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Annual Report of Decommissioning and Remedial Action S&M Activities for the Environmental Management Program at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Fiscal Year 1997

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LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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Commodore Advanced Sciences, Inc.

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

ORNL/ER-426

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Fiscal Year 1997

Date Issued—November 1997

Prepared by
Commodore Advanced Sciences, Inc.
Oak Ridge, Tennessee
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OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
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LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
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PREFACE

This *Annual Report of Decommissioning and Remedial Action S&M Activities for the Environmental Management Program at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Fiscal Year 1997* (ORNL/ER-426) was prepared to communicate the Surveillance and Maintenance accomplishments of the Environmental Management Program at Oak Ridge National Laboratory during fiscal year 1997.

This document was prepared under Work Breakdown Structure 1.4.12.6.1.14.01.04.10.05, Activity Data Sheet 3300W. Publication of this document meets the life cycle baseline milestone date of November 26, 1997. This document provides the accomplishments for both the Remedial Action and Decommissioning Surveillance and Maintenance projects.

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ABBREVIATIONS

D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
FFA	Federal Facility Agreement
FY	fiscal year
HEPA	high-efficiency particulate air (filter)
LITR	Low Intensity Test Reactor
LLLW	liquid low-level (radioactive) waste
OGR	Oak Ridge Graphite Reactor
OHF	Old Hydrofracture Facility
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Research Reactor
PWTP	Process Waste Treatment Plant
RA	remedial action
RCRA	Resource Conservation and Recovery Act
S&M	surveillance and maintenance
TDEC	Tennessee Department of Environment and Conservation
WAG	waste area grouping
WOCC	Waste Operations Control Center

EXECUTIVE SUMMARY

The Oak Ridge National Laboratory (ORNL) Surveillance and Maintenance (S&M) Program performs a variety of activities to ensure that sites and facilities within its responsibility remain in a safe condition and in compliance with applicable regulations. All S&M Program activities during fiscal year (FY) 1997 were accomplished safely, with no health and safety incidents, no lost work days, and no environmental noncompliances. In addition, all activities were performed within schedule thresholds and under budget.

Many remedial action (RA) sites and decontamination and decommissioning (D&D) facilities are inspected and maintained by the S&M Program. RA sites encompass approximately 650 acres and 33 D&D facilities, including 4 inactive reactors. During FY 1997, routine, preventative, and emergency maintenance activities were performed as needed at these sites and facilities. Stabilization activities were also performed to reduce risks and reduce future S&M costs.

Major activities at the RA sites during FY 1997 included maintaining proper liquid levels in surface impoundments and inactive liquid low-level waste storage tanks as well as installing a new cover at the tumulus pads in Waste Area Grouping (WAG) 6, planting trees in the First Creek Riparian Corridor, and performing over 900 well inspections.

Postremediation monitoring was conducted at the 3001 Canal, Core Hole 8, the WAG 6 Resource Conservation and Recovery caps, and WAG 5 Seeps C and D; groundwater monitoring was performed in WAGs 4, 5, and 6 and at the 3001 Canal Well.

At ORNL D&D facilities, significant accomplishments included contaminated lead brick removal, asbestos abatement, contaminated equipment and debris removal, and radiologically contaminated area painting.

Stabilization projects during FY 1997 included grouting the 3001 Canal, stabilizing three basins in the Well Driller's Steam Cleaning Area, removing ten thorium storage wells, demolishing the Low Intensity Test Reactor Heat Exchanger, and preparing the site for dismantling the Old Hydrofracture Facility storage bins and water tank.

1. OVERVIEW

The objective of the Oak Ridge National Laboratory (ORNL) Surveillance and Maintenance (S&M) Program is to implement actions that ensure Environmental Management Program remedial action (RA) sites and decontamination and decommissioning (D&D) facilities remain in compliance with established criteria that protect human health, the environment, and associated U.S. Department of Energy (DOE) assets. The major activities are periodic inspections, correction of deficiencies, and performance of activities to limit liability and to reduce the number and frequencies of inspections. In addition, one-time stabilization activities are implemented for overall cost and/or risk reduction. A complete listing of S&M sites and facilities is provided in Appendix A.

The ORNL S&M Program is accomplished through the Decommissioning S&M Project and the RA S&M Project.

Decommissioning S&M responsibilities encompass 33 facilities that include 4 inactive reactors, radiochemical processing facilities, 13 hot cells within 3 facilities, and technology development facilities. The majority of the ORNL facilities managed by the D&D Program are awaiting the decommissioning phase and have been inactive for 11 to 26 years. Because of this time lapse and the inactive status of these sites, some structural deterioration has occurred. This degradation has taken the form of metal corrosion, roof leaks, accumulation of debris, etc. Conversion of these facilities to a safe-storage condition is currently underway. Safe storage includes the removal of hazardous and externally contaminated radioactive substances from the facilities. In addition, the facilities are observed and/or monitored so that corrective measures may be taken for any health, safety, or environmental concerns identified.

RA S&M responsibilities encompass approximately 650 acres that include 16 waste area groupings (WAGs), 206 solid waste management units, over 2000 groundwater monitoring wells, 38 inactive tanks, 10 impoundments, and several leak and contaminated sites. The ORNL RA S&M Program was initially established to manage historically contaminated inactive sites from the time of their discovery until the initiation of RA. These sites are typically contaminated with radioactive materials and/or hazardous chemicals. Several RA sites are in the S&M Program as a result of postremedial agreements contained in site Federal Facility Agreement (FFA) for the Oak Ridge Reservation and Resource Conservation and Recovery Act (RCRA) permits.

The ORNL S&M Program successfully implemented, within schedule thresholds and under budget, both the RA S&M and the Decommissioning S&M projects. All fiscal year (FY) 1997 S&M activities were accomplished safely, with no health and safety incidents, no lost work days, and no environmental noncompliances.

FY 1997 ORNL S&M activities were accomplished under an Incentive Task Order contract with DOE. This contract is for the period October 1996 through March 1998. Although only three performance incentive deliverables for this contract were scheduled for completion in FY 1997, five of six negotiated performance incentive deliverables were achieved. The completed deliverables are as follows:

- completed the 3001 Canal removal action, and submitted the Removal Action Report;
- completed the Well Driller's Steam Cleaning Area stabilization;

- completed the Storm Drain Survey/ Closures;
- decreased the radiological footprint by painting radiologically contaminated areas; and
- completed the Oak Ridge Research Reactor (ORR) alarm modification to allow remote monitoring from the Waste Operations Control Center (WOCC).

ORNL S&M activities were accomplished through an integrated team approach composed of Lockheed Martin Energy Systems Inc., Lockheed Martin Energy Research Corp., and subcontractor personnel. Consistent with program direction, activities were subcontracted as much as possible. New subcontracts were negotiated on a fixed-price basis incorporating incentives where appropriate.

Significant cost savings were realized in FY 1997 due to reduced inspection, sampling and analysis, and instrumentation maintenance quantities and frequencies resulting from a reevaluation of drivers and a reduction of requirements. These cost savings were used within the S&M Program to partially fund three additional scope activities: stabilization of ten thorium storage wells, dismantlement of the Low Intensity Test Reactor (LITR) Heat Exchanger, and dismantlement of the Old Hydrofracture Facility (OHF) bins. While effectively accommodating changing scope and funding scenarios throughout the year, the S&M Program successfully used 99.6% of total available funding.

The Decommissioning S&M Project implemented a detailed prioritization system for maintenance activities at D&D facilities. Necessary maintenance activities identified during site inspections were prioritized based on the activity's impact on correcting a health and safety concern, maintaining compliance, achieving established milestones, furthering stabilization of the facility, reducing future cost and/or risk, and maintaining the integrity of the facility. This system ensured the successful completion of the highest priority maintenance activities within budget constraints.

Memorandums of Understanding were implemented with building occupant divisions for cost sharing of building maintenance, utilities, and radiological surveys. These Memorandums of Understanding provide a more equitable distribution of costs to the S&M Program.

A summary of significant ORNL S&M Program accomplishments for FY 1997 is presented in Table 1.

Table 1. Significant S&M Program accomplishments during FY 1997

- Stabilized the 3001 Canal to eliminate concerns about contaminated water leaking into the environment and to reduce future S&M costs. The return on the investment is less than 2 years.
- Stabilized three basins in the Well Driller's Steam Cleaning Area to reduce S&M costs. The return on the investment is less than 1 year.
- Excavated and removed ten thorium storage wells, and recommended the site for reclassification to no further investigation/action under the FFA.
- Dismantled the LITR Heat Exchanger (Bldg. 3077), eliminating a safety concern and removing the site from Appendix C of the FFA.
- Completed all site preparation activities for the dismantlement of the OHF storage bins and water tank, which will eliminate a safety concern.
- Terminated scheduled inspections and repair of the WAG 6 RCRA caps with the concurrence of the Tennessee Department of the Environment and Conservation (TDEC), resulting in a cost savings of approximately $224,000 annually.
- Implemented a new postremediation water monitoring program for WAGs 4, 5, and 6 and the 3001 Canal well via fixed-price subcontracting. This monitoring program was successfully performed until responsibilities were transferred to the Integrated Water Quality Program.
- Replanted trees at First Creek, and submitted the *1996 First Creek Planting and Riparian Corridor Annual Report* to DOE and TDEC in February 1997.
- Completed a comprehensive survey of all connections to storm drain systems per federal court order. A total of 631 drains were visually inspected, 144 drains were plugged, and 46 drains were dye tested. All activities were completed within 6 months.
- Removed 425 bags of deteriorating, friable asbestos from the open, outdoor 3102 Heat Exchanger pit to minimize environmental, safety and health concerns.
- Removed approximately 800 ft^3 of contaminated equipment and debris from the first and second floors of the High Radiation Level and Chemical Development Lab (Bldg. 4507).
- Painted more than 27,000 ft^2 of radiologically contaminated areas to reduce future Health Physics surveillance and costs.

2. PROGRAM AND FACILITY MANAGEMENT

S&M Program management and facility operations include those activities supporting the programmatic, business, administrative, and strategic management of the ORNL S&M Program. Specific activities include program planning, performance assessment reporting, environmental compliance planning and reporting, facility safety documentation maintenance, waste management planning, health and safety planning, quality assurance planning, procedures maintenance, data management, self-assessments, and audit support.

2.1 SAFETY DOCUMENTATION

Safety documentation for RA sites and D&D facilities were upgraded throughout the year. A Nuclear Criticality Safety Assessment for Keuring van Electrotechnishe Materialen fuel in a well was completed in July 1997. To determine the need for Nuclear Criticality Safety Assessments or requests for exemptions to DOE orders at other disposal sites (such as wells and trenches in WAGs 4, 5, 6, and 7 and waste pits in WAGs 5 and 7), work was initiated in FY 1997 to gather historical disposal information.

Auditable Safety Analysis documents were also prepared throughout the year. These documents integrate the requirements of preliminary hazard screening documents, hazard screening documents, and limiting condition documents into one document for each D&D facility complex. Auditable Safety Analysis documents were prepared during FY 1997 for the Oak Ridge Graphite Reactor (OGR) facility, the ORR facility, the Metal Recovery Facility, LITR, OHF, the Homogeneous Reactor Experiment facility, the Interim Decontamination Bldg. (7819), the Fission Product Pilot Plant, and the High Radiation Level and Chemical Development Lab. As of the end of FY 1997, three Auditable Safety Analyses have been approved and issued; the others are currently in review.

2.2 PROCEDURE REVISIONS

During FY 1997, drivers for inspections were reevaluated, and procedures revised to effect significant reductions in the quantities and frequencies of surveillance. Other procedures were reviewed and updated or canceled when no longer appropriate or necessary.

A new effort was initiated in FY 1997 to use process flow diagraming methods to clarify procedure requirements instead of tabular response dialogue, which can be confusing to follow with complex systems. Process flow diagrams of the response to facility alarms were prepared for incorporation into the revised Responding to Abnormal Conditions procedure (EMEF/ER2115, Rev. 1).

2.3 OTHER INVESTIGATIONS AND REPORTS

In 1997, an investigation of concerns related to apparent excessive sediment accumulation and resultant increased water levels upstream of the White Oak Creek Embayment structure was initiated. This investigation evaluated potential impacts to White Oak Dam and the White Oak Creek Embayment. Initial results indicate that the sediments are not causing adverse structural problems at the dam or the embayment; however, elevated water levels are causing periodic submergence of the weir at White Oak Dam and are requiring ORNL to modify flow measurement methods. This situation could cause future complications. Further investigation is scheduled for FY 1998.

3. SURVEILLANCE AND MAINTENANCE FOR RA SITES

RA S&M actions provide for routine site inspections, sampling and analysis, radiological and industrial hygiene surveillance, and the performance of routine maintenance activities that are required as a result of routine site inspections. Also included is the maintenance of equipment, roads, fencing, gates, rope boundaries, and appropriate signage and filling of subsidences.

Vegetation control is continuously required for a variety of purposes, including removing trees to permit access for field activities or to aid an inspection. During FY 1997, vegetation maintenance was routinely performed for approximately 250 acres. Figures 1 and 2 show routine RA S&M activities during FY 1997.

Fig. 1. Vegetation control.

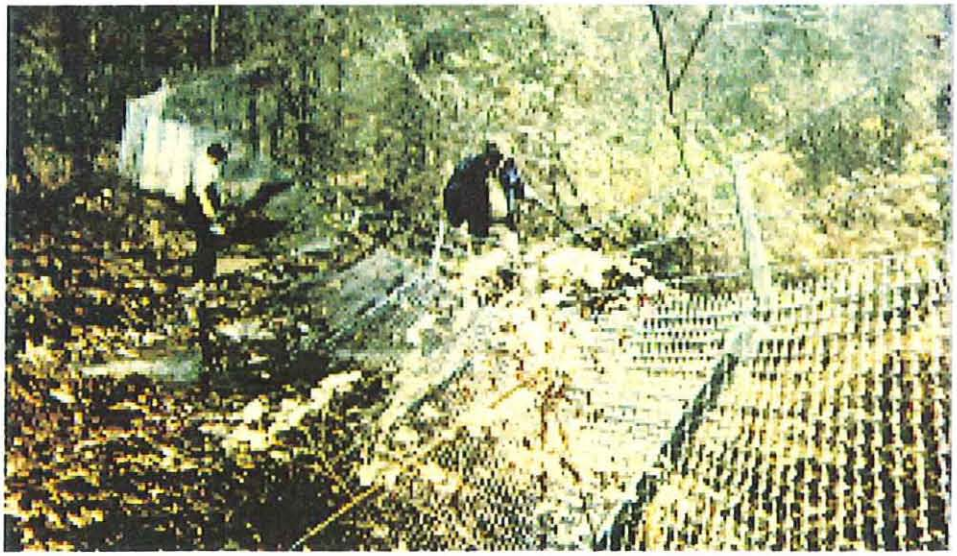

Fig. 2. Fence repair.

3.1 SURFACE IMPOUNDMENTS

The S&M Program is responsible for ten impoundments [excluding three impoundments closed as a stabilization project (see Sect. 6.2)]. Liquid levels were monitored and maintained at all impoundments throughout FY 1997. As necessary to maintain the proper liquid level at each impoundment, levels were reduced to prevent overflow or increased to maintain radiological shielding.

Periodic walkdowns were performed to check for potential problems and to monitor the berms. Mowing, trimming, and other vegetation control were performed as needed to facilitate embankment inspection and maintain embankment structural integrity.

Preventative maintenance was performed in May 1997 at the 3513 Impoundment berm. Deteriorating areas were repaired by spreading bentonite along the south side berm surface, controlling potential seepage pathways into White Oak Creek.

Also during FY 1997, new sampling criteria were developed for the Emergency Waste Impoundment in order to focus/limit the analyses to constituents of concern prior to removing excess water. Figure 3 shows a typical ORNL surface impoundment.

Fig. 3. ORNL surface impoundment.

3.2 WASTE AREA GROUPING 6

WAG 6 is located in Melton Valley and contains three solid waste management units. Major maintenance activities at WAG 6 performed during FY 1997 are as follows:

- removed approximately 3500 ft^3 of surplus and scrap materials in the north end of WAG 6; and
- recovered the fabric covering the WAG 6 tumulus pads with a new layer of plastic and fabric (the new cover prevents potential surface rainwater leaching of any below-grade contaminated materials).

Figure 4 shows a newly recovered tumulus pad.

Fig. 4. WAG 6 tumulus pad.

3.3 INACTIVE LIQUID LOW-LEVEL WASTE STORAGE TANKS

The S&M Program is responsible for 38 inactive liquid low-level waste (LLLW) storage tanks and former tank sites. S&M activities for inactive tanks include visual inspections for site stability; monitoring for any leakage in or out of each tank; dry well sampling and analysis; high-efficiency particulate air (HEPA) filter change-out and treatment; radiological surveillances; instrument calibrations and maintenance; and tank liquid transfers, as required. Former tank sites and tanks that have been grouted in place are monitored for subsidence. A complete listing and status of all tanks in the S&M Program is provided in Appendix B.

3.4 WELLS

The S&M Program is responsible for just over 2000 groundwater monitoring wells throughout ORNL. S&M activities include well inspections (Fig. 5); minor repairs to well caps; and replacement of well locks, as needed. During FY 1997, a total of 915 well inspections were performed.

3.5 FIRST CREEK

A sediment removal was performed at Melton Branch weir and White Oak Creek weir. During activities, wetlands were disturbed, and TDEC required that trees and shrubs be planted at First Creek to replace the lost wetland area. In January 1997, 16 trees were planted in the First Creek riparian corridor to replace trees that had either died or were not planted in the original planting activities in early 1997. Preparation and submittal of the annual report to TDEC was completed in February 1997. The report discusses the First Creek Planting Status, as required by the Aquatic Resources Alteration Permit 95-499.

Fig. 5 Well inspection.

4. POSTREMEDIATION MONITORING

Postremediation monitoring was conducted during FY 1997 at the 3001 Canal, Core Hole 8, WAG 6 RCRA caps, and WAG 5 Seeps C and D. In addition, groundwater monitoring was also conducted at WAGs 4, 5, and 6 and at the 3001 Canal Well.

4.1 3001 CANAL

The 3001 Canal was originally used for the transfer of Graphite Reactor fuel elements from Bldg. 3001 to Bldg. 3019. Prior to the stabilization of the canal in March 1997, it was filled with demineralized water for radiation shielding. Stabilization of the 3001 Canal is discussed in Sect. 6.1.

Routine S&M activities required by the RCRA Interim Closure Plan prior to stabilization included the following:

- sampling and level measurement of canal water,
- radiation surveillance,
- water flow measurements to maintain the demineralizer efficiency,
- periodic replacement of ion exchange resins,
- repair of water and steam leaks, and
- continuous air monitoring.

These monitoring activities were performed until the canal stabilization task was completed. After stabilization, WOCC alarm monitoring and continuous air monitor level indicators for the 3001 Canal were discontinued.

4.2 CORE HOLE 8 TREATMENT SYSTEM

The Core Hole 8 treatment system is a groundwater intercept system that removes ^{90}Sr and was constructed as part of a Comprehensive Environmental Response, Compensation, and Liability Act removal action in FY 1995. The intercept system was designed to be automatic, requiring routine maintenance to assure proper operation.

Postremediation monitoring of the treatment system during FY 1997 consisted of monitoring and responding to high-water-level alarms, replacing a pump, checking floats and pump controls, maintaining pumps, and ensuring the reliability of the groundwater intercept system.

4.3 WAG 6 RCRA CAPS

The solid waste storage area in WAG 6 is a shallow land burial site. An interim cover was placed over the RCRA-regulated units in 1989. Under the closure plan, the caps were required to be routinely inspected and maintained by S&M Program personnel.

In June 1996, a recommendation was sent to TDEC to discontinue S&M of the caps. In November 1996, S&M staff received concurrence from TDEC and DOE–Oak Ridge Operations to terminate inspections and repairs of the caps, with a cost savings of approximately $224,000 annually.

S&M activities through November 1996 included a monthly walk down and inspection of the caps for breaks, tears, seam failures, and items or debris on the caps. Additionally, repairs were made to the caps per the results of a FY 1996 certified inspection.

4.4 WAG 5 SEEPS C AND D TREATMENT SYSTEMS

WAG 5 Seeps C and D were once significant contributors of ^{90}Sr releases to the White Oak Creek watershed. To remediate the problem, the WAG 5 Seeps Removal Action Project constructed a collection and treatment unit at

each of the seeps. A 90% removal efficiency goal was established for the collected groundwater.

S&M activities are conducted to monitor the performance of the treatment units and maintain the units for efficient operation. Activities include the collection of influent and effluent grab samples to verify that ^{90}Sr is within limits and change-out of the nitrogen cylinders and zeolite drums as required to maintain the ^{90}Sr removal efficiency.

Although the ^{90}Sr removal efficiency has been maintained for collected groundwater, the Seep C system experienced continuing problems with iron oxide accumulation. Evaluations are ongoing for potential solutions to the iron oxide formation problem.

Safety upgrades have been approved and will be implemented early in FY 1998. These safety modifications will improve worker safety during the zeolite drum change-outs.

4.5 GROUNDWATER MONITORING OF WAGS 4, 5, AND 6 AND THE 3001 CANAL WELL

New scope for postremediation monitoring of WAGs 4, 5, and 6 and the 3001 Canal Well, previously accomplished through the ORNL Surface Water, Area-Wide Groundwater, or WAG 1 Groundwater projects, was transitioned to the S&M Program in FY 1997. The S&M Program established a new method of accomplishment via fixed-price subcontracting for this monitoring program. The new method of accomplishment was performed through March 1997. The scope was then transferred to the Integrated Water Quality Program at the direction of DOE. Prior to the scope transfer, the annual Groundwater Quality Assessment Report was issued, including recommendations to reduce monitoring activities in an effort to implement S&M proposed cost savings measures.

5. SURVEILLANCE AND MAINTENANCE FOR D&D FACILITIES

Surveillance of buildings in the D&D Program includes inspecting facilities on a routine basis; performing radiological surveys, sampling, and analysis; controlling radiological boundaries; monitoring building sump operability; monitoring and responding to alarms; inspecting for freeze protection; and maintaining ORR pool water quality and level. Any problems identified during facility inspections were processed on a priority basis.

General maintenance activities were performed throughout FY 1997, including equipment and door repair; clean-up to meet Environment, Safety, and Health criteria; lighting maintenance; facility winterization; instrument calibration; and waste packaging and transfer. HEPA filters were checked and changed on a regular basis to maintain the efficiency of each ventilation system (Fig. 6). An aerial survey of the roofs of various D&D facilities was conducted to identify areas of concern for structural failure and/or leakage. Painted radioactive and hazardous area demarcations were maintained, and signs were fabricated and installed as required.

Fig. 6. Building 3139 filter change-out.

As mandated by Federal Court Order 3:92-CV-0036, issued September 26, 1996, all connections to storm drain systems in 168 S&M facilities were surveyed. In total, 631 drains were visually inspected. Based on the survey, 144 drains were plugged, and 46 drains were dye-tested. The work began in October 1996 and was completed, as scheduled, by June 1997.

Current ventilation control limits at all facilities were evaluated for potential threshold changes due to their inactive status. A report was drafted that included recommendations for revising ventilation control limits and relocating instruments to improve controls and data quality. These recommendations are being evaluated for implementation in FY 1998.

The instrumentation in the D&D facilities was reviewed for need and maintenance requirements. As a result of this study, active process instruments in the Decommissioning S&M Program have been reduced by 27%, and active stationary radiation monitoring instruments have been reduced by 69% since June 1996.

5.1 OAK RIDGE GRAPHITE REACTOR (BLDG. 3001) AND ANCILLARY FACILITIES

The OGR, Bldg. 3001, was originally constructed to produce the first gram-size quantities of plutonium and provide information for the large plutonium reactors in Hanford, Washington. Later it was converted to a training reactor. The fuel was removed from OGR in 1966, and the it was designated a National Historic Landmark. Part of the facility is used

for public access to view the reactor face and for ORNL displays. Ancillary facilities include the Filter House and Canal (Bldg. 3002) and the Fan House (Bldg. 3003). The following maintenance activities were performed at the OGR complex in FY 1997:

- Painting (24,143 ft^2) was completed at OGR in radiologically contaminated areas to fix contamination and reduce Health Physics surveillance and costs.
- The high bay exhaust fans were repaired at OGR to minimize flaking lead paint over the visitor's center.
- New covers were fabricated and installed for the OGR slug hatches, and the walls behind the covers were painted to reduce future surveillance and costs.
- Residual oil (approximately 300 gal) was removed from inoperable motors, air monitors, and piping accumulators to prevent potential leaks and future cleanup requirements. Following the removal of oil, the air monitors were disassembled and released as scrap metal.
- A total of 27 55-gal drums of contaminated lead bricks were packaged for removal.
- Water from the OGR aboveground holding tank outside the west wall of Bldg. 3001 was sampled and analyzed. The potassium-contaminated water was removed by pumping it to a process drain to prevent leaks and minimize future cleanup costs.
- Exposed wires in the canal area were covered to eliminate a safety hazard.
- An automatic back draft damper was procured for use instead of an evacuation alarm attached to the negative pressure switch. This will eliminate a safety concern by preventing the possibility of a back draft during a power outage.
- Six unused air-conditioners were removed from Bldg. 3001 to prevent Freon leaks and future cleanup costs.
- The metal walkway at the Bldg. 3002 Filter House was disassembled, the entryway was painted, and a plexiglass enclosure was assembled at the west door. This will provide a safe entry for inspection of the water in the 3002 Canal and will decrease inspection requirements, Health Physics survey time, and the personal protective equipment required.
- Differential pressure gauges were installed across the HEPA filters at the Bldg. 3002 Filter House to measure differential pressure across each of the filters and to permit remote monitoring of these gauges by a centralized computer at OGR. Remote monitoring of these gauges will eliminate uncertainties about filter performance without a manual inspection and will permit forecasting of filter replacements.
- The west door and stair rails at the Bldg. 3002 Filter House were painted to prevent further deterioration from rust.
- Out-of-service resistivity and pH meters were removed from an alarm annunciator panel adjacent to the demineralizer room to eliminate a potential electrical safety hazard.
- In response to TDEC concerns from an earlier survey of the Bldg. 3002 Filter House, the 3002 Canal water and sludge were sampled, all drain connections were re-examined, and National Emission Standards for Hazardous Air Pollutants compliance was documented. Analytical results from the sludge samples confirmed no RCRA constituents of concern. In February 1997, a response to TDEC inquiries was prepared regarding the status of Bldgs. 3001 and 3002.

5.2 OAK RIDGE RESEARCH REACTOR (BLDG. 3042) AND ANCILLARY FACILITIES

The ORR, Bldg. 3042, was a reactor designed and built as a general purpose research tool. Ancillary facilities within S&M responsibility

include the Pumphouse (Bldg. 3085), the Cooling Towers (Bldgs. 3086, 3089, and 3103), the Heat Exchangers (Bldgs. 3087 and 3102), the Normal Off-Gas Filter Pit (Bldg. 3126), the Cell Ventilation Filter Pit (Bldg. 3139), and the Pressurizable Off-Gas Filter Pit (Bldg. 3109). A variety of S&M activities were performed during FY 1997:

- In May, five banks of five demineralizer tanks were relocated to ORR from Bldg. 3004 because of its pending dismantlement.
- In response to a request from TDEC for analytical data and inventory information on the reactor pools, the Bldg. 3042 storage pool was sampled for radionuclide contamination. Analytical results indicated that constituent levels were within process waste acceptance criteria.
- The Bldg. 3042 Bleed and Feed System was activated in November 1996. This system was designed to improve water quality and prevent storage pool corrosion.
- Upgrades were completed to the sump alarm instrumentation at ORR to allow monitoring of the water level 24 hours per day by WOCC, thereby reducing vulnerability during off hours.
- A cover was fabricated for the Bldg. 3139 Cell Vent Filter Pit to prevent inleakage of rainwater.
- The Bldg. 3139 Cell Vent differential pressure gauges were relocated to improve accessibility.
- Charcoal filters in the Bldg. 3139 Filter Pit, historically used to remove iodine isotopes generated during the fission process in the reactor, were removed because iodine is no longer being generated.
- A cover was fabricated and installed at the Bldg. 3109 Pressurizable Off-gas Filter Pit and the Bldg. 3126 Normal Off-gas Filter Pit to eliminate rain inleakage.
- A total of 425 bags of deteriorating, friable asbestos were removed from the open, outdoor Bldg. 3102 Heat Exchanger pit to eliminate a health and safety hazard as well as environmental concerns from the potential for airborne contamination (Figs. 7 and 8). All remaining water and debris were removed from the pit. The water was transferred to the Process Waste Treatment Plant (PWTP).
- The double containment doors at ORR were painted to stop the lead paint from flaking (thereby avoiding costly door repairs from rust deterioration) and to improve faded warning signs.

5.3 RADIOCHEMICAL FACILITIES (BLDGS. 3505 AND 4507)

The Metal Recovery Facility (Bldg. 3505) was a small-scale production nuclear fuel reprocessing plant that was shut down in 1960. S&M activities for this facility during FY 1997 included the following:

- Painting (2250 ft^2) was completed in radiologically contaminated areas to fix contamination and reduce Health Physics surveillance and costs.
- Approximately 500ft^3 of contaminated equipment and debris were removed.

The High Radiation Level and Chemical Development Lab (Bldg. 4507) was in service from 1957 to 1980. It was operated as a laboratory and small-scale pilot plant for studies of reactor fuel processing. The following S&M activities were performed in FY 1997 for Bldg. 4507:

- The deteriorating asbestos tile (approximately 100 ft^2) was removed from the entry air locks.

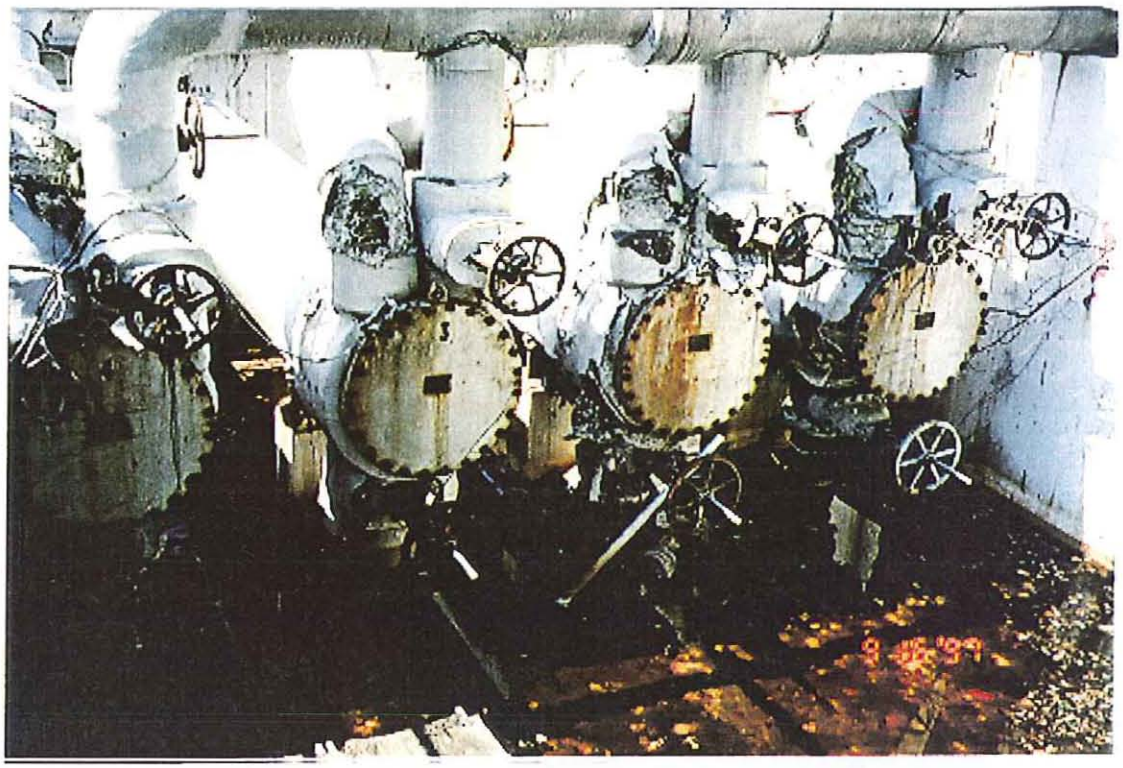

Fig. 7. Building 3102 Heat Exchanger before asbestos removal.

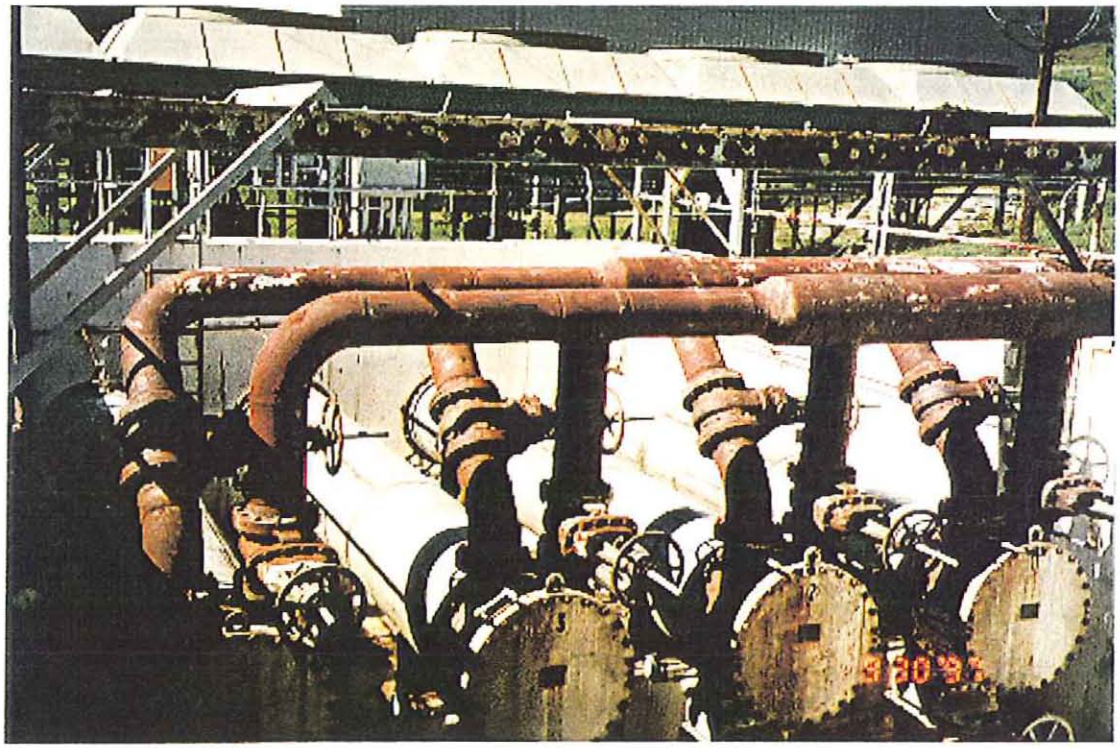

Fig. 8. Building 3102 Heat Exchanger after asbestos removal.

- Unused safety showers, alpha-contaminated equipment, and hot cell instrument panels were removed in addition to 800 ft^3 of contaminated equipment and debris from the first and second floors (Figs. 9 and 10).
- The rotting, wooden catwalk was repaired to provide safe access to the penthouse for the remaining equipment and debris removal.
- Four 55-gallon drums of lead-contaminated carbon bricks (approximately 160) were removed.

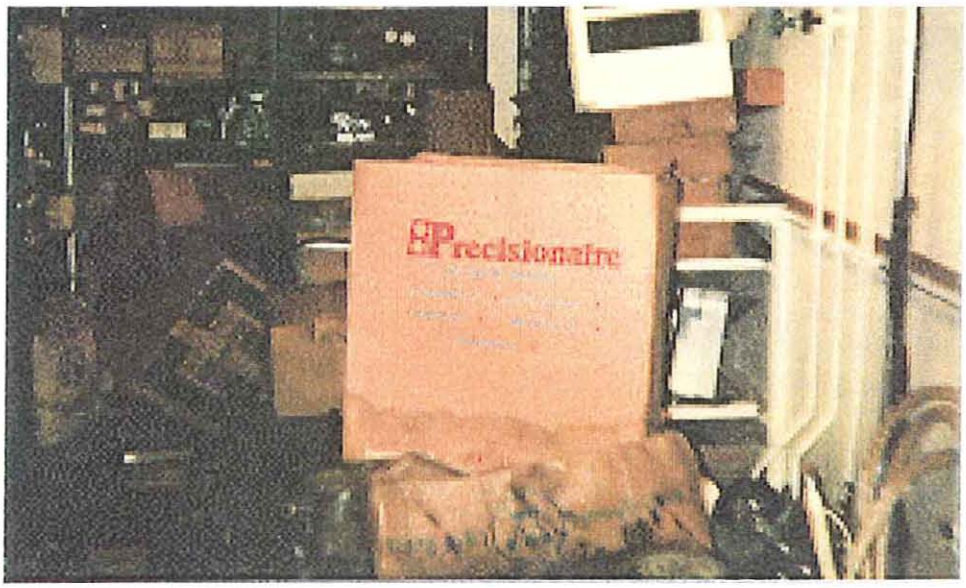

Fig. 9. Building 4507 before material removal.

Fig. 10. Building 4507 after material removal.

5.4 HOMOGENEOUS REACTOR EXPERIMENT (BLDG. 7500)

The Homogeneous Reactor Experiment was built to house two experimental, aqueous, homogeneous reactors for nuclear power application analysis. The facility operated from 1958 until 1961, when the reactor was shut down. A number of maintenance activities were conducted at Bldg. 7500 during FY 1997 as follows:

- A PCB spill was discovered in Bldg. 7500 that resulted from a fluorescent light ballast leaking onto a light fixture. The fixture and another like it in the same area were removed, a Toxic Substances Control Act storage area was set up for the waste, and an ORNL PCB Spill Cleanup Record was prepared. To avert similar problems in the future, removal of light fixtures and capacitors that were known or suspected to contain PCBs was initiated, followed by replacement with the minimal lighting required to accomplish necessary inspections. Approximately 50 light ballasts have been removed, and an additional 65 will be removed in early FY 1998.
- A door was installed in the fire protection riser room to allow the room to be heated locally when the fire protection system is drained and the steam is turned off in the building.
- To eliminate a fire hazard, the drop ceilings in the south end office space were taken down.
- Two pumps were removed, and the duct work in the steam pit was capped in preparation for grouting of the pit in FY 1998. Platform grating and control panels were also dismantled to provide access for grouting.
- Pipe was installed to reroute water from the north sump to the French drain to permit release of leaching groundwater to an outfall south of Bldg. 7500. The water was being pumped to a contaminated pool, where it was subsequently pumped to a tanker for treatment at PWTP.
- Five unused air-conditioners were taken out of the building to prevent Freon leaks and future cleanup costs.
- Approximately 600 ft^3 of contaminated equipment in the high bay area was packaged for disposal.
- The steam pit drain system was upgraded to hard piping at the Homogeneous Reactor Experiment pool to prepare the facility for installation of an automatic sump. The automatic sump will reduce both surveillance and level management time.

5.5 LOW INTENSITY TEST REACTOR (BLDG. 3005)

The LITR was operated from 1951 until 1968, when it was removed from service. FY 1997 activities consisted of scheduled calibrations, surveillances, and general maintenance.

In the fourth quarter of FY 1997, the heat exchanger for this facility was dismantled. See Sect. 6.3 for a discussion of this activity.

6. STABILIZATION PROJECTS

6.1 3001 CANAL

The 3001 Canal is a concrete structure approximately 150 ft long, 8 ft wide, and 12 ft deep. From 1943 to 1963 it was used to transfer spent fuel slugs used in the Graphite Reactor for processing in adjacent Bldg. 3019. Demineralized water was used as a radiation shielding media until 1997. In March 1997, a Comprehensive Environmental Response, Compensation, and Liability Act non-time-critical removal action was performed to replace the demineralized water with a special formulation of controlled, low-strength material [(grout,) 412 yd^3]. The grout provides the necessary shielding from the radiologically contaminated material in the canal walls and eliminates leakage in or out of the structure.

This successful project presented several challenges to the S&M team. Because it is the first known application of pumping the grout in an underwater, radioactive setting, special procedures had to be developed to remove the water and simultaneously add the grout. The work was performed in a restricted environment with respiratory controls and under heat-stress conditions. Figures 11–14 show the canal before, during, and after stabilization activities.

Despite these challenges, the stabilization was completed 2 months ahead of schedule and 22% under budget. The return on the investment is expected in less than 2 years.

A final protective coating was painted over the canal surface and the entire basement area in July 1997.

Fig. 11. Building 3001 Canal before stabilization.

Fig. 12. Pumping of controlled, low-strength material (grout).

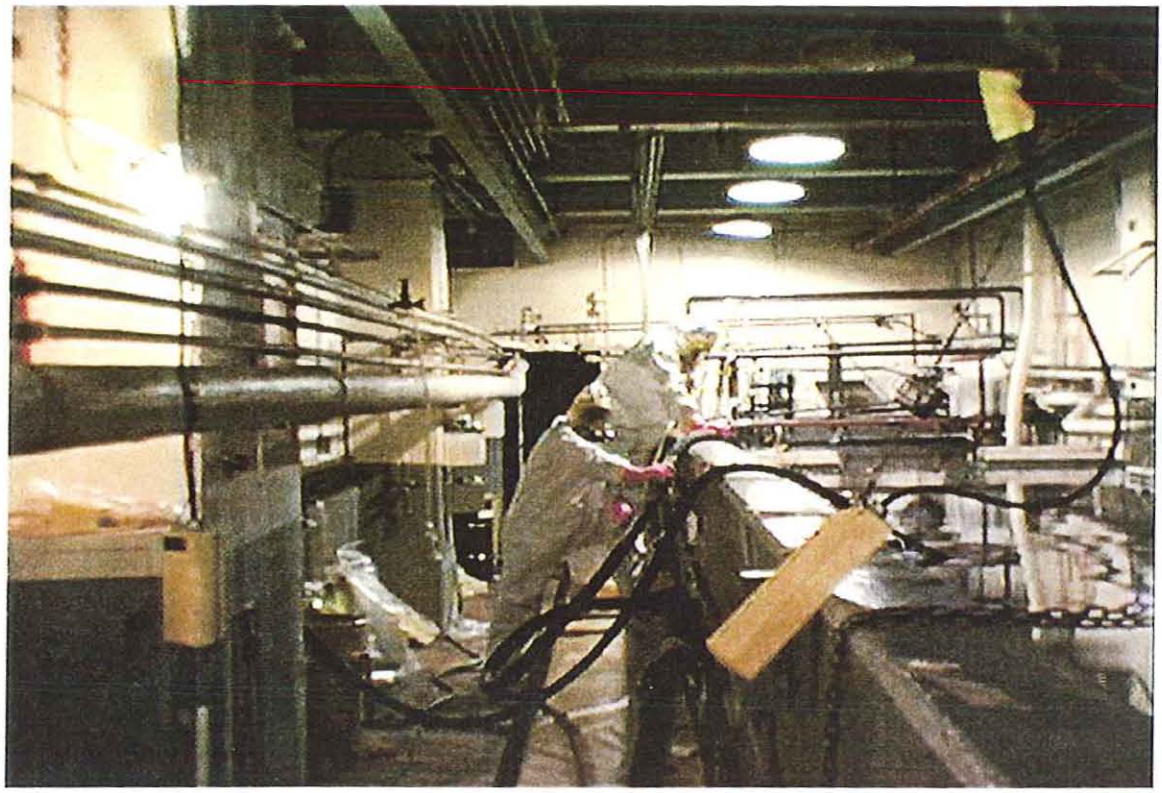

Fig. 13. Building 3001 Canal during stabilization.

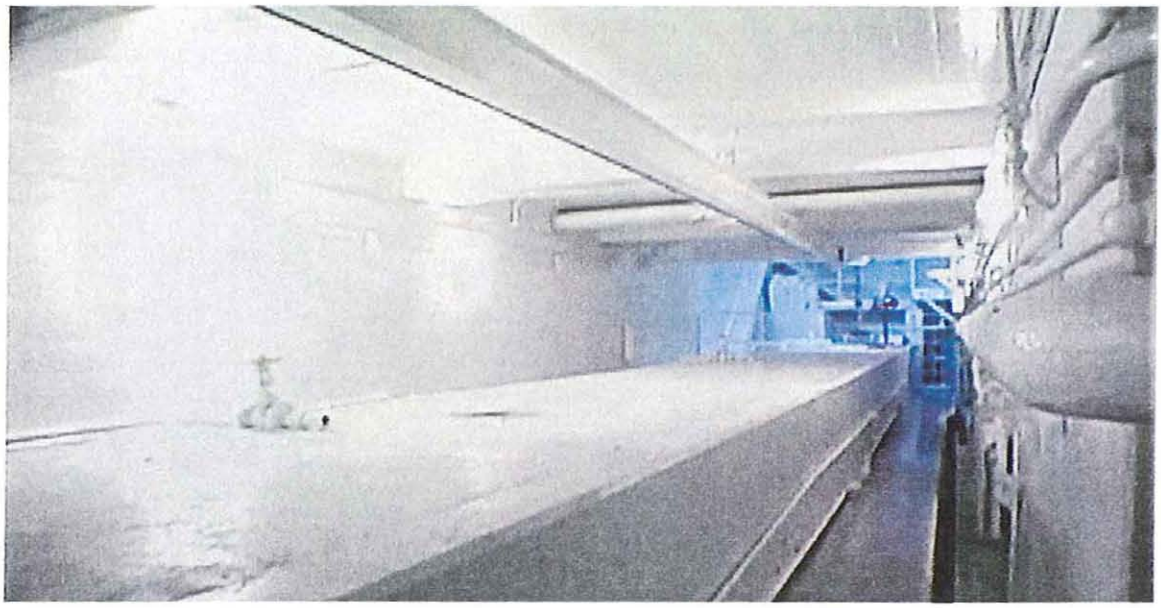

Fig. 14. Building 3001 Canal after stabilization.

6.2 WELL DRILLER'S STEAM CLEANING AREA BASINS

Three settling basins in WAG 5 were once used for steam cleaning operations of well drilling equipment. The TDEC operating permit was terminated on September 30, 1996.

To eliminate future S&M costs, the three basins were stabilized (Figs. 15 and 16). The wastewater in the basins was collected and treated at PWTP, the basin liners were punctured to allow drainage, piping was broken into pieces and placed in the basins, soil and crushed stone were compacted into the basins, and the site was graded to provide positive surface water drainage. Hydroseeding of the site was then performed to control potential erosion. The return on the investment is less than 1 year.

Fig. 15. Well Drillers's Steam Cleaning Area before stabilization.

Fig. 16. Well Drillers's Steam Cleaning Area after stabilization.

6.3 LOW INTENSITY TEST REACTOR HEAT EXCHANGER (BLDG. 3077)

The LITR heat exchanger was designed to provide heat dissipation for the reactor during its operation from 1951 to 1968.

To eliminate a safety concern, the LITR heat exchanger was dismantled during FY 1997. Site preparation activities were performed in July including disconnecting overhead utilities, disconnecting wiring and capping conduits, disconnecting piping and installing a blind flange, and releasing all pressure from pipelines. Project documentation, including a structural integrity assessment to confirm the building could support workers during dismantlement, was prepared. In September, the heat exchanger dismantlement was completed. All dismantled metal was segregated and packaged for disposal or green-tagged for salvage. Significant cost efficiencies were achieved by using an existing contract and accomplishing the dismantlement in conjunction with the EM-60 demolition of Bldg. 3004.

Fig. 17. Low Intensity Test Reactor Heat Exchanger before dismantlement.

Fig. 18. Low Intensity Test Reactor Heat Exchanger after dismantlement.

6.4 THORIUM WELLS ADJACENT TO BLDG. 7019

Ten thorium storage wells were located in the High Flux Isotope Reactor area east of Bldg. 7019, the Thorium Handling Facility (Fig. 19). Each well, consisting of an inner and outer casing, was approximately 3 ft in diameter and 10 ft deep.

Planning and document preparation for the thorium wells stabilization was initiated in August 1997. Excavation and removal of all wells was completed on September 12, 1997, within 1 month of the authorization to proceed (Figs. 20 and 21). In accordance with the comprehensive work plan, the inner liners were removed and radiologically surveyed. No contamination was found, so the liners were transported to the clean scrap metal yard for recycling. The outer casings were cut off about 1 ft below grade, and the remaining portions of the outer open casings were backfilled with a mixture of clay and bentonite. The upper foot of each well was backfilled with topsoil and hydroseeded. The project completion letter included a recommendation that DOE request reclassification to a no further investigation/ action designation under the FFA for this site.

Additionally, approximately 1.25 ft^3 of contaminated soil were packaged, radiologically tagged, and placed in a B-25 box for transfer to Waste Management for disposal.

Fig. 19. Thorium wells before removal.

Fig. 20. Thorium wells removal.

Fig. 21. Thorium wells after removal.

6.5 OLD HYDROFRACTURE FACILITY (BLDG. 7852) BINS AND WATER TANK

Because the OHF storage bins were a potential health and safety hazard, a strategy to demolish them was developed in April 1997. Sampling and analysis of the water tank and the residual contents of the OHF bin interiors were performed to verify waste acceptance criteria and salvageability assumptions. All site preparation activities were completed in FY 1997, including relocating a trailer, rerouting utility lines, modifying the off-gas vent, and extending a gravel pad for the crane that will be used to remove the bins and water tank. Additionally, the water tank was emptied, and approximately 21,000 gal of water were sent to the Non-Radiological Waste Water Treatment Plant. Removal of the bins and water tank will be completed prior to the start of field activities for the OHF Tank Sludges Removal Project in early FY 1998.

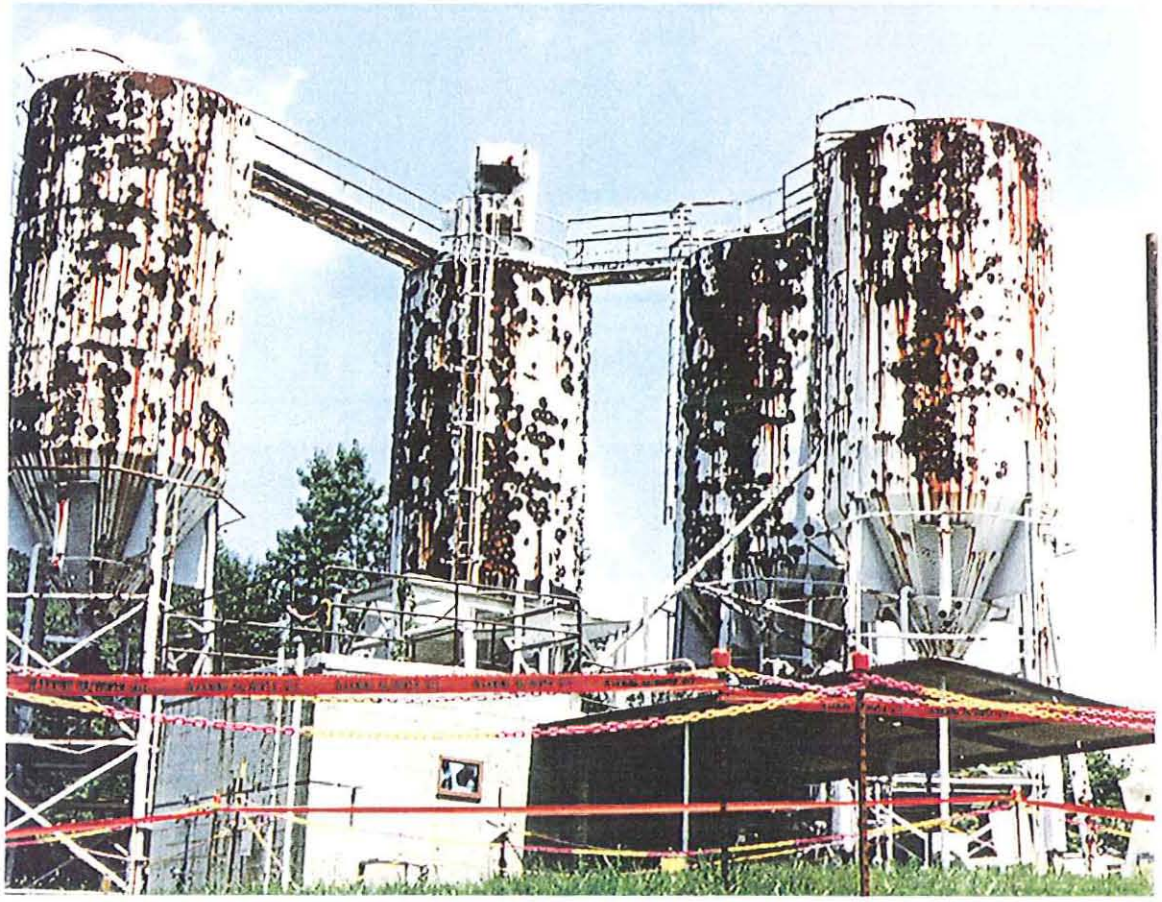

Fig. 22. Old Hydrofracture Facility bins.

6.6 WEST END DUMP SITE

In August 1997, written authorization was received from DOE to implement cleanup of the West End Dump Site. The ORNL S&M Program developed a plan to perform soil sampling and analysis and remove surface debris from this area to permit reclassification of this site to a no further investigation/action designation in the FFA. DOE subsequently requested that cleanup activities be deferred pending receipt of analytical data from soil samples taken by another DOE prime contractor. Once received, the data indicated cleanup was not required to effect reclassification of the area in the FFA. The cleanup was therefore canceled.

6.7 REMOVAL OF RESINS FROM THE 3001 CANAL AND THE ORR DEMINERALIZER COLUMNS

Resins inside the demineralizer columns at the 3001 Canal and the ORR are scheduled for removal in early FY 1998.

Resins inside the demineralizer columns were sampled in June to help finalize removal options. The analytical data from both the ORR and OGR demineralizer column resins indicated that the transuranic isotope content is low enough to permit disposal as a solid low-level waste.

Site preparation activities were completed in FY 1997, including draining the water from the pool demineralizer columns, the north and south reactor columns, and the degasifier columns to PWTP in preparation for drying the resins and fabricating a piping manifold to connect the drains of all the ORR columns to the building cell ventilation system. The ventilation system is used to draw air though the columns and to dry resins prior to removal and disposal. Drying the resins inside the columns before removal effectively minimizes the amount of liquid waste generated.

APPENDIX A

ORNL SURVEILLANCE AND MAINTENANCE PROGRAM FACILITY MANAGEMENT LIST

Table A.1. ORNL EM Program facility management list: RA Program, routine S&M

Facility Number	FFA	WAG	Facility Name	Facility Type
0807	13.02	13	Cs-137 Erosion/Runoff Study Area	Area
0814		13	Trailer	Bldg.
0816	13.01	13	Experimental Study Area (Cs-137 Plots)	Area
0830		2	White Oak Creek Embayment Sediment Control Facility	Area
0857		13	Goat Building	Bldg.
1001	03.01	3	SWSA 3 Burial Grounds	Area
2624	01.46	1	SWSA 1 Burial Grounds	Area
3001	01.79	1	Storage Canal	Area
3001B	01.73	1	Inactive LLLW Collection Tank 3001B	Tank
3003A	01.74	1	Drain Tank South of 3003	Tank
3004B	01.75	1	Inactive LLLW Collection Tank 3004B	Tank
3013	01.76	1	Inactive LLLW Collection Tank 3013	Tank
3023	01.23A	1	Inactive LLLW Collection/Storage Tank W-1	Tank
3023	01.23B	1	Inactive LLLW Collection/Storage Tank W-2	Tank
3023	01.24A	1	Inactive LLLW Collection/Storage Tank W-3	Tank
3023	01.24B	1	Inactive LLLW Collection/Storage Tank W-4	Tank
3023	01.25A	1	Inactive LLLW Collection/Storage Tank W-13	Tank
3023	01.25B	1	Inactive LLLW Collection/Storage Tank W-14	Tank
3023	01.25C	1	Inactive LLLW Collection/Storage Tank W-15	Tank
3023	01.28	1	Inactive LLLW Collection/Storage Tank W-1A	Tank
3037	01.29	1	Inactive LLLW Collection/Storage Tank WC-1	Tank
3110		1	Filter House/Isotope Area Ductwork	Bldg.
3507	01.26A	1	Inactive LLLW Collection/Storage Tank W-5	Tank
3507	01.26B	1	Inactive LLLW Collection/Storage Tank W-6	Tank
3507	01.26C	1	Inactive LLLW Collection/Storage Tank W-7	Tank
3507	01.26D	1	Inactive LLLW Collection/Storage Tank W-8	Tank
3507	01.26E	1	Inactive LLLW Collection/Storage Tank W-9	Tank
3507	01.26F	1	Inactive LLLW Collection/Storage Tank W-10	Tank
3507	01.27	1	Inactive LLLW Collection/Storage Tank W-11	Tank
3513	01.12	1	Waste Holding Basin	Pond
3524	01.13	1	Waste Holding Basin	Pond

Table A.1 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
3535		1	Filter Enclosure in South Tank Farm	Bldg.
3539			Waste Holding Basin	Pond
3540	01.15	1	Waste Holding Basin	Pond
4003	01.47	1	SWSA 2 Burial Grounds	Area
4507 South	01.78	1	Inactive LLLW Collection Tank T-30	Tank
6556			ER Trailers	Bldg.
7078			ER Trailers	Bldg.
7560	09.02A	9	LLLW Collection and Storage Tank 7560	Tank
7562	09.02B	9	LLLW Collection and Storage Tank 7562	Tank
7759	16.01	16	Cesium-137 "Forest" Research Area	Area
7800	04.03	4	SWSA 4 Burial Grounds	Area
7802	05.07	5	SWSA 5 South (Trenches, Undefined Area, Dump, Auger Holes)	Area
7802A		5	Seep Area C Collection and Treatment Unit (WAG 5)	Area
7802C		2	Deep Monitoring Well #1	Well
7802D		2	Deep Monitoring Well #2	Well
7805	07.05	7	Chemical Waste Pit #1	Area
7806	07.06A	7	Chemical Waste Pit #2	Area
7807	07.06B	7	Chemical Waste Pit #3	Area
7808	07.06C	7	Chemical Waste Pit #4	Area
7809	07.07	7	Chemical Waste Trench #5	Area
7810	07.08	7	Chemical Waste Trench #6	Area
7811	04.02	4	Pilot Pits 1, 2 (7811)	Area
7818	07.09	7	Chemical Waste Trench #7	Area
7819		7	Interim Decontamination Building	Area
7821	06.02	6	Emergency Waste Basin	Pond
7822	06.01	6	SWSA #6 RCRA Caps	Area
7822F		6	Tumulus I	Area
7822G		6	Tumulus II	Area
7835	05.06	5	Process Waste Sludge Basin	Area
7852	05.03	5	Old Hydrofracture Facility Site Surfaces	Bldg.

Table A.1 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
7852A	05.02	5	OHF Pond/Pits	Pond
7906		8	Waste Holding Basin	Pond
7907		8	Waste Holding Basin	Pond
7908		8	Waste Holding Basin	Pond
HF-S1	10.01	1	Hydrofracture Experimental Site #1	Area
HF-S2	10.02	10	Hydrofracture Experimental Site #2	Area
WAG 8		8	Waste Area Grouping 8 (roads, signs, fences)	Area
WAG 2		2	Waste Area Grouping 2 (0853 White Oak Creek & Trib.)	Area
WAG 9		9	Waste Area Grouping 9 (roads, signs, fences)	Area
XDO751	11.01	11	White Wing Scrap Yard	Area
	01.31A	1	Inactive LLLW Collection/Storage Tank TH-1	Tank
	01.31B	1	Inactive LLLW Collection/Storage Tank TH-2	Tank
	01.31C	1	Inactive LLLW Collection/Storage Tank TH-3	Tank
	01.32	1	Inactive LLLW Collection/Storage Tank TH-4	Tank
	01.56A	1	Inactive LLLW Collection Tank W-19	Tank
	01.56B	1	Inactive LLLW Collection Tank W-20	Tank
	01.71	1	Inactive LLLW Collection Tank H-209	Tank
	01.81	1	Core Hole 8	Area
	05.05A	5	Inactive OHF Waste Storage Tank T1	Tank
	05.05B	5	Inactive OHF Waste Storage Tank T2	Tank
	05.05C	5	Inactive OHF Waste Storage Tank T3	Tank
	05.05D	5	Inactive OHF Waste Storage Tank T4	Tank
	05.05E	5	Inactive OHF Waste Storage Tank T9	Tank
	05.07C	5	Drainage 3 next to WAG 5	Area
		5	Investigative Derived Wastes	Area
	07.02	7	Homogeneous Reactor Experiment (HRE) Fuel Wells	Area
	07.04B	7	Leak Site 1 Pit 6 SE	Area
	16.03	16	Buried Scrap Metal Area	Area
	99.03	I/A	Cs-137, Co-60 Contaminated Forest (Chestnut Ridge, Eastern Area)	Area
	99.03	I/A	Cs-137, Co-60 Contaminated Forest (Chestnut Ridge,	Area

Table A.1 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
			Western Area)	
	99.04		Cs-137 Contaminated Forest Floor	Area
	99.05		Cs-137 Contaminated Forest Understory	Area
	99.10		Thorium Storage Silos (near 7019)	Area
		Near 5	Decontamination Area	Area
		1	Inactive Wells (Bethel Valley)	Well
		2	Inactive Wells (Melton Valley)	Well
		6	Monitoring Stations 1 & 3	Area
		9	Well Drillers Steam Cleaning Area	Area
		1	First Creek Planting and Riparian Corridor	Area
		6	Groundwater and Surface Water	Area

Table A.2. ORNL EM Program facility management list: D&D Program, routine S&M

Facility Number	FFA	WAG	Facility Name	Facility Type
3001	01A.01A	1	Oak Ridge Graphite Reactor	Bldg.
3002	01A.01C	1	OGR Filter House & Canal	Bldg.
3003	01A.01B	1	OGR Fan House	Bldg.
3005	01A.02A	1	Low-Intensity Test Reactor	Bldg.
3018	01A.01D	1	OGR Stack	Bldg.
3042	01A.03	1	Oak Ridge Research Reactor	Bldg.
3085	01A.03	1	Pumphouse for ORR	Bldg.
3086	01A.03	1	Cooling Tower for ORR (#1)	Bldg.
3089	01A.03	1	Cooling Tower for ORR (#2)	Bldg.
3102	01A.03	1	Heat Exchanger for ORR (#2)	Bldg.
3103	01A.03	1	Cooling Tower for ORR (#3)	Bldg.
3126	01A.03	1	Normal Off-gas (NOG) Charcoal Filter for ORR	Bldg.
3139	01A.03	1	Cell Ventilation Filter for ORR	Bldg.
3505	01A.07	1	Metal Recovery Facility	Bldg.
3515	01A.06	1	Fission Product Pilot Plant	Bldg.
3517	01A.05	1	FPDL Inactive Cells and Service Tunnel	Bldg.
4507	01A.12	1	High Radiation Level Chemical Development Lab	Bldg.
7500	09A.01B	9	Homogenous Reactor Experiment	Bldg.
7852	05.03	5	Old Hydrofracture Facility Site Surface Facilities	Bldg.

Table A.3. ORNL EM Program facility management list: RA Program, emergency maintenance only

Facility Number	FFA	WAG	Facility Name	Facility Type
1554	03.03	3	Contractors' Landfill (West of SWSA 3)	Area
1562	03.02	3	Scrap Metal Area	Area
3001/3019	01.08	1	Graphite Reactor Storage Canal Overflow Contaminated Soil	Area
3001-3003	01A.01E	1	Underground Exhaust Ducts Soil Contamination	Area
3075	01.19	1	Decommissioned LITR Ponds	Area
3116		1	Nitrogen Cylinder Storage	Bldg.
3503	01.01	1	Mercury Contaminated Soil	Area
3507 Area	01.21	1	FPDL LLLW Transfer Line to STF	Area
3512	01.11	1	Decommissioned Waste Holding Basin	Area
3592	01.02	1	Mercury Contaminated Soil	Area
4501	01.03	1	Mercury Contaminated Soil	Area
4508	01.04	1	Mercury Contaminated Soil	Area
7556	09.01	9	Homogeneous Reactor Experiment (HRE) Pond	Area
7569C	19.07	19	Soil Injection of Radioactive Gas	Area
7658	12.01	12	Closed Contractors' Landfill	Area
7659B	19.06	19	Reactive Chemicals Disposal Area	Area
7711	16.02	16	Process Waste Basin	Pond
7802B		2	Seep Area D Collection and Treatment Unit (WM Services)	Area
7822-A	6.03	6	SWSA 6 - Explosive Detonation Trench	Area
7846		2	White Oak Lake	Area
HF-S1A	07.03	7	Hydrofracture Experimental Site #1 Soil Contamination	Area
HF-S2A	08.02	8	Hydrofracture Experimental Site #2 Soil Contamination	Area
XF1226	20.01	20	Municipal Sewage Sludge Application Site	Area
	00.33	1	FPPP Contaminated Soil	Area
	00.44	9	Soil at HRE Decontamination Pad/Shed	Area
	00.50	1	WAG 1 Groundwater	Area
	00.51	1	WOC Floodplain Soils & Sediments	Area
	00.54	6	SWSA 6 TVA Easement	Area

Table A.3 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
	01.05A	1	LLLW Lines & Leak Sites - South of Building 3020	Area
	01.05B	1	LLLW Lines & Leak Sites - East of Building 3020	Area
	01.05C	1	LLLW Lines & Leak Sites - West of Building 3082	Area
	01.05D	1	LLLW Lines & Leak Sites - North of Building 3019	Area
	01.05E	1	LLLW Lines & Leak Sites - SW Corner of Building 3019	Area
	01.05F	1	LLLW Lines & Leak Sites - Between W-5 & WC-19	Area
	01.05G	1	LLLW Lines & Leak Sites - Underneath Building 3047	Area
	01.05H	1	LLLW Lines & Leak Sites, General Isotopes Area	Area
	01.05I	1	LLLW Lines & Leak Sites - Building 3092 Area	Area
	01.05J	1	LLLW Lines & Leak Sites - Underneath Building 3026	Area
	01.05K	1	LLLW Lines & Leak Sites - Between WC-1 & W-5	Area
	01.05L	1	LLLW Lines & Leak Sites - ORR Water Line	Area
	01.05M	1	LLLW Lines & Leak Sites - Building 3028	Area
	01.05N	1	LLLW Lines & Leak Sites - East of Building 2531	Area
	01.05O	1	LLLW Lines & Leak Sites - Underneath Building 3515	Area
	01.05P	1	LLLW Lines & Leak Sites - Building 3525 to a Sump	Area
	01.05Q	1	LLLW Lines & Leak Sites - Underneath Building 3550	Area
	01.05R	1	LLLW Lines & Leak Sites - Sewer Near Building 3500	Area
	01.05S	1	LLLW Lines & Leak Sites - Abandoned Line Central Ave Area	Area
	01.05T	1	LLLW Lines & Leak Sites - Building 4508, North	Area
	01.05U	1	LLLW Lines & Leak Sites - Building 3518, West	Area
	01.05V	1	LLLW Lines & Leak Sites - Northwest of SWSA-1	Area
	01.05W	1	LLLW Lines & Leak Sites - Building 3503, Ground Contamination	Area
	01.06	1	Contaminated Surfaces & Soil from 1959 Explosion, Bldg. 3019	Area
	01.07	1	Contamination at Base of 3019 Stack	Area
	01.09	1	Oak Ridge Research Reactor Decay Tank Rupture Site	Area
	01.20	1	Filter Pit (Fission Product Development Lab)	Bldg.
	01.30A	1	Inactive LLLW Collection/Storage Tank WC-15	Tank

Table A.3 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
	01.30B	1	Inactive LLLW Collection/Storage Tank WC-17	Tank
	01.58	1	Former Waste Pile Area (South of NRWTP)	Area
	04.01	4	LLW Line North of Lagoon Road	Area
	05.01A	5	LLLW Lines and Leak Sites - OHF, Release of Grout	Area
	05.01B	5	LLLW Lines and Leak Sites - OHF Contaminated Soil	Area
	05.05F	5	LLLW Line from Valve Box to OHF	Area
	05.07A	5	PWSB Pipeline from PWSB to Process Waste Treatment Plant	Area
7503		8	LLLW Tank at MSRE	Tank
	05.07B	5	Drainage 1, 2 in WAG 5	Area
	05.14	5	Old Landfill (NE Edge of SWSA 5 South)	Area
	07.04A	7	LLLW Leak Site Gauging Station 200' West of WOC Gauging Station Near OHF	Area
	07.04C	7	LLLW Line Leak Site, Trench 7 Access Road	Area
	07.04E	7	Leak in Line Between Pit 3 and Trench 6	Area
	07.04F	7	Leak in Valve Pit North of Trench 7	Area
	07.040	7	Leak in Transfer Line from Decon Facility and Pit 1	Area
		4	WAG 4 Sr-90 Seeps	Area
	07.11	7	Building 7819 Septic Tank	Area
	08.03A	8	LLLW Lines & Leak Sites - Lagoon Rd & Melton Valley Dr.	Area
	08.03B	8	LLLW Lines & Leak Sites - Melton Valley Drive & SWSA 5 Access	Area
	08.03C	8	LLLW Lines & Leak Sites - 7500 Area	Area
	08.03D	8	LLLW Lines & Leak Sites - West of Melton Valley Pumping Station	Area
	08.03E	8	LLLW Lines & Leak Sites - Bldg. 7920 & MV Pumping Station Area	Area
	08.03F	8	LLLW Lines & Leak Sites - 7920 Ditch Line	Area
	08.03G	8	LLLW Lines & Leak Sites - Melton Valley Transfer Line	Area
	08.13	8	Contractor Spoils Area - Melton Valley, W-SW of 7900	Area
	08.14	8	HFIR Cooling Tower Surface Impoundment	Area
	08.15	8	Aircraft Reactor Experiment Surface Impoundment	Area

Table A.3 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
	08.16	8	MSRE Storage Well	Area
	08.17	8	Abandoned Sanitary Waste Pipeline & Septic Tank N of 7917	Area
	08A.01G	8	ARE Contaminated Tool Storage	Area
	09.04	9	Trash Area East of HRE Parking Lot	Area
	10.03	10	Old Hydrofracture Injection Well	Well
	10.03A	10	OHF Grout Sheets	Area
	10.04	10	New Hydrofracture Injection Well	Well
	10.04A	10	Grout Sheets	Area
	99.01	I/A	Abandoned Burn Pit	Area
	99.06	I/A	Cs-137 Contaminated Meadow	Area
	ER.01	I/A	Ca-45 Tagged Trees	Area
	ER.02	I/A	Ca-45 Tagged Soil and Vegetation	Area
	ER.03	I/A	Na-22 Contaminated Soil	Area
	ER.04	I/A	Cs-137 Bagged Leaves Study	Area
	ER.05	I/A	Hg-197 Tagged Stream	Area
	ER.06	I/A	Cs-134 Tagged Tree	Area
	ER.07	I/A	Ca-45 Tagged Forest	Area
	ER.08	I/A	Cs-137, Fe-59 Contaminated Animal Pens (NcNew Hollow)	Area
	ER.09	I/A	Hg-203 Tagged Stream	Area
	ER.10	I/A	H-3 Contaminated Trees	Area
	ER.12	I/A	Cs-134 Contaminated Oak Trees	Area
	ER.13	I/A	Zn-65 Tagged Red Oak Seedlings	Area
	ER.14	I/A	Cs-134 Contaminated Pine and Oak Seedlings	Area
	ER.15	I/A	Rb-86 Contaminated Plants	Area
	ER.16	I/A	Cs-134 Contaminated Soybean and Sorghum	Area
	ER.17	I/A	Cs-134 Contaminated Grasses	Area
	ER.18	I/A	Cs-134 Contaminated Lichens and Mosses	Area
	ER.19	I/A	Tc-95m Contaminated Soil and Plants	Area
	ER.20	I/A	Tc-95 Uptake Studies	Area

Table A.3 (continued)

Facility Number	FFA	WAG	Facility Name	Facility Type
	ER.21	I/A	Tc-95m and I-131 Contaminated Pasture	Area
	ER.22	I/A	Cr-51 Contaminated Grass Plots	Area
	ER.23	I/A	Tc-99 & Np-237 Contaminated Soil Lysimeters-Plutonium Floodplain	Area
	ER.27	I/A	Cs-134 Contaminated Persimmon Tree	Area
	ER.28	I/A	Co-60 and Mn-54 Animal Study	Area
	ER.29	I/A	C-14 Maintenance-Respiration Study	Area
	ER.30	I/A	C-14 Sucrose Inoculation of Oak and Pine Trees	Area
	ER.31	I/A	C-14 Allocation in White Oak Trees	Area
	ER.32	I/A	C-14 Allocation in White Pine Trees	Area
	ER.33	I/A	C-14 Efflux in Yellow Poplar Stand	Area
	ER.34	I/A	C-14 Allocation in Woody Biomass Plantation Species	Area

Table A.4. ORNL EM Program facility management list: D&D Program, emergency maintenance only

Facility Number	FFA	WAG	Facility Name	Facility Type
3077	01A.02B	1	Air Cooler-Low Intensity Test Reactor	Bldg.
3083	01A.03	1	Neutron Flight Tube Building	Bldg.
3087	01A.16	1	ORR Trane Water-to-Air Heat Exchangers	Bldg.
3107	01A.03	1	Neutron Flight Tube Building	Bldg.
3109	01A.03	1	Process Off-Gas (POG) Filters for ORR	Bldg.
3505 Area	01.63	1	Transfer Canal and Dissolver Pit	Bldg.
7502	09.05	9	Radioactive Waste Evaporator (Bldg. 7500)	Bldg.
7554	09A.01A	9	Cooling Tower (for Building 7500)	Bldg.
7557	09A.01C	9	Charcoal Absorber Pit (for Building 7500)	Bldg.
7558	09.06	9	Waste Evaporator Loading Pit (for Building 7500)	Bldg.
7559	09A.01D	9	Charcoal Absorber Pit (for Building 7500)	Bldg.
7561	09A.01E	9	HRE Decontamination Pad/Shed	Bldg.
		9	Waste Valve Pit (HRE)	Bldg.
7563		9	Circulator Pump Pit (for Building 7500)	Bldg.

APPENDIX B

SUMMARY OF INACTIVE LLLW TANK LEVEL TRENDING ACTIVITIES

The following summarizes tank activities completed through FY 1997. As required by the FFA, inactive LLLW tanks that are receiving nonprogrammatic inputs of liquid are monitored to manage liquid levels. A monthly liquid report is generated, which tracks the liquid level trends of 20 inactive tanks. The level trend analysis does not indicate that any of the 20 inactive tanks are outleaking.

1. GUNITE STORAGE TANK W-5; SOUTH TANK FARM SITE, 3507, NORTH ROW

Tank W-5 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The liquid level has remained unchanged throughout FY 1997. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which allows surveillance of the liquid level 24 hours per day.

2. GUNITE STORAGE TANK W-6; SOUTH TANK FARM SITE, 3507, SOUTH ROW

Tank W-6 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks, causing inleakage through tank penetrations such as pipelines or tank access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day.

3. GUNITE STORAGE TANK W-7; SOUTH TANK FARM SITE, 3507, SOUTH ROW

Tank W-7 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level remained unchanged throughout FY 1997. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day.

4. GUNITE STORAGE TANK W-8; SOUTH TANK FARM SITE, 3507, SOUTH ROW

Tank W-8 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day. Approximately 70,000 gal of supernate were transferred to the active LLLW system in FY 1997.

5. GUNITE STORAGE TANK W-9; SOUTH TANK FARM SITE, 3507, NORTH ROW

Tank W-9 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day. Approximately 50,000 gal of supernate were transferred to the active LLLW system so that approximately 41,000 gal of supernate and sludge could be transferred into Tank W-9 from Tank W-4.

6. GUNITE STORAGE TANK W-10; SOUTH TANK FARM SITE, 3507, SOUTH ROW

Tank W-10 is a 170,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations such as pipelines or tank access ports. The liquid level is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to the WOCC and monitored 24 hours per day. Approximately

80,000 gal of supernate were transferred to the active LLLW system.

7. TANK W-11; SOUTH EAST OF SOUTH TANK FARM

Tank W-11 is a 1,500-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level is monitored daily with a staff gauge, and this information is recorded on the liquid level trend analysis database.

8. OLD HYDROFRACTURE TANK T-1

Tank T-1 is a 15,000-gal, carbon-steel tank. The liquid level is monitored daily with a Foxboro Model 13A DP transmitter. The liquid level has remained unchanged throughout FY 1997. The liquid level monitor will be removed in FY 1998 so that the contents can be sluiced to the active LLLW system.

9. OLD HYDROFRACTURE TANK T-2

Tank T-2 is a 15,000-gal, carbon-steel tank. The liquid level is monitored daily with a Foxboro Model 13A DP transmitter. The liquid level has remained unchanged throughout FY 1997. The liquid level monitor will be removed in FY 1998 when the contents are transferred to the active LLLW system.

10. OLD HYDROFRACTURE TANK T-3

Tank T-3 is a 25,000-gal, carbon-steel tank. The liquid level is monitored daily with a Foxboro Model 13A DP transmitter. The liquid level has remained unchanged throughout FY 1997. The liquid level monitor will be removed in FY 1998 when the contents are transferred to the active LLLW system.

11. OLD HYDROFRACTURE TANK T-4

Tank T-4 is a 25,000-gal, carbon-steel tank. The liquid level is monitored daily with a Foxboro Model 13A DP transmitter. The liquid level has remained unchanged throughout FY 1997. The liquid level monitor will be removed in FY 1998 when the contents are transferred to the active LLLW system.

12. OLD HYDROFRACTURE TANK T-9

Tank T-9 is a 13,000-gal, carbon-steel tank. The liquid level is monitored daily with a Foxboro Model 13A DP transmitter. The liquid level has remained unchanged throughout FY 1997. The liquid level monitor will be removed in FY 1998 when the contents are transferred to the active LLLW system.

13. THORIUM TANK TH-1; SOUTH OF BLDG. 3503

Tank TH-1 is empty. A conductivity probe is inserted through an access pipe to check for liquid level. No permanent instrumentation is mounted to the tank. The tank was rinsed and emptied in preparation for isolating and grouting in place in FY 1998.

14. THORIUM TANK TH-2; SOUTH OF BLDG. 3503

Tank TH-2 is empty. A conductivity probe is inserted through an access pipe to check for liquid level. No permanent instrumentation is mounted to the tank. The tank was rinsed and emptied in preparation for isolating and grouting in place in FY 1998.

15. THORIUM TANK TH-3; SOUTH OF BLDG. 3503

Tank TH-3 is empty. A conductivity probe is inserted through an access pipe to check for liquid level. No permanent instrumentation is

mounted to the tank. The tank was rinsed and emptied in preparation for isolating and grouting in place in FY 1998.

16. THORIUM TANK TH-4; SOUTH OF BLDG. 3500

Tank TH-4 is a 14,000-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day.

17. TANK W-1; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-1 is a 4,800-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day. Approximately 4,000 gal of supernate were transferred to the active LLLW system in FY 1997.

18. TANK W-2; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-2 is a 4,800-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day.

19. TANK W-3; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-3 is a 42,500-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to the WOCC and monitored 24 hours per day. Approximately 30,000 gal of sludge were transferred to W-4 by the Gunite and Associated Tanks Project. A pump has been installed in the tank to prevent an inventory of inleakage from collecting in the tank.

20. TANK W-4; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-3 is a 42,500-gal-capacity tank constructed of Gunite and reinforced steel. The tank liquid level has increased in FY 1997. This inleakage may be due to perched groundwater in the immediate vicinity of the tanks causing inleakage through tank penetrations, such as pipelines or tank access ports. The liquid level instrumentation is a Robertshaw Inven-Tel-185 conductivity probe, which is connected to WOCC and monitored 24 hours per day. Approximately 32,000 gal of supernate were transferred to the active LLLW system. An additional 51,200 gal of liquid and sludge were transferred to Tank W-9 by the Gunite and Associated Tanks Project.

21. TANK W-13; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-13 is a 2000-gal-capacity tank constructed of stainless steel. The tank remains

empty. No permanent instrumentation is mounted to the tank.

22. TANK W-14; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-14 is a 2000-gal-capacity tank constructed of stainless steel. The tank remains empty. No permanent instrumentation is mounted to the tank.

23. TANK W-15; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-15 is a 2000-gal-capacity tank constructed of stainless steel. The tank remains empty. No permanent instrumentation is mounted to the tank.

24. TANK W-1A; NORTH TANK FARM, NORTH OF CENTRAL AVE., SITE 3023

Tank W-1A is a 4000-gal-capacity tank constructed of stainless steel. The tank liquid level is monitored daily with a Foxboro 823 pneumatic gauge. This tank receives significant amounts of inleakage during rainfall events, and the inleakage is routinely transferred to the active LLLW system.

25. TANK WC-1; BETWEEN BLDGS. 3038 AND 3037, NORTH OF CENTRAL AVE.

Tank WC-1 is a 2150-gal-capacity tank constructed of stainless steel. The liquid level has remained unchanged throughout FY 1997. No permanent liquid level instrumentation is mounted to the tank.

26. TANK WC-15; SOUTH OF BLDG. 3587, CORNER OF WHITE OAK AVENUE AND FIFTH STREET

Tank WC-1 is a 1000-gal-capacity tank constructed of stainless steel. The tank liquid level is monitored daily with a Robertshaw Inven-Tel 185 model conductivity probe. This tank is known to have a hole in the bottom. Because the tank is at the interface of the groundwater table, the liquid level fluctuates as the groundwater table rises and falls.

27. TANK WC-17; SOUTH OF BLDG. 3587, CORNER OF WHITE OAK AVENUE AND FIFTH STREET

Tank WC-17 is a 1000-gal-capacity tank constructed of stainless steel. The tank liquid level is monitored daily with a Robertshaw Inven-Tel 185 model conductivity probe. This tank is known to have a hole in the bottom. Because the tank is at the interface of the groundwater table, the liquid level fluctuates as the groundwater table rises and falls.

28. TANK 7560; EAST OF BLDG. 7500, MELTON VALLEY

Tank 7560 is a 1000-gal-capacity tank constructed of stainless steel. The tank was rinsed, emptied, isolated, and grouted in place in FY 1997.

29. TANK 7562; EAST OF BLDG. 7500, MELTON VALLEY

Tank 7562 is a 12,000-gal-capacity tank constructed of stainless steel. The tank was rinsed, emptied, and grouted in FY 1997.

30. TANK T-30; SOUTH OF BLDG. 4507, UNDERGROUND IN CONCRETE PIT

Tank T-30 is a 825-gal-capacity tank constructed of stainless steel. In August 1996, the tank and vault were filled with a low-strength grout. There is no requirement for liquid level measurement in this tank.

31. TANK W-19; SOUTH OF SOUTH TANK FARM, NORTH OF BLDG. 3517

Tank W-19 is a 2250-gal-capacity tank constructed of stainless steel. The tank has remained empty. There is no liquid level instrumentation mounted on this tank.

32. TANK W-20; SOUTH OF SOUTH TANK FARM, NORTH OF BLDG. 3517

Tank W-20 is a 2250-gal-capacity tank constructed of stainless steel. The tank has remained empty. There is no liquid level instrumentation mounted on this tank.

33. TANK 3001-B; SOUTH OF BLDG. 3001

Tank 3001-B was removed, and the vault was grouted in 1995.

34. TANK 3003-A; SOUTH OF BLDG. 3003

Tank 3003-A is a 16,000-gal tank constructed of concrete. The liquid level has remained unchanged. There is no liquid level instrumentation connected to this tank.

35. TANK 3004-B; EAST OF BLDG. 3008, UNDERGROUND, UNDERNEATH LANDSCAPE ROCKS ON PUBLIC ACCESS WALK TO GRAPHITE REACTOR

Tank 3004-B was removed, and the vault was grouted in 1995.

36. TANK 3013; EAST OF BLDG. 3017, SOUTH OF BLDG. 3013

Tank 3013 is a 400-gal-capacity tank constructed of stainless steel. The tank was isolated and filled with a low-strength grout in 1995. There is no need to monitor the liquid level.

37. TANK 7503-A; NORTHWEST OF BLDG. 7503, MELTON VALLEY

Tank 7503-A is a 11,000-gal-capacity tank constructed of stainless steel. The tank has remained empty. There is no liquid level instrumentation connected to this tank.

38. TANK H-209; SOUTHWEST OF BLDG. 3517, NEXT TO WHITE OAK AVENUE

Tank H-209 is a 2500-gal-capacity tank constructed of carbon steel. In 1996, the tank was isolated and filled with a low-strength grout. There is no need to monitor the liquid level.

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