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MARTIN MARIETTA

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**ENVIRONMENTAL
RESTORATION
PROGRAM**

**Environmental Restoration Program
Management Control Plan**

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

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Environmental Restoration Program Management Control Plan

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
managing the
Oak Ridge National Laboratory Oak Ridge Y-12 Plant
Oak Ridge K-25 Site Paducah Gaseous Diffusion Plant
under contract DE-AC05-84OR21400
and the
Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-76OR00001
for the
U.S. DEPARTMENT OF ENERGY

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ACRONYMS

ADS	activity data sheet
BCWS	Budgeted Cost of Work Scheduled
CA	Cost Account
CAM	Cost Account Manager
CAP	Cost Account Plan
CMP	Contract Management Plan
COCA	Consent Order/Compliance Agreement
CSCS	Cost, Schedule Control System
CWBS	Contract Work Breakdown Structure
CYWP	Current Year Work Plans
D&D	decontamination and decommissioning
DOE-OR	Doe Field Office, Oak Ridge
EPA	Environmental Protection Agency
ER	Environmental Restoration
EV	Earned Value
FAD	Funding Authorization Document
GPSO	General Program Service Order
HQ	Headquarters
IPSO	Internal Program Service Order
M&O	Management and Operations
NEPA	National Environmental Policy Act
OU	operable unit

PA	preliminary assessment
PCO	Program/Project Change Order
PMB	Performance Measurement Baseline
RI	remedial investigation
ROD	record of decision
S&M	surveillance and maintenance
SI	site investigation

FOREWORD

This document and its companion system specification prepared by the Science Applications International Corporation, dated April 1991, augment applicable portions of the validated Martin Marietta Energy Systems, Inc., Management Control System Description, dated August 1990, to describe the management concepts to be employed by Energy Systems in its role as management and operations (M&O) contractor for the Environmental Restoration (ER) Program. Although the basic approach discussed herein is very similar to the one used successfully for many years for line item projects, ER programmatic considerations and the inclusion of many more Energy Systems organizations made it necessary to formulate several new procedures, alter some existing forms slightly, and add several new procedures and forms. However, the interpretation of the Cost, Schedule Control System (CSCS) criteria as they apply to the creation of Cost Accounts (CAs) and the Performance Measurement Baseline (PMB), the application of Management Reserve, the formulation of the Contract Budget Base, and the calculation of Earned Value (EV) remain the same for both capital and programmatic work.

In its integrating contractor role, Energy Systems performs services for the ER Program that are important and unique in many respects, but that are not related to this Energy Systems Management Control Plan. These are discussed in the Appendix. They presently include activity data sheet (ADS) preparation and change control, and the development and maintenance of program life cycle schedules and costs. Should the DOE Field Office, Oak Ridge (DOE-OR) assign responsibility for similar tasks to Energy Systems in the future, these will be added to the Appendix.

1. INTRODUCTION

This Management Control Plan has been prepared to define the Energy Systems approach to managing its participation in the ER Program in a manner consistent with *DOE/ORO 931: Management Plan for the Oak Ridge Operations Environmental Restoration Program*; *DOE/OR 975: Management Plan for the DOE Field Office, Oak Ridge, Decontamination and Decommissioning Program*; and the *Energy Systems Environmental Restoration Contract Management Plan (CMP)*. This plan discusses the systems, procedures, methodology, and controls to be used by the program management team to attain these objectives.

Energy Systems has been selected as the M&O contractor for the preliminary assessment (PA), inspection, and characterization of the Oak Ridge K-25 Site, the Oak Ridge Y-12 Site, the Oak Ridge National Laboratory, and the Paducah and Portsmouth gaseous diffusion plants. Energy Systems also oversees the remedial actions necessary to meet environmental regulations at these installations, as well as the surveillance and maintenance (S&M) of shutdown facilities and the decontamination and decommissioning (D&D) of shutdown facilities that have been contaminated by radioactive and/or hazardous materials. This work will be organized within the framework of the Contract Work Breakdown Structure (CWBS) included in the CMP. The following are typical Energy Systems activities as the M&O contractor:

- planning, providing, and managing the S&M of the D&D facilities;
- planning, scheduling, budgeting, and managing all activities required to remediate sites and perform D&D;
- helping DOE-OR develop agendas and strategies for regulatory negotiations;
- ensuring the timely generation of National Environmental Policy Act (NEPA) documentation;
- supporting Federal Facility Agreements, Federal Facility Compliance Agreements, and state Decrees;
- conducting technical exchange meetings;
- coordinating the development of groundwater monitoring networks for each facility;
- installing and monitoring compliance-monitoring wells at the operating plants; and
- providing complete permanent records of all decisions and actions taken.

In the role of integrating contractor, Energy Systems will coordinate the preparation and issuance of routine summary program reports that reflect the progress of all participating prime contractors. Other integrating activities are, as follows:

- preparing government estimates upon request;
- preparing systems engineering and configuration management plans as requested;
- conducting program reviews and reliability, availability, maintainability, and risk analyses;
- preparing integrated system test plans;
- conducting independent design reviews and operational readiness reviews;
- coordinating preparation of ADSs and Five-Year plans, Site-Specific plans and Current Year Work plans (CYWPs);
- preparing and maintaining project schedules, budgets, baselines, and other management databases
- preparing all ER Program Baseline Change Orders, based on input from involved prime participants, and implementing and coordinating the approval (disapproval) process with DOE-OR.
- evaluating other DOE-OR prime contractor and subcontractor programs, procedures, systems, processes, and policies regarding health and safety and environmental requirements;
- coordinating technical reviews of all products, plans, schedules, and documents prepared in fulfillment of regulatory deliverables to ensure that the technical approach is consistent and the regulatory requirements are being met;
- providing waste management toxic storage and disposal services for managing ER Program-originated wastes in a manner consistent with regulatory guidance; and
- developing and operating the Oak Ridge Environmental Information System, which will manage all environmental data products on the Oak Ridge Reservation.

2. OBJECTIVE AND SCOPE

The mission of the ER Program is to eliminate or reduce to prescribed, safe levels the risks to the environment or to human health and safety posed by inactive and surplus DOE-OR-managed sites and facilities that are contaminated by radioactive, hazardous, or mixed wastes. As part of this program, Energy Systems, as M&O contractor, has been asked to assume responsibility for PA, inspection, characterization, and S&M of certain DOE-OR installations and for managing the remedial and D&D actions necessary to support the ER Program mission. It is the objective of this Management Control Plan to detail a management control system adequate to ensure that all program work performed or managed by Energy Systems complies in full with all requirements and specifications.

Management control within Energy Systems begins when a DOE-OR program directive is received; it continues through program implementation to closeout. Accordingly, this plan covers Energy Systems responsibilities for complying with all program assignments and commitments, including delivery of all products and services, objective monitoring of performance, the evaluation of and response to variances, and satisfactory closure of all program work.

The top-level program control is presented schematically in Fig. 1, which reflects a closed-loop system in which work is specified, planned, performed, and evaluated and "Lessons Learned" are incorporated during the process. It is evident that the ER Program must respond to "external" influences that may surface at any time as a result of inter-agency relationships, state or local regulations, and special-interest group interactions.

Fig. 1. Top-level management control.

3. ACCOUNTABILITY AND DOCUMENTATION

Effective program management entails assigning accountability and responsibility for addressing contractual requirements, and establishing controls to assure that those requirements are met. Accountability for Energy Systems performance is assigned to the ER Division and D&D Program directors, then to project managers, who are subject to the guidance of intervening program management levels (Fig. 2). The primary responsibilities of the project managers can be summarized as follows:

- assisting in the derivation of the CWBS and preparing the associated CWBS Dictionary;
- authorizing work via internal work authorizations;
- supporting implementation of performance measurement criteria;
- reviewing routine progress reports prepared by site analysts;
- implementing approved changes;
- implementing corrective actions (internally and for subcontractors);
- coordinating support across organizational lines; and
- assuring proper consideration of risk and trend analyses.

The roles of the managers supporting the ER Division and D&D Program directors and of the front line project managers are discussed briefly in the following paragraphs. The responsibilities of the remaining program team members are described on the Responsibility Assignment Matrix. (See ER/C-P1706)

The **Director of Management Systems** is responsible for coordinating cost estimating and for establishing financial, reporting and general support services to ER Program work within Energy Systems. This includes, but is not limited to, formulating all budgets and related documents; assigning financial allocations; preparing procedures and other management tools to ensure that all management controls and systems comply with CSCS criteria; preparing consolidated reports from all program participants and issuing them on a timely basis to DOE-OR; and providing general support to the directors of Site Restoration Programs, the D&D Program, and Technical Integration as required to meet all ER Program objectives. The Business/Management Systems Manager in the D&D Program will coordinate the D&D input and serve as the focal point for resolving all problems identified by ER Program management personnel.

The **Director of Site Restoration Programs**, working closely with the Director of Management Systems, sees that that all remedial action programmatic work within Energy Systems is carried out according to approved technical criteria, on schedule, and within the allocated spending limits. As supervisor of site program managers, he assists in implementing the Work Authorization System and, along with others, approves related internal program changes. During the remedial action phase, he plays a major liaison role with the Central Engineering Division.

Fig. 2. Project management relationships.

The **Director of Technical Integration** is responsible for managing the off-site work and the technical oversight and regulatory interfaces to ensure site-to-site consistency, to maximize single focus (central) efforts, and to provide a technical resource to the individual site implementation programs. This includes, but is not limited to, coordinating technical support for prioritization, conducting risk assessments, integrating the involvement of the DOE-OR support services contractor with the development and maintenance of the Energy Systems ER Program technical data base, and coordinating regulatory reviews and impact analyses.

The **Site Program Managers** report to the Director of Site Restoration Programs for remedial action, the Director of Technical Integration for off-site work and technical integration, or by a matrix arrangement to the D&D Program Director for D&D activities. They are responsible for seeing that all programmatic work in their domain is performed according to all approved applicable documentation. This documentation includes the technical scope defined in related state, Environmental Protection Agency (EPA) or other federal agency reports; the prescribed schedule described in the CYWP; and the funding limits defined in the Financial Plan.

The following paragraphs discuss the administrative documents to be employed by Energy Systems and the program team members responsible for their preparation, starting at the lowest level, the Work Package.

The **Work Package**, generated by the Cost Account Manager (CAM), is the fundamental document for the segregation of work. In general, a work package identifies a specific product and has the following characterizations reflected on a Cost Account Plan (CAP): the identification number, scope of work, individual responsible, budget in work-hours, material cost in dollars, milestones, and EV method. (See ER/C-P1702.)

The **Planning Package**, established by the CAM, is the portion of the cost account which is not sufficiently detailed to define either a time-phased budget for the work or the EV Method for performance measurement. Generally, one planning package will suffice for a cost account. (See ER/C-P1702.)

The **Cost Account**, established by the CAM, is a collection of related work packages and planning packages supported by an internal work authorization. The cost account represents the intersection between the lowest level of the CWBS and the responsible organization performing the work. (See ER/C-P1702.)

An **Internal Program Service Order (IPSO)** is the form used by Energy Systems to authorize specific ER Program work for an individual Energy Systems organization that does not have its own validated internal work authorization system or form. The IPSO is prepared by the Project Manager, with the assistance of the Site Project Analyst, in direct response to the issuance of a General Program Service Order (GPSO). It is signed by the Project Manager. The scope of work must be detailed sufficiently to permit development of a CAP, and the specified funding limit or budget authority must be consistent with the Funding Authorization Document (FAD). (See ER/C-P1701). Validated internal work authorizations include the Engineering Service Order, Maintenance Job Request, and Purchase Requisition/Purchase Order.

A **General Program Service Order** is the form used by Energy Systems to authorize ER Program work for all participating Energy Systems organizations in response to receiving a

DOE-OR Program Directive. The GPSO is prepared by the Site Program Manager, with the assistance of the Project Manager, and then signed by the Site Program Manager. The GPSO must address the specific Energy Systems work in the related DOE-OR Program Directive and reflect a funding limit (budget authorization) consistent with the FAD. The work scope must also be consistent with the CYWP. (See ER/C-P1701.)

A **Funding Authorization Document** is the form used by Energy Systems to allocate the ER Program funds contained in the latest issue of the DOE-OR Financial Plan by ADS to a specific site, operable unit (OU), or project. The FAD is prepared under the guidance of the business manager in the ER Division and approved by the Director of Management Systems after the concurrence of the D&D Program Director with the portion of the funding allocation assigned to D&D. The FAD or appropriate supporting documentation traceable to the FAD must reflect the funding limits for each IPSO or other internal work authorization. (See EP/C-P1700.)

The **Current Year Work Plan** is a document prepared by Energy Systems and approved by DOE-OR which amplifies the scope of ER Program work contained in both the ADS and the Five-Year Site-Specific Plan for the current fiscal year. It describes the technical parameters in sufficient detail to support the preparation of a GPSO and the attendant costs and schedules for all work expected to be authorized during the current year, subject to the availability of funds. (See ER/C-P1716.)

The **Five-Year Site-Specific Plan** is a document prepared by Energy Systems and approved by DOE-OR which specifies the scope of ER Program work, with the attendant costs and schedules, proposed for a given site and prioritized according to environmental dictates for the ensuing five-year period. The work proposed for the first year of the Five-Year Site-Specific Plan represents the basis for the CYWP discussed above. The Five-Year Site Specific-Plan is updated annually according to DOE-OR guidance.

DOE Headquarters and DOE-OR primarily utilize two budgeting documents for their ER Program within the Oak Ridge area: the ADS and the Activity Package, which is a collection of ADSs with common bonds. Both of these are described in documents DOE/ORO 931 and DOE/OR 975.

4. CONTROL PLAN APPROACH

The management control system that Energy Systems will use for ER Program work is composed of nine interrelated subsystems described herein and in a companion document prepared for the ER Program by the Software Engineering Division of the Science Applications International Corporation, entitled "*Management Control System—System Specification*." These subsystems include Planning, Budgeting, Scheduling, Cost Control, Funding, Cost Estimating, Technical, Change Control, and Performance Measurement and Reporting. Each of these is described briefly in the following paragraphs and in more detail in subsequent sections of this document.

Many of the features of several of these subsystems are identical to those described in the Energy Systems *Management Control System Description* (latest revision dated August 21, 1990), which was validated by DOE-OR several years ago as conforming to the CSCS Criteria for line item and major projects. In areas where the ER Program management control methodology differs from the validated control system, due primarily to the programmatic rather than the line-item management approach, ER Program interim procedures have been developed, all according to the prescribed criteria, to facilitate implementation on a trial basis. Plans are to revise these procedures after some experience has been gained at all five sites to incorporate any additional features that enhance the management objectives while remaining in conformance with the CSCS Criteria. When sufficient experience with the revised procedures indicates that all are acceptable, Central Engineering will expand the present Management Control System Description to include all salient features of the ER Program management control system, thereby producing an Energy Systems Management Control System Description for all programmatic and capital work.

A brief description of each subsystem and its relationship to the overall Energy Systems management plan follows:

The **Planning** subsystem involves organizing all Energy Systems work described in the DOE-OR Five-Year Site-Specific Plan and CYWP within the framework of the CWBS in the Energy Systems CMP. The information in these plans is based on the ADSs used by DOE-Headquarters (HQ) to obtain the necessary funds from Congress.

The **Budgeting** subsystem involves establishing cost account budgets, known as Budgeted Cost of Work Scheduled (BCWS), for all work authorized by issuance of an internal work authorization. The BCWS becomes the standard for performance measurement.

The **Scheduling** subsystem concerns developing and controlling schedules that define the sequence and timing of planned activities, beginning at the work package level and summarizing through all intermediate levels to the program reporting level.

The **Cost Control** subsystem concerns collecting, recording, and analyzing accrued cost data against internal work authorizations issued by Energy Systems for ER Program activities, and carrying out the corrective actions necessary to alleviate cost overruns.

The **Funding** subsystem concerns assigning and controlling funds that are received from DOE-OR via a financial plan and allocated to various Energy Systems participants via a FAD. Funding in the context of this document is synonymous with authorization.

The **Cost Estimating** subsystem involves developing and maintaining cost estimates by Energy Systems for all program phases from the work package level to the program life cycle, and for all intermediate levels.

The **Technical** subsystem concerns the ER Program management activities necessary to implement the technical criteria stipulated in EPA, state, or other regulatory agency documents or federal laws.

The **Change Control** subsystem discusses the procedures used by DOE-OR and Energy Systems to authorize changes either to the technical, cost, and schedule baselines via an ER Program Baseline Change Order or to the other nonbaselined program features via an internal Program/Project Change Order (PCO). Energy Systems also will use a PCO form to approve revisions to its PMB (see ER/C-P1709).

The **Performance Measurement and Reporting** subsystem involves developing CAPs, summarizing CAPs to formulate the PMB, adding Management Reserve to the PMB to define the Contract Budget Base, and assessing and reporting performance against these criteria.

As stated previously, activities both within and between these subsystems are governed by ER Program procedures to assure a uniform implementation approach at all sites. Plans are to revise these procedures as dictated by changes to either DOE-OR or Energy Systems policies or guidance. Where appropriate, new procedures will be developed to promote continued sound management practices.

5. THE PLANNING SUBSYSTEM

The primary purpose of this subsystem is to support the timely generation of all plans necessary to meeting programmatic goals that are consistent with the mission objectives defined in the DOE-OR ER program management plans. In response to this objective, Energy Systems will prepare an ER Program CMP that will be formatted according to DOE-OR Order 4700.1 and that will interface in all respects with the DOE-OR ER program management plans. Several sections of the CMP will be generic in nature and will not be expected to change during the course of the ER Program work; these will deal with Energy Systems organizational structure and divisional responsibilities and Energy Systems policies and program/project procedures. The remaining sections of the CMP will discuss phases of Energy Systems participation which are expected to change frequently as the program work proceeds. They will be updated on an as-needed basis. These include the CWBS extension of the Program Summary Work Breakdown Structure, the cost and labor plans, the schedule, and the PMB. Plans are to submit all such updated information to DOE-OR as a part of the Monthly Report package. After acceptance by DOE-OR, all revisions to the Energy Systems CMP will be subject to program change control. (See ER/C-P1718).

The foundation for Energy Systems' more detailed daily, weekly and monthly planning is the CYWP, which represents an amplification of the first-year work in the Five-Year Site-Specific Plan. The technical, cost, and schedule baselines for both of these DOE-OR approved planning documents are obtained from the appropriate ADSs, used by DOE-HQ to obtain the necessary funds from Congress as part of the annual budgeting process. After approval of the CYWP and the receipt of a FAD (see Sect. 9) and a DOE-OR Program Directive, the site program managers issue GPSOs, after which the project managers issue the internal work authorizations that authorize the most detailed Energy Systems planning—that at the CA level for performance measurement purposes.

6. THE BUDGETING SUBSYSTEM

This subsystem is concerned with the development of CA budgets, also known as BCWS, by the CAMs for work authorized via internal work authorizations issued by the project managers. All CA budgets are to be expressed in labor work hours and material dollars. They must be accepted by the project managers before any work can be started. All disagreements between the CAMs and the project managers about the budgets must be resolved via negotiations between the CAM's supervisor and the site program manager before the CA budget is inputted into the performance measurement system and work is started.

After acceptance of a CA budget, the CAMs separate the portion of the work which is well defined into work packages and assign an appropriate budget to each. They then place the remaining CA budget in a planning package for subsequent conversion to work packages when sufficient work details become available. If there is insufficient budget in the planning package to open the last work package, the difference must be obtained from Management Reserve. (See ER/C-P1712). In most cases, no budget adjustment will be allowed to an open work package unless the scope of work is increased; however, under rare circumstances, some changes in CA budget may be permitted, if approved via the PMB procedure (See ER/C-P1709).

The sum of all CA budgets is known as the Energy Systems PMB, the standard against which monthly performance is compared. When Management Reserve (a budget agreed to by DOE-OR and set aside for Energy Systems management use to accommodate unusual revisions to open CAs) is added to the PMB, the total becomes the Energy Systems CBB, the standard used by Energy Systems management to gauge overall Energy Systems performance. The CBB is not expected to change unless scope is added to Energy Systems participation, in which case both the PMB and Management Reserve would be increased.

The requirement for establishing and controlling BCWS for Energy Systems activities related to the ER Program are found in ER/C-P1702, "Cost Account Planning."

7. THE SCHEDULING SUBSYSTEM

The scheduling subsystem has been developed to accept schedules on several different levels from all program participants and to allow those at the lowest level to summarize through successively higher levels to the program baseline schedule. The schedule hierarchy consists of the program baseline schedule, the site summary schedules, and the detailed project schedules that can accept input at the work package level for individual activities such as taking core samples, drilling wells, etc.

The program baseline schedule will be prepared as part of the Energy Systems role as integrating contractor in cooperation with the DOE-OR program office, normally as part of the annual planning process. This schedule, which will be updated any time more specific information becomes available, reflects the programmatic life-cycle schedule with control milestones. It is derived from input from all prime participants. For those years beyond the span of the ADSs, average durations based on experience will be used for such activities as the PA/site investigation (SI), S&M, the remedial investigation/feasibility study, preparation of the record of decision (ROD), completion of Title II engineering documents, and construction.

The site summary schedule is a roll-up of the lower tier schedules to the site level. It will reflect the DOE-OR controlled milestones for each project at a particular site and will integrate all activities such as Consent Order/Compliance Agreements, Federal Facility Agreements, Federal Facilities Compliance Agreements, agreements in principle, design, and construction.

Detailed project schedules will be prepared as part of the annual planning process and updated any time more specific data becomes available to show the fiscal year programmatic schedule and milestones. This schedule represents the lowest level used to monitor progress. It will employ network logic techniques with precedence notation. Deliverables and appropriate milestones will be entered as individual activities. Time analysis of these logic diagrams will indicate the critical path and float for individual activities.

A probabilistic analysis of network logic schedules will be performed for high-risk activities to determine a range and confidence level for meeting the controlled milestones defined in compliance agreements. This is of prime importance for years beyond the span of the ADSs. These analyses will address such uncertainties as annual funding, funding levels, the technical characteristics of the work, and the alternative selections.

The schedule network will reflect actual progress on a monthly basis; however, the status will be updated on the detailed logic diagrams whenever necessary.

8. THE COST CONTROL SUBSYSTEM

The Energy Systems Cost Control subsystem is initiated by the preparation of Requests for Program Directives for submission to DOE-OR, asking for approval to proceed with the ER Program activities defined for all prime participants in the related CYWP. The program directive requests will address all work planned for authorization at a given site during the current year subject to the availability of funds (budget authority), rather than addressing the work expected to be costed (budget outlay) and the total estimated cost. This approach alleviates the need to limit Energy Systems subcontracting agreements to the current year and to request frequent modifications to the Program Directive if funding levels are drastically changed. The Requests for Program Directives will be prepared in the format specified in and according to the requirements of ER/C-P1713. Although at least one such request will be submitted for each site by program each year, many more may be required to achieve and maintain satisfactory management control (perhaps one per project for the cleanup phase of remedial action and D&D efforts). Future experience will dictate the optimum number to prepare. Those responsible for preparing, reviewing and concurring with the Requests for Program Directives before they are submitted to DOE-OR are shown on the Responsibility Assignment Matrix in ER/C-P1706.

In response to requests, DOE-OR will send a copy of its Program Directives to all the prime participants involved either at the same time or shortly before the DOE-OR Finance Officer releases a Financial Plan to the Energy Systems ER Division Director (see Sect. 9). Each Program Directive will describe the approved scope in general terms and will reflect the total estimated cost for each prime participant, as well as the related schedules. Energy Systems cannot authorize any work that is not within the overall context of the specified conditions.

Receiving the DOE-OR Program Directives permits the site program managers to initiate a GPSO describing the Energy Systems portion of the work, provided funds are available as indicated by the issuance of a FAD. (See ER/C-P1700.) This Management Control Plan does not limit the number of GPSOs which can be issued; rather, this is left to the discretion of the Site Program Manager. However, it is essential that the expanded scope of work be within the context of the related DOE-OR Program Directive and be sufficient to support the issuance of internal work authorizations such as IPSOs, Engineering Service Orders, and Maintenance Job Requests. The cost control subsystem becomes effective when an account is obtained from the DOE-OR Finance officer and a funding limit consistent with the FAD is entered on the GPSO. (See ER/C-P1701.)

The participation of individual organizations within Energy Systems is authorized through the release of an internal work authorization to each one. (See ER/C-P1701.) This extends the cost control subsystem to the CA level, the intersection of the lowest element of the CWBS and the organization responsible for performing the work, by the insertion of the proper account and the funding limit (budget authority). Here again, it is important that the Finance Officer concur with the selected account and that the funding limit is consistent with and traceable to the GPSO. With the scope of work sufficiently detailed to allow the preparation of a BCWS for each work package (see ER/C-P1702), the cost control subsystem is extended to the normal point of cost collection.

As work proceeds, costs are accrued against the accounts shown on the internal work authorizations and reported as Actual Costs of Work Performed. These are reviewed each

month by the project analysts and project managers as a part of the performance measurement system (see Sect. 13) and compared to the funding limit shown on the related internal work authorization. If a cost variance exceeding the accepted threshold is experienced, or if it appears that the prescribed internal work authorization funding limit is inadequate, the Project Manager, in collaboration with the CAM, initiates the corrective actions necessary to eliminate the costing problem.

9. THE FUNDING SUBSYSTEM

The funding subsystem becomes a part of management control when a financial plan is received from DOE-OR which allows the Director of Management Services to issue the related FADs. Plans are eventually to issue one FAD per site, or possibly one FAD per site per program segment (remedial action and D&D), listing all the applicable ADSs. These documents, which are to be prepared according to ER/C-P1700, reflect the funding limit (budget authority) and budget outlay (BO) limits for Energy Systems. They will be revised as authorized in subsequent DOE-OR financial plans.

After the FADs have been issued and DOE-OR Program Directives have been received authorizing work on the CYWP to proceed, the project managers can issue the necessary internal work authorizations. Each of these establishes a CA, consistent with the related GPSO issued by the site program managers. Each internal work authorization has to show the funding limit (budget authority) for the work described, based on the approved BCWS for the CA; the accepted direct labor rates, which must include divisional indirect labor costs; and the projected material costs. This funding limit should be derived by the Project Manager based on information provided by the CAM, the site, and the PA. The sum of the funding limits for all internal work authorizations cannot exceed the funding limit shown on the related GPSO. Nor can the sum of the funding limits shown on the GPSOs related to an FAD exceed the funding limit shown on the FAD for that ADS. However, prudent management may dictate that not all funds on a FAD be obligated; a reserve would thus be provided to cover unforeseen problems until the next Financial Plan is received.

It is required that the funding limit for each internal work authorization be recorded either on the FAD or on a support document traceable to the FAD to provide a continuous record of the current funding status for each ADS.

The funding limit shown on a FAD may be revised based on a new Financial Plan from DOE-OR. Likewise, the funding limit on a GPSO and an internal work authorization may be revised consistent with the revised FAD to fund additional scope. Neither of these actions is subject to change control, provided the new work has been authorized via a DOE-OR Directive.

10. THE COST ESTIMATING SUBSYSTEM

This subsystem is designed to accept the timely input of the several types of cost estimates developed to support the ER Program and to create and maintain several cost baselines, including the program life-cycle forecast and the CYWP baseline. Each cost estimate will be documented relative to the following factors: the task description and its relationship to the CWBS; the type of estimate (discussed more fully in the following paragraphs); the year and quarter on which the costs are based; the escalation rates that are applied to yield the final year spent costs; the methodology used to derive the estimate; the indirect rates applied; the participants involved and the task description of each; and the contingency factors used to cover the cost uncertainties.

During the course of the assessment phase for remedial actions and the characterization phase for D&D, three major types of cost estimates will be developed for entry into the system: planning estimates to accommodate the preliminary budget activities; preliminary estimates during the SI for remedial actions and during the characterization activities for facilities accepted into the D&D program; and detailed estimates upon completion of the work plan for the activities in question. As the work moves from the planning through the preliminary to the detailed estimate stage, more confidence can be placed on the cost estimate because more specific information is available. For example, for the planning estimates, little more may be known than the site location, the likely contaminants, and the extent of prior or current use of the facility involved. However, when the work plans for the remedial investigation (RI) or D&D actions are available, most of the field questions have been resolved, permitting the development of cost estimates in which the estimators and project managers have more confidence.

During the cleanup stage of remedial actions and the decontamination phase of the D&D program, four major types of cost estimates will be entered into the system. These include forecast estimates for inclusion in budget documents and/or planning documents such as the Five-Year Site-Specific Plan; feasibility cost estimates to support the feasibility study; preliminary estimates to support the alternative selected from those considered in the feasibility study; and detailed estimates based on approved engineering data including drawings, specifications, bills of material, design calculations, etc. Here again, the quality of the cost estimate increases dramatically from the planning to the detailed estimate stage, principally because more specific information is available.

This subsystem will make it possible to review and update each of the types of estimates on a regular basis to ensure that all information in the system is current and reflects the latest technical requirements and schedule.

11. THE TECHNICAL SUBSYSTEM

The Technical subsystem has been established to record and maintain control of the performance criteria defined by applicable federal regulations and by DOE orders, which are required to bring contaminated DOE-OR managed sites into compliance with laws, regulations, and legal agreements aimed at protecting human health and the environment. The media of concern include contaminated soil and groundwater, contaminated surface water, contaminated surplus facilities, air contamination, and waste tanks.

11.1 REMEDIAL ACTIONS

As indicated in the work plan discussed in DOE-OR 931, remedial actions in the ER Program will be implemented in phases, beginning with the PA/SI phase during which sites that may be contaminated with transuranic, low-level, hazardous, and/or mixed wastes are identified and screened. Sites that cannot be eliminated by these preliminary studies require more extensive characterization to define the specific nature and the extent of contamination and the resultant impact on public health and the environment. The results of this work are presented in an RI report, which represents the initial source of technical input to this subsystem. The RI plan, a document prepared earlier to establish the sequence and timing of the work, and the RI report both are primary documents referenced in the Federal Facility Agreement. They are DOE-OR milestones.

The remedial action alternatives that remain after a preliminary screening during the RI work will be subjected to far more stringent analyses entailing a further, more detailed definition of each remaining alternative, a comparative analysis against evaluation criteria, and the selection of a recommended approach. The alternative analyses will be based on characterization documents and will consider the impact of NEPA documents on the remediation efforts. Treatability studies will be conducted as necessary to supplement the assessment evaluations and to support the chosen approach. The results of this phase of the work will be contained in a feasibility study report, the second primary document providing input to this subsystem and a key DOE-OR milestone.

After comments from a public review of the proposed remedial action plan, based on the feasibility study report, have been appraised and resolved relative to the alternative evaluation process, the decision document, the ROD, will be prepared. The ROD describes the selected remedial action approach and is submitted to the appropriate regulatory agencies for review and approval. The accepted ROD becomes the next primary source of technical criteria for this subsystem.

The ROD provides the basic design criteria upon which the detailed Title II design of the approved remedial action will be based. The approved Title II engineering package, including drawings, specifications, and bills of materials, is also a primary document reflecting approved technical criteria subject to the provisions of this subsystem. Any revisions found necessary during the construction of the remedial action facilities are subject to program change control.

More specific details on the applicable federal, state or local regulations and the program phases to which they apply can be found in Chapter 7 of DOE-OR 931.

11.2 DECONTAMINATION AND DECOMMISSIONING

The general work plan to be implemented for D&D of contaminated surplus facilities begins with identifying the facilities and accepting them into the ER Program, followed by S&M of facilities awaiting decontamination, and ultimately decommissioning. The process summarized in the following paragraphs is described in more detail in DOE/OR 975.

Facilities that are contaminated with radioactive or hazardous materials and that are no longer needed for research and development or production operations are identified by the organization. That organization also is responsible for placing these facilities in a safe shutdown condition such that decommissioning may be deferred for several years. In an expeditious manner, facility descriptions, current conditions, and other pertinent data are then documented in an acceptance application, which is submitted to the DOE-HQ D&D Program office for review and approval. After the facility is accepted into the program and the necessary funding is appropriated, the D&D Program assumes responsibility for continued S&M and the ultimate decommissioning of the facility.

The decommissioning of a facility is a multi-step process that involves two primary segments: (1) D&D planning, which culminates in a project readiness review, and (2) D&D operations. D&D planning is initiated with characterization of radiological hazards and identification of other hazardous materials or safety hazards important to planning the safe and effective decommissioning of the facility. Once characterization is completed, conceptual design of the D&D alternatives is undertaken, a preferred alternative is selected, and an environmental review and the documentation preparation necessary to comply with NEPA is initiated. The NEPA review process generally begins as early in the project as practical to facilitate the earliest possible NEPA determination. Assuming an environmental assessment results in a finding of no significant impact, the D&D design will proceed through the Titles I and II stages. If the environmental assessment stipulates that an environmental impact statement (EIS) is required, this document will be developed from the appropriate programmatic EIS and from any preceding relevant site-specific EIS. Concurrent with the NEPA process, any required permits will be identified. Then the associated applications will be submitted through the respective plants to the appropriate regulatory agency.

Following completion of the NEPA process, engineering design, specification development, and other necessary documentation will be completed. The design process will also identify any technology gaps that may exist and suggest appropriate development and demonstration activities needed to support decommissioning. These needs will be communicated to the Office of Technology Development for further action. Subcontract procurement for D&D services will also be initiated during the later stages of the design process. The planning process will be completed with a project readiness review.

Upon successful completion of the project readiness review, D&D operations will begin. Initial activities may include site preparation and facility improvements to support D&D, such as containment upgrades or installation of monitoring equipment or instrumentation. After facility preparation is complete, D&D operations will proceed according to the sequence of events developed during the planning stage. The D&D process could include any combination of equipment removal, decontamination, dismantlement, or entombment, depending on the alternative selected and documented through the NEPA process. At appropriate points during the work and at the conclusion of decommissioning, an independent verification contractor

will perform and document inspections to ensure successful completion of the project. Performance will be compared with goals and objectives established at the outset of the project.

Following the completion of field activities, final project documentation will be submitted to DOE-OR for the program archives. Formal release or transfer of the property may be performed at this time if the property is outside the confines of a government reservation or if the transfer is in the best interest of the government for other reasons. Should the site require follow-up S&M, these activities will be initiated and continued as required.

12. THE CHANGE CONTROL SUBSYSTEM

The Change Control System for the ER Program within the jurisdiction of Energy Systems starts at the CA level and proceeds upward through the CWBS to the intersection with the Program Summary Work Breakdown Structure, at which point DOE-OR also becomes involved. A program change that affects only the Energy Systems CMP or associated documents, such as internal work authorizations, is known as an "internal change"; it requires approval of Energy Systems program management (see ER/C-P1718). Changes in this category include, but are not limited to, those that affect Energy Systems-controlled milestones, cost revisions that can be accommodated within the contingency allowance, etc. A program change that affects the program baselines in either of the DOE-OR ER program management plans or in associated documents, such as a Program Directive, is classified as an "external change." Such a change requires review and disposition by a Contractor Baseline Change Control Board before transmittal to DOE-OR for further action. Changes in this category include, but are not limited to, those that affect the technical requirements, DOE-OR-controlled milestones, or the total estimated cost of any prime contractor beyond the contingency limit (see ER/C-P1710).

The PCO form also will be used by Energy Systems to approve justifiable changes to the PMB, which entails a revision to an approved cost account budget for which a work package has been opened in accordance with ER/C-P1702. The adjustment to the cost account budget is accommodated by Management Reserve in accordance with ER/C-P1709 and ER/C-P1712.

A PCO Log will be established at each site for each program (remedial action and D&D) by the site program managers and kept current by the Site Project Analyst to record PCO numbers and titles and the scope, cost, and schedule changes involved. These logs will become part of the permanent program record files.

13. THE PERFORMANCE MEASUREMENT AND REPORTING SUBSYSTEM

The Performance Measurement and Reporting subsystem describes how cost accounts are developed for all ER Program work assigned to Energy Systems and then translated into a PMB, which serves as the datum for analyzing and reporting progress of work. The number and types of reports in which this information will be included is also discussed.

As indicated in the budget subsystem, upon receiving an internal work authorization, each CAM develops a CAP for his/her work and a BCWS for each work package ready to be opened (see ER/C-P1702). In addition to this time-phased work package budget, the CAM must state in the CAP the EV technique he/she plans to use for each work package to evaluate performance. Upon acceptance of the CAP by both the CAM's supervisor and the project manager, these data are entered into data subsystems for the management control system. Revisions to these open work package data are subject to change control (ER/C-P1709).

As soon as work begins, all participants report their labor hours expended and any milestones attained (if applicable), every week if feasible, but at most every month. From this information, the EV will be calculated and then compared to the BCWS, from the budget subsystem, and the actual cost of work performed, from the cost subsystem, to determine the schedule and cost variances, respectively. All variances beyond the accepted threshold limits must be explained to the project analyst and the project manager for possible inclusion in the monthly report. For more details about cost account planning, refer to ER/C-P1702; for PMBs, see ER/C-P1709.

The monthly reporting requirements are to be negotiated with DOE-OR using its Reporting Requirements Checklist form.

Appendix ACTIVITY DATA SHEETS

In its role as integrating contractor, Energy Systems becomes involved in the annual DOE-OR budgeting process by preparing the ADSs that DOE-HQ submits to Congress to obtain the necessary funds for ER work. In addition to a general description of the environmental work which reflects the most viable course of action dictated by the results of completed or ongoing remedial assessment or D&D characterization activities, the ADS also indicates the schedule required to conform to environmental deadlines and the estimated life-cycle costs. These criteria form the DOE-HQ baselines, which must be reflected in any related sub-tier planning documents such as the CYWPs. The ADSs are normally prepared by the Energy Systems project manager, with input from involved members of the program team. After they are concurred with by the Energy Systems site program managers and upper Energy Systems program management, as indicated on the Responsibilities Assignment Matrix (See ER/C-P1706), they are transmitted to DOE-OR by the Director of Management Services. The detailed steps for preparing an ADS are described in EC/C-P1705. After an ADS is approved by DOE-OR, any revision to it is subject to change control as stipulated in Activity Data Sheet Baseline and Change Control guidance provided by DOE-OR.

Congressional approval of an ADS leads to a request from DOE-OR to Energy Systems to prepare five-year site-specific plans and, subsequently, CYWPs. The CYWPs amplify and expand upon the technical and design criteria for the work to be authorized in the first year of the five-year site-specific plans, subject to availability of funds, and also contain the estimated cost and schedule for these activities. These planning documents are discussed in ER/C-P1716.

PROGRAM LIFE-CYCLE SCHEDULE AND COSTS

In its role as integrating contractor, Energy Systems has been requested by DOE-OR to establish and maintain ER Program life-cycle schedules and costs for all prime participants. This work is being divided into two segments: the near term or seven-year span described in the ADSs and sub-tier five-year site-specific plans and CYWPs, and the term covering the remaining years in the program. For both periods, the schedule is developed first and then the estimated costs are derived for the appropriate time frame.

REMEDIAL ACTIONS

In the first segment, the schedule for the start of the PA/RI phase at a given site is based on a priority listing of OUs by the site program managers. The number of starts in a given year depends on the need for and availability of funds. The original estimate of the time that will be required for the entire program cycle from the PA/RI to completion of the remedial actions is based on an assumed average; however, as work proceeds, the schedule is revised to reflect actual experience. Under the present assumptions, it is predicted that proceeding at risk, the entire cycle will entail approximately 14 years, with approximately 75% of the work under the control of the regulators and 25% under the control of the M&O Contractor. If it is decided to proceed without risk, it is postulated that the entire cycle will involve 19

is no allowance in either case for resolving disputes. After the schedule has been established, the associated cost for each OU is determined as described in the Cost Estimate Subsystem and in accordance with the DOE-OR Cost Estimating Manual. All costs are escalated to the year of expenditure. Plans are to review these cost and schedule data as part of the annual budget process. Any significant revisions will be incorporated only upon approval via the ADS change control procedure, as discussed under a separate heading in this Appendix.

For the second segment, i.e., those years beyond the span of the ADSs, the ER Program OU cycle duration for proceeding at risk is used, but the start date for each OU represents a best guess on the part of the site program manager. It generally is based on a perception of need without regard for funding availability. With the schedule fixed, the estimated costs are forecast based on a set of assumptions provided by the site program managers. While these costs and schedules obviously should not be candidates for the rigorous change controls employed for the first segment or earlier years, plans are to review these data on a semi-annual basis and incorporate those changes deemed appropriate. The reasons for such revisions will be documented. For some applications, the cost estimates will be based on fixed-year dollars, whereas for other purposes, the costs may be escalated to the year of expected expenditure.

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