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ENVIRONMENTAL RESTORATION PROGRAM

ORNL/ER-376

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

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ORNL/ER-376

Energy Systems Environmental Restoration Program

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

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Environmental Management Activities at
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PREFACE

This project management plan for the Isotopes Facilities Deactivation Project was prepared to comply with the intent of U.S. Department of Energy Order 4700.1, "Project Management System." This work was performed under Work Breakdown Structure 1.6.6.2.10.2 (Activity Data Sheet 6504-IS, "ORNL Isotopes Facilities"). This management plan documents the objectives, defines organization relationships and responsibilities, and outlines the management control system to be used in the management of the project. In addition, this plan provides a road map for the quality assurance program and identifies other documents supporting the Isotopes Facilities Deactivation Project.

CONTENTS

TABLES

ABBREVIATIONS

CTD	Chemical Technology Division
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy–Headquarters
DOE-ORO	U.S. Department of Energy–Oak Ridge Operations
EM&UE	Environmental Management and Uranium Enrichment Operations
EM-40	U.S. Department of Energy–Headquarters Office of Decontamination and Decommissioning
EM-60	Environmental Management and Uranium Enrichment Office of Nuclear Materials and Facility Stabilization
ER	Environmental Restoration (Program)
IFDP	Isotopes Facilities Deactivation Project
IFSP	Isotopes Facilities Shutdown Program
ITR	Independent Technical Review
LMER	Lockheed Martin Energy Research
LMES	Lockheed Martin Energy Systems
MCS	management control system
NM&FS	Nuclear Materials and Facility Stabilization
ORNL	Oak Ridge National Laboratory
QA	quality assurance
QAP	quality assurance plan
QAS	Quality Assurance Specialist
RTS	Radiochemical Technology Section
S&M	surveillance and maintenance
WBS	work breakdown structure

EXECUTIVE SUMMARY

The purpose of the Isotopes Facilities Deactivation Project (IFDP) is to place former isotopes production facilities at Oak Ridge National Laboratory in a safe, stable, and environmentally sound condition suitable for an extended period of minimum surveillance and maintenance (S&M) as quickly and economically as possible. Implementation and completion of the deactivation project will further reduce the already small risks to the environment and public safety and health. Furthermore, the project should result in significant S&M cost savings in the future. The IFDP management plan has been prepared to document the project objectives, define organizational relationships and responsibilities, and outline the management control systems to be employed in the management of the project. The project has adopted a strategy to deactivate the simple facilities first to reduce the scope of the project and gain experience before addressing more difficult facilities. A deactivation end-point determination process has been developed and utilized to identify end points. The *Work Plan for the Isotopes Facilities Deactivation Project at Oak Ridge National Laboratory*, ORNL/ER-249/R2 (Energy Systems 1994), defines the detailed plans of IFDP facilities as well as the technical methodology used in preparing the plans. The *Lifecycle Baseline Summary for ADS 6504IS Isotopes Facilities Deactivation Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee,* ORNL/ER-325/R1 (LMES 1995), contains the technical cost and schedule baseline for the project.

1. INTRODUCTION

1.1 PURPOSE

This management plan documents the objectives, defines organizational relationships and responsibilities, and outlines the management control systems to be used in the management of the Isotopes Facilities Deactivation Project (IFDP). This plan has been developed by the Environmental Restoration (ER) Program of Lockheed Martin Energy Systems, Inc., (LMES) for the U.S. Department of Energy (DOE) Oak Ridge Operations Office (ORO).

This document complies with the intent of DOE Order 4700.1, "Project Management System." DOE concurrence of this document indicates agreement with its role in the management of IFDP and acceptance of the management control systems.

1.2 SCOPE

Nineteen facilities are currently in IFDP and are listed in Table 1. To complete its mission, IFDP must deactivate and place each facility in shutdown condition. A deactivated, shutdown facility is one in which (1) hazardous materials and waste have been removed from accessible areas, (2) transferrable radioactive contamination has been removed from accessible areas to the extent practical, (3) containment structures are in good physical condition, (4) energy sources in the facility have been de-energized to the extent practical, (5) regular personnel use and occupancy of the building have been terminated, and (6) the facility is structurally sound and weather tight. IFDP has identified all activities required to achieve these conditions in IFDP facilities and will manage the execution according to this plan. Existing building-specific procedures will be utilized and modified as required to conform to ER policy.

Table 1. Scheduled shutdown facilities

Facility	Building number
Krypton-85 Enrichment Facility	Building 3026-C
Metal Segmenting Facility	Building 3026-D
Alpha Powder Facility	Building 3028
Source Development Laboratory	Building 3029
Radioisotope Production Laboratory—C	Building 3030
Radioisotope Production Laboratory—D	Building 3031
Radioisotope Production Laboratory—H	Building 3118
Radioactive Gas Processing Facility	Building 3033
Radioactive Production Laboratory Annex	Building 3033-A
Alpha Handling Facility	Building 3038-AHF
Radioisotope Packaging and Shipping Facility	Building 3038-M

Table 1 (continued)

Facility	Building number
Isotope Materials Laboratory	Building 3038-E
Isotope Technology Building	Building 3047
Fission Product Development Laboratory	Building 3517
Tritium Target Preparation Facility	Building 7025
Radioisotopes Production Laboratory—E	Building 3032
Radioisotopes Area Services	Building 3034
Storage Cubicle	Building 3093
Storage Pad	Building 3099

1.3 PROJECT BACKGROUND

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

The review was initiated in September 1993 and concluded with the issuance of a final report in January 1994. As a result of recommendations in the ITR report, DOE transferred local program oversight from the DOE ORNL site office to the Office of the Assistant Manager for EM&UE. The program was retitled IFDP, and implementation responsibility was transferred from CTD to ER. This document describes the management system for the project.

2. PROJECT OBJECTIVES

2.1 MISSION

The mission of IFDP is to deactivate former ORNL isotopes production facilities. Specifically, IFDP will

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

2.2 TECHNICAL OBJECTIVES

The objective of the shutdown project is to place 19 formerly utilized isotopes facilities at ORNL (Table 1) in a radiologically and industrially safe condition for routine, long-term S&M before eventual decommissioning. These facilities will be placed in a condition to meet the acceptance criteria for ER specified by the DOE Policy Memorandum for Acceptance of Facilities for the ER Program issued March 15, 1991, by L. P. Duffy (Duffy 1991). The project objectives are to

- establish a safe and environmentally secure configuration for these facilities, and ensure that this condition can be maintained for a 10-year period;
- establish an S&M program to maintain the secure configuration at minimum cost;
- implement cost-effective, innovative approaches to ensure that the required safety envelope is defined and maintained during deactivation;
- achieve compliance with environment, safety, and health codes and standards during deactivation;
- create a project organization capable of managing the deactivation of other ORNL facilities as they become surplus;
- apply lessons learned from commercial deactivation technology; and
- establish IFDP as a model for deactivation of hot cell facilities throughout the DOE complex.

2.3 COST AND SCHEDULE

Detailed cost, schedule, and funding baselines have been established for the project in accordance with the *Program Management Plan for the Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory Site Environmental Restoration Program* (Gilbert/Commonwealth 1994). These are contained in the IFDP work plan.

In accordance with the ER Program management plan, the following will be accomplished:

- Maintain internal cost and schedule performance measurement information to provide managers with timely, objective performance data.
- Track actual project progress against baseline budget estimates, and schedule milestones on a monthly basis (Cost and schedule status will be monitored using earned value techniques to determine work progress. Reports that describe the project cost and schedule status and identify undesirable variances will be reviewed by management. Appropriate corrective action will be initiated to rectify cost and schedule variances as they are identified.).
- Identify unfavorable trends that may require management review and action.
- Provide monthly reports based on a project tracking system.
- Analyze project variance by work breakdown structure (WBS) element Level 4, highlighting situations that exceed the established reporting thresholds (The analysis will be for incremental and cumulative data and will include a statement of the problem and the action taken or recommended for correction.).

With these systems, analyses and trends are developed to (1) analyze significant deviations from planned work, (2) develop any necessary work-around plans when the scope or estimate of a task changes, (3) develop revised estimates at completion, and (4) provide the data necessary for the ER Program and DOE reports.

2.4 PROJECT STRATEGY

IFDP has developed a three-phase strategy for the implementation of technical objectives. The three phases are:

- Phase I—project requirements determination;
- Phase II—project execution plan development; and
- Phase III—project execution.

IFDP is now in Phase III. All three phases are described in detail in the IFDP work plan.

2.5 ACTIVITIES AND PERFORMANCE MEASURES

Specific activities and associated performance measures are developed as a part of the project work plan. These activities and performance measures provide a qualitative basis to evaluate the movement toward objectives.

3. PROJECT ORGANIZATION AND RESPONSIBILITIES

3.1 INTRODUCTION

IFDP is one element of the Oak Ridge Nuclear Materials and Facility Stabilization (NM&FS) and is matrixed into the LMES NM&FS program manager. The project is part of the Facility Maintenance and Operations within the LMES ER Program, which is responsible for the implementation of deactivation activities. The project organization chart is shown in Fig. 1. A description of the roles and responsibilities of the key management positions follows.

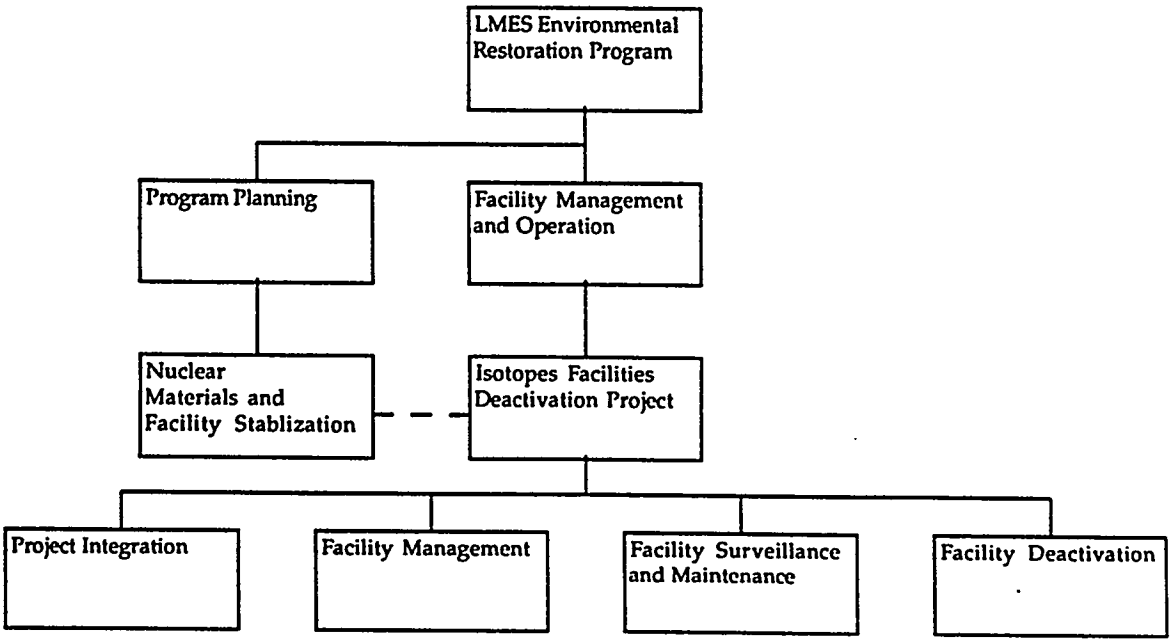

Fig. 1. Isotopes Facilities Deactivation Project organization chart.

3.2 NUCLEAR MATERIALS AND FACILITIES STABILIZATION PROGRAM MANAGER

The LMES Nuclear Materials and Facilities Stabilization Program (NM&FS) manager serving under the ER D&D program director is the primary interface for all EM-60 projects. The NM&FS manager develops budget planning and activity data sheet documents required by DOE-ORO and DOE-HQ. The NM&FS manager also coordinates these programmatic functions and responses to DOE requests for information with the LMES ER Program teams who carry out the work and interface with subcontractors on the ER site.

3.3 FACILITY MANAGEMENT AND OPERATIONS PROGRAM MANAGER

The ER Facility Management and Operations Program manager provides leadership, management, and programmatic direction for the management of facilities in the ER Program. The program manager, under the direction of the LMES ER Division Director, establishes appropriate

program goals, objectives, and project direction via site strategic planning with division management, DOE, regulators, and the public. The Facility Maintenance and Operations manager may represent the program in interactions within LMES; DOE-ORO; regulatory agencies (in association with DOE); other cooperating agencies (e.g., Tennessee Valley Authority, U.S. Geological Survey); and the general public.

3.4 ISOTOPES FACILITIES DEACTIVATION PROJECT MANAGER

The ER IFDP manager is responsible for the development, implementation, and completion of all DOE ER and Waste Management deactivation activities required for acceptance of designated ORNL isotopes facilities into the EM-40 D&D program. The project manager's responsibilities include defining the scope of the project, estimating project costs, developing project schedules, coordinating subcontractor work, maintaining a project budget and schedule, preparing progress reports, integrating the work of all DOE prime contractors, and preparing the project baseline. The project manager also is responsible for ensuring the adequacy of all procedures used in performing IFDP activities.

IFDP is matrixed to the LMES NM&FS manager to coordinate activities, report to DOE, share lessons learned, and provide consistency among transition activities across all DOE sites managed by LMES.

3.5 PROJECT ANALYST

The project analyst develops baseline reporting parameters; compiles, analyzes, monitors, and reports project manpower, schedule, cost, and status information; and assists the team with planning and project status reporting in accordance with LMES and DOE requirements.

The project analyst is also responsible for developing formal logic networks and schedules used to plan and monitor the project status.

3.6 QUALITY ASSURANCE SPECIALIST

The Quality Assurance Specialist (QAS) assists the project team in making quality assurance (QA) assessments and plans. Furthermore, the QAS monitors the documentation of all assessments and the implementation of actions and plans. The QAS participates in quality failure investigation and reporting and assists in scheduling QA audits and in implementing Corrective Actions in response to recommendations.

3.7 ENVIRONMENTAL COMPLIANCE COORDINATOR

The environmental compliance coordinator works with the project manager and serves as a regulatory specialist to ensure that all project-level activities are being performed in full compliance with the applicable state and federal regulations. In executing his duties, the environmental compliance coordinator will utilize the services of the ORNL Office of Environmental Compliance.

3.8 HEALTH AND SAFETY OFFICER

Assessments are required for health and safety based upon known conditions at the site. The project health and safety (H&S) officer is responsible for ensuring that all activities are conducted in accordance with applicable health and safety standards. The H&S officer ensures that the necessary permits, safety equipment, and procedures are in place before work begins. The H&S officer provides the appropriate review and approval for permits and procedures for experimental activities, operations, and maintenance to ensure that the hazards involved have been addressed. Also, the H&S officer is responsible for implementing the LMES as low as reasonably achievable program, ensuring that project personnel properly wear radiation dosimeters and other personal protective equipment and that personnel are trained in general radiation protection procedures.

3.9 DOCUMENT CONTROL MANAGER

The document control manager is responsible for the development, implementation, oversight, and control of publication activities. The document control manager ensures baseline document control and integration into applicable LMES, DOE, state, and U.S. Environmental Protection Agency documentation systems.

3.10 ENGINEERING PROJECT MANAGER

The engineering project manager is responsible for overseeing the design and construction activities. Specifically, the engineering project manager ensures that the full scope of design and construction activities is completed on schedule and within budgeted funds and is responsible for communications with all project team members for achieving timely decisions involving scope, cost, schedule, change proposals, and document flow of the design and construction activities.

The engineering project manager is also responsible for coordinating the development of cost estimates, cost and obligation authority schedules, and project schedules; preparing value engineering analyses; and coordinating revisions to cost estimates and schedules. This manager also provide support for procurement, architect-engineer estimate reviews, bid check reviews, project reviews, and special studies.

3.11 FACILITY MANAGER

The ER Program is responsible for all aspects of facility management of the buildings associated with IFDP, and all decisions and interfaces associated with the management of these buildings will be made by the ER Program. As directed by the ER Program manager, CTD will provide the necessary staff to manage and perform activities required for essential S&M of facilities. CTD will provide the primary interface with other ORNL organizations supporting essential S&M in IFDP facilities. Work direction is limited to performance of essential S&M. Any other activity must be approved by the ER Program manager.

The facility manager is responsible for all operations within IFDP facilities. The facility manager's responsibilities include performance of all required S&M activities, maintenance of all facility documentation, occurrence reporting, and training of facility personnel. In addition, the facility manager shall assure environment, safety, and health consistency in the implementation of activities under his purview.

The facility manager oversees all actions resulting in waste generation and approves documentation for all project-generated wastes that enter, leave, or are generated at the facility. The facility manager ensures that project personnel transport, store, and dispose of hazardous waste, radiological waste, and nonhazardous waste in accordance with all applicable federal, state, and local regulations and with project waste management plans.

4. PROJECT WORK PLAN

The intent of this project is to implement actions required to deactivate former isotopes production facilities, and place them in a safe, shutdown condition. The final condition of the facilities will allow for minimal S&M until D&D is initiated. All activities will be conducted in a manner to ensure the protection of human health and safety.

The detailed work plan for IFDP identifies all tasks and plans to be completed to achieve the project's objective. The IFDP baseline contains the schedule, milestones, and cost estimate. The IFDP work plan contains:

1. General and facility-specific end-point criteria based upon the draft EM-40 facility acceptance criteria.
2. A statement of baseline facility condition.
3. Baseline S&M activities required in each facility.
4. A facility-specific list of candidate deactivation activities.
5. An evaluation of each candidate activity against deactivation criteria, which will include the following points:
   - Is this activity consistent with the IFDP mission?
   - Does this activity mitigate an immediate environment, safety, and health vulnerability?
   - Is this action required by the EM-40 criteria?
   - Will this activity reduce the future liability of the facility?
   - Will this activity result in lower S&M costs?
6. Priorities for reducing environment, safety, and health vulnerabilities and the baseline S&M cost.

The current cost estimates, schedules, and milestones have been approved by DOE and are documented in the baseline document.

5. WORK BREAKDOWN STRUCTURE

The WBS defines the hierarchy between elements of IFDP and reflects the lowest level of work package necessary to complete the program. The WBS is illustrated in Table 2. The WBS work package will be used to

1. organize all work activities;
2. plan and schedule work;
3. prepare resource budgets to support work;
4. develop spending profiles;
5. contract for work; and
6. collect technical, schedule, and cost performance data.

All participants working on IFDP will be required to use this WBS to integrate the technical, schedule, and cost baseline.

Table 2. Isotopes Facilities Deactivation Project work breakdown structure

WBS	Name
1.6.6.2.10.2	Isotopes Facilities Deactivation Project
2.10.2.01	Project Integration
2.10.2.01.01	Project Management
2.10.2.01.02	Project Planning
2.10.2.02	Surveillance and Maintenance (S&M)
2.10.2.02.01	Utilities
2.10.2.02.04	Building 3026
2.10.2.02.06	Building 3028
2.10.2.02.08	Building 3029
2.10.2.02.10	Center Circle Buildings
2.10.2.02.12	Building 3038
2.10.2.02.14	Building 3047
2.10.2.02.16	Building 3517
2.10.2.02.18	Building 7025
2.10.2.02.20	Other S&M
2.10.2.04	Building 3026 Facility Deactivation
2.10.2.04.01	Contamination Control
2.10.2.04.02	Structural Stabilization
2.10.2.04.08	Radioluminescent Lights Removal
2.10.2.04.10	Final Facility Report
2.10.2.06	Building 3028 Facility Deactivation
2.10.2.08	Building 3029 Facility Deactivation

Table 2 (continued)

WBS	Name
2.10.2.10	Center Circle Deactivation
2.10.2.10.01	Contamination Control
2.10.2.10.02	Structural Stabilization
2.10.2.10.07	Reroof Buildings 3030, 3118, & 3031
2.10.2.10.10	Final Facility Report
2.10.2.12	Building 3038 Facility Deactivation
2.10.2.12.01	Contamination Control
2.10.2.12.02	Structural Stabilization
2.10.2.12.04	Yttrium Cell Cleanup
2.10.2.12.05	Glove Boxes and Hoods Removal
2.10.2.12.06	Barricade Cleanup
2.10.2.12.08	Plutonium Vulnerability Assessment
2.10.2.12.10	Final Facility Report
2.10.2.14	Building 3047 Facility Deactivation
2.10.2.14.01	Contamination Control
2.10.2.14.02	Structural Stabilization
2.10.2.14.03	Hot Cell Cleanup
2.10.2.14.05	Glove Boxes and Hoods Removal
2.10.2.14.10	Final Facility Report
2.10.2.16	Building 3517 Facility Deactivation
2.10.2.16.02	Structural Stabilization
2.10.2.16.03	Hot Cell Cleanup
2.10.2.16.09	Inventory Transfer
2.10.2.16.10	Final Facility Report
2.10.2.18	Building 7025 Facility Deactivation
2.10.2.18.01	Contamination Control
2.10.2.18.02	Structural Stabilization
2.10.2.18.10	Final Facility Report
2.10.2.20	Other Facility Deactivation and Support
2.10.2.20.01	Other Engineering Support
2.10.2.20.02	Audits and Assessments

6. PROJECT SCHEDULE

As part of development of the work plan, activity schedules incorporating controlled milestones have been developed for IFDP. This schedule information constitutes the schedule baseline; the master project schedule; and the controlled milestones, which are documented in the IFDP baseline document.

The LMES ER Program is responsible for the preparation and the management of these schedules and milestones in accordance with the management control system (MCS) (Chap. 8.). The master schedule is to be supported by lower-level schedules. The schedules constitute the schedule baseline utilized by LMES for schedule performance, measurement, and control. The DOE-ORO facility transition manager will be provided with copies of all schedules necessary for evaluating project status.

The schedule and schedule control process include the following items.

- Schedules will be constructed to reflect tasks required to complete a single WBS element. Also, in accordance with WBS, lower-level schedules are directly integrated and traceable to higher-level schedules.
- An integrated network capable of producing a critical path logic for the entire project will be implemented for analysis and reporting.
- Schedule objectives discussed in Sect. 2.3 of this plan will be incorporated into major milestones. These milestones provide points for control and reporting within the master project schedule and lower-level schedules. Changes in schedule dates for these major milestones must be approved in accordance with the project change control in Chap. 10.
- On a monthly basis, the ER Program will track actual progress against the master project schedule. Schedule status is reported by each project team member, and the status is reviewed by DOE-ORO and LMES project management. Appropriate Corrective Actions are initiated to rectify schedule variances as they are identified.
- The DOE-ORO project office will conduct periodic analysis of project schedules to ensure the accuracy of the monthly data.

The master project schedule discussed in this chapter will be the working schedule used to plan, determine status, and report on the project. This document will integrate all facets of the project.

7. PROJECT COSTS

7.1 COST BASELINE

The cost baseline for the project is a time-phased cost estimate for completion of the deactivation activities identified in the work plan. The following approach was used to develop the cost estimate:

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

The cost baseline will be contained in the IFDP baseline document. The baseline details the scope of work to be performed each fiscal year and defines the baseline cost estimate for the year. An annual review of the baseline will accommodate changes resulting from revised programmatic requirements, budget constraints, or unplanned conditions or changes. Scope of work information for the baseline will be extracted from this report.

7.2 BASIS FOR COST ESTIMATE

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

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

- D&D activities will not be performed for at least 10 years beyond the completion of deactivation activities.
- All deactivation activities are covered by existing ORNL National Environmental Policy Act documentation. Any additional National Environmental Policy Act documentation will be completed in parallel with other project activities with additional resources.
- Waste tanks WC-10 and WC-2 will be available to support deactivation activities.
- Trained and qualified personnel are available to perform deactivation activities.
- Work inefficiencies are expected for radiation work involving respirators or supplied air.
- Operational readiness reviews will be conducted by the project staff or by an appointed review committee. No other operational readiness reviews will be required.
- Technical planning bases for the project will be implemented as described. Appropriate project contingency will be provided and identified.
- Budget will be provided as planned in the funding profile.

7.3 COST ESTIMATE METHOD

The cost estimate was prepared by the LMES Engineering Division with support from ORNL organizations. The estimating methodologies and practices conform to the LMES *Project Estimating and Scheduling (PES) Standard Operating Manual* (Energy Systems 1991), the *Estimating and Cost Control Manual for Construction Projects* (DOE-ORO 1991), and the *Cost Estimating Hand Book for Environmental Restoration* (U.S. DOE EM&UE Cost Assessment Team 1990). The estimate is an activity-based cost estimate.

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

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

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

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

8. PROJECT MANAGEMENT CONTROL SYSTEM

The IFDP MCS is based on the *Program Management Plan for the Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory Site Environmental Restoration Program* (Gilbert/Commonwealth 1994). The IFDP MCS provides a uniform approach to be used throughout the project. The goal is to ensure planning and execution of this project in a manner that is technically sound, timely, and cost-effective.

The basis of the MCS is the establishment of a baseline and then controlling work to that baseline. The summary Level 4 project baseline is controlled by DOE-ORO.

LMES and subcontractors have developed the contract WBS (Chap. 5) to organize the associated technical, cost, schedule, and funding documentation.

In addition, the system is designed to summarize information for LMES to DOE-ORO and DOE-HQ so that timely management decisions can be made by the project team. This is accomplished as follows:

- Provide a WBS that is integrated with the organization structure and defines manageable work packages for which a technical scope of effort and associated schedule and budget are established and can be assigned to a specific organization for accomplishment.
- Ensure that the MCS for the project is capable of organizing and reporting work in a timely and consistent manner.
- Obtain technical, schedule, cost, and funding information in the format and level of detail necessary to meet management and reporting needs.
- Prepare the data to show the project status and progress against planned accomplishments.
- Evaluate and analyze the information to identify key problems that require management decisions and Corrective Actions.
- Correlate the project funding profile with planned commitments, expenditures, and work accomplished to date.
- Prepare Baseline Change Proposals that impact established work scope, budgets, and schedules.

9. INFORMATION AND REPORTING

9.1 OVERVIEW

Project performance will be reported to DOE through a graded system of bimonthly highlights and monthly cost and schedule status summaries. Bimonthly highlights and monthly reports will be issued for the life of the project. A final report will be issued at the end of the project.

9.2 BIMONTHLY HIGHLIGHTS AND PROJECT MEETING

A bimonthly IFDP staff meeting will be conducted to discuss all programmatic activities, concerns, and accomplishments. Discussion and subsequent reporting items include critical program constraints; budgets; schedules; safety; QA; other support groups; procedures; training; staffing; inventory movement; action items; and bimonthly activity highlights, as submitted by the facility supervisors.

The IFDP bimonthly highlights condense progress and significant concerns into a list for timely reporting to DOE. Monthly cost summaries with analyses of variances will be available by the seventh business day of each month.

9.3 SUMMARY COST CHARTS

The financial reporting system is designed to provide the project manager with the data necessary to control and manage program costs. All costs within the ORNL complex are collected in the Cost Accounting System. IFDP costs will be retrieved electronically from the Cost Accounting System and put into the cost and scheduling tracking system, where comparative analysis may be made against planned costs. Cost reports will be presented in the WBS format.

Summary cost reports showing actual costs relative to a planned budget will be developed for each WBS and reported monthly. These summaries will appear in the bimonthly meeting minutes as soon as the data are available from the Cost Accounting System (normally by the second week). Variances will be controlled as explained in Sect. 2.3.

9.4 DETAILED ACTIVITY PROGRESS REPORT

In addition to the bimonthly reporting discussed in Sect. 9.2, monthly detailed schedule status reports will be generated to assist the project manager. These reports are primarily intended to be a working tool for use by all project participants and will include information in the following areas:

1. major accomplishments;
2. developments affecting baseline estimates, schedules, and scope;
3. cost performance;
4. schedule status on all level 2 and 3 milestones;

5. significant problems and solutions; and
6. significant comments.

These reports will be issued to IFDP participants and DOE through the project tracking system by the tenth working day of each month.

10. CHANGE CONTROL

10.1 BASELINE CHANGE CONTROL

Scope, schedule, and cost baselines have been developed and are used as a basis for project control. Proposed changes to any of these baselines will be approved by a baseline change control board consisting of ER management. Levels of reviews and approvals are detailed in Table 3.

10.2 CONFIGURATION MANAGEMENT (TECHNICAL CHANGE CONTROL)

Configuration Management is used on this project to help ensure that vital structures, systems, and components for the project conform to their respective requirements (including interfaces) and documents. The primary objective of Configuration Management is to support safe, reliable, and appropriate operations on project work. Changes to configuration items (safety class items, vital monitors, etc.) will be reviewed and approved by qualified technical reviewers. In the rare event that a proposed change to a configuration item adversely affects DOE-controlled cost, schedule, and scope baselines, project team members may choose to submit a Baseline Change Proposal.

10.3 CONTROLLED PROJECT DOCUMENTATION

The IFDP manager is responsible for designating controlled documents for the project. To comply with the configuration control objectives, each controlled document will be assigned a document number with a publication date. Every issuance shall be permanently maintained in the central project files. A Document Change Form with a revision number will accompany proposed revisions with a detailed explanation of requested changes. A summary sheet listing all controlled documents will be maintained by the IFDP project manager. The objectives of the controlled program documentation activity are to control the content and quality of each document and to ensure proper distribution. No attempt will be made to control distribution (i.e., numbered copies) before retrieving or destroying prior issuances.

Table 3. Change approval authorities

Scope change	Cost change	Schedule change	DOE-HQ BCCB Level 1	DOE-ORO BCCB Level 2A	Subproject team Level 2B	LMES Level 3
Addition or deletion of WBS at Level 6 element			Approve (addition or deletion of an element)	Endorse	Endorse	Endorse
Change to WBS dictionary at Level 7 (assumptions, technical description, responsible assignment) or the Task Work Agreement				Approve	Endorse	Endorse
	> $25M		Approve	Endorse	Endorse	Endorse
	< $25M		Information	Approve	Endorse	Endorse
		Level 1 milestones	Approve change ≥ 6 months	Endorse > 6 months. Approve ≤ 6 months	Endorse	Endorse
		Level 2A milestones		Approve change ≥ 3 months	Endorse	Endorse
		Subproject team Level 2B milestones (see milestone log by subproject)			Approve	Endorse

Note: Level 1, 2A, and 2B milestones are identified on controlled milestone logs of baseline.
[a]BCCB = Baseline Change Control Board

11. SUPPORTING PLANS

In addition to the IFDP work plan (Chap. 4.), other supporting plans have been identified and will be prepared.

11.1 FACILITY SURVEILLANCE AND MAINTENANCE PLANS

A plan identifying all existing S&M activities currently performed in all facilities will be prepared. The plan will identify each S&M activity, the organization responsible for performing the activity, the basis for the activity, the required frequency, and the approximate cost. This will be used to identify which deactivation activities will decrease baseline S&M cost and provide a firm basis for the estimated annual costs for facilities after completion of the IFDP.

11.2 HEALTH AND SAFETY PLAN

The *Health and Safety Plan for the Isotopes Facilities Deactivation Project at the Oak Ridge National Laboratory, Oak Ridge, Tennessee,* ORNL/ER-370 (LMES 1996), has been prepared to (1) ensure that all activities are conducted in accordance with applicable health and safety standards; (2) ensure that the necessary permits and safety equipment and procedures are in place before commencement of work activities; (3) provide the appropriate review and approval for permits and procedures for experimental activities, operations, and maintenance to ensure the hazards have been addressed; and (4) provide implementation of an as low as reasonably achievable program, and ensure that project personnel wear proper dosimeters and appropriate personnel protective clothing and equipment, and are properly trained. This document meets the requirements of the *Health and Safety Plan for the Environmental Restoration Program at Oak Ridge National Laboratory*, ORNL/ER-226.

11.3 QUALITY ASSURANCE PLAN

Day-to-day technical management, coordination, control, and reporting of project activities for IFDP is under ER responsibility; however, the facility management function is provided by the Lockheed Martin Energy Research (LMER) CTD for ER under the conditions outlined in a Memorandum of Agreement between the two organizations. This management arrangement allows the IFDP QA program to be directed by the CTD *Radiochemical Technology Section Quality Assurance Plan*, RTS-QAP-X-91-CT-006, R2, (ORNL 1991). The *Environmental Restoration Quality Program Plan*, (ERWM/TM-4, R4), states that other LMER and LMES divisions performing work for ER can operate under their own QA project plans, as long as the plans are reviewed and accepted by the responsible ER Quality Assurance Engineer. Additionally, the Radiochemical Technology Section (RTS) QA plan (QAP) states that support organizations or subcontractors performing work within the scope of the RTS program shall have an approved QA program or work under the RTS QAP and its referenced procedures.

RTS-QAP-X-91-CT-006 meets the intent of the ORNL ER QAP (ORNL/ER-225, R1), the ER QAP, the DOE order on QA (DOE 5700.6C), the requirements of the LMES Quality Program Description (Y/QD-15), and the Price-Anderson Amendments Act Quality Assurance Program Commitments and Implementation Plan (Y/QD-35). As allowed under the upper tier ER QAP and

the RTS QAP, there will not be a separate QAP written for this project. RTS-QAP-X-91-CT-006 will be the governing QA document for IFDP, and its implementation addresses activities conducted in and for facilities within the scope of the IFDP. Implementation of RTS-QAP-X-91-CT-006 ensures achievement of IFDP objectives in a safe, reliable, and predictable manner. The RTS QAP will be evaluated annually and revised as necessary to incorporate changes to the IFDP QA requirements. The RTS QAS will have QA oversight and verification responsibilities for IFDP.

RTS-QAP-X-91-CT-006 is arranged in the same format as DOE 5700.6C. It covers QA requirements for training, quality improvement, documents and records, work processes, design, procurement, inspection and acceptance testing, management assessment, and independent assessment. It also includes a requirement matrix to show the relationship with 10 *CFR* 830.120, DOE Order 5700.6C, and ANSI/ASME NQA-1. This project management plan outlines the authorities and responsibilities for IFDP and includes a project description and project organization chart (Chap.7). A table is included to show the relationships between the DOE, NQA-1, ER, and RTS QA requirements (Table 4). This table will provide a reference to the ER QAP as an indication of the parallel requirements within each program.

11.4 READINESS REVIEWS

A readiness review plan will be developed as needed by the project manager before implementation of major work activities, such as restart of operations when no such activities have been identified to date.

Readiness reviews will be conducted in accordance with the ER Procedure "Conducting Project Readiness Reviews," ER/C-P1610.

Table 4. Modular profile for the Characterization and Monitoring Project

EPA QAMS 005/80	NQA-1 Basic Element	DOE Order 5700.6C Criteria	ES/ER/TM-4	RTS-QAP-X-91-CT-006	Location of QAPjP
5.1 Title Page	6. Document Control	4. Documents and Records	4. Documents and Records	4.	3.1 Introduction
5.2 Table of Contents	6. Document Control	4. Documents and Records	4. Documents and Records	4.0	3.2 Definition, Purpose, and Scope
5.3 Project Description	2. Quality Assurance 6. Document Control	1. Program	1. Program	1.1	3.5 Project Description
5.4 Project Organization and Responsibility	1. Organization	1. Program 2. Personnel Training and Qualification	2. Personnel Training and Qualification	2.0 1.5	3.4 Project Organization and Responsibilities
5.5 QA Objectives for Measurement Data	3. Design Control	6. Design	6. Design	6.0	3.7 QA Objectives for Measurement Data in Terms of PARCC
5.6 Sampling Procedures	5. Instruction, Procedures, and Drawings 6. Document Control, Technical Peer Reviews	4. Documents and Records 5. Work Processes 6. Design	4. Documents and Records 5. Work Processes 6. Design	5.0	3.8 Sampling Procedures
5.7 Sample Custody	6. Document Control 8. Identification and Control of Items 13. Handling, Storage, and Shipping	4. Documents and Records 5. Work Processes	4. Documents and Records 5. Work Processes	4.0 5.0	3.10 Sample Custody
5.8 Calibration Controls and Frequency	12. Control of Measuring and Test Equipment	5. Work Processes	5. Work Processes	8.0 8.3	3.11 Calibration and Frequency
5.9 Analytical Procedures	5. Instruction, Procedures, and Drawings 6. Document Control 9. Control of Processes	4. Documents and Records 5. Work Processes 6. Design	4. Documents and Records 5. Work Processes 6. Design	5.0 4.0 6.0	3.12 Analytical Procedures
5.10 Data Reduction, Validation, and Reporting	4. Procurement Document Control 7. Control of Purchased Items and Services 11. Test Control	7. Procurement 8. Inspection and Acceptance Testing	7. Procurement 8. Inspection and Acceptance Testing	7.0 8.0	3.15 Data Reduction, Validation, and Reporting

Table 4 (continued)

EPA QAMS 005/80	NQA-1 Basic Element	DOE Order 5700.6C Criteria	ES/ER/TM-4	RTS-QAP-X-91-CT-006	Location of QAPjP
5.11 Internal QC Checks	10. Inspections 11. Test Control 19. Software Quality Assurance	6. Design 8. Inspection and Acceptance Testing	6. Design 8. Inspection and Acceptance Testing	8.0 8.2	3.16 Internal Quality Control
5.12 Performance and System Auditing and Frequency	18. Audits	9. Management Assessments 10. Independent Assessments	9. Management Assessments 10. Independent Assessments	9.0 9.2 10.0 10.2	3.17 Performance and System Audits
5.13 Preventive Maintenance Procedures and Scheduling	12. Control of Measuring and Test Equipment 14. Inspection, Test, and Operating Status	5. Work Processes	5. Work Processes	5.0 5.2	3.18 Preventive Maintenance
5.14 Specific Routine Procedures	5. Instructions, Procedures, and Drawings 6. Document Control 9. Control of Processes	6. Design	6. Design	5.0 5.2	3.19 Specific Project Procedures
5.15 Corrective Action	16. Corrective Action	3. Quality Improvement 9. Management Assessment 10. Independent Assessment	3. Quality Improvement	3.0 3.3	3.20 Corrective Action
5.16 QA Reports to Management	15. Non-Conformance 16. Corrective Action 17. Quality Assurance Records	2. Personnel Training and Qualifications 3. Quality Improvement 9. Management Assessment 10. Independent Assessment	2. Personnel Training and Qualifications 3. Quality Improvement	9.0 9.22	3.21 QA Reports to Management

12. REFERENCES

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