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ENVIRONMENTAL RESTORATION PROGRAM

Surveillance and Maintenance Plan for Waste Area Groupings at Oak Ridge National Laboratory, Oak Ridge, Tennessee, for FY 1993–2002

M. K. Ford
L. Holder, Jr.
R. G. Jones

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ORNL Environmental Restoration Program

Surveillance and Maintenance Plan for Waste Area Groupings at Oak Ridge National Laboratory, Oak Ridge, Tennessee, for FY 1993–2002

M. K. Ford
L. Holder, Jr.
R. G. Jones

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Prepared by
Waste Management and Remedial Action Division
Oak Ridge National Laboratory

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U.S. Department of Energy
Office of Environmental Restoration and Waste Management
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Author Affiliations

M. K. Ford, L. Holder, Jr., and R. G. Jones are members of the Waste Management and Remedial Action Division of Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc.

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ACRONYMS

ACD	Analytical Chemistry Division
AEC	Atomic Energy Commission
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BSR	Bulk Shielding Reactor
BV	Bethel Valley
CTD	Chemical Technology Division
D&D	Decontamination and Decommissioning
DOE	Department of Energy
DOE-OR	Department of Energy-Oak Ridge Field Office
ER	Environmental Restoration
ESD	Environmental Sciences Division
FPDL	Fission Product Development Laboratory
FPPP	Fission Product Pilot Plant
HDPE	High-Density Polyethylene
HASRD	Health and Safety Research Division
HEPA	High-Efficiency Particulate Air
HFIR	High Flux Isotope Reactor
HRT	Homogeneous Reactor Test
ICM	Interim Corrective Measures
LITR	Low-Intensity Test Reactor
LLW	Low-Level Waste
LLLW	Liquid Low-Level Waste
LP	Laboratory Protection
MAD	Measurement, Applications, and Development
MPC	Maximum Permissible Concentration
MRF	Metal Recovery Facility
MSRE	Molten Salt Reactor Experiment
MV	Melton Valley
NHF	New Hydrofracture Facility
NQA	Nuclear Quality Assurance
NWT	Northwest Tributary
OGR	Oak Ridge Graphite Reactor
OHF	Old Hydrofracture Facility
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Research Reactor
OSHA	Occupational Safety and Health Act
P&E	Plant and Equipment
PVC	Polyvinylchloride
PWTP	Process Waste Treatment Plant
QA	Quality Assurance
QD	Quality Department
RAS	Remedial Action Section
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RLO	Richland Operations Office
RP	Radiation Protection
RRD	Research Reactors Division

S&M	Surveillance and Maintenance
SARA	Superfund Authorization and Recovery Act
SCMP	Site Corrective Measures Program
SWMU	Solid Waste Management Unit
SWSA	Solid Waste Storage Area
TRE	Trivalent Rare Earths
TRU	Transuranic
TURF	Thorium-Uranium Facility
WAG	Waste Area Grouping
WEAF	Waste Examination Assay Facility
WMRAD	Waste Management and Remedial Action Division
WOC	White Oak Creek
WOCC	Waste Operations Control Center
WOCESCS	White Oak Creek Embayment Sediment Control Site
WWSY	White Wing Scrap Yard

EXECUTIVE SUMMARY

The Oak Ridge National Laboratory (ORNL) Waste Area Grouping (WAG) Surveillance and Maintenance (S&M) program was designed for the management of former waste management and environmental research sites contaminated with radioactive materials and/or hazardous chemicals from the end of their operating life until final facility disposition or site stabilization in accordance with environmental regulations and best management practices. Management of this program is guided by an S&M plan, which outlines requirements for ensuring safe protective storage prior to final remediation at each site.

At the beginning of FY 1990, the Oak Ridge Reservation Environmental Restoration Division was formed to oversee ultimate remedial action at each site/facility. However, for the purpose of S&M, Site Corrective Measures Program (SCMP) sites were combined with storage tanks and impoundments formerly supported by the Defense Decontamination and Decommissioning (D&D) program to form the current WAG S&M program. This report provides an update to the previous SCMP S&M plan, which was issued in September 1990, and includes the tanks and impoundments that were formerly part of the Defense D&D program. Considerable change has taken place since 1990 concerning site conditions, regulatory pressures, and the aforementioned transfer of facilities into the program. Other pertinent factors impacting S&M activities are increased awareness and emphasis on safety-related and environmental and health protection measures. The latter factors are influencing the level of oversight and documentation required to implement special maintenance projects and to ensure that protective measures in place at surplus facilities are adequate to meet current requirements. This report documents these impacts on the program for the period FY 1993 through FY 2002.

1. INTRODUCTION

The Oak Ridge National Laboratory (ORNL) Waste Area Grouping (WAG) Surveillance and Maintenance (S&M) program was designed for the management of sites contaminated with radioactive materials and/or hazardous chemicals from the end of their operating life until final facility disposition or site stabilization in accordance with environmental regulations and good management practices. Program objectives include (1) S&M of sites/facilities awaiting final disposition; (2) planning for safe and orderly final closure at each site/facility; and (3) implementing a program to accomplish final disposition in a safe, cost-effective, and timely manner.

1.1 ORNL WAG S&M PROGRAM

The ORNL WAG S&M program provides the integral S&M function at sites/facilities to ensure that they remain in acceptable condition without undue risks to the health or well-being of the ORNL work force, the public, or the environment. (See Table 1 for a list of sites/facilities managed by the program and Figs. 1 and 2 for their locations.) The program is administered by the Remedial Action Section (RAS) of the ORNL Waste Management and Remedial Action Division (WMRAD). The inventory of sites and facilities managed by this group includes a wide variety of former waste management areas, environmental research sites, and areas of incidental contamination from past operations. This report has been prepared to document planned S&M activities and estimated resource needs at each of these sites/facilities for the next 10 years.

1.2 S&M PROGRAM OBJECTIVES

The objectives of the ORNL WAG S&M program are as follows:

1. to ensure adequate containment of the residual radioactive materials remaining at the listed sites,

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 a structured program of routine S&M, as well as through implementation of special maintenance when deemed necessary as a result of site surveillance. These activities provide assurance that adequate site control is achieved during remedial investigations and feasibility studies until final site decommissioning or closure is accomplished. Program activities are conducted in four principal areas as described below:

1. S&M planning—planning of surveillance schedules, evaluation of surveillance information, supervision of routine and special maintenance, and routine reporting;

2. routine S&M—scheduled site inspections, sampling and analysis of contaminant pathways, and periodic maintenance as a result of inspections and monitoring;

3. special maintenance—correction of serious site deficiencies beyond the scope of routine maintenance; and

4. project management—this task supports overall project and S&M line management within ORNL for the Department of Energy-EM sponsored ORNL WAG S&M task. Routine activities include development, review, editing, and approval of weekly highlights, monthly progress reports, formal reports, fiscal analysis, and other documentation for WAG S&M activities. Other activities include line management oversight of all ORNL staff directly involved in the S&M effort. Program interface is also provided for ORNL management, the Energy Systems central Environmental Restoration (ER) Division, and Department of Energy-Oak Ridge Field Office (DOE-OR) and its other prime contractors. In addition to periodic progress reports, deliverables produced from this task include activity data sheets, current year work plans, budget submission data and schedules, program baseline data, and other programmatic documentation as required by DOE.

1.3 SCOPE OF S&M PLAN

This S&M plan has been developed to address the S&M requirements for ORNL WAG S&M sites up to the time of initiation of remedial action. This plan provides (1) an outline of the program responsibilities, interfaces, S&M guidelines, and documentation requirements of the overall S&M program (Sect. 2—Program Description); (2) a summary of the operational history, physical and radiological condition, occupancy, security provisions, current S&M activities and their associated costs, and estimated future major repairs and resource needs for each site (Sect. 3—Project Summaries); and (3) an integration of the individual facility S&M requirements into an overall program budget and schedule (Sect. 4—Program Costs and Schedules). This long-range planning document was designed to provide estimates of the projected resource needs for the S&M programs over a 10-year period. Such long-range estimates are useful for program planning purposes, although the confidence in the data beyond 3 years decreases.

The S&M plan will be reviewed annually and will be updated to provide DOE with documentation of the current management philosophies and resource allocations. The updated plan forms the basis for preparation of annual activity data sheets for budget requests concerning WAG S&M.

Table 1. Sites/facilities managed by Oak Ridge National Laboratory Waste Area Grouping Surveillance and Maintenance program

WAG S&M
SWSA 1[a]
SWSA 2
SWSA 3
SWSA 4
SWSA 5
SWSA 6 ICM
LLW Pit 1[b]
LLW Pit 2
LLW Pit 3
LLW Pit 4
LLW Trench 5
LLW Trench 6
LLW Trench 7
Process Sludge Basin (7835)
Hydrofracture Experiment Site 1 (HF-1)
LLW Line Leak Site—End of Trench 7 Access Road
LLW Line Leak Site—Trench 6 Southeast
LLW Line Leak Site—Gaging Station Northwest of Building 7852
White Wing Scrap Yard
Deep Monitoring Wells (DM-1 and DM-2)
Waste Holding Basin (3513)
Gunite Storage Tanks W-5 to W-10
Waste Tank W-1A
Waste Tank WC-1
Waste Tanks WC-15 and WC-17
Waste Tanks W-1 to W-4 and W-13 to W-15
Waste Tank W-11
Waste Tanks TH-1 to TH-3
Waste Tank TH-4
Waste Tanks T-1, T-2, T-3, T-4, and T-9
OHF Pond (7852A)[c]
OHF Waste Pits
HRE Pond[d]
HRE Waste Tanks (7560 and 7562)
OGR Canal[e]
LITR Pond[f]
FPDL LLW Transfer Line[g]
0800 Environmental Study Area
Closed Contractors Landfill (7658)
Transfer Line Leak Site (7819 to Pit 1)
HFIR/TRU Waste Collection Basins (7906, 7907, and 7908)[h]
Equalization Basin (3524)
Waste Tanks W-19 and W-20
MRF Canal and Dissolver Pit

Table 1 (continued)

Basins 3539 and 3540 (190 Process Ponds)
Chestnut Ridge ^{137}Cs Plots
White Oak Creek (WOC) Embayment Sediment Control Facility

[a]SWSA = Solid Waste Storage Area
[b]LLW = Low-Level Waste
[c]OHF = Old Hydrofracture Facility
[d]HRE = Homogeneous Reactor Experiment
[e]OGR = Oak Ridge Graphite Reactor
[f]LITR = Low-Intensity Test Reactor
[g]FPDL = Fission Product Development Laboratory
[h]HFIR/TRU = High Flux Isotope Reactor/transuranic

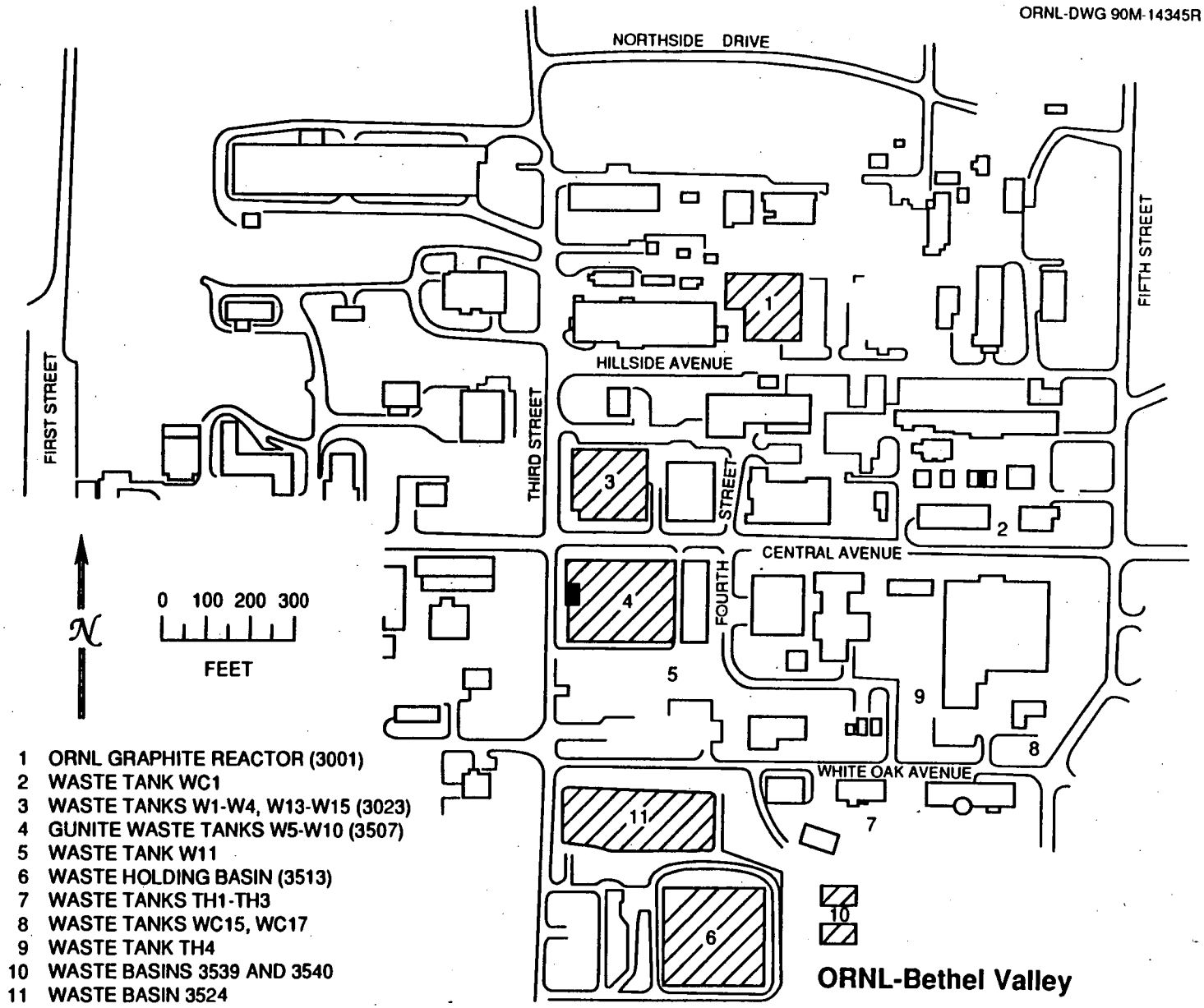

Fig. 1. Location map for Oak Ridge National Laboratory surplus facilities—Bethel Valley area.

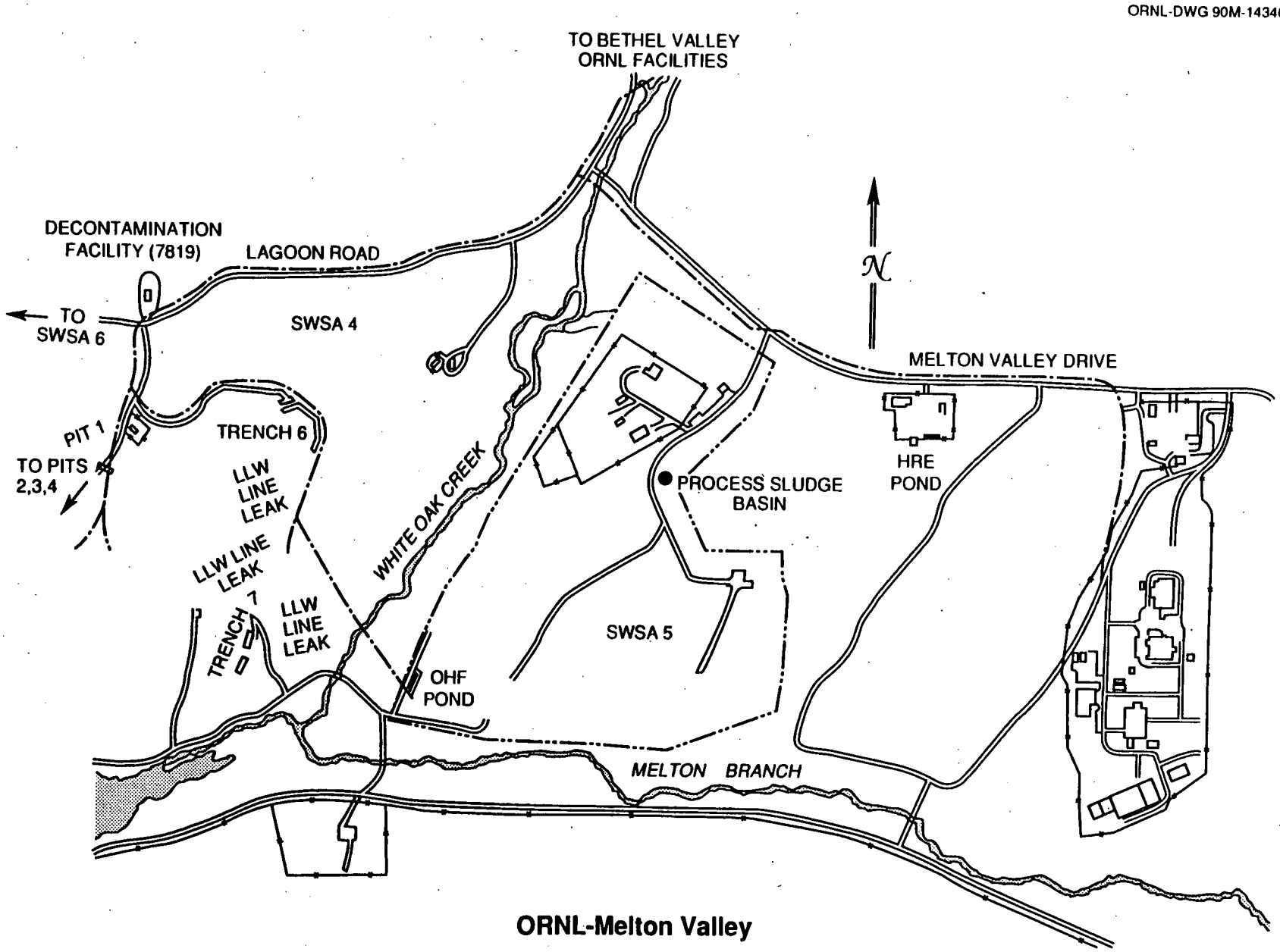

Fig. 2. Location map for Oak Ridge National Laboratory surplus facilities—Melton Valley area.

2. PROGRAM DESCRIPTION

2.1 STRUCTURE AND RESPONSIBILITIES

As described briefly in Sect. 1, the ORNL WAG S&M program is administered through the WMRAD by members of the RAS. The S&M staff (group leader, secretary, and technical staff) manage S&M for all facilities (see Fig. 3).

Facility managers are charged with the responsibility of providing adequate S&M of their respective sites to ensure compliance with the objectives of the S&M program. Surveillance needs have been determined on the basis of the operational history of each site, current conditions, and the occupancy of the building or area. Some sites require continuous monitoring of tank levels, ventilation streams, and process-liquid discharges, while others need only periodic surveillance to assess the adequacy of containment or need for maintenance attention. Maintenance requirements include both routine repairs/equipment replacement (often based on surveillance reports) and major repairs of structurally deteriorating systems. A full-time vegetation maintenance crew is employed during the mowing season. Projects to upgrade site conditions (i.e., resealing asphalt caps, erecting fences to exclude deer from contaminated sites, etc.) occasionally use fixed-price subcontractors. Requests for maintenance manpower and resources as well as for oversight of maintenance activities are the responsibility of the appropriate facility manager.

Aside from the RAS manager within WMRAD, personnel from other sections and a number of other ORNL divisions are used to carry out the S&M function. Staff from the WM Section play a key role in providing round-the-clock surveillance support through the Waste Operations Control Center (WOCC). These personnel provide operational support for surveillance and upkeep of surplus tanks and also provide continuous monitoring of critical facility parameters on the central WOCC computer. Other divisions and departments that directly or indirectly support S&M activities include:

1. Laboratory Protection (LP),
2. Plant and Equipment Division (P&E),
3. Quality Department (QD),
4. Instrumentation and Controls Division (I&C),
5. Analytical Chemistry Division (ACD),
6. Engineering Division,
7. Environmental Sciences Division (ESD),
8. Radiation Protection Division (RPD), and
9. Research Reactors Division (RRD).

This support is either provided at the request of the facility operator or conducted independently as part of the overall ORNL S&M program. For those activities conducted specifically for the WAG S&M, direct funding must be provided through the appropriate program category (EW or EX). Activities provided for as part of normal ORNL operation are funded through overhead and do not require direct program funds. WMRAD assumes the lead role in all S&M activities.

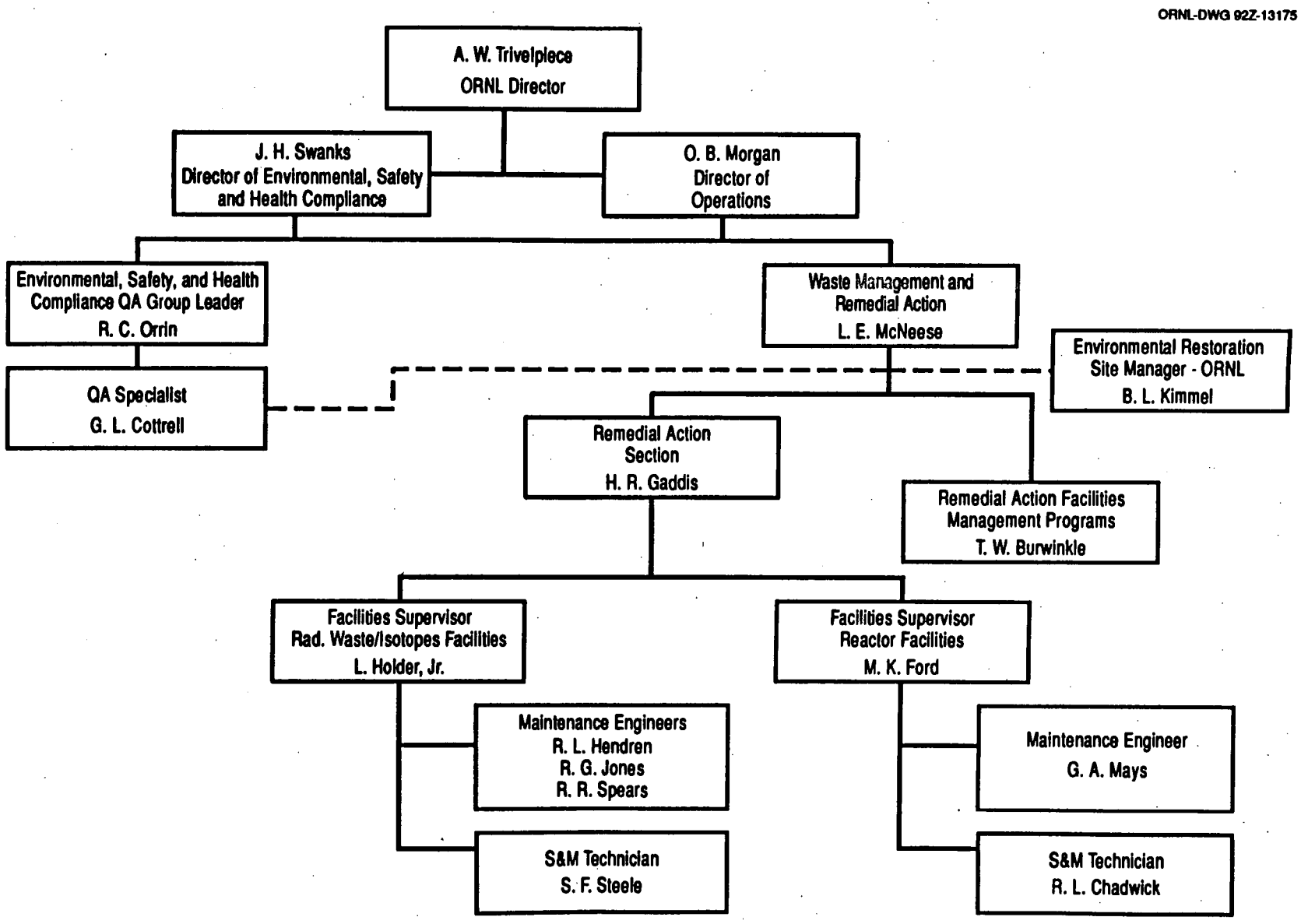

Fig. 3. Oak Ridge National Laboratory (ORNL) organizational structure for ORNL Waste Area Grouping Surveillance and Maintenance program.

2.2 S&M PLANNING

Routine planning will be provided by the RAS for oversight and management of all routine S&M activities conducted at contaminated sites. Routine activities include performing field inspections, guidance, direction, supervision, and coordination in the day-to-day operations. Other service and support groups required are P&E; ACD; I&C; WMO; Engineering; planning; strategy development; scheduling; budgeting; procedures preparation; documentation; reporting; preparation of annual summary reports of S&M activities; and updates to the S&M plans.

Surveys will be conducted at selected WAG sites by a Measurement Applications and Development (MAD) group to determine the presence, nature, and extent of radiological and/or hazardous chemical surface contamination. The surveys typically consist of walkover meter surveys with limited soil sampling where required. Results from the surveys are used to establish a baseline of current conditions for planning S&M for previously uncharacterized sites. This information is also used to determine if there are needs for immediate special maintenance action to correct hazards to personnel or potential environmental risks.

2.3 ROUTINE S&M

Funding requirements to support this activity are outlined in Table 2.

2.3.1 Surveillance Requirements

Routine surveillance is provided at inactive sites to ensure 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 provide surveillance of structural integrity. Requirements have been established for these activities in four general areas: (1) site surveillance, (2) radiological surveillance, (3) safety inspections, and (4) security and protection. A discussion of these requirements follows.

2.3.1.1 Site surveillance

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

Site surveillance is normally carried out by an S&M inspection technician as part of a routine inspection, using formal procedures and checklists. Such surveillance includes:

1. visual inspections of the facility or site for structural or system failures, material degradation, liquid leaks, radiation monitor indications, equipment irregularities, subsided trenches, etc.;

Table 2. Surveillance and Maintenance Program costs (Oak Ridge Reservation Environmental Restoration Program)

S&M activities	Fiscal year projected costs ($K)									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1. S&M Planning										
Planning	527	546	555	570	570	570	570	570	570	570
Scoping Surveys	1000	1100	840	815	815	815	815	815	815	815
Subtotal	1527	1646	1395	1385	1385	1385	1385	1385	1385	1385
2. Routine S&M										
SWSA 1	29	31	31	31	31	31	31	31	31	31
SWSA 3	32	34	34	34	34	34	34	34	34	34
SWSA 4	62	64	64	64	64	64	64	64	64	64
SWSA 5	153	161	167	167	167	167	167	167	167	167
SWSA 6 ICM	174	182	190	190	190	190	190	190	190	190
LLW Pit 1	9	10	10	10	10	10	10	10	10	10
LLW Pit 2	14	15	16	16	16	16	16	16	16	16
LLW Pit 3	12	13	13	13	13	13	13	13	13	13
LLW Pit 4	12	13	13	13	13	13	13	13	13	13
LLW Trench 5	14	15	16	16	16	16	16	16	16	16
LLW Trench 6	14	15	16	16	16	16	16	16	16	16
LLW Trench 7	9	10	10	10	10	10	10	10	10	10
Process Sludge Basin	5	6	6	6	6	6	6	6	6	6
Hydrofracture Experiment 1	5	6	6	6	6	6	6	6	6	6
LLLW Line Leak Site—										
End of Trench 7 Access Road	14	15	15	15	15	15	15	15	15	15
LLW Line Leak Site—Trench 6	7	8	8	8	8	8	8	8	8	8
LLW Line Leak Site (Gaging Station)	13	11	11	11	11	11	11	11	11	11

Table 2 (continued)

S&M activities	Fiscal year projected costs ($K)									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
White Wing Scrap Yard	120	70	70	70	70	70	70	70	70	70
Deep Monitoring Wells (DM-1 and DM-2)	2	2	2	2	2	2	2	2	2	2
Waste Holding Basin (3513)	60	63	66	66	66	66	66	66	66	66
Gunite Storage Tanks W-5 to W-10	328	336	443	443	443	443	443	443	443	443
Waste Tank W1-A	16	18	18	18	18	18	18	18	18	18
Waste Tank WC-1	10	11	11	11	11	11	11	11	11	11
Waste Tanks WC-15 and WC-17	9	10	11	11	11	11	11	11	11	11
Waste Tanks W-1 to W-4 and W-13 to W-15	18	19	20	20	20	20	20	20	20	20
Waste Tank W-11	9	10	10	10	10	10	10	10	10	10
Waste Tank TH-4	10	11	11	11	11	11	11	11	11	11
Waste Tanks T-1, T-2, T-3, T-4, and T-9	42	44	46	46	46	46	46	46	46	46
WOCESCS	48	50	53	53	53	53	53	53	53	53
Waste Tanks W-19, W-20	1	1	1	1	1	1	1	1	1	1
MRF Canal and Dissolver Pit	5	5	5	5	5	10	5	5	5	5
OHF Pond (7852A)	67	69	72	72	72	72	72	72	72	72
OHF Waste Pits	9	10	10	10	10	10	10	10	10	10
HRE Pond	79	96	69	69	69	69	69	69	69	69
HRE Waste Tanks (7560 and 7562)	10	12	13	13	13	13	13	13	13	13
OGR Canal	188	120	120	120	120	120	120	120	120	120

Table 2 (continued)

S&M activities	Fiscal year projected costs ($K)									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
0800 Environmental Study Area	57	59	61	61	61	61	61	61	61	61
Closed Contractors Landfill	6	7	8	8	8	8	8	8	8	8
7819 Transfer Line Leak Site	7	8	9	9	9	9	9	9	9	9
HFIR Waste Collection Basins (7906, 7907, and 7908)	20	21	22	22	22	22	22	22	22	22
Equalization Basin (3524)	90	91	92	92	92	92	92	92	92	92
190 Ponds (3539 and 3540)	17	18	18	18	18	18	18	18	18	18
Chestnut Ridge ^{137}Cs Plots	18	25	27	27	27	27	27	27	27	27
Routine S&M Subtotal	1824	1795	1914	1914	1914	1914	1914	1914	1914	1914
3. Special Projects										
Designated	1653	565								
In Design			60	0	0	0	0	0	0	0
4. Project Management	626	634	634	634	634	634	634	634	634	634
S&M Program Totals	5630	4640	4003	3933	3933	3933	3933	3933	3933	3933

2. routine checks on containment ventilation systems in terms of pressure drop readings, 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. other site-specific needs such as maintaining vegetation, preventing unauthorized dumping, or monitoring operability of electric deer fence.

In addition to these surveillance activities, routine inspections of the radiation detection instrumentation and critical operating equipment and testing of high-efficiency particulate air (HEPA) filtration systems are provided through the Laboratory-wide surveillance program. ORNL quality assurance (QA) requirements are met through these on-site inspections and routine QA documentation and audits.

2.3.1.2 Radiological surveillance

The requirements for radiological surveillance is categorized as follows: (1) radiation/contamination surveys; (2) surface radiological investigation (scoping surveys); and (3) radioactive waste stream and environmental monitoring. The radiation surveys will be conducted regularly by Radiation Protection (RP) staff according to the ORNL *Health Physics Procedures Manual* on a schedule dictated by the type and levels of contamination and its potential for being transferred. Many times, the frequency of the surveys will be determined by results of a previous scoping survey. These surveys will be conducted by a team from the Measurement Applications and Development (MAD) group of the Health and Safety Research Division (HASRD). Waste stream and environmental monitoring of individual sites is provided as part of the ORNL waste management control system. 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.

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

1. daily smear and direct reading surveys of occupied areas having the potential for surface contamination;

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

3. weekly surveying (smear and/or direct) of routinely accessed areas adjacent to contamination zones;

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

5. surveillance of all equipment or materials removed from a WAG site; 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 RP staff as part of their regular inspection of active and surplus sites/facilities within each established survey area. Additional survey support is made available as the need arises upon request of the facility manager.

In addition to routine radiation/contamination surveys by RP staff, scoping surveys will be conducted by MAD personnel at selected sites to determine site radiological conditions and to identify S&M needs. The scoping survey will be an intensive surface investigation of the entire site and its environs with soil sampling and laboratory analyses where appropriate. Upon completion of the survey, a report will be prepared listing all hazards identified and recommending actions to correct deficient conditions and address surveillance needs.

The ORNL 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 WOCC for monitoring and recording of the operating characteristics of the liquid and gaseous radioactive waste systems. 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 facility operator so that corrective action can be taken.

WOCC monitors a variety of information, from atmospheric conditions to exit-stack flow rates. However, for the WAG sites, only a few of which have radioactive waste discharges, the control center is primarily responsible for the surveillance of:

1. exhaust duct gaseous effluent radioactivity,
2. cell blower status,
3. surface water radioactivity,
4. process waste water flow rates and radioactivity,
5. liquid low-level waste (LLLW) collection tank inventories and transfers, and
6. LLLW collection tank dry well radioactivity.

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

Special groundwater surveillance is also conducted at sites with potential for significant environmental contamination. Groundwater monitoring wells are in place at several sites and have been previously used to characterize area groundwater for radioactive and hazardous chemical wastes. These wells are sampled semiannually and analyzed for known contaminants and specific indicator parameters to determine if significant changes have taken place in groundwater quality. Results from this surveillance will be used to assess the need for a corrective action or a shift in decommissioning priority.

2.3.1.3 Safety inspections

Safety inspections will be conducted on a routine basis for all sites 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*. WMRAD assumes the lead role in these inspections, using staff from

other divisions, as appropriate, as part of the inspection team. The semiannual 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, other inspections, reviews, and audits, in addition to similar reviews by DOE-OR organizations, may be performed by various organizations within the Laboratory. These inspections and audits could be initiated by the ORNL Office of Operational Safety, the ORNL Radioactive Operations Committee, or the DOE-OR Safety and Health Division. The objective of these reviews is to assess (1) the effectiveness of the S&M program in protecting ORNL and off-site personnel from risks associated with surplus facilities and (2) compliance of activities with established ORNL/DOE practices and procedures. Results of these investigations will be used by the S&M staff to plan and implement corrective action when required and to define future resource requirements should any changes necessitate additional funding commitments.

2.3.1.4 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 staffed guard posts, controlled access for sensitive and hazardous areas, fire alarm and protection systems, a continuously staffed 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 is required for the surplus facilities. Access to 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.

2.3.2 Maintenance Requirements

The maintenance program encompasses (1) routine maintenance activities; (2) major site or equipment repairs; and (3) disposal of solid, liquid, and gaseous radioactive waste. Guidance for these activities is provided through the *Plant and Equipment Division Procedures Manual* and the ORNL *Health Physics Procedures Manual.* 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 and under the supervision of the facility managers.

2.3.2.1 Routine maintenance

Routine maintenance requirements and schedules are established as a joint effort between the S&M inspection technician, S&M maintenance engineer, the facility manager, and the P&E field engineer. Several sites require a continuous vegetation maintenance program during the growing period of March through October. During this period, a full-time P&E crew is used to mow and trim grass, spray herbicide, and clear brush for fence and roadway maintenance. These personnel are assigned each day to the S&M technician who is responsible for providing transportation, job priorities/assignments, supervision, and support

for job-related needs (mechanics, radiation protection, industrial hygiene, etc.). Other maintenance activities (repairs to fences, diversion systems, asphalt caps, roofs, etc.) are triggered by routine inspections and are conducted as regular P&E jobs through the S&M maintenance engineer and/or the P&E field engineer.

Preventative maintenance requirements and schedules are established by P&E for some facilities where structures, systems, or equipment are involved. Input from the respective P&E field engineer, facility manager, and S&M maintenance engineer 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 services 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 ensure long-term operability.

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

2.3.2.2 Waste management

Routine S&M activities produce radioactive waste, which must be managed and disposed of. In addition to routine or special maintenance activity, several facilities continually produce waste in solid, liquid, or gaseous form, which must be managed within the ORNL waste disposal systems. The loss of hydrofracture as an economic means of LLLW disposal has had a dramatic impact on liquid disposal cost. New solid waste disposal practices aimed at greater confinement and more thorough waste certification requirements have resulted in similar cost increases for solid waste management.

The types of waste generated in maintaining current conditions include LLLW generated from the OGR canal demineralizer to gaseous waste streams from the gunite tanks, which are processed through the ORNL central gaseous waste system. Charges for these services are assessed on a monthly basis. Charges for waste generated from special maintenance projects will be included in the costs for the respective projects.

2.3.3 Documentation

Documentation of all S&M activities conducted at WAG S&M sites is the responsibility of the facility manager. This reporting ranges from computer control cards submitted by field engineers or surveyors to detailed engineering design packages for major repairs. Facility managers are required to maintain a file of all facility-related S&M activities that they initiated or controlled. Health physics records are archived by RP Section staff, and P&E program maintenance files are maintained on computer, with routine distribution to appropriate facility operators or division management. Quality Department inspection reports

are also computer-filed, with summaries distributed to division offices. The remaining S&M participants maintain permanent records of their activities within the respective divisions.

Periodic reporting is a routine function of the S&M group. Monthly status reports are provided to the DOE sponsors and are the responsibility of the facility managers. In addition, reports are provided at midyear and at the end of each fiscal year to summarize routine activities completed and to provide status reports on special maintenance projects conducted during the reporting period. Other documents and records are produced and maintained as appropriate to ensure an effective and properly managed S&M program. A more detailed description of these documentation requirements has been developed and published in the current QA plan that governs all S&M functions. This plan addresses all quality-related documents and describes the records system for storage and archiving of vital information.

2.4 SPECIAL PROJECTS

In certain instances, major site repairs or improvements may be necessary to correct material degradation problems, ensure radionuclide containment, or eliminate a significant safety concern. These improvements could include solid waste storage area (SWSA) subsidence, resurfacing or expanding asphalt covers, and fencing significant areas of surface activity to ensure personnel safety or reduce the potential for deer contamination. The scope of such projects can vary from routine construction jobs to complex tasks requiring multidivision participation, including engineering designs, safety reviews, and specialized construction forces. Fixed-price subcontractors will be used when feasible.

2.5 PROJECT MANAGEMENT

Project management supports overall project and line management within ORNL for the DOE-EM sponsored ORNL WAG S&M tasks. Routine activities include development, review, editing, and approval of weekly highlights, monthly progress reports, formal reports, fiscal analysis, and other documentation for WAG S&M activities. Other activities include line management oversight of all ORNL staff directly involved in the S&M effort. Program interface is also provided for ORNL management, the Energy Systems central Environmental Restoration Division, and DOE-OR and its other prime contractors. In addition to periodic progress reports, deliverables produced include activity data sheets, current year work plans, budget submission data and schedules, program baseline data, and other programmatic documentation as required by DOE.

2.6 QUALITY ASSURANCE

The S&M program for WAG S&M sites/facilities, like all programs at ORNL, is required to adhere to the American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) Nuclear Quality Assurance (NQA) standard for quality assurance. To meet this requirement, the *Environmental, Safety, and Health Compliance Quality Assurance Manual*, which specifically addresses each of the 18 NQA-1 elements for S&M activities, will be followed. The manual encompasses all S&M functions and focuses on the key areas of functional responsibilities, document control and records management,

instructions, procedures, inspections, and corrective action. The plan is sufficient to address most S&M activities; however, for very large or special case S&M projects, additional QA measures may be required. These special cases will be evaluated on a case-by-case basis with appropriate QA actions taken as necessary.

3. PROJECT SUMMARIES

S&M activity summaries have been developed for each of the sites/facilities and are presented in the Appendix. These summaries provide a brief overview of the facility history and current conditions and give a listing of the S&M activities currently conducted. Staffing estimates and associated costs have been included for each activity. Site-related costs are integrated for the entire program in Sect. 4.

The S&M activity summaries contain ten categories of information:

1. Site Name—An ORNL-designated facility title, usually descriptive, that identifies the site.

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 (BV) or Melton Valley (MV) portions of ORNL (see Figs. 2 and 3).

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

4. Status—A listing of the current facility status in terms of operability and facility responsibility. The current facility manager is also identified.

5. Description—A brief discussion of the operating history, physical description, current conditions, and radiological hazards of the facility. In most cases, the information contained in this section is based on historical records of the facility operation and on preliminary radiological and environmental characterizations conducted as part of long-range planning activities.

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 staffing 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. 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 results; otherwise, the listing identifies the type of documentation used and the administrative unit that maintains the permanent file (i.e., WOCC records refer to the files maintained at the ORNL WOCC). Staffing and resource requirements are recorded in work-hours per year for individual tasks and in dollar costs (FY 1993 dollars)

for material needs. Items that do not require direct programmatic funding have been noted.

8. Routine Maintenance—An itemized listing of routine maintenance activities for each site/facility, similar in scope and content to item 7.

9. Anticipated Repairs/Improvements—A brief description of identified major repairs or other 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 repair requirements. This summary totals the staffing 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 1995 are in constant FY 1995 dollars.

4. PROGRAM COSTS AND SCHEDULES

Based on the information provided in previous chapters, overall S&M program costs have been developed. The annual resource requirements are presented in Table 2 for the planning period FY 1993 through FY 2002. The costs have been itemized by facility (or groups of associated facilities) within the appropriate funding category. Program management needs have been listed as a separate item. The estimated dollar amounts are based on year of expenditure through FY 1995, with out-year figures reported in constant FY 1995 dollars.

The S&M program is structured to provide adequate control over all assigned sites up to the initiation of project disposition activities (project stage). Special projects funding has been included in each of the planning years in order to provide adequate support for nonroutine site maintenance or other special needs. Specific tasks have been identified in the project summaries where they are known for the early years, with additional items to be funded each year as necessary. Capital equipment requirements have also been included in this category, primarily for upgrading surveillance instrumentation or containment features.

Appendix

PROJECTED S&M ACTIVITY SUMMARIES

A.1 WAG—S&M (EW)

A.1.1 Solid Waste Storage Area 1

1. SITE NAME: Solid Waste Storage Area 1 (2624).

2. LOCATION: SWSA 1 is located in BV at the foot of Haw Ridge, approximately 25 ft south of WOC and is bisected by the south portion of Third Street. ORNL grid coordinates are N 20,980 and E 30,710.

3. SERVICE DATES: 1943 to 1944, with the earliest recorded waste burial being in April and May 1943.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—SWSA 1 began operating in 1943. Both auger holes and trenches were reportedly used for waste burial. No records exist concerning what was buried at SWSA 1 nor the exact locations where burial occurred. However, it is suspected that only a relatively small amount of radioactivity (2000 to 4000 Ci) was buried here since fissionable material was conserved during this period and ORNL operations did not include isotope separation and concentration during its use.

   (b) Physical Description—The site is triangular in shape and encompasses approximately 1 acre. The portion south of Third Street slopes upward, while the northern section is relatively flat and seasonally marshy. It appears that the specific location was selected primarily on the basis of its proximity to the Laboratory with no consideration of the potential of waste leaking into nearby WOC. Groundwater occurs below the site at a comparatively shallow depth and, according to water table contour maps, moves in the general direction of WOC. This water is monitored via the ORNL Stream Monitoring System.

   (c) Current Condition—The site is now grassed, surrounded by a barbed wire fence with "Radiation Hazard—Keep Out" signs at regular intervals and does not show signs of unusual erosion. No subsided trenches have been discovered at the site.

   (d) Radiological Hazards—No surface contamination or radiation fields significant enough to warrant a "contamination" or "radiation" zone, per the ORNL *Health Physics Manual*, have been discovered at SWSA 1. The radionuclide inventory is reported to be in the range of 2000 to 4000 Ci, as discussed above.

6. SECURITY/PROTECTION SYSTEMS: Although located in BV, SWSA 1 is outside the main ORNL complex. It is accessible via Lagoon Road and Third Street and during nonworking hours is part of the ORNL limited access area. It is surrounded by a barbed wire fence with "Radiation Hazard—Keep Out" signs at regular intervals.

7. SURVEILLANCE ACTIVITIES: See Table A.1.1-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.1-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: SWSA 1 is not anticipated to require any significant repairs or improvements.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	13	14	14	14	14	14	14	14	14	14
Maintenance	16	17	17	17	17	17	17	17	17	17
Total	29	31	31	31	31	31	31	31	31	31

Table A.1.1-1. Surveillance activities—SWSA 1

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	200 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	15 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	45 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.1-2. Maintenance activities—SWSA 1

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	280 wh/y[d]
(b) Fence/gate repairs	As required	WMRAD/P&E		50 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.2 Solid Waste Storage Area 2

1. SITE NAME: Solid Waste Storage Area 2.

2. LOCATION: SWSA 2 is located on the south side of a hill near the east entrance and main parking area of the Laboratory, northwest of Bldg. 4500, 200 ft north of Central Avenue and 135 ft west of 5th Street. ORNL grid coordinates are N 22,500 and E 32,500. An access road to a transformer station passes through the northwest corner of the SWSA.

3. SERVICE DATES: 1944 to 1946.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—SWSA 2 was opened shortly after the closing of SWSA 1 in 1944. The area was selected because of its proximity to the OGR and processing facilities to provide easier, all-weather access to the burial ground. There are no available records documenting the quantity or type of waste disposed of in SWSA 2. However, it has been established that beta- and gamma-contaminated solid waste was placed in black iron drums and buried in trenches. In addition, liquid waste contaminated with plutonium was placed in stainless steel drums and either buried in trenches or stored above ground in a ravine in the denuded slope. SWSA 2 was closed in 1946 when it was determined that it was not compatible with the long-range land-use planning at ORNL. Following closure of SWSA 2, the stainless steel drums containing the plutonium-contaminated liquid waste were removed and transferred to SWSA 3, but the iron drums containing beta- and gamma-contaminated solid waste had deteriorated. Because of this condition, the drums and surrounding soil in SWSA 2 were removed and reburied in SWSA 3. Sometime during the period 1946–1949, the hillside of SWSA 2 was bulldozed, contoured, and seeded.

   (b) Physical Description—The site is rectangular in shape, 300 ft × 650 ft (3.5 acres).

   (c) Current Condition—The site is currently unfenced with a grass cover that has stabilized the soil. To further reduce erosion, a contour ditch was installed to direct runoff from points above the burial ground around the hillside without crossing the trench area. Surface water runoff from within the site is carried by another ditch to the storm sewer system.

   (d) Radiological Hazards—In 1977, core samples were taken at various points in SWSA 2 and water samples taken from the core holes. Soil was analyzed for uranium, plutonium, and ^{137}Cs; the results indicated lower levels than samples collected in 1976 from 16 sites throughout eastern and central Tennessee. Likewise, water samples that were analyzed for tritium, gross alpha, and gross beta activity had levels not significantly different from background samples.

6. SECURITY/PROTECTION SYSTEMS: SWSA 2 is within the ORNL BV secured area. Because historical accounts and environmental sampling efforts confirm that waste buried in SWSA 2 has been removed, no boundary fence or warning signs exist at this site.

7. SURVEILLANCE ACTIVITIES: No surveillance activities are conducted at SWSA 2 except routine monitoring well sampling and analysis as part of the ORNL/RAP WAG 1 monitoring effort funded by ORNL overhead.

8. ROUTINE MAINTENANCE: Grass in a portion of SWSA 2 is kept mowed because of an overhead power line. No additional site maintenance is required.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: SWSA 2 is not anticipated to require any significant repairs or improvements.

10. COST AND SCHEDULE:

    (a) Annualized costs

    None anticipated.

    (b) Projected resource requirements

    None anticipated.

A.1.3 Solid Waste Storage Area 3

1. SITE NAME: Solid Waste Storage Area 3, 1001.

2. LOCATION: SWSA 3 is located in a fenced area at the foot of Haw Ridge 0.6 mile west of the Laboratory complex at the west terminus of White Oak Avenue. ORNL grid coordinates are N 21,760 and E 26,200.

3. SERVICE DATES: April 1946 to 1951.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—SWSA 3 site was opened in April 1946 when SWSA 2 was recognized unable to fulfill the new extended land-use utilization required at the Laboratory at that time. It remained operational for approximately 5 years, after which it was closed to trench disposal. The site was used to store scrap metal as well as a landfill for the storage of low-level radioactive waste. Little is known about the kinds of waste stored at this site. Alpha wastes were contained in drums and deposited in concrete-lined trenches and covered with concrete. Beta-gamma wastes were buried in unlined trenches and backfilled with soil. It is estimated that 44,000 to 56,000 Ci of radioactive waste contained in a volume of 600,000 ft^3 of LLW was buried in SWSA 3. In more recent years, the site was used for aboveground storage of reusable equipment.

   (b) Physical Description—The SWSA occupies about 7 acres in a fenced area. It is at the northwestern edge of the ORNL site. The site is flat and grassed. Surface runoff is generally toward the Northwest Tributary (NWT) of WOC. The site contains a groundwater table divide that results in groundwater flow east from the eastern half of the SWSA (toward the NWT) and west from the western half of the SWSA (toward Raccoon Creek).

   (c) Current Condition—The site is now grassed and surrounded by a chain link fence with "Radiation Hazard—Keep Out" signs at regular intervals. It shows no sign of subsidence or unusual erosion.

   (d) Radiological Hazards—The radionuclide inventory at SWSA 3 is 44,000 to 56,000 Ci. The SWSA is a known source of ^{90}Sr release although the quantities are relatively small (only a few percent of the annual Laboratory release). In 1964 well water samples were analyzed and indicated the presence of small amounts of trivalent rare earths (TRE) and ^{3}H, as well as ^{90}Sr. Well water samples collected in 1973 indicated ^{90}Sr levels of 3.0 dpm/ml. Soil samples analyzed in 1978 indicated levels higher than natural background.

6. SECURITY/PROTECTION SYSTEMS: SWSA 3 is in BV outside the main plant complex secure area. For this reason, it is individually fenced with a high chain link fence and is patrolled regularly by ORNL Laboratory Protection. Access to SWSA 3 is by controlled key.

7. SURVEILLANCE ACTIVITIES: See Table A.1.3-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.3-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: SWSA 3 is not anticipated to require any significant repairs or improvements.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	14	16	16	16	16	16	16	16	16	16
Maintenance	18	18	18	18	18	18	18	18	18	18
Total	32	34	34	34	34	34	34	34	34	34

Table A.1.3-1. Surveillance activities—SWSA 3

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	220 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	15 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	45 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.3-2. Maintenance activities—SWSA 3

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	330 wh/y[d]
(b) Fence/gate repairs	As required	WMRAD/P&E		30 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.4 Solid Waste Storage Area 4

1. SITE NAME: Solid Waste Storage Area 4, 7800.

2. LOCATION: SWSA 4 is located in MV about 0.5 mile southwest of the main ORNL complex. The site is bounded on the northern side by Lagoon Road and on the west by Chemical Waste Area Access Road. ORNL grid coordinates are N 19,220 and E 28,180.

3. SERVICE DATES: February 1951 to 1959.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—SWSA 4 began operating in 1951. LLW disposal was accomplished by normal trench burial for beta-gamma wastes. Trenches ranged from 50 to 200 ft in length, 8 to 30 ft in width, and 8 to 14 ft in depth. Alpha-contaminated wastes were disposed of in trenches with the addition of a 1.5-ft concrete slab poured over each trench. Higher activity waste and some "special" high-activity waste were placed in concrete-lined auger holes 1 to 2 ft in diameter and approximately 15 ft deep. Auger holes were also used for the "temporary storage" of material contaminated with fission products of short half-life. About 50 of these auger holes are located in the northern part of SWSA 4 along Lagoon Road. Little information exists to characterize the type, concentration, or quantity of radionuclides placed in SWSA 4 for any of its years of operation. Records were maintained but were destroyed by fire. During its period of operation, wastes from other AEC facilities were disposed of in SWSA 4, as well as wastes from the Laboratory. It is estimated that 90,000 to 120,000 Ci of waste were buried in this SWSA, which contains about 2 million ft^3 of waste.

   (b) Physical Description—The SWSA occupies a 23-acre site in MV. The SWSA face is covered by a network of water diversion drainage ditches. The southern edge of the SWSA is bounded by a seepage area, which drains by a tributary into WOC. The eastern edge of the SWSA is bounded by a contaminated area known as the intermediate pond, where a pond was created in the 1940s by a dike across WOC. The contamination was created by the sediment left behind when the dike was breached after about two years of use.

   (c) Current Condition—The site is now grassed, surrounded by a barbed wire fence with locked chain link access gates and warning signs at regular intervals, and does not show signs of unusual erosion. Although the surface is currently sound, soil backfilling to repair subsided trenches is routinely required. The southern boundary of the SWSA is a noted seep area, and some bathtubbing occurs on the SWSA face in the western portion.

   (d) Radiological Hazards—The radionuclide inventory in SWSA 4 is estimated to be 90,000 to 120,000 Ci as discussed above. The major hazards associated with this SWSA are the seepage of radionuclides from the south boundary. Efforts to divert surface water runoff have been successful in reducing this release in recent years.

Contaminants measured have included ^{90}Sr, ^{137}Cs, ^{60}Co, TREs, ^{106}Ru, ^{210}Po, and ^{239}Pu. In addition, tritium, ^{90}Sr, ^{60}Co, ^{125}Sb, and ^{137}Cs have been found in groundwater sampling of wells at the SWSA.

6. SECURITY/PROTECTION SYSTEMS: SWSA 4 is in MV and is accessible during daylight hours via Lagoon Road. It is surrounded by a barbed wire fence with warning signs at regular intervals and three locked chain link gates. During nonworking hours, it is within the ORNL limited access area. Access is gained by controlled key.

7. SURVEILLANCE ACTIVITIES: See Table A.1.4-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.4-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Projects to upgrade the condition of the asphalt diversion system and to repair subsided trenches in SWSA 4 will continue until the site is remediated. These will be considered maintenance activities and conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	27	29	29	29	29	29	29	29	29	29
Maintenance	35	35	35	35	35	35	35	35	35	35
Special Projects	300	0	0	0	0	0	0	0	0	0
Total	362	64	64	64	64	64	64	64	64	64

Table A.1.4-1. Surveillance activities—SWSA 4

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	480 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	20 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	50 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.4-2. Maintenance activities—SWSA 4

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	520 wh/y[d]
(b) Fence/gate repairs	As required	WMRAD/P&E		65 wh/y
2. Special maintenance				
(a) Subsidence repair	As required	WMRAD/P&E	S&M log	115 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.5 Solid Waste Storage Area 5

1. SITE NAME: Solid Waste Storage Area 5, 7802.

2. LOCATION: The site is located on a hillside east of WOC, between SWSA 4 and Melton Branch. ORNL grid coordinates N 17,820 and E 29,560. Latitude 35.91401, longitude 84.31295.

3. SERVICE DATES: 1959 to 1973 [TRU retrievable storage and Waste Examination and Assay Facility (WEAF) remain in operation.]

4. STATUS: SWSA 5 is divided into two major areas providing different waste storage functions: (1) SWSA 5/South, used for trench burial of routine solid compactible LLW, removed from service in 1973, and (2) SWSA 5/North, still actively used for retrievable storage of TRU waste. This S&M program addresses SWSA 5/South, which is controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—SWSA 5 was opened in 1959 as SWSA 4 neared full capacity. LLW disposal was accomplished by normal trench burial. Trenches in the area vary in length from about 40 to 500 ft and are about 15 ft deep and 12 ft wide. The trenches are located at right angles to the strike of the shale to minimize collapse of trench walls. This means that most trenches are located parallel to the hill slope. An area in the south central portion of the SWSA was used for disposal of segregated alpha-contaminated waste, which was trench-buried and then covered with a slab of concrete. Auger holes were used for the disposal of higher activity and fissile waste to the west of the alpha disposal area. No records are available for the alpha disposal area. An estimated 86,520 m^3 of waste are buried here. Major radionuclides in SWSA 5/South are ^{90}Sr, ^{244}Cm, ^{238}Pu, ^{106}Ru, ^{137}Cs, ^{60}Co, and ^{3}H. The total inventory is $<2.1 \times 10^5$ Ci.

   (b) Physical Description—The SWSA is a fenced area of about 80 acres of which 50 acres have been used. SWSA 5/South is a moderately sloping hillside with grass cover, is fenced, and contains several unpaved access roads. The SWSA face is covered with a network of water diversion drainage ditches.

   (c) Current Condition—The SWSA has been suffering from subsidence problems recently. Since 1987, 485 truck loads of dirt have been used as backfill, and these areas have been reseeded. The general condition of this SWSA is now acceptable; however, reoccurrences of these and other subsidences are expected.

   (d) Radiological Hazards—SWSA 5 represents a major source of ^{90}Sr and ^{3}H release from the Laboratory to the environment. In addition, measurable amounts of ^{244}Cm and ^{238}Pu have been released. This has been caused by infiltration of precipitation and has been aggravated because of poor trench orientation. Corrective actions were taken in the form of a water diversion system. Water from SWSA 5 drains southeast into Melton Branch, and most of the surface water runoff is monitored at Station 4 on Melton Branch.

6. SECURITY/PROTECTION SYSTEMS: SWSA 5 is in MV and is accessible during daylight hours via Melton Valley Drive. It is surrounded by a barbed wire fence with warning signs at regular intervals, two locked gates, and one badge-reader-actuated automatic gate. During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.5-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.5-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: An FY 1993 project will access the effectiveness and repair needs of the concrete diversion system in SWSA 5. Based on the findings of this study, a plan will then be developed to either remove or refurbish the damaged ditches. No other improvements are planned except subsided trench repair, which will be considered a maintenance activity.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	50	53	55	55	55	55	55	55	55	55
Maintenance	103	108	112	112	112	112	112	112	112	112
Special Projects	27	173	0	0	0	0	0	0	0	0
Total	180	334	167	167	167	167	167	167	167	167

Table A.1.5-1. Surveillance activities—SWSA 5

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	920 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	30 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	50 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.5-2. Maintenance activities—SWSA 5

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	1300 wh/y[d]
(b) Fence/gate repairs	As required	WMRAD/P&E	S&M log	550 wh/y
(c) Access road upkeep	As required	WMRAD/P&E	S&M log	50 wh/y
(d) Subsidence repair	As required	WMRAD/P&E	S&M log	160 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.6 SWSA 6 ICM

1. SITE NAME: SWSA 6 ICM.

2. LOCATION: SWSA 6 is located in MV about 0.75 mile southwest of the main ORNL complex. The site is bounded by Lagoon Road to the north, White Oak Lake (WOL) to the south, and Highway 95 to the west.

3. SERVICE DATES: 1969 to April 1989.

4. STATUS: Inactive; controlled by the ER Division (S. B. Garland II). SWSA 6 is currently an active solid waste disposal site. Only the interim corrective measures (ICM) portion of the SWSA is considered inactive and addressed in this plan.

5. DESCRIPTION:

   (a) Operating History—SWSA 6 is a shallow land burial site. A variety of wastes were disposed of in trenches and auger holes until May 1986. At that time the site was closed pending an investigation that RCRA-regulated wastes were being disposed of there. The site was reopened only after operational changes were made to standardize waste packaging and to prohibit the disposal of waste regulated by the Resource Conservation and Recovery Act (RCRA). Those areas that had received hazardous and/or mixed wastes after November 8, 1980, were designated as "RCRA-regulated units," and a plan for closure of these areas was developed. Since the installation of a permanent cap was not feasible at the time, high-density polyethylene (HDPE) caps were installed over all the RCRA-regulated areas. This plan addresses the S&M of these capped areas.

   (b) Physical Description—The ICM is made up of eight 80-mil HDPE caps covering a total area of approximately 10 acres. The edges of each cap are secured in anchor trenches, and sand bags are placed at regular intervals to prevent cap movement. A network of berms and runon/runoff ditches handle the large amount of surface runoff during rainfall.

   (c) Current Condition—Currently, all components making up the SWSA 6 ICM are in excellent condition.

   (d) Radiological Hazards—Although a vast amount of solid LLW remains in the trenches underneath the HDPE caps, radiological hazards are minimal as long as the integrity of the caps is maintained. This will be accomplished by detailed routine inspections and prompt attention to maintenance needs.

6. SECURITY/PROTECTION SYSTEMS: SWSA 6 is in MV and is accessible during daylight hours via Lagoon Road. It is surrounded by a chain link security fence with warning signs at regular intervals, three locked gates, and one badge-reader-actuated automatic gate. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.6-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.6-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	77	80	82	82	82	82	82	82	82	82
Maintenance	97	102	108	108	108	108	108	108	108	108
Total	174	182	190	190	190	190	190	190	190	190

Table A.1.6-1. Surveillance activities—SWSA 6 ICM

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection				
(a) Weekly	Weekly	WMRAD[a]	Checklist/S&M log[b]	1200 wh/y[c]
(b) Monthly	Monthly	WMRAD	Report	320 wh/y
(c) Semiannual (subcontractor)	Semiannual	WMRAD	Report	$24K
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	20 wh/y[e]
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring (White Oak Dam)	Continuous	EHP	Environmental Monitoring data base	*e*
5. Security patrol	Daily	LP[f]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]LP = Laboratory Protection.

Table A.1.6-2. Maintenance activities—SWSA 6 ICM

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD[a]	ICM maint. log[b]	1140 wh/y[c]
(b) Grounds maintenance (berms, ditches, placards, etc.)	As required	WMRAD	ICM maint. log	800 wh/y
(c) Cap repair (subcontractor)	As required	WMRAD	ICM maint. log	$52K

[a]WMRAD = Waste Management and Remedial Action Division.
[b]interim corrective measures.
[c]wh/y = work-hours per year.

A.1.7 LLW Pit 1

1. SITE NAME: LLW Pit 1, 7805.

2. LOCATION: Pit 1 is located just west of SWSA 4 in MV. ORNL grid coordinates are N 18,830 and E 26,850.

3. SERVICE DATES: July through October 1951 as part of the LLW disposal system, and 1962 through 1964 as a drain for the Decontamination Facility (7819).

4. STATUS: The site was removed from service the last time in 1964. The pit was filled with Conasauga shale and paved over in 1981. Pit 1 had known seeps downgradient, and the primary radionuclide known to leak was ^{106}Ru. Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—Pit 1 began operating in July 1951 for disposal of concentrated LLW, which ceased in October 1951. At the time of its construction, it was believed that the pit would be leak-tight (much as a tank). However, its operation was terminated when radionuclides (primarily ^{106}Ru) were discovered to be leaking from the pit, although in much lower concentrations than found in LLW. In 1962 Pit 1 again began to receive waste, this time in the form of decontamination solutions from the Decontamination Facility (7819). This continued into 1964 at which time the site was permanently retired. From July to October 1951, Pit 1 received 123,000 gal of concentrated LLW containing about 390 Ci of ^{137}Cs and ^{106}Ru. No estimate of volumes and curies received from 7819 is available.

   (b) Physical Description—Pit 1 was 100 ft long by 20 ft wide with a depth of 15 ft. It was filled in and covered with asphalt in 1981. The asphalt cap covering Pit 1 was refurbished in 1989 and is currently in good condition.

   (c) Current Condition—The pit has a known seep downgradient, and there is a known leak site from the 7819 drainage line just to its north.

   (d) Radiological Hazards—Pit 1 had a known leakage of radionuclides downgradient (primarily ^{106}Ru). The primary radionuclides disposed of at this site are ^{137}Cs and ^{106}Ru with minor amounts of uranium and plutonium. The first waste received at the pit was heavily alkaline (pH 12.5). The nature of the waste that was discharged into the pit from 7819 is unknown, but the total radionuclide inventory was probably low. The impact of decontamination compounds on the mobility of the waste is unknown.

6. SECURITY/PROTECTION SYSTEMS: Pit 1 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.7-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.7-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Pit 1 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	4	4	4	4	4	4	4	4	4	4
Maintenance	5	6	6	6	6	6	6	6	6	6
Special Projects	0	36	0	0	0	0	0	0	0	0
Total	9	46	10	10	10	10	10	10	10	10

Table A.1.7-1. Surveillance activities—LLW Pit 1

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	60 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	10 wh/y[e]
(b) Routine radiation survey	As required	EHP	Radiation Protection data base	10 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.7-2. Maintenance activities—LLW Pit 1

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	75 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	25 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.8 LLW Pit 2

1. SITE NAME: LLW Pit 2, 7806.

2. LOCATION: Pit 2 is located just south of Pit 1 in MV. ORNL grid coordinates are N 17,670 and E 26,010.

3. SERVICE DATES: 1952 through 1962.

4. STATUS: The site was removed from service in 1962, backfilled with soil and graded in 1963, and covered with asphalt in 1970. It was patched and resealed in the summer of 1989. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—Pit 2 began operating in 1952 and until 1954 was the primary method of disposal of LLW. Waste was initially transported to the site via truck and then via the LLW Transfer Line. During this operation as a single entity, Pit 2 received about 1,294,443 gal of liquid waste containing 16,600 Ci of beta activity. After 1955, when Pit 2 began receiving overflow from Pit 3, it was not possible to determine the amounts of radioactivity it received. Finally, in April 1956, Pit 4 was added to the system. Pit 2 always operated in conjunction with Pits 3 and 4 with Pit 3 continuing as the primary discharge point. Between 1959 and 1961, Pits 2, 3, and 4 received large discharges of ^{106}Ru. During this period an interceptor trench was dug on the west side of Pit 2 and the seepage pumped back to Pit 2. During 1961, when isotope-specific discharges from the pits area drainages were routinely reported, several hundred curies per month of ^{106}Ru were discharged in both streams (east and west weirs). This ultimately led to a curtailment of ruthenium transfer to the pits.

   (b) Physical Description—Pit 2 is located on a hillside south of Pit 1. The pit had the shape of an inverted rectangular pyramid, 200 × 100 ft at the ground surface and 15 ft deep. At a depth 12 ft from its bottom, the pit had a capacity of 1 million gal.

   (c) Current Condition—Pit 2 was backfilled in 1962 and 1963 and covered with asphalt in 1970. The covering was patched and resealed in 1989. It has known seeps to the west and southwest.

   (d) Radiological Hazards—Pit 2 had known leakage of radionuclides downgradient to the west and southwest (primarily ^{106}Ru, which has now decayed). Stream surveys conducted in drainages in the area indicate past contamination by ^{90}Sr and ^{60}Co. Widespread dispersion of radioactive contamination, including hundreds of ground surface hot spots, numerous trees, and understory vegetation, was found in the vicinity of Pits 2, 3, and 4 during a 1989 scoping survey.

6. SECURITY/PROTECTION SYSTEMS: Pit 2 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.8-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.8-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Pit 2 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	5	6	6	6	6	6	6	6	6
Maintenance	9	10	10	10	10	10	10	10	10	10
Special Projects	0	41	0	0	0	0	0	0	0	0
Total	14	56	16	16	16	16	16	16	16	16

Table A.1.8-1. Surveillance activities—LLW Pit 2

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	80 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	15 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.8-2. Maintenance activities—LLW Pit 2

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	160 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	40 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.9 LLW Pit 3

1. SITE NAME: LLW Pit 3, 7807.

2. LOCATION: Pit 3 is located just northeast of Pit 2 in MV. ORNL grid coordinates are N 17,840 and E 26,290.

3. SERVICE DATES: Between 1955 and 1961 as part of the LLW disposal system. From January 1955 to April 1956, Pit 3 was operated in conjunction with Pit 2. In April 1956, Pit 4 was added to the system and the three pits were operated as a unit with Pit 3 being used as the initial discharge point for LLW.

4. STATUS: The site was removed from service in 1961. The pit was backfilled with soil and covered with asphalt in 1963. It was patched and resealed in the summer of 1989. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—Pit 3 began operating in 1955. Waste was transported to the site via the LLW transfer line. Because Pit 3 operated in conjunction with either Pit 2 or Pits 2 and 4, it is not possible to describe the amount of LLW and activity it received alone. Between 1959 and 1961, Pits 2, 3, and 4 received large discharges of ^{106}Ru. During 1961, when isotope-specific discharges from area drainages of the pits were routinely reported, several hundred curies per month of ^{106}Ru were discharged in both streams (east and west weir). This led ultimately to a curtailment of ruthenium transfer to the pits. Pit 3 developed seeps downgradient to the east of its drainage area. These seeps were not as severe as those of Pit 2 or those found later from Pit 4.

   (b) Physical Description—Pit 3 had the same shape and dimensions as Pit 2 (frustum of an inverted rectangular pyramid, 200 × 100 ft at the ground surface and 15 ft deep). At a depth of 12 ft from its bottom, the pit had a capacity of 1 million gal.

   (c) Current Condition—Currently, Pit 3 is covered with asphalt that was patched and resealed in the summer of 1989.

   (d) Radiological Hazards—Pit 3 had known leakage of radionuclides downgradient to east (primarily ^{106}Ru which has now decayed). Stream surveys conducted in drainages in the area indicate past contamination by ^{90}Sr and ^{60}Co. Widespread dispersion of radioactive contamination, including hundreds of ground surface hot spots, numerous trees, and understory vegetation, was found in the vicinity of Pits 2, 3, and 4 during a 1989 scoping survey.

6. SECURITY/PROTECTION SYSTEMS: Pit 3 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.9-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.9-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Pit 3 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	6	6	6	6	6	6	6	6	6
Maintenance	7	7	7	7	7	7	7	7	7	7
Special Projects	0	49	0	0	0	0	0	0	0	0
Total	12	62	13	13	13	13	13	13	13	13

Table A.1.9-1. Surveillance activities—LLW Pit 3

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	80 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	As required	EHP	Radiation Protection data base	15 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.9-2. Maintenance activities—LLW Pit 3

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	105 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	35 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.10 LLW Pit 4

1. SITE NAME: LLW Pit 4, 7808.

2. LOCATION: Pit 4 is located downhill and just south of Pit 2 in MV. ORNL grid coordinates are N 17,280 and E 25,970.

3. SERVICE DATES: Between 1956 and 1961 as part of the LLW disposal system. Between 1963 and 1976 the pit received sludge from the old Process Waste Treatment Plant (PWTP). It was removed from service in 1976.

4. SITE STATUS: The pit was backfilled with soil and graded in 1976 and covered with asphalt in 1980. It was patched and resealed in the summer of 1989. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operations History—Pit 4 began receiving overflow of liquid waste from Pit 2 in April 1956. It leaked very rapidly and never held liquid as well as Pits 2 and 3. However, because it was at the end of the overflow train, it did not receive much waste volume and proportionally less radioactivity. In 1959, when large quantities of ^{106}Ru were discharged to the pits, some rather severe seepage was noted on the east side of Pit 4. An interceptor trench that was 10 ft deep and 175 ft long was dug on the east side. Intercepted seepage was collected and pumped back into Pit 4. For awhile, ~50 Ci of ^{106}Ru and 8000 gal were pumped back to Pit 4 daily. Copper compounds were put into Pit 4 in an effort to reduce the solubility of ^{106}Ru and absorb it in the soil. In 1961, in an effort to further reduce the ^{106}Ru release, another interceptor trench was dug on the west side of Pit 4, and its collected seepage was pumped back into the pit. At this same time, 10 tons of sodium sulfide were placed in the pit system in an effort to enhance ^{106}Ru adsorption. Between 1963 and 1976, Pit 4 was apparently the only pit receiving sludge from the old PWTP because the other pits had been backfilled by 1963. Radioactivity in this sludge is estimated to be relatively low (130 Ci of ^{90}Sr and 286 Ci of unidentified beta activity). When the new PWTP became operational in 1976, Pit 4 was gradually backfilled and in 1980 was paved with asphalt.

   (b) Physical Description—Pit 4 was identical in design to Pits 2 and 3; that is, frustum of an inverted regular pyramid, 200 × 100 ft at the ground surface and 15 ft deep. At a depth of 12 ft from its bottom, the pit had a capacity of 1 million gal.

   (c) Current Condition—Pit 4 is in very good condition, covered with asphalt that was patched and resealed in the summer of 1989.

   (d) Radiological Hazards—During their operational period, the pits together received a total inventory of 522,565 Ci of gross beta activity. They are estimated to have received 21 million gal of liquid waste containing 42,000 Ci of ^{90}Sr, 184,000 Ci of ^{137}Cs, 230,000 Ci of ^{106}Ru (most of which was released to the pits in 1959), and more than 70,000 Ci of the trivalent rare earths. Widespread dispersion of radioactive contamination, including hundreds of ground surface hot spots, numerous trees, and

understory vegetation, was found in the vicinity of Pits 2, 3, and 4 during a 1989 scoping survey.

6. SECURITY/PROTECTION SYSTEMS: Pit 4 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.10-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.10-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Pit 1 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	6	6	6	6	6	6	6	6	6
Maintenance	7	7	7	7	7	7	7	7	7	7
Special Projects	0	49	0	0	0	0	0	0	0	0
Total	12	62	13	13	13	13	13	13	13	13

Table A.1.10-1. Surveillance activities—LLW Pit 4

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	80 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	15 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.10-2. Maintenance activities—LLW Pit 4

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	105 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	35 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.11 LLW Trench 5

1. SITE NAME: LLW Trench 5, 7809.

2. LOCATION: Trench 5 is located in MV just east of Pits 2, 3, and 4. ORNL grid coordinates are N 17,470 and E 26,760.

3. SERVICE DATES: Between 1960 and 1966 as part of LLW disposal system.

4. STATUS: The site was removed from service in 1966, backfilled with dirt, and paved with an asphalt cover in 1970. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operations History—Trench 5 began operation in 1960. Waste was transported to the site via the LLW transfer line. It had the best performance history of all the pit and trench sites. It was pretreated with copper sulfate and sodium sulfide to reduce ruthenium mobility problems and pretested for seepage rate using water. The trench received an estimated 9.5 million gal of LLW.

   (b) Physical Description—Trench 5 is 300 ft long by 3 ft wide and is 15 ft deep. It originally had an earthen cover but was paved with asphalt in 1970.

   (c) Current Condition—Currently, Trench 5 has an asphalt cover which was patched and resealed in the summer of 1989 and is now in good repair.

   (d) Radiological Hazards—Trench 5 had no known groundwater seeps or other visual leakage.

6. SECURITY/PROTECTION SYSTEMS: Trench 5 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.11-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.11-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Trench 5 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	5	6	6	6	6	6	6	6	6
Maintenance	9	10	10	10	10	10	10	10	10	10
Special Projects	0	39	0	0	0	0	0	0	0	0
Total	14	54	16	16	16	16	16	16	16	16

Table A.1.11-1. Surveillance activities—LLW Trench 5

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	80 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	15 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.11-2. Maintenance activities—LLW Trench 5

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	145 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	35 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.12 LLW Trench 6

1. SITE NAME: LLW Trench 6, 7810.

2. LOCATION: Trench 6 is located in Melton Valley on a ridge top just south of SWSA 4. ORNL grid coordinates are N 18,680 and E 27,980.

3. SERVICE DATES: Between September 10 and October 10, 1961, as part of the LLW disposal system. Trench 6 was operated only 1 month because of severe seepage downgradient to its south.

4. STATUS: The site was removed from service in 1961 when a severe seepage was noted to its south. The trench was paved with an asphalt cover in 1981. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operations History—Trench 6 opened in September 1961. Waste was transported to the site via the LLW transfer line. The trench was pretreated with copper sulfate to reduce ruthenium mobility problems and pretested for seepage rate using water. The trench received an estimated 130,000 gal of LLW with the following inventory:

^{137}Cs	665 Ci
^{106}Ru	501 Ci
^{89}Sr	145 Ci
^{60}Co	24 Ci

   (b) Physical Description—The trench is 500 × 3.3 ft and constructed in almost a U-shape. It originally had an earthen cover but was paved with asphalt in 1981.

   (c) Current Condition—Trench 6 was paved with an asphalt cover in 1981 and was resealed in the summer of 1989. It is currently in excellent repair.

   (d) Radiological Hazards—Trench 6 had a major groundwater seep directly south of the center of its U shape. This groundwater seep leaked primarily ^{106}Ru, which has now decayed away. Its radionuclide inventory is described above.

6. SECURITY/PROTECTION SYSTEMS: Trench 6 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.12-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.12-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Trench 6 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	6	6	6	6	6	6	6	6	6
Maintenance	9	10	10	10	10	10	10	10	10	10
Special Projects	0	28	0	0	0	0	0	0	0	0
Total	14	44	16	16	16	16	16	16	16	16

Table A.1.12-1. Surveillance activities—LLW Trench 6

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	80 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	15 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.12-2. Maintenance activities—LLW Trench 6

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	135 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	45 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.13 LLW Trench 7

1. SITE NAME: LLW Trench 7, 7818.

2. LOCATION: Trench 7 is located on a hillside east of Trench 5 and west of the OHF. ORNL grid coordinates are N 17,440 and E 27,600.

3. SERVICE DATES: Trench 7 was built in 1962 and used until removed from service in 1966.

4. STATUS: In 1966, Trench 7 was replaced by hydrofracture technology and removed from service. It was paved with asphalt in 1970. Several interim corrective actions were taken in 1985 and 1986 in an effort to reduce the discharge at a groundwater seep on the east side of its drainage area. These actions included expansion of the 1970 asphalt cap, excavation and sealing of the waste transfer line just north of the trench, and installation of a grout curtain on the eastern and northern perimeter of the site. Controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operations History—Trench 7 began a 4-year operation in 1962 with waste transported to the site via the LLW transfer line. During its operation, the trench received about 9.5 million gal of liquid waste containing the following major radionuclide inventory:

^{137}Cs	231,000 Ci
^{106}Ru	3,400 Ci
^{90}Sr	48,000 Ci
^{60}Co	1,500 Ci

   Trench 7 developed a seep on the eastern side of its drainage area.

   (b) Physical Description—Trench 7 was constructed in two 100-ft-long, 3-ft-wide segments on a hillside above WOC. The intention was to provide for independent operation of each segment in the event of a leak. The trench was asphalt covered in 1970.

   (c) Current Condition—Trench 7 has a known seep to the east and a known LLW leak upslope just to the north. The leak site has an asphalt cover.

   (d) Radiological Hazards—In general, Trench 7 performed quite well during its operation. However, several areas of surface radioactivity are known. Trench 7 was known to leak minor amounts of ^{106}Ru on its eastern side via seep RS7. In addition, a leak in the LLW line, bringing waste to the trench, occurred in 1966 about 200 ft above the northern end of the trench, along what is now an extension to the access road. This spill, which contained about 100 Ci of radioactivity, was covered with fill dirt and left. The spill area is known to contain mainly ^{137}Cs, ^{244}Cm, and about 10 Ci of ^{90}Sr. This spill site is also considered an SWMU (see SWMU 7.4c). Several radionuclides have been found in groundwater in the trench area including ^{3}H, ^{99}Tc,

^{60}Co, and ^{90}Sr. Only ^{90}Sr was above maximum permissible concentration (MPC), but ^{60}Co approached MPC.

6. SECURITY/PROTECTION SYSTEMS: Trench 7 is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.13-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.13-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering Trench 7 will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	3	4	4	4	4	4	4	4	4	4
Maintenance	6	6	6	6	6	6	6	6	6	6
Special Projects	0	29	0	0	0	0	0	0	0	0
Total	9	39	10	10	10	10	10	10	10	10

Table A.1.13-1. Surveillance activities—LLW Trench 7

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	45 wh/y[c]
2.	Routine radiation surveys	Semiannual	EHP[d]	Radiation Protection data base	15 wh/y
3.	Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4.	Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5.	Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.13-2. Maintenance activities—LLW Trench 7

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	90 wh/y[d]
(b) Minor repairs	As required	WMRAD/P&E	S&M log	30 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.14 Process Sludge Basin (7835)

1. SITE NAME: Process Sludge Basin (7835).

2. LOCATION: North of SWSA 5 inside fenced area of SWSA 5.

3. SERVICE DATES: 1976 through 1981.

4. STATUS: Inactive; this site is under the control of WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—This impoundment was constructed in 1976 and was used to contain and settle process waste sludge produced at the PWTP (3544). Little information is available about the characteristics of sediment contained in this impoundment. This site is no longer used. Solidification/ stabilization of sludge in the pond was never carried out because of the lack of funding.

   (b) Physical Description—The basin is 80 ft^2 and has a mean depth of 8 ft. Elevation at the top of the berm is 809 ft. Sludge constituents are primarily ferrous sulfate and ferric hydroxide with mixed fission products present. The pond was constructed with a compacted clay layer with a PVC liner on top. The integrity is complete, but there is a steady influx of groundwater keeping the pond filled. The berm height has been extended 2 ft in height by adding clean fill dirt.

   (c) Current Condition—The site is in good condition with a chain link fence around the berm and a locked gate.

   (d) Radiological Hazards—It is estimated that as much as 50 Ci may be contained in the 4-ft-thick layer of sludge. The bulk density ranges from 1.09 to 1.16 g/cm^3 and 9.4% solids with a gamma activity of 1900 to 54 pCi/cm^3. Beta activity is approximately 67 nCi/cm^3.

6. SECURITY/PROTECTION SYSTEMS: The site is in Melton Valley in the SWSA 5 security area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.14-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.14-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements to the impoundment are anticipated at this time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	4	4	4	4	4	4	4	4	4	4
Maintenance	1	2	2	2	2	2	2	2	2	2
Total	5	6	6	6	6	6	6	6	6	6

Table A.1.14-1. Surveillance activities—Process Sludge Basin (7835)

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	75 wh/y[c]
2.	Routine radiation survey	Semiannual	EHP[d]	Radiation Protection data base	5 wh/y
3.	Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4.	Security patrol	Daily	LP[f]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]LP = Laboratory Protection.

Table A.1.14-2. Maintenance activities—Process Sludge Basin (7835)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	20 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.15 Hydrofracture Experiment Site 1 (HF-1)

1. SITE NAME: Hydrofracture Experiment Site 1 (HF-1).

2. LOCATION: The injection point of the first hydrofracture experiment (HF-1) is located just south of Lagoon Road in an area called the Four Acre Site. ORNL grid coordinates for the injection well are N 18,920 and E 25,890.

3. SERVICE DATES: 1955 to 1959. Prior to the use of this site for the HF-1 study, this site was employed for detailed investigation related to the seepage pits and trenches. This site was selected the hydrofracture experiment in 1959 with the injection well drilled in October of that year.

4. STATUS: The site is presently abandoned and covered with small pine trees, but most bench marks and some well casings are still visible. The site is fenced with warning signs in place. This site is under the control of WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—This site was first used for studies in relation to the seepage pits and trenches in 1955. A groundwater tracer test was conducted and wells were drilled for that purpose. On October 15, 1959, a slot was cut in the well 73 casing, and the fracture was initiated with water. The next day, 27,000 gal of grout was injected using 35 Ci of ^{137}Cs and 8.7 Ci of ^{114}Ce at a depth of 290 ft. Then, 400 gal of water was used to flush the injection well of the last of the grout. Grout was then observed flowing at a very slow rate from the 3-in. core hole 200 m north of the injection well, until about 200 gal of grout had come out in a few hours. The next morning, clear water was flowing out and continued to flow at a decreasing rate for 2 months. The grout and the soil around the well were dug up a few days later, after the grout had set, and were disposed of in SWSA 5.

   (b) Physical Description—There has been no activity at this site since the characterization of the grout sheet. The area immediate to the injection well is now covered with small pines and shrubs. The contaminated area extends across Lagoon Road to the north about 150 ft so that both sides are enclosed with barbed wire with hazard signs in place to restrict access.

   (c) Current Condition—In the more than 25 years of inactivity at this site, the area has returned to its natural state with vegetation covering the well cases and benchmarks. The area is fenced with a three-strand barbed wire fence around both perimeters.

   (d) Radiological Hazards—The 1987 airborne radiation survey revealed ^{144}Ce has decayed to trivial levels and ^{137}Cs has decreased to about 18 Ci. A follow-up surface survey completed in March 1988 indicates the injection wellhead showing highly elevated gamma readings of up to 75 mR/h on contact. In addition, one large contaminated area encompassing ~613 ft^2 was found to have levels of gamma radiation from 0.1 to 20 mR/h at the ground surface. Approximately 100 small, spotty areas with elevated surface gamma exposure rates ranging from 25 μR/h to 1 mR/h were found within an approximate 300-ft radius of the injection wellhead.

Gamma spectrometry inspection of surface soil samples collected from several hot spots shows, as expected, ^{137}Cs as the major gamma-emitting radionuclide. No transferable alpha or beta-gamma contamination was evident at the site.

6. SECURITY/PROTECTION SYSTEMS: HF-1 is in MV and is accessible during daylight hours via Lagoon Road. It is surrounded by barbed wire fencing with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.15-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.15-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs/improvements are anticipated other than routine maintenance.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	4	5	5	5	5	5	5	5	5	5
Maintenance	1	1	1	1	1	1	1	1	1	1
Total	5	6	6	6	6	6	6	6	6	6

Table A.1.15-1. Surveillance activities—Hydrofracture Experiment Site 1 (HF-1)

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	65 wh/y[c]
2.	Routine radiation surveillance	Semiannual	EHP[d]	Radiation Protection data base	15 wh/y
3.	Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4.	Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5.	Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.15-2. Maintenance activities—Hydrofracture Experiment Site 1 (HF-1)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance (fence/sign repair)	As required	WMRAD/P&E[a,b]	S&M log[c]	20 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.16 LLW Line Leak Site—End of Trench 7 Access Road—SWMU ID Number 7.4c

1. SITE NAME: LLW Line Leak Site—End of Trench 7 Access Road—SWMU ID Number 7.4c.

2. LOCATION: This leak site is located along the old LLW transfer line leading to Trench 7 in MV about 200 ft north of Trench 7. The site of the leak currently lies under the Trench 7 access road extension.

3. LEAK DATE: The leak was first reported in April 1966.

4. STATUS: Inactive; area controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The leak site resulted from a rupture in a section of plastic pipeline in April 1966. It is believed that at this time a large volume of liquid waste (3000 gal) was transported (by means of surface runoff) downhill (south) to the north and northeast ends and the west side of Trench 7. Total activity was estimated to be about 100 Ci and consisted mainly of cesium and cerium and about 10 Ci of ^{90}Sr. Several inches of soil was removed and 5 ft of clean soil contoured over the affected area.

   (b) Physical Description—The leak site lies under the Trench 7 access road. No dimensions are available for the volume occupied by the leak site, but the amount of waste leaked was estimated at 3000 gal.

   (c) Current Condition—A recent scoping survey of the site has revealed significant strontium uptake in the trees in a broad area. The area has been isolated from pedestrian and vehicular traffic.

   (d) Radiological Hazards—Wastes handled by the LLW transfer system include major radionuclides such as ^{90}Sr, ^{137}Cs, ^{106}Ru, ^{60}Co, and various rare earths. Contamination continues to be a problem at this site. Beta-gamma measurements on contact with the trunk of an American Elm tree ranged to ~70 mrad/h with the leaves recorded as ~3 mrad/h. Three surface soil samples taken from the access road area demonstrate significant gross beta and ^{90}Sr contamination with the highest values (12,000 pCi/g of gross beta and 5400 pCi/g of ^{90}Sr) obtained just west of the northern tip of Trench 7. Strontium uptake in the trees in the area is the primary hazard to personnel.

6. SECURITY/PROTECTION SYSTEMS: The leak site is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated gate (Post 24). During nonworking hours, it is within the ORNL limited-access area. It should be noted that the Trench 7 Access Road has been closed, chained with warning signs installed, and the contractor staging area operations halted.

7. SURVEILLANCE ACTIVITIES: No surveillance activities are currently conducted at this site. See Table A.1.16-1 for a description of planned surveillance activities.

8. ROUTINE MAINTENANCE: No maintenance activities are currently conducted at the site. See Table A.1.16-2 for a description of planned maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None anticipated.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	9	10	10	10	10	10	10	10	10	10
Maintenance	5	5	5	5	5	5	5	5	5	5
Total	14	15	15	15	15	15	15	15	15	15

Table A.1.16-1. Surveillance activities—LLW Lines and Leak Sites (SWMU 7.4c)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	180 wh/y[c]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.

Table A.1.16-2. Maintenance activities—LLW Lines and Leak Sites (SMWU 7.4c)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance (fence upkeep)	As required	WMRAD/P&E[a,b]	S&M log[c]	100 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.17 LLW Line Leak Site—Trench 6 Southeast—SWMU ID Number 7.4b

1. SITE NAME: LLW Line Leak Site—Trench 6 Southeast—SWMU ID Number 7.4b.

2. LOCATION: This site is located along the old LLW transfer line in MV about 150 ft southeast of Trench 6. ORNL grid coordinates are N 18,363 and E 27,976. This site is also known as North Leak Site or Site 1.

3. LEAK DATE: The leak was first reported in July 1973. The leak evidently occurred at some earlier date.

4. SITE STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. SITE DESCRIPTION:

   (a) Operations History—The transfer line was in use from 1962 to 1966, but the site was not surveyed until 1973 when evidence of a leak was discovered. It was determined that waste had reached the ground and spread laterally several feet. Surface contamination movement to the southwest was observable in the direction of surface runoff. Beta-gamma exposure rates measured at 3 ft above ground surface ranged from 240 mR/h to 1 R/h with the majority of the radiation localized in a 20- × 20-ft area. Analysis of soil samples showed that the surface soil in the immediate vicinity of the leak was significantly contaminated with mixed fission products. Radionuclide concentrations in the samples ranged from 0.01 to 50 μCi/g of beta-gamma activity with gross alpha levels up to 1 nCi/g. The beta-gamma activity was primarily ^{137}Cs and ^{90}Sr. The primary alpha emitter was ^{244}Cm with minor amounts of ^{241}Am, ^{238}Pu, and ^{239}Pu. In 1983, entombment of the site began. The site was first isolated by digging down to the line on either side of the leak area and installing permanent pipe caps. The line was cut, short sections of pipe removed, and the entrained water collected for disposal and the open ends sealed. Over 100 yd^3 of contaminated soil and vegetation was removed, herbicide was applied to the areas to be paved, the area was refilled with a bentonite cap, followed by clean soil and the application of an asphaltic cap.

   (b) Physical Description—The leak site resulted from a leak in the section of LLW transfer line, which carried waste to Trench 7. The leak site was located in an area of gradual topographic relief (with a slope of 15%) to the southwest. No dimensions are available for the volume occupied by the leak nor is the amount of waste leaked known.

   (c) Current Condition—The leak site has been given an asphalt cover that is presently in good condition.

   (d) Radiological Hazards—Wastes handled in the LLW transfer system include major radionuclides such as ^{90}Sr, ^{137}Cs, ^{106}Ru, ^{60}Co, and various rare earths along with some plutonium, uranium, and TRU isotopes. Activity in soil samples taken from the site are described above under Operations History. The radionuclide inventory remaining at the leak site is not known.

6. SECURITY PROTECTION SYSTEMS: The leak site is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.17-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.17-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness, the asphalt cap covering the leak site will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	4	5	5	5	5	5	5	5	5	5
Maintenance	3	3	3	3	3	3	3	3	3	3
Special Projects	0	30	0	0	0	0	0	0	0	0
Total	7	38	8	8	8	8	8	8	8	8

Table A.1.17-1. Surveillance activities—LLW Lines and Leak Sites (SWMU 7.4b)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	65 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	As required	EHP	Radiation Protection data base	10 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.17-2. Maintenance activities—LLW Lines and Leak Sites (SWMU 7.4b)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	45 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	15 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.18 LLW Line Leak Site—Gaging Station northwest of Bldg. 7852—SWMU ID Number 7.4a

1. SITE NAME: LLW Line Leak Site—Gaging Station northwest of Bldg. 7852—SWMU ID Number 7.4a.

2. LOCATION: This leak site is located along the old LLW transfer line in Melton Valley about 200 ft west of WOC along the portion of the LLW line that leads to the OHF. ORNL grid coordinates are N 17,680 and E 28,000. This site is also known as Leak Site 2 or South Leak Site.

3. LEAK DATE(S): The first leak at the site occurred July 9, 1970. Some evidence suggests that a second leak may have occurred later.

4. SITE STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. SITE DESCRIPTION:

   (a) Operations History—The transfer line was in operation in the late 1950s with the first recordable leak July 9, 1970. The site was surveyed in 1973, and surface contamination was observable all the way to WOC. During July and August 1973, 3415 ft^3 of contaminated soil was removed from the site and disposed of in SWSA 6. However, a 1979 survey revealed additional contamination, and the site was entombed in 1983. In this effort, the site was first isolated by digging down to the LLW line on either side of the leak area and installing permanent pipe caps. The line was then cut into short sections and removed, the entrained water collected for disposal, and the open ends sealed. Over 100 yd^3 of contaminated soil and vegetation was removed, herbicide was applied to the areas to be paved, the area was refilled with a bentonite cap, followed by clean soil and the application of an asphalt cap.

   (b) Physical Description—The leak occurred at a mechanical, neoprene-gasketed joint in the LLW transfer line, which carried waste from the Trench 7 area to the OHF. The leak site drops 15 ft over a distance of 100 ft. The waste had seeped from the coupling and had reached ground surface where it had spread laterally over a small area. Currently, the leak site has been entombed and remains in a stable state.

   (c) Current Condition—The leak site has been given an asphalt cover that is presently in good condition.

   (d) Radiological Hazards—While ^{90}Sr, ^{137}Cs, ^{106}Ru, ^{60}Co, and various rare earths along with plutonium, uranium, and TRU isotopes were transferred through this system, contamination was removed at the site so that there was no significant release of radiation to WOC. Soil samples ranged from 2 Ci/g to 7 Ci/g. A second survey in 1979 revealed additional contamination, suggesting either additional leakage or inadequate removal of contaminated soil. At 3 ft above ground surface, beta-gamma activity ranged from 240 mR/h to 800 mR/h along the line. The site was

subsequently entombed with a multilayered cover, but the radionuclide inventory remaining at the leak site is not known.

6. SECURITY PROTECTION SYSTEMS: The leak site is in MV and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.18-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.18-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: To prevent deterioration caused by weathering and to ensure cap effectiveness; the asphalt cap covering the leak site will require resealing every 7 to 10 years. The first resealing project is scheduled for FY 1994. Routine spot repairs will be conducted as required.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	7	8	8	8	8	8	8	8	8	8
Maintenance	6	3	3	3	3	3	3	3	3	3
Special Projects	0	30	0	0	0	0	0	0	0	0
Total	13	41	11	11	11	11	11	11	11	11

Table A.1.18-1. Surveillance activities—LLW Line Leak Site (SWMU 7.4a)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	105 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	5 wh/y[e]
(b) Routine radiation survey	As required	EHP	Radiation Protection data base	30 wh/y
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*
4. Surface water monitoring	Continuous	EHP	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.18-2. Maintenance activities—LLW Line Leak Site (SWMU 7.4a)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	90 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	30 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.19 White Wing Scrap Yard

1. SITE NAME: White Wing Scrap Yard, WAG 11.

2. LOCATION: White Wing Scrap Yard (WWSY) is a 30.4-acre area located in the McNew Hollow area on the western edge of East Fork Ridge. It is 1 mile east of the junction of White Wing Road (Highway 95) and the Oak Ridge Turnpike and is contained within administrative grid coordinates N 34,500-N 35,800 and E 27,500-E 29,250.

3. SERVICE DATES: The site began receiving material in the early 1950s; however, the precise dates of material storage is uncertain, as is the time the area was closed to further storage.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—Of the 30.4 total acres, the approximate area used for scrap storage was 25 acres. Hot Yard Road divides the area into north and south components, the northern utilized by the Oak Ridge K-25 Site and the Oak Ridge Y-12 Plant and the southern by ORNL. No description exists for the materials stored by ORGDP or Y-12. The material stored by ORNL (estimated to be 500,000 ft^3) was reported to consist of 10- × 40-ft mild steel tanks, dump trucks, two pieces of earth-moving equipment (one weighing 22 tons), large glass-lined tanks, walk-in hoods, support frames, steel and stainless steel, and aluminum of many sizes and shapes. During active use, the north part was enclosed by a chain link fence and the south portion with a barbed wire fence. In 1966, efforts were begun to clean up the area, and these fences were removed.

   Contaminated scrap materials were removed and buried in SWSA 5, and the uncontaminated material was sold to a contractor for scrap recovery. Site cleanup continued until March 1970, and in October 1970 removal of about 6000 yd^3 of contaminated soil from the southern portion of the site was initiated. Following removal of the contaminated soil, the entire site was surveyed for residual radionuclide contamination and then abandoned.

   In FY 1989, an attempt to mow the site was halted because of safety hazards presented by the debris scattered throughout the area (scrap metal, glass, wood, and plastic). When a subsequent scoping survey revealed that many of these pieces were contaminated, the entire scrap yard was roped off with placards to prevent deer hunters from entering the area.

   (b) Physical Description—The site is level to gently sloping with much brush and small trees. The two roads that access the site have recently been renovated during construction of groundwater monitoring wells in the area.

(c) Current Condition—The area is presently unfenced. Portions of the cleared areas previously used for storage have been mowed and the entire scrap yard roped off with warning signs to deer hunters. Small pieces of debris (some contaminated) appear on the surface over much of the site.

(d) Radiological Hazards—A sampling program conducted in the fall of 1986 stated that, except for the possibility of nickel and ^{90}Sr, no significant contamination was observed in the entire WAG 11. However, a scoping survey conducted in 1989 found many contaminated objects as well as contaminated soil at several locations. The report of this survey (ORNL/ER/INT-1) can be consulted for more detailed information.

6. SECURITY/PROTECTION SYSTEMS: Access to WWSY is obtained through locked gates at the Highway 95 and Oak Ridge Turnpike entrances. A perimeter fence to enclose WWSY is planned for FY 1993.

7. SURVEILLANCE ACTIVITIES: See Table A.1.19-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.19-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Construction of a fence around the entire WWSY is scheduled for FY 1993. Other improvements to the site include the possibility of a major site cleanup and brush clearing to be made in FY 1993.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	45	45	45	45	45	45	45	45	45	45
Maintenance	75	25	25	25	25	25	25	25	25	25
Special Projects	450	0	0	0	0	0	0	0	0	0
Total	570	70	70	70	70	70	70	70	70	70

Table A.1.19-1. Surveillance activities—White Wing Scrap Yard

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	800 wh/y[c]
2.	Routine radiation surveys	Semiannual	EHP[d]	Radiation Protection data base	100 wh/y
3.	Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.

Table A.1.19-2. Maintenance activities—White Wing Scrap Yard

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Access roads upkeep, vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	1000 wh/y[d]
2.	Fence/gate repairs	As required	WMRAD/P&E	S&M log	500 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.20 Deep Monitoring Wells (DM-1 and DM-2)

1. SITE NAME: Deep Monitoring Wells (DM-1 and DM-2).

2. LOCATION: DM-1 and DM-2 are 1000 ft east and west, respectively, of the New Hydrofracture Facility.

3. SERVICE DATES: 1983–1986.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—LLLW was disposed of by hydrofracture injection at a depth of 1000 ft into a low-permeability shale in 1983. In August 1984, radioactively contaminated water was detected in two deep monitoring wells (DM-1 and DM-2). Water in the wells was subsequently sampled in September 1984 and January 1985. The data obtained suggested that the hydrofracture operation was the source of the contamination. Sampling of these wells was conducted again in January 1986, but since the well was drilled through multiple rock formations, it could not be determined that the contamination was from the same rock formation as the injected wastes. These two wells were removed from service at that time and replacement wells were drilled.

   (b) Physical Description—The wells are capped and surrounded by a curbed concrete pad. A metal building has been erected on the pads to provide security and containment.

   (c) Current Condition—The 1986 sampling operation left the concrete pad at DM-1 slightly contaminated. Since complete decontamination of the porous concrete surface could not be achieved, the containment building was erected. Except for this contamination, both wells, pads, and buildings are in excellent condition.

   (d) Radiological Hazards—Except for the contaminated pad at DM-1, no radiation hazards exist at either well while the sites are inactive. Should a well be opened for any reason, release of contaminated water as a result of pressurization is a possibility.

6. SECURITY/PROTECTION SYSTEMS: These sites are in MV and are accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). During nonworking hours, it is within the ORNL limited-access area.

7. SURVEILLANCE ACTIVITIES: See Table A.1.20-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.20-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: There are no repairs or improvements anticipated to these sites. However, improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	1	1	1	1	1	1	1	1	1	1
Maintenance	1	1	1	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2	2	2	2

Table A.1.20-1. Surveillance activities—Deep Monitoring Wells (DM-1 and DM-2)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	15 wh/y[c]
2. Routine radiation survey	Semiannual	EHP[d]	Radiation Protection data base	5 wh/y
3. Security patrol	Daily	LP[e]	Daily security report	*f*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]LP = Laboratory Protection.
[f]Costs are included in ORNL overhead charges. No WAG S&M funding is required.

Table A.1.20-2. Maintenance activities—Deep Monitoring Wells (DM-1 and DM-2)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Containment Building maintenance	As required	WMRAD[a]	S&M log[b]	20 wh/y[c]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.

A.1.21 Waste Holding Basin

1. SITE NAME: Waste Holding Basin.

2. LOCATION: Site 3513 (BV).

3. SERVICE DATES: 1944–1977.

4. STATUS: Inactive; pond controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The waste holding basin served as an LLLW 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 LLLW processing system or discharged to the environment. In the latter years of use, the pond received only the liquid effluent from the LLLW treatment plant, serving as a settling basin prior to discharge to WOC.

   (b) Physical Description—The basin is an unlined earth-bermed structure approximately 230 × 250 ft at the top of the berm, with sloping sides down to the pond bottom (approximately 200 × 220 ft). The depth of water in the basin varies but averages about 6 ft. The pond surface is open to the environment. Pond overflow was routed to the adjacent equalization basin for processing prior to discharge to WOC. All outfalls were removed to eliminate possible unpermitted discharge. A wire grid system has been installed over the basin to prevent water fowl from landing.

   (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}Pu are 20, 130, and 3 Ci, respectively. The concentration of ^{239}Pu in the sediment is of the order of 2 nCi/g. The water contained in the pond is only slightly contaminated.

6. SECURITY/PROTECTION SYSTEMS: The waste holding basin is within the ORNL BV secured area. The pond is encircled with a wire mesh fence and posted with "Radiation Hazard—Keep Out" signs.

7. SURVEILLANCE ACTIVITIES: See Table A.1.21-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.21-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	29	30	32	32	32	32	32	32	32	32
Maintenance	31	33	34	34	34	34	34	34	34	34
Total	60	63	66	66	66	66	66	66	66	66

Table A.1.21-1. Surveillance activities—Waste Holding Basin

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. S&M site inspection	Weekly	WMRAD[a]	S&M weekly check sheet[b]	490 wh/y[c]
2. Safety inspection	Semiannual	WMRAD	WMRAD memo	10 wh/y[d]
3. Radiological surveillance				
(a) Routine surveillance	Semiannual	EHP[e]	Radiation Protection data base	15 wh/y[d]
(b) Surveys for grounds maintenance	As required	EHP	Radiation Protection data base	65 wh/y
4. Groundwater surveillance				
(a) Monitoring wells sampling	Semiannual	EHP	ESD memo	$50K
5. Effluent monitoring	Continuous	EHP	WOCC records[f]	*d*
6. Routine security patrol	Daily	LP[g]	Daily security report	*d*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[e]EHP = Environmental and Health Protection.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.21-2. Maintenance activities—Waste Holding Basin

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. General maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	620 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.22 Gunite Storage Tanks W-5 to W-10

1. SITE NAME: Gunite Storage Tanks W-5 to W-10.

2. LOCATION: South Tank Farm Site 3507 (BV).

3. SERVICE DATES: 1943–1978.

4. STATUS: Tanks were emptied of sludge under the Interim Waste Operations Program, but they still retain some unsluiceable heels. Responsibility for the South Tank Farm falls under WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The gunite tanks have been used for the storage and transfer of LLLW 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 past 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 have been constructed within the tank farm area. The equipment used for the sludge removal campaign remains on site and will probably be used in final decommissioning activities.

   (c) Current Condition—Tanks W-7 through W-10 are believed to be structurally sound, but recent video inspections indicate the interior walls of W-5 and W-6 to be of questionable integrity. W-5 exhibits reinforcing wire exposure on the northwest wall and pronounced etching of the concrete. W-6 displays areas that exhibit cracks with some wet spots associated with them. The large volume of supernate in W-6 prohibits inspection of the lower 8 ft of the wall. Preliminary studies indicate that the tank walls can easily support the overburden, but this condition should be considered in future decommissioning activities. Level increases have been noted in five of the tanks during periods of heavy rain. Past efforts have had marginal success in correcting this inleakage problem.

   (d) Radiological Hazards—The tanks still contain over 3×10^3 Ci of total radioactivity, primarily ^{90}Sr and ^{137}Cs, with some transuranics present. This radioactivity is associated with the waste slurry left in each tank and the contamination embedded

in the tank walls. Detailed characterizations of these tanks will have to be conducted prior to final decommissioning.

6. SECURITY/PROTECTION SYSTEMS: The Gunite tank farm is within the ORNL BV secured area. The grounds are posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.1.22-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.22-2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning of the Gunite tanks is currently undefined. Further tank wall deterioration or groundwater inleakage may dictate future repairs or improvements. An increase in surveillance funding levels for FY 95 and beyond will be required to cover the expenses of improvements and additions in monitoring, data collection, data analysis, reporting and increased surveillance due to anticipated stricter requirements imposed by changing data and reporting requirements.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	243	250	355	355	355	355	355	355	355	355
Maintenance	85	86	88	88	88	88	88	88	88	88
Special Projects	400	100	0	0	0	0	0	0	0	0
Total	728	436	443	443	443	443	443	443	443	443

Table A.1.22-1. Surveillance activities—Gunite Storage Tanks

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. S&M site inspection	Weekly	WMRAD[a]	S&M weekly check list[b]	2130 wh/y[c]
2. Waste tank monitoring				2130 wh/y
(a) Liquid level monitoring	Continuous	WMRAD	WOCC records[d]	
(b) Dry well monitoring	Continuous	WMRAD	WOCC records	
(c) Dry well sample and analysis	Monthly	ACh[e], WMRAD	WOCC records	
3. Off-gas system filters DOP[f] testing	Quarterly (or after replacement)	QD[g], WMRAD	QD printout	100 wh/y[h]
4. Off-gas monitoring	Continuous	WMRAD	WOCC records	*h*
5. Radiological surveillance				
(a) Surveys for grounds maintenance, filter changes, and preventative maintenance	As required	EHP[i]	Radiation Protection data base	400 wh/y
(b) Routine radiological surveys	Semiannual	EHP	Radiation Protection data base	100 wh/y
6. Routine security patrol	Daily	LP[j]	Daily security report	*d*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.
[e]ACh = Analytical Chemistry Division.
[f]DOP = dioctyl phthalate.
[g]QD = Quality Department.
[h]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[i]EHP = Environmental and Health Protection.
[j]LP = Laboratory Protection.

Table A.1.22-2. Maintenance activities—Gunite Storage Tanks

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	Routine maintenance	As required	WMRAD/P&E/I&C[a,b,c]	S&M log[d]	1600 wh/y[e]
2.	Off-gas filter replacement	As required	WMRAD	QD[f] printout	100 wh/y
3.	Maintenance materials	Annually	WMRAD	S&M log	$1000

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]I&C = Instrumentation and Controls.
[d]S&M = surveillance and maintenance.
[e]wh/y = work-hours per year.
[f]QD = Quality Department.

A.1.23 LLW Tank W1-A

1. FACILITY NAME: LLW Tank W1-A.

2. LOCATION: North Tank Farm—Site 3023 (BV).

3. SERVICE DATES: 1955–1986.

4. STATUS: Tank W1-A was formerly a part of the ORNL LLW system and was used for collecting and storage of liquid wastes from 3019 and 2026. All tanks in the North Tank Farm are controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—Tank W1-A was the last of the tanks in the North Tank Farm to remain active. It was used as a collection and stabilization tank for waste solutions from the Radiochemical Analytical Laboratories (2026 and 3019-B).

   (b) Physical Description—The tank is constructed of stainless steel, has a 4000-gal capacity, and is located on the west side of the tank farm. It is connected to the rest of the LLW system through an outlet line controlled by an adjacent valve pit.

   (c) Current Condition—The tank is believed to be structurally sound despite having been exposed to strong acidic solutions during its operation. However, surveillance records have indicated past leakage into the system resulting in a collection of groundwater. Recent investigations seem to indicate that this inleakage is a result of poor integrity in the drain lines upstream of the tank.

   (d) Radiological Hazards—Based on the buildings that Tank W1-A served, it can be assumed it contains curie quantities of fission products, with lesser quantities of transuranic materials. It has been estimated that the inner surface of the tank and connecting lines would retain 1×10^6 dpm/100 cm^2 and would likely produce direct radiation in excess of 100 R/h. Nitric acid has been used during the tank's operation but would not likely be retained after proper stabilization of the tank contents.

6. SECURITY/PROTECTION SYSTEMS: The North Tank Farm is within the ORNL BV secured area. The tank farm is posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.1.23-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.23-2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements are anticipated prior to decommissioning. In the event routine surveillance indicates that a

problem has developed with the integrity of the tank, appropriate action will be taken and would likely involve removal of tank contents and stabilization of the tank interior.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	12	14	14	14	14	14	14	14	14	14
Maintenance	4	4	4	4	4	4	4	4	4	4
Total	16	18	18	18	18	18	18	18	18	18

Table A.1.23-1. Surveillance activities—LLW Tank W1-A

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Waste tank monitoring				220 wh/y[a]
(a) Liquid level monitoring	Continuous	WMRAD[b]	WOCC records[c]	
(b) Dry well sample and analysis	Monthly	WMRAD	WOCC records	
2. Radiological surveillance	As required	EHP[d]	Radiation Protection data base	20 wh/y
(a) Personnel monitoring during maintenance operations				

[a]wh/y = work-hours per year.
[b]WMRAD = Waste Management and Remedial Action Division.
[c]WOCC = Waste Operations Control Center.
[d]EHP = Environmental and Health Protection.

Table A.1.23-2. Maintenance activities—LLW Tanks W1-A

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	40 wh/y[d]
2. Transfer of inleakage to LLW system	As required	WMRAD	WOCC records	40 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.24 Waste Storage Tank WC-1

1. FACILITY NAME: Waste Storage Tank WC-1.

2. LOCATION: Between Bldg. 3037 and 3038 (BV).

3. SERVICE DATES: 1950–1968.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 LLLW 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- × 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.

6. SECURITY/PROTECTION SYSTEMS: Waste tank WC-1 is within the ORNL BV secured area. The ejector pit is posted as a radiation/contamination zone.

7. SURVEILLANCE ACTIVITIES: See Table A.1.24-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: No routine maintenance activities are conducted at waste tank WC-1.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the waste tanks (including WC-1) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	10	11	11	11	11	11	11	11	11	11
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	10	11	11	11	11	11	11	11	11	11

Table A.1.24-1. Surveillance activities—Waste Tank WC-1

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	45 wh/y[c]
2. Waste tank monitoring				140 wh/y
(a) Dry well sampling	Monthly	WMRAD	WOCC records[d]	
(b) Sample analysis	Monthly	ACh[e]	WOCC records	$5K
3. Routine radiation survey	Semiannual	EHP[f]	Radiation Protection data base	15 wh/y
(a) Personnel monitoring during maintenance operations				

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.
[e]ACh = Analytical Chemistry Division
[f]EHP = Environmental and Health Protection.

A.1.25 Waste Storage Tanks WC-15 and WC-17

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

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

3. SERVICE DATES: 1940s–1960s.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 LLLW system for treatment. The tanks were removed from service because of 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 five other underground tanks, two 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. When the tanks were removed from service and emptied, the piping was isolated to preclude further 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 and corrosion products (primarily ^{60}Co and ^{137}Cs).

6. SECURITY/PROTECTION SYSTEMS: Waste tanks WC-15 and WC-17 are within the ORNL BV secured area. The tank farm is posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: The active tanks in the tank farm are under constant surveillance. Tank WC-17 liquid level is monitored continuously at the WOCC. No additional surveillance is provided for the abandoned tanks. See Table A.1.25-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: The active tank farm is maintained by the ORNL Waste Operations Department. No additional maintenance is provided for the abandoned tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the waste tanks (including WC-15 and WC-17) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	9	10	11	11	11	11	11	11	11	11
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	9	10	11	11	11	11	11	11	11	11

Table A.1.25-1. Surveillance activities—Waste Tanks WC-15 and WC-17

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	120 wh/y[c]
2. Waste tank monitoring				
(a) Liquid level monitoring	Continuous	WMRAD	WOCC records[d]	50 wh/y
3. Routine radiation survey	Semiannual	EHP[e]	Radiation Protection data base	10 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.
[e]EHP = Environmental and Health Protection.

A.1.26 Waste Storage Tanks W-1 to W-4 and W-13 to W-15

1. FACILITY NAME: Waste Storage Tanks W-1 to W-4 and W-13 to W-15.

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

3. SERVICE DATES: 1940s–1960s.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 transfer of the material to the liquid waste treatment facilities. These tanks were removed from service because of leakage (W-1 and W-2) or because they were no longer required for use (W-3, W-4, W-13, W-14, and W-15).

   (b) Physical Description—Tanks W-1 and W-2 are both underground Gunite-sprayed concrete vessels of approximately 5000-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 2000-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 is 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 LLLW. Soil contamination in the vicinity of tank W-1 has been documented.

6. SECURITY/PROTECTION SYSTEMS: The North Tank Farm is within the ORNL BV secured area. The tank farm is posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.1.26-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.26-2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for these waste tanks is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time. However, tank deterioration or regulatory compliance may dictate site improvements before that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	14	15	16	16	16	16	16	16	16	16
Maintenance	4	4	4	4	4	4	4	4	4	4
Special Projects	150	0	0	0	0	0	0	0	0	0
Total	168	19	20	20	20	20	20	20	20	20

Table A.1.26-1. Surveillance activities—Waste Storage Tanks W-1 to W-4 and W-13 to W-15

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	150 wh/y[c]
2. Waste tank monitoring				100 wh/y
(a) Drain monitoring	Continuously	WMRAD	WOCC records[d]	
(b) Dry well sample	Monthly	WMRAD	WOCC records	
(c) Sample analysis	Monthly	ACh[e]	WOCC records	
(d) Liquid level monitoring	Daily	WMRAD	WOCC records	
3. Radiological surveillance	As required	EHP[f]	Radiation Protection data base	15 wh/y[g]
(a) Routine radiation survey	Semiannual	EHP	Radiation Protection data base	15 wh/y
(b) Personnel monitoring during maintenance operations				

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.
[e]ACh = Analytical Chemistry Division.
[f]EHP = Environmental and Health Protection.
[g]Costs are included in ORNL overhead charges. No WAG S&M funding is required.

Table A.1.26-2. Maintenance activities—Waste Storage Tanks W-1 to W-4 and W-13 to W-15

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance	As required	WMRAD/P&E[a,b]	WMRAD records	40 wh/y[c]
2. Transfer of surface drainage from W-3 and W-4 to LLLW system	As required	WMRAD	WOCC records[d]	40 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.

A.1.27 Waste Storage Tank W-11

1. FACILITY NAME: Waste Storage Tank W-11.

2. LOCATION: South of Site 3536.

3. SERVICE DATES: 1943–1948.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 LLLW system for processing. The tank was removed from service because of leaks.

   (b) Physical Description—This tank is a 1700-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 interconnected 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. Because of 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.

6. SECURITY/PROTECTION SYSTEMS: Tank W-11 is within the ORNL BV secured area. The tank farm is posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.1.27-1 for details of surveillance activities. Tank W-11 is equipped with a liquid level staff gage, which is monitored daily. 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 Operations Department. No additional maintenance is provided for the abandoned tank.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the waste tanks (including W-11) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	9	10	10	10	10	10	10	10	10	10
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	9	10	10	10	10	10	10	10	10	10

Table A.1.27-1. Surveillance activities—Waste Storage Tank W-11

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Waste tank monitoring				180 wh/y[a]
(a) Liquid level monitoring	Daily	WMRAD[b]	RAS records[c]	

[a]wh/y = work-hours per year.
[b]WMRAD = Waste Management and Remedial Action Division.
[c]RAS = Remedial Action Section.

A.1.28 Waste Storage Tanks TH-1, TH-2, and TH-3

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

2. LOCATION: South of Bldg. 3503 (BV).

3. SERVICE DATES: 1952–1970.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 8000 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. Because of 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 well known, but the radioactivity is believed to be in curie amounts.

6. SECURITY/PROTECTION SYSTEMS: This tank farm is within the ORNL BV secured area. The farm is posted with respect to 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 Operations Department. No additional maintenance is provided for the abandoned tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the waste tanks (including TH-1, TH-2, and TH-3) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

A.1.29 Waste Storage Tank TH-4

1. FACILITY NAME: Waste Storage Tank TH-4.

2. LOCATION: Southwest of Bldg. 3500 (BV).

3. SERVICE DATES: 1952–1970.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. 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 LLLW process system. The tank was removed from service because its use was no longer required.

   (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.

6. SECURITY/PROTECTION SYSTEMS: Tank TH-4 is within the ORNL BV secured area. A metal lid has been installed to prevent unauthorized access.

7. SURVEILLANCE ACTIVITIES: See Table A.1.29-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: No routine maintenance activities are conducted at waste tank TH-4.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the waste tanks (including TH-4) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	10	11	11	11	11	11	11	11	11	11
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	10	11	11	11	11	11	11	11	11	11

Table A.1.29-1. Surveillance activities—Waste Storage Tank TH-4

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine surveillance	Weekly	WMRAD[a]	S&M checklist[b]	110 wh/y[c]
2. Waste tank monitoring				80 wh/y
(a) Dry well sampling	Monthly	WMRAD	WOCC records[d]	EHP[e]
(b) Sample analysis	Monthly	ACh[f]	WOCC records	EHP[e]
3. Routine radiation survey	Semiannual	EHP[e]	Radiation Protection data base	10 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]WOCC = Waste Operations Control Center.
[e]EHP = Environmental and Health Protection.
[f]ACh = Analytical Chemistry Division.

A.1.30 Waste Tanks T-1, T-2, T-3, T-4, and T-9

1. FACILITY NAME: Waste Tanks T-1, T-2, T-3, T-4, and T-9.

2. LOCATION: Site 7852 (MV).

3. SERVICE DATES: 1964–1980.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The Old Hydrofracture Facility (OHF) was an experimental and operational plant for the injection of waste grout into a fractured shale formation. Beginning in 1966, operational injections of concentrated liquid waste from the ORNL LLLW system were routinely made until facility shutdown in 1980. During this time, the five tanks were used for the storage of waste prior to blending in the preparation of the grout.

   (b) Physical Description—Each of the five storage tanks are made of carbon steel with the following capacities:

T-1	15,000 gal
T-2	15,000 gal
T-3	25,000 gal
T-4	25,000 gal
T-9	13,000 gal

   (c) Current Condition—The tanks are believed to be in very good condition and not experiencing any leakage. Tank liquid level surveillance and dry well monitoring have been performed on a regular basis and confirm the tanks integrity. Cathodic protection continues to be maintained.

   (d) Radiological Hazards—Although each tank does contain radioactive waste, no measure of total residual radioactivity has been made for the tanks. It has been approximated that the tanks current volumes contain 4600 Ci of radioactivity. Major radionuclides include ^{137}Cs, ^{90}Sr, ^{60}Co, and TRU-type materials. Past operations have deposited contamination on the ground around the tank accesses. Each is zoned and placarded appropriately.

6. SECURITY/PROTECTION SYSTEMS: Tanks T-1, T-2, T-3, T-4, and T-9 are located within the MV access controlled area. Access to the area is through a badgereader-controlled gate with access granted only to those having a genuine need plus a minimum of 24 h of Superfund Authorization and Recovery Act/Occupational Safety and Health Act (SARA/OSHA) training. All contamination and radiation areas are zoned and labeled according to the ORNL *Health Physics Manual.*

7. SURVEILLANCE ACTIVITIES: See Table A.1.30-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.30-2.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Rework cathodic protection system for Tanks T-1 through T-4 and T-9; improve level instrumentation.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	37	39	40	40	40	40	40	40	40	40
Maintenance	5	5	6	6	6	6	6	6	6	6
Special Projects	31	0	0	0	0	0	0	0	0	0
Total	73	44	46	46	46	46	46	46	46	46

Table A.1.30-1. Surveillance activities—Waste Tanks T-1, T-2, T-3, T-4, and T-9

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	300 wh/y[c]
2. Waste tank monitoring				280 wh/y
(a) Liquid level monitoring	Daily	WMRAD	S&M tank log	
(b) Dry well monitoring	Daily	WMRAD	Tank farm log	
(c) Dry well sample and analysis	Monthly	EHP/ACD[d]	S&M tank log	
3. Off-gas system filters (DOP testing)[e]	Quarterly	QD[f]/WMRAD	QD records	100 wh/y[g]
4. Off-gas monitoring	Daily	WMRAD	Tank farm log	40 wh/y
5. Radiological surveillance				
(a) Surveys for grounds maintenance, filter changes, and preventative maintenance	As required	EHP[h]	Radiation Protection data base	*f*
(b) Routine surveys	Semiannual	EHP	Radiation Protection data base	20 wh/y
6. Groundwater sampling	Semiannual	EHP	Environmental Monitoring data base	*g*
7. Surface water sampling	Continuous	EHP	WOCC data base[i]	*g*
8. Security patrol	Daily	LP[j]	Daily security report	*g*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]ACD = Analytical Chemistry Division.
[e]DOP = dioctyl phthalate.
[f]Quality Department.
[g]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[h]EHP = Environmental and Health Protection.
[i]WOCC = Waste Operations Control Center.
[j]LP = Laboratory Protection.

Table A.1.30-2. Maintenance activities—Waste Tanks T-1, T-2, T-3, T-4, and T-9

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	80 wh/y[d]
(b) Minor repairs	As required	WMRAD/P&E/I&C[e]	S&M log	5 wh/y
2. Off-gas filter replacement	As required	WMRAD/P&E	S&M log	15 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.
[e]I&C = Instrumentation and Controls.

A.1.31 Old Hydrofracture Pond (7852A)

1. SITE NAME: Old Hydrofracture Pond (7852A).

2. LOCATION: The OHF Pond is located in MV, slightly more than 1 mile south of the main ORNL complex. The facility is situated on the west edge of SWSA 5 just west of the OHF Facility.

3. SERVICE DATES: 1963 to November 19, 1980.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The impoundment was constructed to serve as an emergency containment basin in the event of a spill from the radioactive grout injections. Because of the malfunction of pumping equipment or piping, the impoundment did receive radioactive grout from injections made in 1965 and 1977. OHF operations ceased in 1980, but in the winter of 1984–85, the pond did receive drilling fluid and drill cuttings from an exploratory core boring through the radioactive grout sheets underlying the OHF site. Probings indicated a sediment thickness of 0.9 ft or 14,500 gal. The core cuttings account for 230 gal or less than 2% of the total sediment volume.

   (b) Physical Description—Construction dimensions of the bottom of the basin are 100 × 20 ft, and the sides slope at 1 vertical on 1.5 horizontal. Design capacity of the unlined pond was 100,000 gal. The sides are lined with limestone riprap. Inflow was to the south end of the impoundment via a buried 18-in. line from the injection well cell. A concrete standpipe was provided as an emergency outflow at the north end of the pond.

   (c) Current Condition—Condition of the pond structure is believed to be good. The local monitoring wells, which indicate upgradient and downgradient contamination, are believed to be influenced by the nearby SWSA 5.

   (d) Radiological Hazards—The major radionuclides measured in the sediment are ^{137}Cs and ^{90}Sr at concentrations of 3.4×10^6 and 1.1×10^6, respectively. The radionuclide measured in greatest quantity was ^{137}Cs, 60 Ci, followed by ^{90}Sr, 20 Ci. Major contaminants in the pond water are the radionuclides. The bulk of the radioactivity is from ^{137}Cs, 1.1×10^5 pCi/L and ^{90}Sr, 1.2×10^5 pCi/L.

6. SECURITY/PROTECTION SYSTEMS: The pond is located within the MV access-controlled area. Access to the area is through a badge-reader-controlled gate with access granted only to those having a genuine need plus a minimum of 24 h of SARA/OSHA training. All contamination and radiation areas are zoned and labeled according to the ORNL *Health Physics Manual.*

7. SURVEILLANCE ACTIVITIES: See Table A.1.31-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.31-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Repairs or improvements will be made as required; however, none are anticipated at this time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	47	48	48	48	48	48	48	48	48	48
Maintenance	20	21	24	24	24	24	24	24	24	24
Total	67	69	72	72	72	72	72	72	72	72

Table A.1.31-1. Surveillance activities—Old Hydrofracture Pond (7852A)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	870 wh/y[c]
2. Radiation monitoring				
(a) Routine radiation surveys	Semiannual	EHP[d]	Radiation Protection data base	20 wh/y
(b) Surveys for grounds maintenance	As required	EHP	Radiation Protection data base	50 wh/y[e]
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	$50K
4. Surface water monitoring	Continuous	WMRAD	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.31-2. Maintenance activities—Old Hydrofracture Pond (7852A)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	400 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.32 Old Hydrofracture Facility (OHF) Waste Pits

1. SITE NAME: Old Hydrofracture Facility (OHF) Waste Pits.

2. LOCATION: Site 7852 (MV).

3. SERVICE DATES: 1964–1980.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The OHF was an experimental and operational plant for the injection of waste grout into a fractured shale formation. Beginning in 1966, operational injections of concentrated liquid waste from the ORNL LLLW system were routinely made until facility shutdown in 1980. During this period, the three waste pits were used to allow maximum recycle of contaminated water during slotting and washup, minimizing the need to inject waste water.

   (b) Physical Description—The waste pits, which are composed of three separate concrete-walled cells (12 × 12 ft wide and ~9 ft deep), are located ~20 ft to the northeast of the pump house. The original pit, the southern cell, was filled with grout during an experimental injection, and the two additional cells were built to the north. The two northern cells are covered with a corrugated plastic roof.

   (c) Current Condition—The two remaining pits contain contaminated water and sediments over an undetermined layer of solidified grout. Both pits collect water at a rate that is directly related to the amount of rainfall received. Overflow is directed to OHF pond, 7852A.

   (d) Radiological Hazards—Results from past surveys indicate contamination in millicurie amounts in the waste pits, with ^{137}Cs being the most dominant. The direct dose rates under the roof covering the two northernmost cells are 10 to 40 mrad/h.

6. SECURITY/PROTECTION SYSTEMS: The OHF waste pits are located within the Melton Valley access-controlled area. Access to the area is through a badge-reader-controlled gate with access granted only to those having a genuine need plus a minimum of 24 h of SARA/OSHA training. All contamination and radiation areas are zoned and labeled according to the ORNL *Health Physics Manual.*

7. SURVEILLANCE ACTIVITIES: See Table A.1.32-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.32-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None anticipated.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	4	4	4	4	4	4	4	4	4	4
Maintenance	5	6	6	6	6	6	6	6	6	6
Total	9	10	10	10	10	10	10	10	10	10

Table A.1.32-1. Surveillance activities—Old Hydrofracture Facility waste pits

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine surveillance	Weekly	WMRAD[a]	S&M checklist[b]	65 wh/y[c]
2. Radiological surveillance				
(a) Surveys for liquid transfer	As required	EHP[d]	Radiation Protection data base	10 wh/y
(b) Routine radiation surveys	Semiannual	EHP	Radiation Protection data base	5 wh/y[e]
3. Surface water monitoring	Continuous	WMRAD	WOCC data base[f]	*e*
4. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.32-2. Maintenance activities—Old Hydrofracture Facility waste pits

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Liquid transfer	As required	WMRAD/P&E[a,b]	S&M log[c]	100 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.33 Homogeneous Reactor Experiment (HRE) Retention Pond

1. SITE NAME: Homogeneous Reactor Experiment (HRE) Retention Pond.

2. LOCATION: MV, adjacent to HRE facility (Bldg. 7500).

3. SERVICE DATES: 1955–1962.

4. STATUS: Inactive; main facility and ancillary buildings controlled by WMRAD (M. K. Ford).

5. DESCRIPTION:

   (a) Operating History—The 300,000-gal retention pond was provided in 1955 to serve the HRE, a 5-MW experimental reactor. Early in the HRE program, the pond received slightly contaminated condensate from the waste evaporator, located in Bldg. 7502. Later, the most significant flow into the pond came from shielding water discarded after use from the reactor shield tank in Bldg. 7500. A water diversion ditch was constructed around the west end of the pond to divert surface runoff. The water was retained in the pond until the activity limit was met for dumping the waste to the creek.

   (b) Physical Description—The pond was constructed by both excavating and building up compacted earth on a hillside. Originally, it was a 45- × 50-ft rectangular flat-bottomed pond 10 ft deep, with its level bottom at 803 ft elevation. The bottom originally sloped upward from the flat rectangle, rising 10 ft vertically in a 15-ft horizontal distance, to give a maximum rectangular shoreline of 75 × 80 ft. A water diversion ditch on the west side diverts water runoff. Originally, the pond was an unlined earthen basin but was later changed to an asphalt membrane spray base to better retain hazardous material and radioactive leaching. Two applications of the asphalt were made.

   (c) Current Condition—In 1970, that part of the pond over the accumulated sludge was completely filled with clay (or shale) from a local borrow pit. The pond was half-filled with clay and sludge that eroded from the bank when the filling operation began. Grading of the area was minimized because of radiation readings taken of the surrounding surface. Approximately 1100 lb of sodium borate weed killer was added to the soil and an 8-in. layer of crushed stone added. A 1.5 in. asphaltic concrete cap was added, along with seven observation wells driven into the cap.

   (d) Radiological Hazards—Radiological characterization of the pond shows ^{137}Cs in the northeast corner (120 Bq/g) and 80 ft west of asphalt (5.9 Bq/g), ^{90}Sr south of asphalt (24 Bq/g), west of asphalt, downslope perimeter (45 Bq/g), and southwest perimeter. Plutonium-239 was also located in significant quantities (9 Bq/g) in the northeast corner of the pond. All the findings were taken at 30 cm under the asphaltic concrete cap. No significant spread of contamination or personnel exposure has occurred since facility shutdown.

6. SECURITY/PROTECTION SYSTEMS: The HRE Retention Pond is in the ORNL MV restricted area. The site is posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.1.33-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.1.33-2 for details of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Improved instrumentation and sampling devices are planned for the 12,000 gallon low-level waste tank (Bldg. 7562). This activity is planned for FY 93 and FY 94.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	55	58	59	59	59	59	59	59	59	59
Maintenance	9	9	10	10	10	10	10	10	10	10
Special Projects	15	29	0	0	0	0	0	0	0	0
Total	79	96	69	69	69	69	69	69	69	69

Table A.1.33-1. Surveillance activities—Homogeneous Reactor Experiment Retention Pond

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	150 wh/y[c]
2. Radiation monitoring				
(a) Routine radiation surveys	Semiannual	EHP[d]	Radiation Protection data base	10 wh/y
(b) Surveys for grounds maintenance	As required	EHP	Radiation Protection data base	50 wh/y[e]
3. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	$50K
4. Surface water monitoring	Continuous	WMRAD	WOCC data base[f]	*e*
5. Security patrol	Daily	LP[g]	Daily security report	*e*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.1.33-2. Maintenance activities—Homogeneous Reactor Experiment Retention Pond

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	180 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.34 HRE Waste Tanks (7560 and 7562)

1. SITE NAME: HRE Waste Tanks (7560 and 7562).

2. LOCATION: Melton Valley (adjacent to Bldg. 7500—HRE).

3. SERVICE DATES: Tank 7560 (1957 to 1961)
   Tank 7562 (1957 to 1987)

4. STATUS: Inactive; these tanks are controlled, along with the HRE facility, by WMRAD (M. K. Ford).

5. DESCRIPTION:

   (a) Operating History—Tanks 7560 and 7562 were part of the HRE waste treatment facilities, serving for interim storage tanks during evaporation of liquid wastes from the HRE. Following shutdown of the HRE, tank 7560 was deactivated. This tank was also used as the clean vapor condensate tank for the evaporator associated with the HRE-2. All wastes were neutralized prior to placement in either of the tanks to prevent corrosive attack on the concrete. The tank was emptied in 1961, following the termination of HRE. Some spills occurred, as evidenced by soil samplings (^{90}Sr and ^{137}Cs contamination). Tank 7562 was used to store high-level liquid wastes from the HRE facility prior to concentration by the evaporator. Evidence indicates the tank was used as a reservoir for runoff from the decontamination pad at the south of Bldg. 7500. The tank has been pumped recently (1988) of 1200 gal of aqueous waste (LLLW).

   (b) Physical Condition—Tank 7560—a small, horizontal, stainless steel tank with an outside diameter of 4.5 ft, a length of 9 ft, and a capacity of approximately 1000 gal. The tank does not have an interior liner and rests on a concrete pad (6 × 12 × 17 ft) connected by anchor bolts. The tank is limestone backfilled with compacted dirt coverage.

   Tank 7562—An intermediate-size, horizontal, stainless steel tank with an outside diameter of 10 ft, length of 22.3 ft, and capacity of 12,000 gal. The tank does not have an inside liner and rests on a concrete pad (13 × 25 × 1.5 ft), with a 1.5-ft layer of limestone fill and earth compaction.

   Both tanks contain access through service piping and overflow lines, with manholes on the tanks also.

   (c) Current Conditions—Both tanks are inactive, with tank 7560 completely dry and tank 7562 containing approximately 600 gal of residual sludge. Both tanks are in good condition. Adjacent dry wells indicate that leakage occurs from the tanks from past radiological characterizations of soil samples.

(d) Radiological Hazards—No evaluation has been made of tank 7560 contents, but soil samples indicate the presence of fission products (^{137}Cs and ^{90}Sr). Past spills at tank 7560 indicate there is slight contamination exterior to the tank.

Tank 7562 has been sampled and contains residual radioactive and fission products (^{60}Co and ^{137}Cs) plus indications of material from decontamination at the Decontamination Pad for the HRE.

6. SECURITY/PROTECTION SYSTEMS: Tanks 7560 and 7562 are in the ORNL MV Valley restricted area. The area is posted with respect to access restrictions and radiation/contamination zones. The HRE is protected by a fire alarm.

7. SURVEILLANCE ACTIVITIES: See Table A.1.34-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: No routine maintenance is conducted at this site.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No major repairs are deemed necessary prior to decommissioning of the HRE facility.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	10	12	13	13	13	13	13	13	13	13
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	10	12	13	13	13	13	13	13	13	13

Table A.1.34-1. Surveillance activities—HRE Waste Tanks (7560 and 7562)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine surveillance	Monthly	WMRAD[a]	HRE monthly log[b]	130 wh/y[c]
2. Radiological surveillance	As required	EHP[d]	Radiation Protection data base	20 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]HRE = Homogeneous Reactor Experiment.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.

A.1.35 3001 Storage Canal

1. SITE NAME: 3001 Storage Canal.

2. LOCATION: Bldg. 3001 basement west (BV).

3. SERVICE DATES: 1943–1963.

4. STATUS: Inactive; Bldg. 3001, as well as the fuel storage canal, controlled by WMRAD (M. K. Ford).

5. DESCRIPTION:

   (a) Operating History—The canal is a subsurface transfer facility used during OGR operation for fuel slug transfer to an adjacent 3019 reprocessing facility. The canal is extensively contaminated with fission products from ruptured fuel slugs, with the sides of the canal walls increased 11 in. to benefit biological shielding. More recent usage of the canal has been for activation material storage and attenuation studies in water for gamma radiation.

   (b) Physical Description—The canal is an L-shaped pool with dimensions of 77 × 73 × 6 ft and a depth of 10.5 to 11.5 ft. The shielding median is water, which is demineralized with a dual-bed system for maintaining stored materials in a corrosion-free environment. Walkways are provided on both sides of the canal for personnel access with raised walkways to facilitate remote handling working conditions. The area is ventilated by utilization of the OGR cell ventilation system at a negative pressure of a 0.1- to 0.5-in. water column.

   (c) Current Conditions—Most of the activated materials and high-activated sources stored in the canal have been removed through contact-handled methods. Approximately 25,000 Ci of ^{60}Co and 125,000 Ci ^{90}Sr were removed. Sludge from past fuel slug ruptures remain with significant quantities of fission products, transuranics, and RCRA constituents. Also, small cobalt needles that were spilled during a past storage effort are present in an undetermined quantity. The water quality is maintained acceptable for a corrosive-free environment (200,000 to 1,000,000 mho-cm).

   (d) Radiological Hazards—Fission products and transuranics are present in significant quantities both on the canal floor and in the concrete canal walls. Plutonium-239, ^{137}Cs, and ^{90}Sr are the main constituents of the sludge and wall contamination.

6. SECURITY/PROTECTION SYSTEMS: The 3001 Storage Canal is within the ORNL BV secured area. The area is posted with access restrictions and radiation/contamination zones. The facility is protected by a fire alarm and sprinkler system.

7. SURVEILLANCE ACTIVITIES: See Table A.1.35-1 for details of routine maintenance activities.

8. ROUTINE MAINTENANCE: See Table A.1.35-2 for details of routine maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Special Projects for the 3001 storage canal include (1) Canal Hatch Upgrade, (2) Canal Sampling Enhancement Project, and (3) Process Piping Special Maintenance. These tanks will require effort for FY 1993–1995 and are detailed under "Cost and Schedule", Section 10, below.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	132	100	100	100	100	100	100	100	100	100
Maintenance	56	20	20	20	20	20	20	20	20	20
Special Projects	165	200	60	0	0	0	0	0	0	0
Total	353	320	180	120	120	120	120	120	120	120

Table A.1.35-1. Surveillance activities—3001 Storage Canal

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine inspection		WMRAD[a]	LITR[b]—Bldg. 3001 shift check sheet (UCN-10593)	210 wh/y[c]
(a) Containment negative pressure	Daily			
(b) Air blower check	Weekly			
(c) Auxiliary blower	Semiannual			
(d) Canal water level	Daily			
(e) Walkway inspection	Daily			
(f) Demineralizer Solubridge reading	Daily			
(g) Cation column radiation reading	Weekly			
(h) Demineralizer pH, resistance, and counts	Daily			
2. Radiological surveillance		EHP[d]	Radiation Protection data base; Air Monitoring data sheet (UCN-3367)	85 wh/y
(a) Canal surveillance	Weekly			

[a]WMRAD = Waste Management and Remedial Action Division.
[b]LITR = Low-Intensity Test Reactor.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.

Table A.1.35-2. Maintenance activities—3001 Storage Canal

	Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1.	General maintenance and repair	As required	WMRAD/P&E[a,b]	S&M records[c]	85 wh/y[d]
2.	Health Physics maintenance and repair	Quarterly	EHP	Program maintenance records	20 wh/y
3.	Maintenance of overhead crane	Semiannual	P&E	P&E Report 1216	20 wh/y
4.	Maintenance	Annual	WMRAD	S&M records	$5000

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.1.36 Low-Intensity Test Reactor (LITR) Pond

1. SITE NAME: Low-Intensity Test Reactor (LITR) Pond.

2. LOCATION: Northeast of Bldg. 3005 (BV).

3. SERVICE DATES: 1951-1964.

4. STATUS: Inactive; site controlled by WMRAD (M. K. Ford).

5. DESCRIPTION:

   (a) Operating History—The retention ponds were used during the early portion of the LITR operation to serve as holding tanks for process water at the facility. This allowed settling of particulates and allowed ionized particles with short half-lives to decay before dumping into First Creek. The murky water was completely purged from the LITR, and the ponds were established to completely hold the volume of the primary cooling water. In 1964, the ponds were pumped of remaining groundwater and filled with earth.

   (b) Physical Description—The LITR retention ponds were two separate ponds located 350 ft east of the LITR reactor building, with 18,000-gal capacity, dimensions of 2.4 × 14 m, ranging from 1.8 m to 2.4 m deep. The ponds were both lined with limestone, and the stone was covered at the time by earth backfill.

   (c) Current Conditions—The ponds have been drained of reactor water or groundwater and filled with compacted soil. The area around the ponds is not roped off but is appropriately labeled as a regulated area.

   (d) Radiological Hazards—Soil samples of the soil directly under and adjacent to the ponds consist of radionuclides ^{137}Cs, ^{60}Co, ^{90}Sr, ^{238}Pu, and ^{239}Pu, all present in concentrations above established background levels.

6. SECURITY/PROTECTION: The LITR is within the ORNL BV secured area. The ponds are posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: No surveillance is carried out at these ponds.

8. ROUTINE MAINTENANCE: No routine maintenance is conducted at these ponds.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements are anticipated at the LITR through the planning period.

A.1.37 FPDL LLW Transfer Line

1. FACILITY NAME: FPDL LLW Transfer Line.

2. LOCATION: Between FPDL (Bldg. 3517) and Central Avenue collection header (BV).

3. SERVICE DATES: 1958–1986.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—The FPDL LLW Transfer Line was installed in 1958 for transporting low-level radioactive waste from the FPDL to the South Tank Farm for storage subsequent to volume reduction by evaporation and final disposal by hydrofracture. In more recent years, the evaporated waste was retained in tankage after volume reduction. The line was removed from service in 1986 and replaced by a double-contained system.

   (b) Physical Description—The line consists of approximately 317 ft of 1.5-in. single-contained stainless steel pipe. It runs underground from the east end of the FPDL, north and west around Bldg. 3505, to a collection header along Central Avenue.

   (c) Current Condition—The line is believed to be in sound physical condition with no known leaks having occurred.

   (d) Radiological Hazards—On the basis of the usage of the line, it can be assumed that the interior of the pipe is highly contaminated, primarily with ^{90}Sr and ^{137}Cs. Transferable levels have been estimated to exceed 2.5×10^8 dpm/100 cm^2 beta-gamma and the interior radiation level on the order of 5 R/h. Nitric acid has also been transferred but would not likely be present in significant quantities after a flushing operation.

6. SECURITY/PROTECTION SYSTEMS: The LLW line is within the ORNL BV secured area. The surface areas above and around the vicinity of the line are posted with respect to access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: Facilities at either end of the line are under continuous surveillance by Chemical Technology and Environmental and Health Protection division personnel. No additional surveillance is provided for the transfer line.

8. ROUTINE MAINTENANCE: Maintenance of the upstream generating facility (FPDL) and the LLW collection system are provided by the Isotope Production/Surplus Facilities Management Program and the ORNL WM Program, respectively. No additional maintenance is provided for the line.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements should be required prior to decommissioning and excavation.

A.1.38 Waste Storage Tanks W-19 and W-20

1. SITE NAME: Waste Storage Tanks W-19 and W-20.

2. LOCATION: East of Building 3505.

3. SERVICE DATES: 1955–1960.

4. STATUS: Inactive; controlled by WMRAD (G. J. Mandry).

5. DESCRIPTION:

   (a) Operating History—Tanks W-19 and W-20 were originally thought to be associated with the operations of the Metal Recovery Facility, however recent information indicates that they were used in the transfer of liquid waste from Building 3019 to Building 3517.

   (b) Physical Description—Each tank is of stainless steel construction and has a capacity of 2,250 gallons. In addition to the tanks there is an associated valve pit and piping.

   (c) Current Conditions—The tops of the tanks are buried under three feet of soil. They have been rinsed and drained at the time of termination of service and are still currently empty. The extent of structural deterioration is unknown. The valve pit appears to be in good condition.

   (d) Radiological Hazards—Levels are unknown, but since these tanks were used primarily for the transfer and storage of fission products, it is expected that they are highly contaminated internally. The valve pit and associated piping has similar internal contamination.

6. SECURITY/PROTECTION SYSTEMS: Tanks W-19 and W-20 are within the ORNL BV secured area. The tanks are also posted with respect to radiation/contamination area restrictions.

7. SURVEILLANCE ACTIVITIES: See Table A.1.38-1 for details of surveillance activities. Neither tank is equipped with a liquid level gauge. No additional surveillance is provided for these abandoned tanks.

8. ROUTINE MAINTENANCE: No routine maintenance needs have been identified for these tanks.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for decommissioning activities for the inactive waste tanks is currently undefined. Routine S&M will be discontinued when these efforts are initiated. No repairs are anticipated prior to that time.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	1	1	1	1	1	1	1	1	1	1
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1	1	1	1

Table A.1.38-1. Surveillance activities—Waste Storage Tanks W-19, W-20

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Waste tank monitoring				
(a) Visual observation	Weekly	WMRAD	RAS records	12 wh/y

A.1.39 Metal Recovery Facility Canal and Dissolver Pit

1. FACILITY NAME: MRF canal and dissolver pit.

2. LOCATION: Northwestern corner of MRF. The canal is adjacent to the building while the dissolver pit is immediately east of the canal but inside the facility.

3. SERVICE DATES: 1952–1960.

4. STATUS: Inactive, controlled by CTD (K. Haff).

5. DESCRIPTION:

   (a) Operating History—The canal was used as a water-shielded handling facility for irradiated fuel materials which were to be processed by the MRF, and is connected to the dissolver pit by a 3 in. slug chute. Both facilities were removed from service when the MRF suspended operations in 1960.

   (b) Physical Description—The canal is a 6 × 35 × 14 ft deep concrete basin. The dissolver pit is 8 × 10 ft wide, extending 10 feet below grade with aboveground shield blocks and piping connections.

   (c) Current Conditions—Initial decommissioning of both facilities has been performed. The canal currently contains gravel with a sump detection system and has a metal cover. Both the canal and dissolver pit have been stabilized and placed in a monitored, controlled standby condition, awaiting final decommissioning.

   (d) Radiological Hazards—Although both the canal and dissolver pit have been partially decommissioned, significant residual levels of contamination are still present.

6. SECURITY/PROTECTION SYSTEMS: Both facilities are within the ORNL BV secured area, and are also restricted with respect to radiation/contamination area postings.

7. SURVEILLANCE ACTIVITIES: See Table A.1.39-1 for details of surveillance activities. The liquid level in the dissolver pit and canal is monitored weekly.

8. ROUTINE MAINTENANCE: No routine maintenance needs have been identified for the canal. The dissolver pit routinely collects MRF rainwater inleakage and needs to be pumped out approximately every 2 years.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The schedule for final decommissioning activities for the inactive waste tanks (which includes the canal and dissolver pit) is currently undefined. Routine S&M will be discontinued when these efforts are initiated. The canal cover may require another application of paint for contamination control purposes. No other repairs are anticipated.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	5	5	5	5	5	5	5	5	5
Maintenance	0	0	0	0	0	5	0	0	0	0
Total	5	5	5	5	5	10	5	5	5	5

Table A.1.39-1. Surveillance activities—MRF Canal and Dissolver Pit

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Canal monitoring				
(a) Sump liquid level	Weekly	CTD	CTD records	26 wh/y
(b) Visual observation	Daily	CTD	CTD records	5 wh/y
2. Dissolver pit monitoring				
(a) Liquid level	Weekly	CTD	CTD records	26 wh/y

A.2 WAG—S&M (EX)

A.2.1 0800 Environmental Study Area (SWMU 13.1)

1. SITE NAME: 0800 Environmental Study Area (SWMU 13.1).

2. LOCATION: The study area is located north of the Clinch River about 330 ft at mile 20.5 on an azimuth south 1.5 miles from the intersection between Bethel Valley Road and State Highway 95 (ORNL grid coordinates N 17,480 and E 20,370).

3. SERVICE DATES: 1966–1983.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—A large field study was commissioned in 1966 because of civil defense interests in postattack survival. A 5-acre area was fenced in a fescue grassland community, and eight 100-m^2 enclosures (pens) were constructed. In August 1968, four of the enclosures were contaminated and four remained as controls. The contaminant consisted of ^{137}Cs fused at high temperatures to silica particles. The particle size distribution was selected to simulate particle diameters characteristic of weapons fallout. During the period of observation, samples of vegetation clippings and soil cores were removed from the enclosures, analyzed, and disposed of elsewhere. Other experiments were carried out both inside and outside the chain link fence through the years, the last being a pasture contamination study to assess the transfer of radioisotopes from forage grass to milk in goats. Each of these experiments utilized short half-life isotopes, which have since decayed to nondetectable limits.

   (b) Physical Description—The 0800 Environmental Study Area consists of 5 acres enclosed with an 8-ft chain link fence and cross-fenced with a 3-ft chain link fence separating a third of the area. There are three equipment gates and two pedestrian gates to provide access to the area. There is also a trailer previously used as a laboratory and a storage shed used as a barn during the goat milk project.

   (c) Current Condition—The area has been cleared of residue from the past projects. Vegetation is maintained in an acceptable condition, and warning signs are maintained on the perimeter fence. Electrical power has been removed from the site.

   (d) Radiological Hazards—Soil samples indicate some contamination has migrated from the plots. Although dose rates at the perimeter fencing are close to negligible, concerns about public access to these pens with elevated radioactivity readings have been expressed. Twenty-four years have passed since the pens were contaminated. Correcting for radiological decay, less than 5 Ci of radioactivity would remain today, assuming no particle losses due to weathering, runoff, wind transport, etc.

6. SECURITY/PROTECTION SYSTEMS: The site is reached by an access and patrol road fitted with a locked bar gate on off shifts. The site is surrounded by an 8-ft chain link fence topped by three barbed-wire strands. All gates in this fence are locked at all times.

7. SURVEILLANCE ACTIVITIES: See Table A.2.1-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.1-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	24	26	28	28	28	28	28	28	28	28
Maintenance	33	33	33	33	33	33	33	33	33	33
Total	57	59	61	61	61	61	61	61	61	61

Table A.2.1-1. Surveillance activities—0800 Area

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	340 wh/y[c]
2. Routine radiation survey	Semiannual	EHP[d]	Radiation Protection data base	40 wh/y
3. Routine soil sampling	Semiannual	EHP/ACD[e]	S&M log	80 wh/y, $6000
4. Groundwater well sampling	Semiannual	EHP	Environmental Monitoring data base	*f*
5. Security patrol	Daily	LP[g]	Daily log	*f*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Analytical Chemistry Division.
[f]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[g]LP = Laboratory Protection.

Table A.2.1-2. Maintenance activities—0800 Area

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	580 wh/y[d]
(b) Minor repairs (signs, fence, etc.)	As required	WMRAD/P&E	S&M log	80 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.2 Closed Contractor's Landfill (7658)

1. SITE NAME: Closed Contractor's Landfill (7658).

2. LOCATION: 1.4 miles east-southeast of the main plant area at intersection of MV Access Road and Ramsey Drive.

3. SERVICE DATES: Early 1960s to 1975.

4. STATUS: Inactive; controlled by WMRAD (L. Holder, Jr.). Temporary storage area for P&E Division.

5. DESCRIPTION:

   (a) Operating History—The road into the area was built in the 1960s, and the landfill area at the top of the hill (north) was opened at this time. In the mid-1960s the area on top of the hill was closed, and the landfill area at the bottom of the hill was opened. In 1975 when another landfill was opened, the Contractor's Landfill was closed. The landfill was then graded level and seeded. Ramsey Drive was later built over outcroppings of the southernmost part of the landfill. When the pavement in these areas collapsed, the buried material was dug up, moved to the northern part of the site, and replaced with fill dirt to support the road.

   (b) Physical Description—The site is ~3 acres and is ~500 ft long and 260 ft wide. The original land surface sloped from north to south so that the depth of fill probably ranges from less than 6 ft on the north side to ~30 ft on the south.

   (c) Current Condition—The site has a gravel surface and is presently used as aboveground storage for noncontaminated scrap metal dumpsters.

   (d) Radiological Hazards—Records indicate that the Closed Contractor's Landfill does not represent a source of release of radioactive or hazardous materials. Aerial and walkover radiation surveys have not detected radiation levels above background. No visible leakage or seeps have been observed or documented.

6. SECURITY/PROTECTION SYSTEMS: The Contractor's Landfill is located in a limited access area in MV.

7. SURVEILLANCE ACTIVITIES: See Table A.2.2-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: No maintenance activities are conducted or anticipated.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: None.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	6	7	8	8	8	8	8	8	8	8
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	6	7	8	8	8	8	8	8	8	8

Table A.2.2-1. Surveillance activities—Closed Contractor's Landfill

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	EHPD[a]	S&M checklist[b]	120 wh/y[c]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.

A.2.3 Decontamination Facility (7819) Transfer Line Leak Site

1. SITE NAME: Decontamination Facility (7819) Transfer Line Leak Site.

2. LOCATION: The leak occurred approximately 150 ft south of Lagoon Road on a line south of Bldg. 7819.

3. LEAK DATE: First indication of a leak was 1968–69 when trees began dying. The transfer line was in operation from 1964 through 1970.

4. STATUS: Inactive; this area is under the control of WMRAD (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—An underground 6-in. vitrified clay pipeline extended from the decontamination facility (7819) southward beneath Lagoon Road to Pit 1 (a storage basin for liquid waste). This building was used for decontaminating equipment (i.e., isotope carriers from laboratories and hot cells) during the mid-1960s through the early 1970s. The first indication of the transfer line leak was when trees began dying in areas where drainage could accumulate along the line. It is believed this toxic effect was due to strong acids and/or alkalies that were used in the decontamination operations.

   (b) Physical Description—The area has now returned to its natural state—overgrown with vegetation. It is identified as a restricted area by fences and radiation hazard signs.

   (c) Current Condition—In 1983, ~40 ft of the transfer line of vitrified pipe to Pit 1 was excavated during the SWSA 4 surface runoff diversion project. About 200 ft^3 of contaminated soil and pipe sections were disposed of in SWSA 6. The exposed pipe ends were plugged in situ, as was the outdoor drain north of Bldg. 7819, to prevent further leaking of contaminants. The site has not been disturbed since that time.

   (d) Radiological Hazards—During an August 1986 scoping survey of the site, ^{137}Cs and ^{90}Sr were identified as the primary radionuclides in soil samples. The wastes that flowed through this line consisted of soaps, chelating agents, oxalates, nitric acid, alkalies, caustics, and radioactive wastes associated with decontamination procedures. A scoping survey in February 1987 identified a region near the pipe site with 20 mrad/h contamination and two other regions with 4 mrad/h each.

6. SECURITY/PROTECTION SYSTEMS: This leak site is in Melton Valley and is accessible during daylight hours via Chemical Waste Area Access Road through a badge-operated automatic gate (Post 24). It is surrounded by a barbed wire fence with warning signs at regular intervals. During nonworking hours, it is within the ORNL limited access area.

7. SURVEILLANCE ACTIVITIES: See Table A.2.3-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.3-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: The leak site will be evaluated during the remedial investigation/feasibility study (RI/FS) process planned for the ORNL RA program, and a plan for final closure will be developed. During the interim period, anticipated repairs, to be conducted as required, include continuation of the fence line on the west and south sides of the perimeter. Improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	5	6	7	7	7	7	7	7	7	7
Maintenance	2	2	2	2	2	2	2	2	2	2
Total	7	8	9	9	9	9	9	9	9	9

Table A.2.3-1. Surveillance activities—7819 Transfer Line Leak Site

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspection	Weekly	WMRAD[a]	S&M checklist[b]	45 wh/y[c]
2. Radiation survey	Semiannual	EHP[d]	Radiation Protection data base	55 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.

Table A.2.3-2. Maintenance activities—7819 Transfer Line Leak Site

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Minor sign/fence repair	As required	WMRAD/P&E[a,b]	S&M log[c]	40 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.4 HFIR/TRU Waste Collection Basins (7906, 7907, and 7908)

1. SITE NAME: HFIR/TRU Waste Collection Basins (7906, 7907, and 7908).

2. LOCATION: Basin 7906 lies due south of the High Flux Isotope Reactor (HFIR), and Basins 7907 and 7908 are adjacent to it on a line west-southwest. These ponds are all located in the MV, ORNL facilities complex.

3. SERVICE DATES: 1965 to April 1989.

4. STATUS: Inactive; expected to be transferred to WMRAD during FY-1993.

5. DESCRIPTION:

   (a) Operating History—TRU basins 7907 and 7908 were constructed to receive process waste streams from the Thorium-Uranium Facility (TURF) and the Transuranic Processing Facility (TRU) at ORNL. Process wastes consisted of process cooling water, laboratory discharges, water from cell shields, and discharges from miscellaneous building sinks, hoods, and floor drains. Basin 7906 also received waste streams from the HFIR facility and was referred to as the HFIR "hot" pond. The basin received wastes that were suspected of containing radioactivity as well as diverted effluent from the TRU and TURF facilities.

   (b) Physical Description—Basins 7907 and 7908 are identical in size and shape. Each pond is 60 × 80 ft at the top of the berm with a depth of approximately 11 ft and a capacity of 50,000 gal. Basin 7906 is much larger measuring 167 × 116 ft with a 7-ft depth and is capable of storing 500,000 gal. The ponds are unlined, earth-bermed and open, with gravel riprap along the basin walls.

   (c) Current Condition—The impoundments appear to be generally well maintained. However, a pump station located next to the ponds was recently found to contain standing water, possibly indicative of leaks.

   (d) Radiological Hazards—Radiological characterization performed in 1986 of Basins 7907 and 7908 sediment obtained negligible values for gross alpha and gross beta ~30 Bq/g. Basin 7906 sediments indicated limited radionuclide content. A 1990 scoping survey located contaminated soil and vegetation in the drainage south of the basins.

6. SECURITY/PROTECTION SYSTEMS: Basins 7906, 7907, and 7908 are contained within the HFIR facility security fence in MV.

7. SURVEILLANCE ACTIVITIES: See Table A.2.4-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.4-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements are anticipated at this time to the impoundment. The site will be evaluated during the RI/FS process planned for ORNL RA program and a plan for final closure developed. During the interim period, improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	13	14	15	15	15	15	15	15	15	15
Maintenance	7	7	7	7	7	7	7	7	7	7
Special Projects	70	0	0	0	0	0	0	0	0	0
Total	90	21	22	22	22	22	22	22	22	22

Table A.2.4-1. Surveillance activities—7906, 7907, and 7908 Basins

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Site inspection	Weekly	WMRAD[a]	S&M checklist[b]	85 wh/y[c]
2. Safety inspection	Semiannual	WMRAD	Memo	10 wh/y[d]
3. Radiological surveillance	As required	EHP[e]	Radiation Protection Section data base	20 wh/y
4. Groundwater surveillance	Semiannual	EHP	Environmental Monitoring Section data base	
(a) Monitoring wells sampling/reporting		EHP		90 wh/y[d]
5. Waste Management Operations	As needed	WMRAD		55 wh/y
6. Routine security patrol	Daily	LP[f]	Daily security	*d*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[e]EHP = Environmental and Health Protection.
[f]LP = Laboratory Protection.

Table A.2.4-2. Maintenance activities—7906, 7907, and 7908 Basins

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. General maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	140 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.5 Equalization Basin (3524)

1. SITE NAME: Equalization Basin (3524).

2. LOCATION: The Equalization Basin Site is on the southeast corner of the intersection of Third Street and White Oak Avenue at ORNL coordinates N 21,725 and E 31,000.

3. SERVICE DATES: 1945 to April 1989.

4. STATUS: Inactive; expected to be transferred to WMRAD during FY-1993.

5. DESCRIPTION:

   (a) Operating History—The 3524 pond formerly received process wastes from BV facilities, but on occasion some wastes were received from MV facilities. It has functioned as an intermediate storage, collection, and mixing basin for the process waste treatment system located in Bldg. 3544. Process waste streams were primarily effluents that contained traces of metals and solvents with little radioactivity.

   (b) Physical Description—The equalization basin is an unlined natural clay basin measuring 95 × 250 ft, with a maximum depth of 6.5 ft, and is capable of storing 1 million gal. The basin was constructed in two stages and has a nonuniform depth. During expansion of the western half, rock outcroppings prevented complete excavation.

   (c) Current Condition—A ^{82}Br tracer experiment in 1986 revealed the presence of several rapid leak paths from the equalization basin. Evaluation of the tracer samples and independent leak flow measurements indicated the leakage was probably on the order of 10 gpm. In 1989, all process waste that formerly entered the equalization basin was diverted to the BV process waste storage tanks.

   (d) Radiological Hazards—Sediment core samples analyzed in 1984 indicated an estimated total of 150 Ci of activity, of which 87% was contributed by two radionuclides, ^{137}Cs (102 Ci) and ^{90}Sr (29 Ci). However, the 1987 total inventory estimate was 75 Ci, with 45 Ci ^{137}Cs and 23 Ci ^{90}Sr. These differences were considered "not unusual."

6. SECURITY/PROTECTION SYSTEMS: The 3524 pond is within the ORNL main plant security fence. The site itself is surrounded by a wire screen fence on the peak of the berm and a 3-ft wire mesh attached to the fence posts. In addition, plastic monofilament has been fixed to the posts in a north-south direction to discourage waterfowl attempts at pond landings and to lessen the chance of introducing contaminated animals into the food chain.

7. SURVEILLANCE ACTIVITIES: See Table A.2.5-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.5-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Other than the replacement of the monofilament line, no repairs or improvements are anticipated at this time to the impoundment. The site will be evaluated during the RI/FS process planned for ORNL RA program, and a plan for final closure will be developed. During the interim period, improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	78	79	80	80	80	80	80	80	80	80
Maintenance	12	12	12	12	12	12	12	12	12	12
Total	90	91	92	92	92	92	92	92	92	92

Table A.2.5-1. Surveillance activities—3524 Basin

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Site inspection	Weekly	WMRAD[a]	S&M checklist[b]	55 wh/y[c]
2. Safety inspection	Semiannual	WMRAD	Memo	5 wh/y[d]
3. Radiological surveillance	As required	EHP[e]	Radiation Protection data base	10 wh/y
4. Groundwater surveillance	Semiannual	EHP	Environmental Monitoring data base	
(a) Monitoring wells sampling/reporting		EHP		90 wh/y[d]
5. Waste Management Operations	Continuous/ as needed	WMRAD	WOCC records[f]	1400 wh/y
(a) Pumping leakage back into basin				
6. Routine security patrol	Daily	LP[g]	Daily security	*d*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[e]EHP = Environmental and Health Protection.
[f]WOCC = Waste Operations Control Center.
[g]LP = Laboratory Protection.

Table A.2.5-2. Maintenance activities—3524 Basin

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. General maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	240 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.6 Basins 3539 and 3540 (190 Process Ponds)

1. SITE NAME: Basins 3539 and 3540 (190 Process Ponds).

2. LOCATION: Basins 3539 and 3540 are located south of Bldg. 3584 and east of Holding Basin 3513. The approximate ORNL grid coordinates are N 21,300 and E 31,300.

3. SERVICE DATES: 1964 to April 1989.

4. STATUS: Inactive; expected to be transferred to WMRAD during FY-1993.

5. DESCRIPTION:

   (a) Operating History—The two 190 Process Waste Ponds are paired surge basins, designed to receive process waste streams from the Bldg. 4500 complex. Waste streams were split into the basins and monitored for radionuclide content before discharge into either WOC or the 3524 Equalization Basin. The basins were operated in such a manner that when one pond was filling the other was empty or in the process of being emptied. The pond's design prevented overfilling with the overflow routed to Basin 3524. Wastes were derived from floor drains, laboratory drains, steam condensates and process vessel cooling waters. The processes that generated these wastes included reactor operations, isotope processing, hot cell operations, and research and development.

   (b) Physical Description—Each pond measures 60 × 85 ft at the top of the berm and has a maximum depth of 8 ft. The sides are lined with limestone riprap sloping at 1 vertical on 1.5 horizontal. A 6-in.-thick compacted clay liner serves as the bottom for each basin. The capacity of each basin is 150,000 gal.

   (c) Current Condition—The basins appear to be reasonably well maintained with the sidewalls structurally sound. The sludge in the bottom ranges from 2 to 4 in.

   (d) Radiological Hazards—Gross radiological characterization completed in 1986 on both basins indicated sediments contained less than 100 Bq/g of ^{137}Cs and ^{60}Co. Gross alpha and beta were less than 15 Bq/g.

6. SECURITY/PROTECTION SYSTEMS: The 190 Pond site is within the ORNL main plant security fence. The site itself is surrounded by a chain with appropriate signs in place.

7. SURVEILLANCE ACTIVITIES: See Table A.2.6-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.6-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements are anticipated at this time to the impoundment. The site will be evaluated during the RI/FS process planned for ORNL RA program, and a plan for final closure will be developed.

During the interim period, improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	16	17	17	17	17	17	17	17	17	17
Maintenance	1	1	1	1	1	1	1	1	1	1
Total	17	18	18	18	18	18	18	18	18	18

Table A.2.6-1. Surveillance activities—190 Process Waste Basins (3539 and 3540)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Site inspection	Weekly	WMRAD[a]	S&M checklist[b]	205 wh/y[c]
2. Safety inspection	Semiannual	WMRAD	Memo	5 wh/y[d]
3. Radiological surveillance	As required	EHP[e]	Radiation Protection data base	20 wh/y
4. Groundwater surveillance	Semiannual	EHP	Environmental Monitoring data base	
(a) Monitoring wells sampling/reporting		EHP		90 wh/y
5. Routine security patrol	Daily	LP[f]	Daily security	*d*

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]Costs are included in ORNL overhead charges. No WAG S&M funding is required.
[e]EHP = Environmental and Health Protection.
[f]LP = Laboratory Protection.

Table A.2.6-2. Maintenance activities—190 Process Waste Basins (3539 and 3540)

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. General maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	20 wh/y[d]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.7 Chestnut Ridge ^{137}Cs Plots

1. SITE NAME: Chestnut Ridge ^{137}Cs Plots.

2. LOCATION: Both plots are located on the crest of Chestnut Ridge. In relation to Bldg. 2001 at ORNL, one is 0.8 mile on an azimuth of S 84 W and the other 1.55 miles on an azimuth of N 49 E.

3. SERVICE DATES: June 1969 thru December 1970.

4. STATUS: Inactive; controlled by WMRAD. (L. Holder, Jr.).

5. DESCRIPTION:

   (a) Operating History—A study of annual and seasonal consumption of eastern white pine seeds by populations of small forest animals was conducted for a total of 58 weeks in the ^{137}Cs plots. A total of 59 kg of pine seed tagged with 71 mCi of ^{137}Cs and 554 mCi of ^{60}Co was used for this experiment. The plots were abandoned at the termination of the study in 1970.

   (b) Physical Description—Each plot is laid out on a 15 × 15 grid, 10 m between points. Each plot occupies about 4.8 acres.

   (c) Current Condition—Very little remains of the experiment materials. There is an occasional aluminum stake that was used to locate the grid points or to hold feeders in place. Other than an occasional stake, both plots retain the appearance of an undisturbed forest.

   (d) Radiological Hazards—A complete survey of the plots has been conducted; and preliminary probing indicated some hot spots at the feeder sites, most of which is attributed to the longer half-life of ^{137}Cs (30 years) rather than ^{60}Co, whose half-life is 5.8 years. Most contamination levels are below 0.1 mrad/hr.

6. SECURITY/PROTECTION SYSTEMS: Both plots have been roped off to exclude hunters and the public from the area. "No Hunting" and "Radiation Warning" signs are in place. The plots are on the reservation but outside the limited access fences. A planned FY-1992 project will erect a security-type fence around each plot.

7. SURVEILLANCE ACTIVITIES: See Table A.2.7-1 for a description of surveillance activities.

8. ROUTINE MAINTENANCE: See Table A.2.7-2 for a description of maintenance activities.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: Improvements to these plots include a fence to be installed to replace the rope that is presently in place. The site will be evaluated during the RI/FS process planned for ORNL RAP, and a plan for final closure will be developed. During the interim period, improvements will be made as determined necessary by evaluation of surveillance program data.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	15	22	24	24	24	24	24	24	24	24
Maintenance	3	3	3	3	3	3	3	3	3	3
Special Projects	225	0	0	0	0	0	0	0	0	0
Total	243	25	27	27	27	27	27	27	27	27

Table A.2.7-1. Surveillance activities—Chestnut Ridge ^{137}Cs Plots

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Site inspection	Weekly	WMRAD[a]	S&M checklist[b]	280 wh/y[c]
2. Radiological surveillance				
(a) Surveys for grounds maintenance	As required	EHP[d]	Radiation Protection data base	10 wh/y[e]
(b) Routine radiation survey	As required	EHP	Environmental Monitoring data base	10 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.
[d]EHP = Environmental and Health Protection.
[e]Costs are included in ORNL overhead charges. No WAG S&M funding is required.

Table A.2.7-2. Maintenance activities—Chestnut Ridge ^{137}Cs Plots

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine maintenance				
(a) Vegetation maintenance	As required	WMRAD/P&E[a,b]	S&M log[c]	50 wh/y[d]
(b) Minor repairs (fence, signs, etc.)	As required	WMRAD/P&E	S&M log	10 wh/y

[a]WMRAD = Waste Management and Remedial Action Division.
[b]P&E = Plant and Equipment.
[c]S&M = surveillance and maintenance.
[d]wh/y = work-hours per year.

A.2.8 White Oak Creek Embayment Sediment Control Site

1. FACILITY NAME: White Oak Creek Embayment Sediment Control Site.

2. LOCATION: Terminus of White Oak Creek (WOC) at Clinch River.

3. SERVICE DATES: Operation is scheduled to begin toward the end of FY 92.

4. STATUS: At this writing, the construction phase has not been completed and ORNL has not accepted ownership or charge for S&M of this facility.

5. DESCRIPTION:

   (a) Operating History—WOC Embayment Sediment Control Site will not begin operation until late in FY-92.

   (b) Physical Description—The facility consists of a sheetpile cell structure constructed across WOC with wing walls, also of sheetpile, tied to the cell and the creek banks on each side. Riprap was machine-placed on the banks and creek bottom to protect the facility from erosion and scour during high-flow events. Gabions were placed on top of the cell to retard velocities from discharge pools. In addition, gabions were placed in the creek bottom upstream of the structure to moderate surges during times of heavy rainfall.

   (c) Current Condition—Since the structure is still under construction, it is obviously in new condition.

   (d) Radiological and Chemical Hazards—Unknown quantities of contamination are present in the creek bed sediment, and the structure is designed to retain this contamination from discharge into the Clinch River. There is no chemical hazard associated with this structure.

   (e) Occupancy—The structure is located in a remote area of the reservation near the 0800 Site, also under the control of WMRAD.

6. SECURITY/PROTECTION SYSTEMS: The structure is totally enclosed by a chain link fence, with access gates on each side of the creek. The gates are locked, and the key is under the control of WMRAD. Signs are posted at regular intervals, including on the Clinch River outfall side, to warn visitors of access restrictions and radiation/contamination zones.

7. SURVEILLANCE ACTIVITIES: See Table A.2.8-1 for details of surveillance activities.

8. ROUTINE MAINTENANCE: No routine maintenance activities are conducted at this site.

9. ANTICIPATED REPAIRS/IMPROVEMENTS: No repairs or improvements are foreseen at this new facility.

10. COST AND SCHEDULE:

Task	Fiscal year cost ($K)									
	93	94	95	96	97	98	99	00	01	02
Surveillance	48	50	53	53	53	53	53	53	53	53
Maintenance	0	0	0	0	0	0	0	0	0	0
Total	48	50	53	53	53	53	53	53	53	53

Table A.2.8-1. Surveillance activities—White Oak Creek Embayment Sediment Control Site

Activity	Frequency	Responsibility	Documentation	Staffing/ resource requirements
1. Routine site inspections (to satisfy RCRA regulations)	Weekly	WMRAD[a]	S&M log[b]	960 wh/y[c]

[a]WMRAD = Waste Management and Remedial Action Division.
[b]S&M = surveillance and maintenance.
[c]wh/y = work-hours per year.

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