin prior to discharge to White Oak Creek.

(b) Physical Description - The basin is an unlined earth-bermed structure approximately 230 ft by 250 ft at the top of the berm, with sloping sides down to the pond bottom (approximately 200 ft by 200 ft). The depth of water in the basin varies, but averages about 6 ft. The pond surface is open to the environment. Pond overflow is routed directly to the creek, although the potential for overflow is minimal since the only liquid input to the pond is from precipitation, and the pond level is several feet below the overflow limit.

(c) Current Condition - The pond is believed to be structurally sound. Vegetation has become established along the basin perimeter. There is no evidence of significant pond leakage.

(d) Radiological Hazards - The pond sediment is contaminated with fission products and actinides. Preliminary estimates of the radionuclide inventories of ^{90}Sr, ^{137}Cs, and $^{239,240}Pu$ are 34 Ci, 200 Ci, and 5 Ci, respectively. The concentration of $^{239,240}Pu$ in individual sediment samples ranged from <1 to 70 nCi/g. The water contained in the pond is believed to be only slightly contaminated.

(e) Occupancy - Members of the Environmental Sciences Division at ORNL have used the pond in the past as an experimental plot for the study of radionuclide transport mechanisms. However, no active sampling programs are currently under way. The pond is located in a semi-remote area of the Bethel Valley complex, with minimal routine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The waste holding basin is within the ORNL Bethel Valley secured area. The pond is posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated through the planning period.

Table 1. Surveillance Activities - Waste Holding Basin

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Safety Inspection	Semi-Annual	Op	Op Memo	2 mh/y*
2. Radiological Surveillance	As Required	ISAHP	Radiation Survey Data Sheets (UCN-9784)	10 mh/y
(a) Surveys for grounds maintenance				
3. Effluent Monitoring	Continuous	Op	WOCC Records	*
4. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Waste Holding Basin

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance	As Required	Op/P&E		*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.005	$500
Routine Maintenance	0	0
TOTAL	0.005	$500

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Maintenance										
Repairs/ Improvements										
TOTAL	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Gunite Storage Tanks W-5, W-6, W-7, W-8, W-9, W-10

2. LOCATION: South Tank Farm Site 3507 (Bethel Valley)

3. SERVICE DATES: 1943-1978

4. FACILITY STATUS: Tanks are being emptied of sludge under ongoing Interim Operations Program. Site responsibility is to be transferred to the SFMP upon project completion (scheduled for FY 1984).

5. FACILITY DESCRIPTION:

(a) Operating History - The gunite tanks have been used for the storage and transfer of liquid ILW since their construction in 1943. The tanks have accumulated varying amounts and compositions of radioactive sludge that precipitated from solution during the 35 years of tank service.

(b) Physical Description - Each of the six cylindrical, domed waste-storage tanks in this ORNL tank farm is 50 ft in diameter with a vertical height of 18 ft at the center and 15 ft at the walls. The storage capacity for each tank is approximately 170,000 gal. The tanks were built of steel-reinforced Gunite (a trade name for a mix of cement, sand, and water sprayed from a cement gun) with no inside liner. The six tanks are buried under 5 to 6 ft of earth cover and are arranged in a 60 ft center-to-center square matrix. Each tank was set on a concrete dish and installed with a sampling dry well.

The current sludge removal project has resulted in little physical change in the tanks. Additional access holes have been drilled into the tanks and permanent structural supports and sluicing equipment constructed within the tank farm area. Upon completion of the sludge removal project, this equipment will likely remain in place for use in final decommissioning activities. The sludge volume in the tanks varies from virtually none (tank W10 being utilized as a bentonite suspension and slurry transfer tank), to approximately 140,000 gal. When the sludge removal project is completed, some liquid waste is anticipated to remain in each of the six tanks (approximately 30,000 gal total).

(c) Current Condition - The tanks are believed to be structurally sound and are in operable condition. However, based on observations during the sludge removal project, the interior walls are known to be deteriorating, to the point of exposing the structural reinforcement steel. Preliminary studies indicate that the tank walls can still easily support the overburden, but that the condition should be considered in future decommissioning activities.

(d) Radiological Hazards - The tanks currently contain over 2×10^6 Ci of total activity, primarily due to ^{90}Sr and ^{137}Cs, with some transuranics present. About 95% of this activity is expected to be removed with the sludge. The remainder (up to 1×10^5 Ci) would be associated with the waste slurry left in each tank and imbedded in the tank walls. Detailed characterizations of these tanks will have to be conducted upon completion of the sludge removal.

(e) Occupancy - The site is currently occupied by operating personnel associated with the sludge removal project. The tank farm is located in a central area of the main ORNL complex, adjacent to several active facilities along a major vehicle and pedestrian thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

The gunite tank farm is within the ORNL Bethel Valley secured area. The grounds are posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities currently employed (tanks only). Activities may change upon completion of sludge removal project.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities currently employed (tanks only). Activities may change upon completion of sludge removal project.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

The extent of needed repairs or improvements will be dependent upon the condition of the tanks and associated equipment at the end of the sludge removal process. An assessment of the M&S needs will be made during the last quarter of FY 1984.

Table 1. Surveillance Activities - Gunite Storage Tanks (Tanks Only)

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Waste Tank Monitoring				200 mh/y
(a) Drains monitored	Continuous	Op	WOCC Records	
(b) Dry wells sampled	Daily	Op	WOCC Records	
(c) Sample analysis	Daily	ACh	WOCC Records	
2. Off-Gas System Filters DOP Testing	Quarterly (or after replacement)	QA&I	Op Printout	48 mh/y*
3. Off-Gas Monitoring	Continuous	Op	WOCC Records	*
4. Radiological Surveillance	As required	ISAHP	Radiation Survey Data Sheets (UCN-9784)	10 mh/y
(a) Surveys for grounds maintenance, filter changes, and preventative maintenance				
5. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Gunite Storage Tanks (Tanks Only)

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Maintenance	As Required	Op/P&E	Op Records	4 mh/y
2. Off-Gas Filter Replacement	As Required	Op	QA&I Printout	4 mh/y
3. Maintenance Materials	Annual	Op	Op Records	$200

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.11	$11K
Routine Maintenance	0.01	$1K
TOTAL	0.12	$12K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$200
TOTAL	$200

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	11	13	14	14	14	14	14	14	14	14
Maintenance	1	1	2	2	2	2	2	2	2	2
Repairs/ Improvements										
TOTAL	12	14	16	16	16	16	16	16	16	16

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tank WC-1

2. LOCATION: Between Building 3037 and 3038 (Bethel Valley)

3. SERVICE DATES: 1950-1968

4. FACILITY STATUS: Inactive, Tank controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - This tank was used to collect and monitor liquid waste from radioisotope production processes and experimental systems in the radioisotope area. The stored waste was then transferred to the ILW system for treatment. Tank WC-1 was abandoned in 1968 because of a leaking discharge line.

(b) Physical Description - Tank WC-1 is an underground 2000 gal stainless steel vessel. The waste tank was constructed on a collection pad with an adjacent dry well for sampling. The tank ejector pit, consisting of associated valving, piping, and sampling stations, is located approximately 10 ft to the west of the tank. When abandoned in 1968, the tank was emptied and the pit was isolated, filled in and capped under a 10 ft by 10 ft concrete slab. Only this slab, dry well cover, and a tank flange are visible above ground.

(c) Current Condition - The tank is believed to be structurally sound, with no apparent leaks. The concrete cap over the ejector pit shows no signs of significant deterioration.

(d) Radiological Hazards - The tank and ejector pit contain curie quantities of ^{60}Co, ^{137}Cs, and ^{90}Sr as residual contamination. No direct personnel exposure pathways are present.

(e) Occupancy - The tank is located in a central area of the main ORNL complex, adjacent to several active facilities, and lies within 25 ft of a major vehicle thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

Waste tank WC-1 is within the ORNL Bethel Valley secured area. The ejector pit is posted as a radiation/contamination zone.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted at waste tank WC-1.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tank WC-1 through the planning period.

Table 1. Surveillance Activities - Waste Tank WC-1

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Surveillance	Monthly	Op	WOCC Records	50 mh/y
2. Waste Tank Monitoring				50 mh/y
(a) Dry well sampling	Monthly	Op	WOCC Records	
(b) Sample analysis	Monthly	ACh	WOCC Records	

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.05	$5K
Routine Maintenance	0	0
TOTAL	0.05	$5K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	5	6	6	6	6	6	6	6	6	6
Maintenance										
Repairs/ Improvements										
TOTAL	5	6	6	6	6	6	6	6	6	6

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tanks WC-15 and WC-17

2. LOCATION: Tank Farm Southeast of Bldg. 3587 (Bethel Valley)

3. SERVICE DATES: 1953-1960s

4. FACILITY STATUS: Inactive, Tanks controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - These tanks were used to collect and monitor liquid wastes from the research laboratories in Bldg. 4500. The stored waste was then transferred to the ILW system for treatment. The tanks were removed from service due to leakage.

(b) Physical Description - Tanks WC-15 and WC-17 are identical underground 1000 gal stainless steel vessels, located in an active tank farm consisting of 5 other underground tanks, 2 pump pits, an off-gas filter system, instrument cabinet, and associated piping. The tanks are sitting on a concrete collection pad draining to an operable dry well and pump system. The tanks are surrounded and covered with crushed rock.

(c) Current Condition - The tanks are known to have leaked, although the extent of their structural deterioration has not been determined. At the time the tanks were removed from service, they were emptied and the piping isolated to preclude use. The surface flange on WC-15 was removed and the area covered.

(d) Radiological Hazards - No accurate information on the condition of the tanks and piping is available. However, based on the history of their operation, it is expected that the vessels are internally contaminated with curie quantities of mixed fission products (primarily ^{60}Co and ^{137}Cs).

(e) Occupancy - The tanks are located in an active tank farm requiring periodic access by operating personnel. The farm is located in a central area of the main ORNL complex, adjacent to several active facilities along pedestrian and vehicle thoroughfares.

6. SECURITY/PROTECTION SYSTEMS:

Waste tanks WC-15 and WC-17 are within the ORNL Bethel Valley secured area. The tank farm is posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

The active tanks in the tank farm are under constant surveillance. No additional surveillance is provided for the abandoned tanks.

8. ROUTINE MAINTENANCE:

The active tank farm is maintained by the ORNL Waste Management Program. No additional maintenance is provided for the abandoned tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tanks WC-15 and WC-17 through the planning period.

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tanks W-1, W-2, W-3, W-4, W-13, W-14, W-15

2. LOCATION: North Tank Farm, Site 3023 (Bethel Valley)

3. SERVICE DATES: 1940s-1960s

4. FACILITY STATUS: Inactive; Tanks controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - The tanks in the North Tank Farm were used for the collection and storage of liquid wastes from various ORNL facilities, prior to the transfer of the material to the liquid waste treatment facilities. These tanks were removed from service due to leakage (W-1, W-2) or because there were no requirements for their use (W-3, W-4, W-13, W-14, W-15).

(b) Physical Description - Tanks W-1 and W-2 are both underground gunite — sprayed concrete vessels of approxmiately 5,000 gal capacity, located in the west end of the tank farm. Tanks W-3 and W-4 are also of sprayed concrete construction, but have capacities of 41,000 gal each and are located underground in the eastern part of the farm. Both sets of gunite tanks are set on concrete saucers, with an associated dry well. Each tank has an array of inlet and outlet lines leading to valve pits and controls. Waste tanks W-13, W-14, and W-15 are underground stainless-steel tanks of approximately 2,000 gal capacity each. These tanks are set inside a concrete cell with drainage to a dry well. This tankage is located in the center of the tank farm and includes a normal array of piping, valving, and controls.

(c) Current Condition - All of these storage tanks were emptied at the time they were removed from service. However, tanks W-3 and W-4 are known to collect surface water and must be routinely monitored. Only tanks W-1 and W-2 are documented as leaking, but the structural integrity of all the tanks are questionable. The conditions of the piping, valve pits, and controls for all the tanks are deteriorating with time.

(d) Radiological Hazards - The radiological condition of these tanks is generally unknown. It is estimated that curie quantities of ^{60}Co, ^{90}Sr, ^{106}Ru, ^{137}Cs, and ^{231}Pa are present in the tanks and piping, primarily in the form of surface contamination. The surface water that collects in tanks W-3 and W-4 becomes slightly contaminated after sitting in the tanks and is treated as ILW. Soil contamination in the vicinity of tank W-1 has been documented.

(e) Occupancy - The tanks are located in a tank farm that contains only one active storage tank. Periodic access to the farm is required by operating personnel. The farm is centrally located in the main ORNL complex, adjacent to several active facilities along a primary vehicle and pedestrian thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

The north tank farm is within the ORNL Bethel Valley secured area. The tank farm is posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tanks W-1, W-2, W-3, W-4, W-13, W-14, and W-15 through the planning period.

Table 1. Surveillance Activities - Waste Storage Tanks W-1, W-2, W-3 W-4, W-13, W-14, W-15

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Waste Tank Monitoring				100 mh/y
(a) Drains monitored	Continuously	Op	WOCC Records	
(b) Dry wells sampled	Monthly	Op	WOCC Records	
(c) Sample analysis	Monthly	ACh	WOCC Records	
(d) Liquid levels monitored (W-3, W-4)	Daily	Op	WOCC Records	
2. Radiological Surveillance	As Required	ISAHP	Radiation Survey Data Sheets (UCN-9784)	10 mh/y
(a) Personnel monitoring during maintenance operations				

Table 2. Routine Maintenance Activities - Waste Storage Tanks W-1, W-2, W-3, W-4, W-13, W-14, W-15

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Maintenance	As Required	Op/P&E	Op Records	5 mh/y*
2. Transfer of Surface Drainage from W-3 and W-4 to ILW System	As Required	Op	WOCC Records	5 mh/y*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.06	$6K
Routine Maintenance	0.01	$1K
TOTAL	0.07	$7K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	6	7	8	8	8	8	8	8	8	8
Maintenance	1	1	1	1	1	1	1	1	1	1
Repairs/ Improvements										
TOTAL	7	8	9	9	9	9	9	9	9	9

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tank W-11

2. LOCATION: South of Site 3536 (Bethel Valley)

3. SERVICE DATES: 1943-1948

4. FACILITY STATUS: Inactive; Tank controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - Tank W-11 was used as a liquid waste collection and monitoring tank for various laboratories in Bldg. 3550. The stored waste was ultimately transferred to the ORNL ILW system for processing. The tank was removed from service because of leaks.

(b) Physical Description - This tank is a 1,700 gal gunite-sprayed concrete vessel, located underground in a small tank farm with one active tank (W-12). In addition to the tanks, the farm contains an ejector pit, a subsurface liquid collection system, and a variety of interconnecting piping, valving, and controls.

(c) Current Condition - Tank W-11 was emptied at the time it was removed from service. The extent of its structural deterioration is unknown. Due to the presence of the active tank (W-12) in this tank farm, the ejector pit and controls are actively maintained.

(d) Radiological Hazards - The tank is believed to be highly contaminated internally, primarily with ^{90}Sr, ^{137}Cs, and ^{60}Co in curie quantities.

(e) Occupancy - The tank is located in an active tank farm requiring periodic access by operating personnel. The farm is located in a central area of the main ORNL complex, although it is not along any major traffic thoroughfares.

6. SECURITY/PROTECTION SYSTEMS:

Tank W-11 is within the ORNL Bethel Valley secured area. The tank farm is posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

The active tank in the tank farm is under continuous surveillance. No additional surveillance is provided for the abandoned tank.

8. ROUTINE MAINTENANCE:

The active tank farm is maintained by the ORNL Waste Management Program. No additional maintenance is provided for the abandoned tank.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tank W-11 through the planning period.

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tanks TH-1, TH-2, TH-3

2. LOCATION: South of Building 3503 (Bethel Valley)

3. SERVICE DATES: 1952-1970

4. FACILITY STATUS: Inactive, Tanks controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - Tanks TH-1, TH-2, and TH-3 were used as liquid waste collection and transfer tanks for the Thorium Pilot Plant projects in Bldg. 3503. The tanks were removed from service because there were no requirements for their use.

(b) Physical Description - These tanks are all underground stainless steel vessels, with a combined capacity of approximately 8,000 gal. The three tanks are located on the north end of an active tank farm containing four other tanks. Associated with this farm is a pump pit, valving stations, and instrumented controls. All but two of the tanks in the farm (TH-1 and WC-9) are constructed on concrete drainage pads with adjacent dry wells.

(c) Current Condition - All three inactive storage tanks were emptied at the time of service termination. Their structural integrity is unknown, although they are believed to be sound. Due to the presence of the active tanks in this farm, the pump pit and controls are actively maintained.

(d) Radiological Hazards - The tanks and associated piping are contaminated internally, primarily with thorium and its daughters. The extent of residual contamination is not known, but the activity is believed to be in curie amounts.

(e) Occupancy - The tanks are located in an active tank farm requiring periodic access by operating personnel. The farm is located in a semi-remote area of the main ORNL complex, with minimal nonoperating personnel access.

6. SECURITY/PROTECTION SYSTEMS:

This tank farm is within the ORNL Bethel Valley secured area. The farm is posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

The active tanks in the tank farm are under continuous surveillance. No additional surveillance is provided for the abandoned tanks.

8. ROUTINE MAINTENANCE:

The active tank farm is maintained by the ORNL Waste Management Program. No additional maintenance is provided for the abandoned tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tanks TH-1, TH-2, and TH-3 through the planning period.

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Waste Storage Tank TH-4

2. LOCATION: Southwest of Building 3500 (Bethel Valley)

3. SERVICE DATES: 1952-1970

4. FACILITY STATUS: Inactive; Tank controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - Tank TH-4 was used to collect and transfer radioactive waste solutions from irradiated thorium and uranium pilot plant projects in Bldg. 3503 to the ILW process system. The tank was removed from service because there were no requirements for its use.

(b) Physical Description - The tank is an underground, gunite-sprayed concrete vessel of approximately 4000 gal capacity. The transfer lines, valving and controls are located in the tank farm south of Bldg. 3503. The tank is set on a concrete basin, with an associated drainage dry well.

(c) Current Condition - The tank is filled with an alkaline thorium and uranium sludge resulting from precipitated waste solutions over the years of operation. The tank is believed to be structurally sound, with no known leakage problems. The valving and controls are maintained as a part of the active 3503 tank farm.

(d) Radiological Hazards - The contained sludge in tank TH-4 is a combination of irradiated uranium and thorium and their daughters in curie quantities. No estimate of the radionuclide inventory is available.

(e) Occupancy - The tank is located in a central area of the main ORNL complex, adjacent to several active facilities. Personnel access across the site is minimal.

6. SECURITY/PROTECTION SYSTEMS:

Tank TH-4 is within the ORNL Bethel Valley secured area.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted at waste tank TH-4.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for waste tank TH-4 through the planning period.

Table 1. Surveillance Activities - Waste Storage Tank TH-4

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Surveillance	Monthly	Op	WOCC Records	50 mh/y
2. Waste Tank Monitoring				50 mh/y
(a) Dry well sampling	Monthly	Op	WOCC Records	
(b) Sample analysis	Monthly	ACh	WOCC Records	

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.05	$5K
Routine Maintenance		
TOTAL	0.05	$5K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	5	6	6	6	6	6	6	6	6	6
Maintenance										
Repairs/ Improvements										
TOTAL	5	6	6	6	6	6	6	6	6	6

DEFENSE PROGRAM - Radwaste Group

1. FACILITY NAME: Old Hydrofracture Facility

2. LOCATION: Site 7852 (Melton Valley) 3. SERVICE DATES: 1964-1980

4. FACILITY STATUS: Inactive, Site controlled by Operations Division (L. C. Lasher)

5. FACILITY DESCRIPTION:

(a) Operating History - The Old Hydrofracture Facility was an experimental and operational plant for the injection of waste grout into a fractured shale formation. The experimental design was tested in 1964-1965 using dilute and concentrated waste solutions. Beginning in 1966, operational injections of concentrated liquid waste from the ORNL ILW system were routinely made until facility shutdown in 1980. The plant was closed when the New Hydrofracture Facility, located just south of this site, was constructed.

(b) Physical Description - The facility consists primarily of an injection well approximately 1000 ft deep, five waste storage tanks, four bulk storage tanks for cement and other solid constituents of the grout mix, waste and injection pumps, a waste/grout mixer, and assorted piping and other equipment. The wellhead, injection pumps, and mixer are enclosed in concrete block containment cells in a 28 ft x 54 ft building, while the waste transfer pumps, waste storage tanks, and bulk storage tanks are separate structures. The waste storage tanks (T1-T4, T9) are buried, individually contained, with a dry well available for observation of each tank. A concrete waste pit, built to provide reuse of slightly contaminated process and wash water during injection operations, is located 50 ft north of the injection well. A 100,000 gal open-air earth-bermed emergency waste pond was constructed to contain the waste/grout mixture in the event of a wellhead rupture or for other surge applications during a normal injection.

(c) Current Condition - The facility structures are basically sound, although gradually deteriorating with time. Due to this deterioration, it is becoming increasingly difficult to maintain a negative pressure within the mixing and injection cells. The waste storage tanks remain operational and exhibit no detectable leaks. The bulk storage tanks are showing signs of accelerated corrosion but appear to be in a usable condition. The waste pond is believed to be structurally sound, although there is some indication that it may be leaking, with radionuclide migration toward White Oak Creek.

(d) Radiological Hazards - Although no detailed radiological characterization of the site has been conducted, it is known that portions of the site are significantly contaminated due to process operations. The contaminants are principally mixed

fission products (^{137}Cs, ^{90}Sr, ^{60}Co, etc.), with some trace amounts of transuranic isotopes. The primary areas of contamination are the surfaces and equipment in the injection/mixing cells, and the waste pit and emergency pond. Isolated areas of contamination are known to exist underneath and immediately adjacent to the building, as well as associated with valve pits, waste pumps, and the transfer piping. The waste tanks are internally contaminated.

(e) Occupancy - The site is currently unoccupied in a remote location of the ORNL site, with minimal routine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The Old Hydrofracture Facility is in the ORNL Melton Valley restricted area, within the boundaries of Solid Waste Storage Area 5. The building and grounds are posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for the Old Hydrofracture Facility through the planning period.

Table 1. Surveillance Activities - Old Hydrofracture Facility

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	WOCC Records	100 mh/y
(a) Visual of site	Daily			
(b) Negative pressure in cells	Daily			
2. Waste Tanks Surveillance				100 mh/y
(a) Dry well sampling	Monthly	Op	WOCC Records	
(b) Sample analysis	Monthly	ACh	WOCC Records	
(c) Tank levels	Daily	Op	WOCC Records	
3. Radiological Surveillance	As Required	ISAHP	Radiation Survey Data Sheets (UCN-9784)	10 mh/y
(a) Surveys for ground maintenance and preventive maintenance				
4. Safety Inspection	Semi-Annual	Op	Op Memo	5 mh/y*
5. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
6. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Old Hydrofracture Facility

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	Op Records	20 mh/y
2. Maintenance Materials	Annual	Op	Op Records	$500
3. Utilities	Annual	Op	Op Records	$500

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.1	$10K
Routine Maintenance	0.01	$1K
TOTAL	0.11	$11K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$500
Utilities	$500
TOTAL	$1K

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	10	12	13	13	13	13	13	13	13	13
Maintenance	2	2	3	3	3	3	3	3	3	3
Repairs/ Improvements										
TOTAL	12	14	16	16	16	16	16	16	16	16

A.2 COMMERCIAL PROGRAM

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Storage Garden 3026-D

2. LOCATION: Northeast of Building 3026-D (Bethel Valley)

3. SERVICE DATES: 1946-1955

4. FACILITY STATUS: Inactive; Site controlled by Operations Division (J. M. Miller)

5. FACILITY DESCRIPTION:

(a) Operating History - This facility was used to store fission product test samples from the radium-lanthanum process, as well as other miscellaneous contaminated items.

(b) Physical Description - The facility consists of a number of pipes encased in a concrete block approximately 10 ft by 10 ft by 6 ft deep. The garden is located approximately 10 ft east of the northeast corner of Bldg. 3026-D.

(c) Current Condition - The condition and contents of the storage garden at the end of its service life are not well known. The site is currently sealed by an asphalt cover.

(d) Radiological Hazard - The radiological condition of the storage garden is unknown. The major contaminants expected to remain in the wells are ^{137}Cs and ^{90}Sr.

(e) Occupancy - The garden is located adjacent to several active facilities, although personnel access to the garden area is limited.

6. SECURITY/PROTECTION SYSTEMS:

The storage garden is within the ORNL Bethel Valley secured area. The grounds are posted on radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

No routine surveillance activities are conducted at this facility.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted at this facility.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for the 3026-D Storage Garden through the planning period.

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Storage Garden 3033

2. LOCATION: North of Building 3033 (Bethel Valley)

3. SERVICE DATES: 1956-1975

4. FACILITY STATUS: Inactive; Site controlled by Operations Division (K. W. Haff)

5. FACILITY DESCRIPTION:

(a) Operating History - This storage garden was used to store sealed radioactive sources, miscellaneous contaminated items, and irradiated targets prior to processing.

(b) Physical Description - The 3033 storage garden consists of seven stainless steel cylinders, approximately 1 ft in diameter and 5 ft long, set in concrete with about 3 in. extending above ground-level. Each well is equipped with a shielded cover that extends approximately 1 ft into the well. The garden is located immediately behind Bldg. 3033.

(c) Current Condition - The storage garden is currently empty with shielded covers in place. The wells are believed to be structurally sound, with little visible deterioration.

(d) Radiological Hazards - Only low levels of residual contamination remain in the storage garden, principally in the form of surface contamination on the steel walls.

(e) Occupancy - The garden is located in the rear of an active radioactive process building (3033) in a little used or accessed area.

6. SECURITY/PROTECTION SYSTEMS:

The storage garden is within the ORNL Bethel Valley secured area.

7. SURVEILLANCE ACTIVITIES:

No routine surveillance activities are conducted at this facility.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted at this facility.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for Storage Garden 3033 through the planning period.

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Carbon-14 Process System

2. LOCATION: Building 3033-A (Bethel Valley) 3. SERVICE DATES: 1956-1975

4. FACILITY STATUS: Inactive; Facility controlled by Operations Division (K. W. Haff)

5. FACILITY DESCRIPTION:

(a) Operating History - The C-14 process system was constructed to prepare ^{14}C as barium carbonate from beryllium nitride targets that had been irradiated at Hanford. Subsequent commercial production of ^{14}C eliminated the need for routine production of this radionuclide in a government facility.

(b) Physical Description - The process facility is located in an enclosure in the southwest corner of Bldg. 3033-A, a corregated-metal sided structure. The ^{14}C process equipment consists of a 20-gal dissolver vessel (glass-lined steel) located in a concrete shielded pit under the floor of the facility, and a general process hood containing scrubbers, furnaces, and gas converters. The equipment is housed in a 9 ft by 12 ft room with a concrete floor covered with vinyl asbestos tile. A single door in a removable wall provides access to the room.

(c) Current Condition - The facility remains in a standby condition but is beginning to show signs of deterioration. The room contains debris and surplus equipment.

(d) Radiological Hazard - The facility is significantly contaminated with ^{14}C (up to 10^6 dpm/100 cm^2 beta). The source of the contamination problem appears to be the process hood, with contamination spreading to the floor and lower walls. Repeated efforts to decontaminate portions of the facility for personnel access have not resulted in permanent removal of the surface contamination.

(e) Occupancy - The ^{14}C room is unoccupied, with only periodic personnel access. However, the process system is located in a building housing other active programs.

6. SECURITY/PROTECTION SYSTEMS:

The C-14 process system is within the ORNL Bethel Valley secured area. The process room door is locked and the facility posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

In an effort to remove the source of the recurring contamination problem, the process hood and associated equipment in the hood will be removed in late FY 1983 and early FY 1984. The remaining facility will be decontaminated to a level that would permit routine personnel access for surveillance purposes. (0.5 man-years, $25K in FY 1983, $25K in FY 1984).

Table 1. Surveillance Activities - C-14 Process System

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection	Quarterly	Op	Op Records	20 mh/y
2. Radiological Surveillance		ISAHP	Radiation Survey Data Sheets (UCN-9784)	20 mh/y
(a) Routine survey/smears-inside facility	Quarterly			
(b) Routine survey/smears-entrance to facility	Weekly			
(c) Surveillance of maintenance activities	As Required			
3. Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*
4. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
5. Routine Security Patrol	Daily	LP	Daily Security Report	*
6. Glove Box Header Exhaust Filter DOP Testing	Semi-annual (or after replacement)	QA&I	Op Printout	6 mh/y*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - C-14 Process System

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	Op Records	20 mh/y
2. Decontamination Activities	As Required	Op	Op Records	40 mh/y

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.02	$2K
Routine Maintenance	0.03	$3K
TOTAL	0.05	$5K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements	
Process Hood Decontamination (FY 1984)	$25K
TOTAL	$25K

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	2	2	3	3	3	3	3	3	3	3
Maintenance	3	3	4	4	4	4	4	4	4	4
Repairs/ Improvements	25									
TOTAL	30	5	7	7	7	7	7	7	7	7

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Waste Evaporator Facility

2. LOCATION: Building 3506 (Bethel Valley) 3. SERVICE DATES: 1949-1954

4. FACILITY STATUS: Inactive; Building controlled by Operations Division (R. W. Schaich)

5. FACILITY DESCRIPTION:

(a) Operating History - The facility received the ILW liquid waste streams from ORNL laboratories and other processing areas during the 1950s for concentration prior to final disposition by shale fracture techniques. This activity was suspended when the presently active evaporator facility (Bldg. 2531) was brought on-line. Subsequent installations of experimental equipment were used to develop fission product purification processes and demonstrate contaminated waste incineration.

(b) Physical Description - The facility consists of a stainless steel lined, reinforced concrete cell with underground piping, valve pit, and an attached wood-framed operating area. The building dimensions are approximately 22 ft by 28 ft by 8 ft high. The evaporator facility is located on the west side of the south tank farm (Site 3507).

(c) Current Condition - The building structure is basically sound, although roof repairs have had to be made due to normal deterioration. The interior of the structure is in a state of disrepair through years of neglect but poses no immediate problems since the facility is unused. Most of the former process equipment has been removed.

(d) Radiological Hazard - The waste evaporator was decontaminated prior to its use as an incinerator facility. Hence, the building now contains only low-levels of contamination, primarily associated with the valve pit, piping, and some surface contamination. The radionuclides of concern are expected to be ^{137}Cs and ^{90}Sr, in less than curie quantities.

(e) Occupancy - The facility is unoccupied, with personnel access on only an occassional basis. The site is located adjacent to several active facilities, along a major pedestrian and vehicle thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

The waste evaporator is within the ORNL Bethel Valley secured area. Building exterior doors are normally locked and the building and grounds are posted on access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated at the Waste Evaporator Facility through the planning period.

Table 1. Surveillance Activities - Waste Evaporator Facility

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection	Semi-annual	Op	Op Records	20 mh/y
2. Radiological Surveillance (a) Survey for preventative maintenance	As Required	ISAHP	Radiation Survey Data Sheet (UCN-9784)	10 mh/y
3. Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*
4. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
5. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Remote Maintenance Activities - Waste Evaporator Facility

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	Op Records	20 mh/y

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.02	$2K
Routine Maintenance	0.01	$1K
TOTAL	0.03	$3K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	2	2	3	3	3	3	3	3	3	3
Maintenance	1	1	2	2	2	2	2	2	2	2
Repairs/ Improvements										
TOTAL	3	3	5	5	5	5	5	5	5	5

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Fission Product Pilot Plant (FPPP)

2. LOCATION: Building 3515 (Bethel Valley) 3. SERVICE DATES: 1948-1958

4. FACILITY STATUS: Inactive/Entombed; Site controlled by Operations Division (R. W. Schaich)

5. FACILITY DESCRIPTION:

(a) Operating History - The FPPP was used in the fission product recovery development program for the separation of curie quantities of various radionuclides from ILW waste streams. It was abandoned in 1958 when it was replaced by the Fission Product Development Laboratory (FPDL).

(b) Physical Description - The facility consisted primarily of an unlined concrete-shielded cell, approximately 20 ft by 10 ft by 8 ft high, with an adjacent operating area. The process cell contained several small (few gallon capacity) stainless steel vessels and columns with associated piping, valving, and controls. The concrete block and reinforced concrete building is located on the east side of the south tank farm (Site 3507).

(c) Current Condition - Shortly after the FPPP was abandoned, the building was entombed in a concrete block shell with dimensions of 17 ft by 26 ft by 12 ft tall. This entombment structure remains and appears to be structurally sound.

(d) Radiological Hazard - Radiation levels within the process cell prior to entombment ranged from 1 R/h to 100 R/h, with the major contaminants being ^{137}Cs and ^{90}Sr. The remaining radionuclide inventory in the facility is believed to be in the range of 10 to 100 Ci. Contamination is present underneath and adjacent to the building due to drain line leaks during past operations. The entombment structure appears to be providing adequate containment.

(e) Occupancy - The facility is entombed, with no personnel access. The site is in a central location of the main ORNL complex, adjacent to several operating facilities and a major pedestrian and vehicle thoroughfare.

6. SECURITY/PROTECTION SYSTEMS:

The FPPP is within the ORNL Bethel Valley secured area. The building and grounds are posted on radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

No routine maintenance is performed at this facility.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated at the Fission Product Pilot Plant through the planning period.

Table 1. Surveillance Activities - Fission Product Pilot Plant

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection	Annual	Op	Op Records	10 mh/y
2. Radiological Surveillance	Annual	ISAHP	Radiation survey Data Sheet (UCN-9784)	5 mh/y
3. Safety Inspection	Semi-annual	Op	Op Memo	2 mh/y*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.01	$1K
Routine Maintenance		
TOTAL	0.01	$1K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	1	1	2	2	2	2	2	2	2	2
Maintenance										
Repairs/ Improvements										
TOTAL	1	1	2	2	2	2	2	2	2	2

COMMERCIAL PROGRAM - Isotope Group

1. FACILITY NAME: Shielded Transfer Tanks (STT)

2. LOCATION: Solid Waste Storage Area 4 (Melton Valley)

3. SERVICE DATES: 1958-1970

4. FACILITY STATUS: Inactive; Tanks controlled by Operations Division (R. W. Schaich)

5. FACILITY DESCRIPTION:

(a) Operating History - These shielded tanks were used for the shipment of ^{137}Cs-loaded ion exchange resins from Richland, Washington to ORNL for processing. The resins were removed from the tanks and the ^{137}Cs converted to a usable form at the Fission Product Development Laboratory. The casks were reused several times over their service lifetimes.

(b) Physical Description - There are five shielded tanks being managed by the SFMP, four STT Model No. II and one STT Model III. The Model II tanks consist of a 500 gal, 3/8-in.-thick stainless steel liner surrounded by a 3 1/2-in. lead shield, all encased in a 3/4-in. mild steel outer shell. The overall tank dimensions are approximately 6 ft in diameter by 7 ft tall, with a loaded weight of about 38,000 lb. The Model III tank (referred to as "gun barrel") consists of a 200 gal stainless steel liner encased in 9 in. of steel (8 ft tall, 4 ft diam). Both types of tanks have provisions for lifting. Four of the tanks (RD-C-43, 47, 48, and gun barrel) are located in a materials storage yard on the western end of Solid Waste Storage Area (SWSA) No. 4; the fifth is behind Bldg. 7819, just northwest of SWSA 4.

(c) Current Condition - Three of the four Model II tanks (RD-C-43, 47, 48) still contain approximately 400 gal of Decalso inorganic ion exchange media. The other Model II tank (RD-C-44) is empty. The Model III tank is believed to contain 150 gal of AW-500 inorganic ion exchange media. The tanks are stored without protection from the weather and are showing only signs of minor external deterioration. There is no evidence of loss of containment in any of the tanks.

(d) Radiological Hazards - Each of the tanks still containing resin are estimated to have approximately 1000 Ci of residual ^{137}Cs. Surface exposure rates on the tanks range from 2-20 mR/h, with nominal surface activity levels of less than 1000 dpm/100 cm^2.

(e) Occupancy - The tanks are located in a remote area of the Laboratory, with little potential for personnel exposure.

6. SECURITY/PROTECTION SYSTEMS:

The tanks are within the ORNL Melton Valley restricted area.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted on the tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

In order to maintain better control over access to tank RD-C-44, it will be transported in FY 1984 to the fenced storage area where the remainder of the tanks are located ($2,000). No other repairs or improvements are anticipated through the planning period.

Table 1. Surveillance Activities - Shielded Transfer Tanks

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection	Annual	Op	SFMP Memo	10 mh/y
2. Radiological Surveillance a. Monitoring of surface contamination levels and exposure rates	Annual	ISAHP	Radiation Survey Data Sheet (UCN-9784)	10 mh/y

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.01	$1K
Routine Maintenance		
TOTAL	0.01	$1K

Annual Materials Requirements	Cost
None	

Anticipated Major Repairs/Improvements	
Relocation of tank RD-C-44 (FY 1984)	$2K
TOTAL	$2K

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	1	1	2	2	2	2	2	2	2	2
Maintenance										
Repairs/ Improvements	2									
TOTAL	3	1	2	2	2	2	2	2	2	2

COMMERCIAL PROGRAM - Reactor Group

1. FACILITY NAME: Molten Salt Reactor Experiment (MSRE)

2. LOCATION: Building 7503 (Melton Valley) 3. SERVICE DATES: 1965-1969

4. FACILITY STATUS: Inactive/occupied; Reactor building controlled by Operations Division (S. S. Hurt)

5. FACILITY DESCRIPTION:

(a) Operating History - The MSRE was a single-region, unclad-graphite-moderated, homogeneous-fueled reactor built to investigate the practicality of the molten salt reactor concept for central power station applications. It was operated from June 1965 to December 1969 at a nominal full power level of 8.0 MW. The circulating fuel solution was a mixture of lithium, beryllium, and zirconium-fluoride salts, containing uranium fluoride as the fuel. Reactor heat was transferred from the fuel salt to a similar coolant salt and then dissipated to the atmosphere.

(b) Physical Description - The primary reactor components, the reactor vessel, auxiliary equipment, fuel drain tanks, and fuel storage tanks are located below-grade in reinforced concrete cells. Access to these cells is through removable concrete roof plugs. The reactor and associated equipment are housed in a steel and concrete structure approximately 80 ft by 157 ft by 33 ft tall, with special containment features. Containment ventilation is provided by centrifugal fans located at the base of a 100 ft steel discharge stack. Before discharge, the air passes through roughing and HEPA filtration. Ancillary facilities include an office building (Bldg. 7509), a diesel generator house, utility building, blower house, cooling water tower, and vapor condensing system. Heat dissipation was provided by a salt-to-air radiator, exhausting through a discharge stack.

(c) Current Condition - Following shutdown, the fuel and coolant salts were drained to storage tanks within the containment cells and isolated. Although the stored coolant salt needs little attention, the fuel salt (4650 kg) contained in two critically-safe tanks, requires annual heating to the molten salt state to allow recombination of fluorine gas released by radiation effects. The reactor and drain tank cells are sealed and shield blocks secured. These cells, as well as the reactor bay area, are maintained under a slight negative pressure. The building and ancillary facilities are structurally sound, with only isolated areas of deterioration.

(d) Radiological Hazards - The most significant contaminated areas in the MSRE are in and adjacent to the reactor vessel and fuel storage cells. Exposure rates of up to 2200 R/h have been measured in the reactor vessel, principally due to fission products and neutron-induced radioactivity. The remaining

ancillary cells, process piping and other process-related equipment are internally contaminated. The accessible areas of the building, including the reactor bay, are generally uncontaminated. No significant spread of contamination or personnel exposure has occurred since facility shutdown.

(e) Occupancy - Portions of the building are being utilized by other ORNL Divisions for research, workshop, and storage space. Maintenance funds are allocated from each of the participating divisions. The MSRE is in a remote location of the ORNL site, with minimal nonroutine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The MSRE is in the ORNL Melton Valley restricted area. The buildings and grounds are posted on access restrictions and radiation/contamination zones. The building is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated at the MSRE through the planning period.

Table 1. Surveillance Activities - Molten Salt Reactor Experiment

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Waste Operations Surveillance		Op	WOCC Records and MSRE Control Room Log	360 mh/y
(a) Stack fan status	Daily			
(b) Radiation monitors check	Daily			
(c) Stack activity check	Daily			
(d) Stored salt monitoring (pressure and temperature)	Daily			
(e) Instrument alarm monitoring	Continuous			
2. Routine Inspection		Op	MSRE Monthly Log	120 mh/y
(a) Daily log inspection	Monthly			
(b) Stored salt temperatures	Monthly			
(c) Sump levels check	Monthly			
(d) Visual of building and ancillary facilities	Monthly			
3. Annual Surveillance		Op	MSRE Annual Log	240 mh/y
(a) Reheat of fuel and flush salt	Annual			
(b) Reactor and drain tank cells pressure test	Annual			
(c) Sump pump operability	Annual			
(d) Ventilation system check	Annual			
(e) Verify switches and valves	Annual			
(f) Review routine inspection and maintenance records	Annual			

Table 1. (Continued)
Page 2

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
4.	Radiological Surveillance		ISAHP	Radiation Survey Data Sheet (UCN-9784)	100 mh/y
	(a) Routine inspections	Monthly			
	(b) Surveillance of maintenance activities and material transfers	As Required			
5.	Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*
6.	Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
7.	Fire Sprinkler System Test	Annual	LP	Inspection Report of Sprinkler Systems	6 mh/y*
8.	HEPA filter DOP testing	Annual (or after replacement)	QA&I	Op Printout	8 mh/y*
9.	Overhead Crane Inspection	When Operated	QA&I	QA&I Memo	8 mh/y*
10.	Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Molten Salt Reactor Experiment

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	OP Records	120 mh/y
2. Exhaust Filter Changes	Every 5 Years (or as required)	Op	QA&I Printout	140 mh/y*
3. Health Physics Instrument Maintenance/ Repair	Quarterly (or as required)	ISAHP	Program Maintenance Records	40 mh/y
4. Maintenance of Heating/Cooling Systems	Quarterly (or As Required)	P&E	P&E Report 1216	80 mh/y
5. Maintenance of Overhead Bridge Crane	Semi-annual	P&E	P&E Report 1216	40 mh/y
6. Maintenance Materials	Annaul	Op	Op Records	$8000 ($5000*)
7. Utilities	Annual	Op	Op Records	$19,000

*Additional resources required for filter changeout on a five year cycle, beginning FY 1983.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.41	$41K
Routine Maintenance	0.14	$14K
TOTAL	0.55	$55K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$8,000
Utilities	$19,000
TOTAL	$27,000

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	41	48	52	52	52	52	52	52	52	52
Maintenance	41	48	52	52	66	52	52	52	52	66
Repairs/ Improvements										
TOTAL	82	96	104	104	118	104	104	104	104	118

COMMERCIAL PROGRAM - Reactor Group

1. FACILITY NAME: Low Intensity Test Reactor (LITR)

2. LOCATION: Building 3005 (Bethel Valley) 3. SERVICE DATES: 1951-1968

4. FACILITY STATUS: Inactive/Occupied; Building controlled by Operations Division (B. L. Corbett)

5. FACILITY DESCRIPTION:

(a) Operating History - In 1951, the LITR was converted from a hydraulic mockup of the materials testing reactor (later built in Idaho) to an operating reactor for the purpose of supplying a variety of irradiation facilities for ORNL and other research groups. The LITR was a water moderated and cooled reactor using enriched uranium as fuel and beryllium as a reflector. The reactor was originally designed for 500 kW power level but was converted to a 3 MW testing reactor prior to permanent shutdown in 1968.

(b) Physical Description - The LITR is made up of five cylindrical steel and aluminum sections, connected by gasketed flanges, which house the reactor controls, coolant pipes and the reactor internals. All but the lowest tank section is above ground. The enclosure for the reactor is not an integral building, but is a composite of essentially independent rooms built on an as-required basis. The facility is primarily of steel and corregated-metal construction with dimensions of approximately 70 ft by 62 ft by 57 ft. As the reactor passed through stages from training reactor to test reactor, additional shielding was added consisting of a thin layer of borated plastic surrounded by loose-stacked concrete blocks and river sand (10 ft thick total). Heat dissipation for the final design was provided by two 1 MW water-to-air heat exchangers and one 1-MW water-to-water heat exchanger (Site 3077).

(c) Current Condition - The LITR fuel was removed as part of the reactor shutdown. However, the beryllium reflector and other reactor vessel components still remain in the vessel. A slight negative pressure is continuously maintained in the building, with exhaust routed to the Bulk Shielding Reactor (BSR) off-gas system. Those portions of the facility not normally occupied are gradually deteriorating with time.

(d) Radiological Hazards - As mentioned above, all the internal radioactive and contaminated components of the reactor (except the fuel and shim rods) are still in place. Interior surfaces of the reactor tank and primary water piping are contaminated with radioactive corrosion products and traces of long-lived fission products. It is suspected that the concrete block and sand shielding materials are contaminated and contain some quantities of induced radioactivity due to neutron leakage around the

borated plastic shield. All areas of the building that are normally occupied are uncontaminated and outside any radiation zones.

(e) Occupancy - The east and west rooms and the old control room are currently being utilized on a full-time basis by the Plant and Equipment Division and Instrumentation and Controls Division as a shop. Maintenance of these occupied areas is provided by other programs. The LITR is located on the north side of the main ORNL complex, adjacent to several active facilities.

6. SECURITY/PROTECTION SYSTEMS:

The LITR is within the ORNL Bethel Valley secured area. The building and grounds are posted on access restrictions and radiation/contamination zones. The facility is protected by a fire sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated at the LITR through the planning period.

Table 1. Surveillance Activities - Low Intensity Test Reactor

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	LITR Building 3001 Shift Check Sheet (UCN 10593)	200 mh/y
(a) Visual of building	Daily			
(b) Steam heater check (when applicable)	Daily			
(c) Absolute filter pressure drop	Daily			
(d) Radiation monitoring system check	Daily			
2. Radiological Surveillance		ISAHP		
(a) Smear surveys of reactor bay and shops	Weekly		Radiation Survey Sheet (UCN-9784)	25 mh/y
(b) Inspection of radiation monitors	Weekly		Air Monitoring Data Sheet (UCN-3367)	20 mh/y
3. Off-Gas Monitoring (BSR)	Continuous	Op	WOCC Records	*
4. Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*
5. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	4 mh/y*
6. Fire Sprinkler System Check	Annual	LP	Inspection Report of Sprinkler System	6 mh/y*
7. HEPA Filter DOP Testing (BSR)	Semi-Annual (or after replacement)	QA&I	Op Printout	16 mh/y*
8. Overhead Crane Inspection	Annual	QA&I	QA&I Memo	32 mh/y*
9. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Low Intensity Test Reactor

	Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1.	General Maintenance and Repair	As Required	Op/P&E	Op Records	100 mh/y
2.	Health Physics Instrument Maintenance/ Repair	Quarterly (or as required)	ISAHP	Program Maintenence Records	40 mh/y
3.	Maintenance of Heating/Cooling Systems	Quarterly (or As Required)	P&E	P&E Report 1216	80 mh/y
4.	Maintenance of Overhead Bridge Crane	Semi-annual	P&E	P&E Report 1216	40 mh/y
5.	Maintenance Materials	Annual	Op	Op Records	$1000
6.	Utilities	Annual	Op	Op Records	$6000

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.12	$12K
Routine Maintenance	0.13	$13K
TOTAL	0.25	$25K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$1000
Utilities	$6000
TOTAL	$7000

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	12	14	15	15	15	15	15	15	15	15
Maintenance	20	23	25	25	25	25	25	25	25	25
Repairs/ Improvements										
TOTAL	32	37	40	40	40	40	40	40	40	40

COMMERCIAL PROGRAM - Reactor Group

1. FACILITY NAME: Homogeneous Reactor Experiment (HRE)

2. LOCATION: Building 7500 (Melton Valley) 3. SERVICE DATES: 1957-1961

4. FACILITY STATUS: Inactive/occupied; Building controlled by Operations Division (S. S. Hurt)

5. FACILITY DESCRIPTION:

(a) Operating History - This facility was originally constructed (1951) to house the Homogeneous Reactor Experiment No. 1, the first of two experimental aqueous homogeneous reactors to be developed for nuclear power application analysis. In 1953, a decision was made to replace HRE-1 with a new experiment (HRE-2), and the second reactor was constructed during 1953-1956. The HRE-2 was a two-region reactor containing 93% enriched ^{235}U [U_2SO_4 + $CUSO_4$ + D_2SO_4 in heavy water (D_2O)] as the fuel, surrounded by a blanket region of D_2O. The reactor, which included an on-line chemical processing plant, reached criticality in 1957, operating for most of its active life at a nominal full power level of 5MW. Shortly after full-power operation was achieved, a hole developed in the reactor core tank, allowing mixing between the fuel and blanket regions. After extensive repair efforts failed, the reactor continued to operate with fuel in both regions. The reactor was shut down in April 1961 after approximately 16,295 MWh of operation.

(b) Physical Description - The HRE-2 was a complex experimental reactor system principally housed in three below-grade steel-lined concrete cells, within a steel and reinforced concrete structure (90 ft by 105 ft by 42 ft high). The reactor cell contained the fuel and blanket systems, consisting of the reactor vessel, high and low pressure circulating loops, heat exchangers, and an off-gas handling system. A portion of the fuel flow was circulated through the chemical processing plant, also located in shielded cells, providing continuous removal of impurities from the fuel solution. Process liquid waste was handled and treated at the HRE through a system of underground stainless steel tanks, a separate concrete waste evaporator building (Bldg. 7502), and an unlined earthen 300,000 gal storage pond. Gaseous wastes were treated in the main building and vented through a 100 ft steel stack. Primary reactor heat removal was through a steam-to-air heat exchanger located on the building roof. Auxiliary heat dissipation was provided by a wooden water-to-air heat exchanger, located west of the reactor building (Site 7554).

(c) Current Condition - During 1961-1962, the reactor fuel and heavy water were recovered from the system and the facility placed in standby condition. Portions of the reactor core vessel were removed in late 1962 for studies. The reactor, chemical plant,

and the auxiliary systems remain as left at that time. A portion of the chemical process cells have been altered to accommodate other research programs during the period from 1963 to the present. The reactor building is structurally sound, with only isolated areas of deterioration. The liquid waste storage pond has been filled and covered with asphalt to reduce radionuclide transport. However, the condition of the storage pond, as well as the other ancillary facilities (waste evaporator, cooling tower, decontamination pad), is deteriorating over time.

(d) Radiological Hazards - The most highly contaminated portions of the reactor system are located in the reactor cell. This cell was routinely flooded during maintenance operations, resulting in widespread contamination of cell walls and equipment surfaces. Exposure levels up to 600 R/h have been measured in the cell area. The contaminants are believed to be primarily ^{90}Sr and ^{137}Cs. The estimated inventory of fission and corrosion products remaining in the process piping is 30-40 kg. Personnel accessible areas outside the reactor and process cells are relatively free of contamination, with only isolated areas of elevated activity remaining. Of the ancillary facilities, the waste evaporator and holding pond are known to contain significant quantities of radionuclides but have not been adequately characterized to date.

(e) Occupancy - A portion of the main building is currently occupied by members of a reactor research group that is utilizing the former process cells for experiments. Maintenance funds are provided by this program for upkeep and operation of the part of the facility they occupy. The site is in a remote location of the ORNL site, with minimal nonroutine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The HRE is in the ORNL Melton Valley restricted area. The buildings and grounds are posted on access restrictions and radiation/contamination zones. The building is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated at the HRE through the planning period.

Table 1. Surveillance Activities - Homogeneous Reactor Experiment

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	Surveillance Check List for the HRT	160 mh/y
(a) Visual of building	Monthly			
(b) Sump pumps operation	Monthly			
(c) Sumps activity levels	Monthly			
(d) 12,000 gal waste tank activity level	Monthly			
(e) 12,000 gal waste tank liquid level	Monthly			
(f) 1,000 gal waste tank liquid level	Monthly			
(g) Off-gas filter pressure drop	Monthly			
(h) Storage pool radiation level	Monthly			
(i) Storage pool water level	Monthly			
(j) Auxillary containment fan check	Monthly			
(k) Containment sump levels	Monthly			
(l) Air compressor check	Monthly			
(m) Main containment fan check	Monthly			
2. Radiological Surveillance		ISAHP	Radiation Survey Data Sheets	100 mh/y
(a) Smear surveys of reactor bay and offices	Monthly		(UCN-9784)	
(b) Surveillance of maintenance activities and material transfers	As Required			
3. Safety Inspection	Semi-annual	Op	Op Memo	5 mh/y*

Table 1. (Continued)
Page 2

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
4. Fire Safety Inspection	Quarterly	LP	Inspection and Protection Report	8 mh/y*
5. Fire Sprinkler System Test	Annual	LP	Inspection Report of Sprinkler System	6 mh/y*
6. HEPA Filter DOP Testing	Semi-annual (or after replacement)	QA&I	Op Printout	8 mh/y*
7. Overhead Crane Inspection	Annual	QA&I	QA&I Memo	28 mh/y*
8. Routine Security Patrol	Daily	LP	Daily Security Report	*

*Costs are included in ORNL overhead charges. No direct SFMP funding is required.

Table 2. Routine Maintenance Activities - Homogeneous Reactor Experiment

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	Op Records	80 mh/y
2. Exhaust Filter Changes	Every 5 years (or As Required)	Op	QA&I Printout	140 mh/y*
3. Health Physics Instrument Maintenance/ Repair	Quarterly (or As Required)	ISAHP	Program Maintenance Records	40 mh/y
4. Maintenance of Heating/Cooling Systems	Quarterly (or As Required)	P&E	P&E Report 1216	80 mh/y
5. Maintenance of Overhead Bridge Crane	Semi-annual	P&E	P&E Report 1216	40 mh/y
6. Maintenance Materials	Annual	Op	Op Records	$1000 ($3000*)
7. Utilities	Annual	Op	Op Records	$10,000

*Additional resources required for filter changeout on a five-year cycle, beginning in FY 1983.

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.13	$13K
Routine Maintenance	0.12	$12K
TOTAL	0.25	$25K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$1K
Utilities	$10K
TOTAL	$11K

Anticipated Major Repairs/Improvements

None

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	13	15	17	17	17	17	17	17	17	17
Maintenance	23	27	29	29	52	29	29	29	29	52
Repairs/ Improvements										
TOTAL	36	42	46	46	69	46	46	46	46	69

COMMERCIAL PROGRAM - Reactor Group

1. FACILITY NAME: ORR Water-to-Air Heat Exchanger

2. LOCATION: ORNL Site 3087 (Bethel Valley) 3. SERVICE DATES: 1958- 1961

4. FACILITY STATUS: Inactive; Site controlled by the Operations Division (B. L. Corbett)

5. FACILITY DESCRIPTION:

(a) Operating History - This heat exchanger was the original heat dissipation system for the Oak Ridge Research Reactor (ORR). When the reactor power level was increased from 20 MW to 30 MW in 1960, the radiators were replaced by a water-to-water heat exchanger and cooling tower heat dissipation system.

(b) Physical Description - The heat exchanger consisted of eight aluminum 24 ft by 22 ft horizontally-mounted, finned, water-to-air radiators (2.5 MW capacity each). The units were housed in steel support structures, secured to concrete pads, and connected to the ORR by underground aluminum piping. Cooling air flow was provided by variable speed fans.

(c) Current Condition - This heat dissipation system was drained and disconnected from the ORR when removed from service. One radiator was later removed for use at an off-site location. The condition of the piping, motors, and other equipment is uncertain, although it is apparent that the exterior metal surfaces are deteriorating due to weather exposure.

(d) Radiological Hazards - The interior surfaces of the transfer and heat exchanger piping are slightly contaminated, principally with long-lived corrosion products. No significant hazard was encountered when the single heat exchanger was dismantled for shipment off-site.

(e) Occupancy - The heat exchanger is located in a semi-remote area on the north end of the main ORNL complex, with little routine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The site is within the ORNL Bethel Valley secured area.

7. SURVEILLANCE ACTIVITIES:

No routine surveillance activities are conducted at this facility.

8. ROUTINE MAINTENANCE:

No routine maintenance activities are conducted at this facility.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

No major repairs or improvements are anticipated for the ORR Heat Exchanger through the planning period.

COMMERCIAL PROGRAM - Reactor Group

1. FACILITY NAME: ORR Experimental Facilities

2. LOCATION: Building 3042 (Bethel Valley) 3. SERVICE DATES: 1959-1973

4. FACILITY STATUS: Experimental facilities are inactive; ORR is active and controlled by the Operations Division (B. L. Corbett)

5. FACILITY DESCRIPTION:

(a) Operating History - Since 1959, several different experimental facilities have been installed at the Oak Ridge Research Reactor (ORR-Bldg. 3042) for use in testing of various materials, analysis of liquid and gaseous coolant systems, and irradiated sample transfers. Six of these facilities have been designated as surplus and have been accepted into the ORNL SFMP. These are (1) GCR A9-B9 experiment (1960-1969) for measurement of fission product gases from ceramic fuels, (2) Molten Salt Loop (1959-1967) for analysis of homogeneous reactor fuels, (3) Maritime Ship Reactor Loop (1959-1962) for materials testing of structural materials and fuel pins for nuclear merchant ship applications, (4) Pneumatic Tube Irradiation Facility (1968-1973) for transfer of irradiated samples from the ORR to a laboratory in Bldg. 3001, (5) GCR Loop I (1960-1967) to test new fuels for gas-cooled reactors, and (6) GCR Loop II (1962-1963) for the irradiation of unclad graphite fuel specimens for study of fission product release.

(b) Physical Description - Each of the experimental facilities at the ORR are separate, identifiable units with a variety of designs, structural materials, and flow patterns. All of the facilities included an in-reactor section, with associated piping, instrumentation and controls leading to away-from-reactor processing or experimental areas. These areas were located either immediately adjacent to the reactor or at remote locations, primarily in the basement of the ORR. The out-of-reactor portions of the facilities were normally contained in shielded cells, either lead, concrete block, or concrete and steel, with separate instrument and control panels. The complexity of the systems range from a simple lead-shielded stainless steel pneumatic tube to a large pressurized water loop consisting of pumps, heat exchangers, heaters, surge tanks, water purification systems, sampling stations, emergency electric supply, and continuously-manned control room.

(c) Current Conditions - Following completion of the respective experiments, the in-reactor portions of the facilities were removed and the remaining systems placed in standby. Most of the facilities remain as left at that time, with only limited equipment or instrumentation removal conducted to provide room for active experiments, or for reactor maintenance activities. The

abandoned experiments are in various states of disrepair and deterioration. The ORR building is maintained under constant negative pressure, with HEPA filtration of exhaust air.

(d) Radiological Hazards - All of the experimental facilities involved transfers of irradiated solids, liquids or gases, during normal operations. As a result, the transfer piping became contaminated with long-lived corrosion or fission products to varying degrees depending upon the experiment. In addition, for those experiments where significant chemical processing or irradiated product handling and analysis was conducted, much of the process equipment is contaminated. No detailed characterization efforts have been conducted to determine the radiation/contamination levels, or accurately estimate the residual radionuclide inventory present in these facilities.

(e) Occupancy - All of the experimental facilities are housed in the main reactor building of the operating ORR. This reactor is staffed by full-time operators, maintenance personnel, health physicists, and support staff. The ORR is located on the northern side of the main ORNL complex, adjacent to several active facilities, with routine personnel access.

6. SECURITY/PROTECTION SYSTEMS:

The ORR is within the ORNL Bethel Valley secured area. The experimental areas are posted on access restrictions and radiation/contamination zones. Doors to experimental areas are normally locked. The building is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES:

See Table 1 for details of surveillance activities that are in addition to those conducted for the operating ORR.

8. ROUTINE MAINTENANCE:

See Table 2 for details of routine maintenance activities that are in addition to those conducted for the operating ORR.

9. ANTICIPATED REPAIRS/IMPROVEMENTS:

In order to provide access for a proposed new experiment in the south horizontal engineering test facility of the ORR, portions of the GCR Loop II experiment may have to be removed. This activity would be conducted in FY 1984, if the new experiment is approved ($50K).

Table 1. Surveillance Activities - ORR Experimental Facilities

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. Routine Inspection		Op	ORR Shift Check Sheet	200 mh/y
(a) Visual of experimental areas	Daily			
2. Radiological Surveillance		ISAHP	Radiation Survey Data Sheet (UCN-9784)	50 mh/y
(a) Radiation/contamination survey of Loop II	Weekly			
(b) Surveillance of other facilities	Quarterly			
(c) Surveillance of maintenance activities	As Required			

Table 2. Remote Maintenance Activities - ORR Experimental Facilities

Activity	Frequency	Responsibility	Documentation	Manpower/ Resource Requirement
1. General Maintenance and Repair	As Required	Op/P&E	Op Records	40 mh/y
2. Maintenance Materials	Annual	Op	Op Records	$500

10. COST AND SCHEDULE:

(a) Annualized Costs

Annual Manpower Requirements	Man-Years	Cost
Surveillance Activities	0.13	$13K
Routine Maintenance	0.02	$2K
TOTAL	0.15	$15K

Annual Materials Requirements	Cost
Filters/Miscellaneous Supplies	$0.5K
TOTAL	$0.5K

Anticipated Major Repairs/Improvements	
Removal of Loop II Cell Equipment (FY 1984)	$50K
TOTAL	$50K

(b) Projected Resource Requirements by Year of Expenditure

Task	Fiscal Year Cost ($000)									
	84	85	86	87	88	89	90	91	92	93
Surveillance	13	15	17	17	17	17	17	17	17	17
Maintenance	3	4	4	4	4	4	4	4	4	4
Repairs/ Improvements	50									
TOTAL	66	19	21	21	21	21	21	21	21	21

INTERNAL DISTRIBUTION

1. T. W. Burwinkle
2. K. W. Cook
3-5. M. E. Mitchell
6-10. T. E. Myrick
11. Central Research Library
12. Document Reference Section
13. Laboratory Records Department
14. Laboratory Records, RC
15. ORNL Patent Office

EXTERNAL DISTRIBUTION

16. Office of Assistant Manager for Energy Research and Development, U.S. Department of Energy, Oak Ridge Operations, P. O. Box E, Oak Ridge, TN 37831

17-18. Technical Information Center, U.S. Department of Energy, P. O. Box 62, Oak Ridge, TN 37831