FINAL REPORT COST QUALITY MANAGEMENT ASSESSMENT

for the

IDAHO OPERATIONS OFFICE

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Washington, DC 20585

June 1995

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PREFACE

The Office of Engineering and Cost Management (EM-24, formerly the Office of Engineering and Cost Evaluation) of the Office of Compliance and Site Coordination (formerly, the Office of Oversight and Self-Assessment) conducted Cost Quality Management Assessments (CQMA) at 12 Department of Energy (DOE) sites* during 1991 and 1992. CQMA teams reviewed the management of cost and cost-related activities of the Office of Waste Management and Office of Environmental Restoration projects at each site. A separate team conducted CQMAs on Office of Technology Development activities at four of the sites.** Each CQMA team comprised four subteams: Cost- and Schedule-Estimating Process, Independent Cost Review, Indirect Cost, and Management and Technical Evaluation.

Teams prepared site reports containing their findings. The teams presented discussions on their findings and, as appropriate, developed recommendations to help improve the management of cost and cost-related activities. The Assistant Secretary for Environmental Management (EM-1) charged each site to respond to the CQMA report with a corrective Action Plan.

The CQMA team will revisit each site to assess each site's progress against the performance baseline established during the initial CQMA. Team members will collect information to assess that progress by reviewing documents, including the site's *Action Plan*, and by conducting interviews. Team members will examine cost- and cost-related management practices against the Performance Objectives and Criteria contained in the *CQMA Site Handbook*.

During the Round II CQMA, the team will prepare a draft report to leave on site. The report will present observations, discussions, and recommendations. In addition, the report will summarize the site's progress against its *Action Plan*. Team members will be particularly attentive to noteworthy practices and to policy and procedure documents that might be adapted by other sites.

At the completion of Round II, the CQMA process will change. CQMA is expected to become a part of each site's self-assessment program. EM-24 will provide assistance to the self-assessment process as needed. The sites' CQMA self-assessment activity is expected to emphasize that cost management is an important component of program management. Thus, the CQMAs will continue to measure the quality of cost and cost-related activities at DOE sites.

*Chicago, Fernald, Idaho, Kansas City, Los Alamos, Nevada, Oak Ridge, PANTEX, Rocky Flats, Richland, San Francisco, and Savannah River.

**Idaho, Los Alamos, Oak Ridge, and Richland.

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I EXECUTIVE SUMMARY

The Office of Engineering and Cost Management (EM-24) conducted a Cost Quality Management Assessment (CQMA) of EM-30 and EM-40 activities at the Idaho National Engineering Laboratory (INEL) on February 3-19, 1992. The CQMA team, composed of subject specialists from the Department of Energy (DOE), U.S. Army Corps of Engineers, and the private sector, assessed the cost and cost-related management activities at INEL using the *Cost Quality Management Assessment Handbook* (Rev. 0, volume I). A separate CQMA team conducted an assessment of EM-50 activities the week of June 29, 1992, using volume II of the *Handbook*.

The Round II CQMA, conducted at INEL on September 19-29, 1994, reviewed EM-30, EM-40, EM-50, and EM-60 cost and cost-related management practices against the Performance Objectives and Criteria (POCs) contained in the *CQMA Site Handbook* (Rev. 3). The interviews conducted and documents reviewed by the CQMA team show that INEL has made measurable progress since the Round I CQMA. Of the 48 Round II POCs, the EM-30, -40, and -60 programs at INEL meet 42 and partially meet 6. During the Round I CQMA, the EM-30 and EM-40 programs at INEL were evaluated against 54 POCs and met 18, partially met 34, and did not meet 2. Of the 46 Round I POCs, EM-50 met 29, partially met 8, and did not meet 5; 4 POCs were determined to be "not applicable." During Round II, EM-50 met 24, partially met 18, and did not meet 1 of the 43 POCs.

The Round II CQMA did not address Indirect Cost Analysis at the request of the Office of the Chief Financial Officer at DOE Headquarters (DOE-HQ). The Indirect Cost Analysis will be conducted in a separate review.

The CQMA team observed several noteworthy practices:

- The EM-40 Decontamination & Decommissioning (D&D) and EM-60 Transition and Management (T&M) organizations were able to complete six work packages through the readiness review stage within existing budgets. All six work packages could proceed immediately if funding were made available.
- The use of Track 1 (no characterization) and Track 2 (minimum characterization) pre-Remedial Investigation procedures has yielded several millions of dollars in cost avoidance since their inception. INEL is eager to share its experience with other organizations.
- Since the Round I CQMA, INEL has issued volumes II and III of the *INEL Cost Estimating Guide*. Volume I covers construction; volume II deals with Environmental Restoration (ER); and Volume III addresses Waste Management.

To assist INEL as it continues to improve its cost and cost-related management practices, the CQMA team reports the following observations:

- The Idaho Operations Office (DOE-ID) lacks an integrated, site-wide plan that communicates, both internally and externally, DOE-ID's requirements for managing environmental management programs/projects. Timely issuance of a DOE plan is necessary for Lockheed Idaho Technologies Company to finalize its *Site Management Plan*. Clearly stated goals, plans, and direction from DOE-ID management will expedite the transition of the site from a six-contractor organization to a single-contractor organization.
- M.K. Ferguson of Idaho Company (MK-FIC) has been authorized to develop total life-cycle cost and schedule baselines for the ER program. However, this information is not incorporated into activity data sheets, nor is the information used in baseline change control analysis.
- The quantity and type of documentation prepared by INEL in support of the Environmental Management program should be carefully reviewed, and documents should be consolidated or eliminated when feasible. This will reduce the dollar and manpower costs of collecting, preparing, duplicating, and distributing information.
- The 5% contingency applied to all remediation work for Fiscal Year (FY) 1995 and beyond is questionable. A 5% contingency might be appropriate for assessment work where INEL has substantiating historical information, but it is unacceptable for remediation work unless the rate is supported by contingency analysis.
- Only one Level 2 ER Baseline Change Proposal was submitted to DOE-HQ in FY 1994. This change should not have been submitted—or approved—because it combined several changes, some of which were a summation of FY 1993 and FY 1994 approved changes. Also, it was not clear which of the changes were actually incorporated into the baseline and other affected documents (e.g., Financial Change Request). INEL lacks a configuration management plan that designates the procedures for baseline change implementation and verification.
- Each of the current Management and Operations (M&O) contractors uses different software to do cost/ schedule estimates for programs and projects. EG&G uses Dekker Trakker and Lotus; Westinghouse Idaho Nuclear Company uses Excel; MK-FIC uses Primavera (modified); Babcock and Wilcox uses Excel/Lotus; and Rust Geotec uses MicroPlan. With Lockheed scheduled to assume the M&O contract in October 1994, DOE-ID has not yet required a single, standardized software program for cost and schedule estimating.
- An examination of the EM-30 and EM-40 mid-year review presentations showed wide differences in reporting formats and styles. The EM-40 presentation reported performance measurement against the baseline while EM-30 placed more emphasis on financial reporting. Neither report discussed baseline changes, the cumulative effects of these changes on the program/project, and the impact of changes on contingency. EM-60 reports also were deficient in discussing baseline change and contingency analysis.
- At the pre-Energy Systems Acquisition Advisory Board presentation, it was evident that the EM-40 D&D program and the EM-60 T&M program baselines are not integrated to provide coherent information on Surveillance and Maintenance and Dispositioning surplus facilities.

- Consideration should be given to rolling-up the technical task descriptions into four activity data sheets and reporting on them quarterly instead of monthly. This would reduce the large administrative costs associated with reporting on small-budget projects.

II INTRODUCTION

II.A SITE INTRODUCTION

The Idaho National Engineering Laboratory (INEL) is a multidisciplinary Department of Energy (DOE) laboratory located in southeastern Idaho. The laboratory site covers nearly 890 square miles. INEL was established in 1949 as a site where nuclear reactors, support facilities, and equipment could be safely built, tested, and operated—primarily to prove that the atom could be used safely to generate electric power. Today, INEL is one of DOE's principal centers for conducting nuclear research and development. INEL has the world's largest and most varied collection of reactors including reactors for research, testing, power, and ship propulsion.

INEL is a Government-owned site managed by DOE under the administration of three DOE field offices that share responsibility for programs at INEL. These offices are the DOE Idaho Operations Office (DOE-ID), the Pittsburgh Naval Reactors Office, and the DOE Chicago Operations Office. Six Management and Operations contractors support DOE activities at INEL: EG&G Idaho, Inc. (EG&G); Westinghouse Idaho Nuclear Company (WINCO); Babcock & Wilcox of Idaho; Westinghouse Electric Corporation; M.K. Ferguson of Idaho Company (MK-FIC); and Rust Geotec. In addition to these main contractors, many other support contractors to provide other services.

As the INEL Site Manager, DOE-ID is responsible for site services, environmental control and management, and overall safety and emergency planning functions. DOE-ID provides some of these services directly; others are provided through EG&G. EG&G provides general support services for INEL, manages reactor-safety experimental programs for DOE-ID and the U.S. Nuclear Regulatory Commission, and conducts other programs including waste management, geothermal, and energy conservation. WINCO operates the Idaho Chemical Processing Plant to reprocess Government-owned nuclear fuel. MK-FIC is the site construction management contractor. All EG&G, WINCO, and MK-FIC programs are administered by DOE-ID.

The organizations assessed in this Cost Quality Management Assessment (CQMA) are DOE-ID and three of its contractors—EG&G, WINCO, and MK-FIC. In conducting this assessment the CQMA team interviewed program- and project-management, technical, construction, and cost-estimating personnel at the management and working levels from the Environmental Restoration and Waste Management programs in each of the organizations noted above.

II.B THE COST QUALITY MANAGEMENT ASSESSMENT PROGRAM

A CQMA of EM-30 and EM-40 programs was conducted at DOE-ID on February 3–14, 1992. A CQMA of EM-50 activities was conducted during the week of June 29, 1992. The Round II CQMA, at which EM-30, EM-40, and EM-50 activities were reviewed, was conducted September 19–30, 1994. During Round II, CQMA team members divided into three subteams, interviewed DOE and contractor personnel, and reviewed documents. Appendix C is a list of

the individuals interviewed by subteam; documents reviewed are listed in appendix D; and members of the CQMA Team are listed in appendix E.

The team assessed cost and cost-related management practices at DOE-ID against the Performance Objectives and Criteria contained in the *CQMA Site Handbook* (Rev. 3).

The results of the CQMA are presented in detail in section III.

III CQMA SUMMARY AND DETAILED REPORTS

III.A COST- AND SCHEDULE-ESTIMATING PROCESS

Introduction

This section presents the results of an assessment of the practices and processes the Department of Energy (DOE) Idaho National Laboratory Engineering (INEL) uses to develop cost and schedule estimates for Environmental Restoration and Waste Management (EM) program baselines. The results of this assessment show that INEL has made measurable progress since the Round I Cost Quality Management Assessment (CQMA) and has:

- Formed several teams, with members from both the DOE-Idaho Operations Office (DOE-ID) and the Management and Operating (M&O) contractors, to coordinate and direct cost- and schedule-estimating efforts
- Issued volumes II and III of the *INEL Cost Estimating Guide* (although we suggest consolidating the three volumes and issuing the work breakdown structure and unit price book [UPB] as separate documents)
- Issued the *INEL Value Engineering Guidance Document*.

Of the 21 Performance Objectives and Criteria (POCs) in this section applicable to Office of Waste Management (EM-30) and Office of Environmental Restoration (EM-40) activities, INEL meets 17 and partially meets 4. Of the 19 POCs applicable to Office of Technology Development (EM-50) activities, 12 were met, 6 were partially met, and 1 was not met. The Cost- and Schedule-Estimating Process subteam did not evaluate Office of Facility Transition and Management (EM-60) activities.

Observations and Recommendations

The Cost- and Schedule-Estimating Process subteam makes the following observations and recommendations:

- DOE-ID does not have organization charts or mission statements for the current organization.

We **recommend** that DOE-ID develop organization charts and mission statements so that lines of authority are documented.

- The EM-40 contingency model has not been validated.

We **recommend** that the EM-40 contingency model be validated.

- Contingency analyses do not include the rationale for the factors applied.

We recommend that the rationale for the factors applied in the contingency analysis be included.

- There are no site-wide estimate and scheduling software standards.

We recommend that DOE-ID adopt standard software for cost and schedule estimating.

- Cost- and schedule-estimating forms are not yet standardized across the site.

We recommend that DOE-ID require standard cost- and schedule-estimating forms.

III.A.1 Formal Cost- and Schedule-Estimate Preparation

III.A.1.1 Requirements and Responsibility for Preparation of Cost Estimates Within the Organization

POC A.1.1

Each major operating unit (e.g., Operations Office, area office, M&O contractor, National Laboratory) maintains a Cost Estimating Group. The Cost Estimating Group ensures an objective cost-estimating process while also encouraging interaction among the program, project, design, operating, and/or construction groups to ensure understanding of programmatic objectives and resolution of cost issues.

DOE/MA-0063, Vol. 6; DOE Order 5700.2D.

Observations, Discussion, and Recommendations

Round I

The Corresponding POC (III.A.2.1) was *partially met* for EM-30 and EM-40 activities.

EG&G and Westinghouse Idaho Nuclear Company (WINCO) maintain distinct cost-estimating groups (CEGs) that produce estimates for capital or construction projects but do not develop facilities operations or assessment-related EM estimates. Formal cost estimates for nonconstruction activities are prepared by the contractors' program technical staffs with assistance from the organizations' finance and budget staffs.

DOE-ID does not maintain a formal CEG. Cost and budget support is provided to the DOE-ID technical managers by a central DOE-ID Planning and Budget staff.

The Round I CQMA recommended that:

- A centralized CEG, responsible for developing estimating procedures and guidelines and for the review of all formal cost estimates, be established within each organization

- Contractor Environmental Restoration (ER) and Waste Management (WM) technical personnel continue to prepare the initial estimates but an independent assessment (formal review and approval) be performed by a central estimating group.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

- * The corresponding POC (III.A.1.1) was *met* for EM-50 activities.
Cost estimates at INEL were prepared by the most knowledgeable person (the one with the most previous experience), typically the principal investigator (PI), and supporting expert staff. Estimates were based on historical data, engineering judgment, and vendor quotations. The proposal preparation process for EG&G was documented in *Waste Technology Development Directives* (WTDD) Program Directive 2.1, "Proposing Technology Development Tasks."

Round II

The POC is partially met for EM-30 and EM-40 activities.

EG&G, one of the two M&O contractors at DOE-ID, maintains a central CEG. The CEG is primarily responsible for construction estimates but supports Waste Management (EM-30) and Environmental Restoration (EM-40) when requested. EM-30 estimates are generated by work package managers. EM-40 estimates are generated by Waste Area Group (WAG) managers.

WINCO, the other M&O contractor, maintains a central CEG that is responsible primarily for construction estimates and supports the program/project managers as requested. EM-40 estimates are generated by the project manager. WINCO does not support any EM-30 activities.

Rust Geotec, a DOE support contractor, performs technical assistance and estimate/schedule review for DOE-ID. Rust Geotec is contracted to support EM-40 programs; the contract is administered out of Albuquerque.

DOE-ID, reorganized in September 1993 and recently reorganized again, has neither new mission statements nor organization charts. Functional lines of responsibility and authority are not documented. DOE-ID does not have cost estimators on staff.

We recommend DOE-ID develop organization charts and mission statements for the various groups so lines of authority will be documented.

- * *The POC is not met for EM-50 activities.*

DOE-ID does not have access to professional cost estimators to help review cost estimates generated by the M&O contractors. Currently, a contractor PI generates the estimates, which

are reviewed by DOE-ID and forwarded to DOE Headquarters (DOE-HQ) Office of Technology Development (EM-50) for final approval and funding.

We recommend that DOE-ID establish a CEG. We further suggest that a professional cost estimator, trained in Research & Development (R&D) cost estimating, be hired at DOE-ID either under the Ecology & Environment contract or as a Federal employee.

III.A.1.2 Complete Project Scope

POC A.1.2

All formal cost and schedule estimates (e.g., estimating restoration costs and schedules, evaluating contractor estimates) are prepared based on a complete project definition (i.e. project scope of work) to a level of detail appropriate to the stage of the project. This project scope defines the basis of the cost estimate and is an integral part of the estimate. Each project scope contains the site description, regulatory requirements, and technical approach used to define the project. Any project scope containing all three of these is complete; any definition that fails to address one or more is incomplete.

The project scope is updated as more detail is known. Revisions to each project scope are logged to trace both the scope and estimate development history.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.2) was *partially met* for EM-30 and EM-40 activities.

Project definitions containing site information, regulatory requirements, and technical approach were the ER activity data sheets (ADSs) and, for the WM program, the back-up documentation. As new information became available, new scope was introduced through a Change Request Form submitted an appropriate change control board. Changes in scope and effort were tracked by use of a Change Control Log.

For ER projects, definitions exist only at the ADS level.

The Round I CQMA recommended that ER program contractors consider including estimate documentation with a depth of narrative similar to that contained in the WM program back-up documentation.

* The corresponding POC (III.A.1.2) was *met* for EM-50 activities.

Based on the documents and information collected during the CQMA assessment, the policies and procedures set forth by the contractors were being practiced.

The INEL *Action Plan* called for an evaluation of the DOE-ID Work Authorization and Control System (WACS) policy and procedure, particularly regarding the standard forms used and the information requirements imposed on DOE-ID program managers. On the basis of the evaluation, and required changes to WACS would be developed. The *Action Plan* also called for the development of DOE-ID procedure(s) for written guidance including minimum definition requirements for technical work, documentation detail, risk assessment, and lessons learned.

Round II

The POC is met for EM-30 and EM-40 activities.

EM-40 ADSs include technical descriptions, milestones, and scheduling information.

EM-30 work packages contain scope data including technical approach and site descriptions. Revisions to scope, including regulatory requirements and cost and schedule estimates, are traced through the change control process. *Implementing Program Management Plans* (PMPs) document the change control process.

* *The POC is met for EM-50 activities.*

PIs generally develop a project scope of work based on a site need. The technical task plan (TTP) begins as a proposal detailing the description of the scope, cost, schedule, deliverables, required equipment, number of employees, background, approach, and future accomplishments. Management places a strong emphasis on the project scope and cost. Updating a project scope requires a change control form (CCF) to be initiated.

III.A.1.3 Cost-Estimating Functions

POC A.1.3

Cost Estimating Groups report to an appropriate level to maintain the integrity of the check and balance process. Cost Estimating Groups perform the following cost-estimating functions:

- Preparation or review of the estimates that support
 - Project decision phases
 - Planning-/assessment-related costs
 - Decision phases of construction design (0% to 100%)
 - Modification/change orders (over \$25K)
 - Independent Government Cost Estimates
 - Independent Cost Estimates
 - Operations and maintenance costs
- Review of all other costs associated with the project
- Performance of cost and schedule risk analyses and contingency estimates

- Definition and maintenance of historical and current cost databases
 - Unit prices (material/labor/equipment)
 - Labor productivity
 - Special work factors
 - Indirect costs
- Development of initial project schedules
- Review of budget cost impacts
- Review of special and standard clauses in the contract
- Participation in value engineering studies
- Performance or support of Life Cycle Cost Analyses
- Updates of project costs and cost-to-complete estimates.
 - DOE Order 1332.1A; DOE Order 4010.1; DOE/MA-0295; DOE/MA-0063, Vols. 1,6

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.3) was *partially met* for EM-30 and EM-40 activities.

No CEG fully meets the criteria in this POC. The CQMA Team, however, noted two important efforts to assist the technical project staff develop its estimates: a site-wide *INEL Cost Estimating Guide* and the *Cost Estimating Handbook*.

The Round I CQMA recommended that a central estimating group be established to be responsible for developing procedures and performing a final review of all formal cost estimates.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

- * The corresponding POC (III.A.1.3) was *met* for EM-50 activities.

Both EG&G and WINCO have CEGs, but they are used primarily for construction estimates not, typically, for R&D work. The cost-estimating function is performed by the PIs. The PIs are supported by experienced staff members. The staff members who are proposed to perform the work also contribute to the estimating process.

Round II

The POC is met for EM-30 and EM-40 activities.

Within the M&O organizations, there are cost estimators in central CEGs and project managers responsible for managing projects and work packages. These two groups report to appropriate levels as shown on organization charts. The personnel perform the activities specified in this POC, and checks-and-balances are maintained through peer review as required in the *INEL Cost Estimating Guide*, upward reporting, and estimate sign-off by individuals responsible for official estimates.

* *The POC is partially met for EM-50 activities.*

DOE-ID has no contingencies in its cost and schedule estimates. Modifications to the cost, schedule, and scope of the TTPs must follow the change control procedure. PIs generate estimates from catalog prices and historical data. Occasionally, vendors are contacted for price quotations. The DOE-ID technical program officer and M&O technical program manager (TPM), and project managers review costs associated with a project. Life Cycle Cost Analysis (LCCA) is performed on projects scheduled to last more than 1 year. PIs develop the initial schedule and review the budget for cost impact when changes to the scope or schedule occur. Review and tracking of the program is performed by DOE project managers.

Most DOE project managers have not had formal cost-estimating training.

We **recommend** that PIs and DOE project managers be required to attend formal courses in project management and cost estimating.

III.A.1.4 Schedule Estimating Functions

Schedule estimating is an important and integral part of the planning and estimating effort. Scheduling is performed by cost/schedule estimators who quantify the defined effort in discrete terms and place tasks in proper relationship to one another. Schedules are often constrained by contractual dates, facility limitations, and other uncontrollable external factors including:

- Future regulations and policies
- Availability of nonfinancial resources (e.g., specialized personnel and equipment)
- Uncertainty of demand
- Climate
- Bonding and liability issues
- Patent and intellectual property issues
- Availability of funding.

For each project, a critical path is determined by the estimator who sequences tasks from project start-up through project completion. A critical path is the particular sequence of activities that takes the longest time to reach the end event.

POC A.1.4

Professional schedule-estimating staff is available to support project managers in meeting their responsibilities for schedule estimating. Project schedule estimates take into account contractual dates and facility limitations. To the extent possible, these estimates recognize other uncontrollable external factors. The level of detail in the schedule is commensurate with the project stage. A critical path is developed for each project.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.4) was *partially met* for EM-30 and EM-40 activities.

Schedules for ER work at INEL were driven by the Federal Facility Agreement and Consent Order. To provide a measure of schedule contingency, the M&O contractors were scheduling task completion dates in advance of enforceable milestones.

The scheduling process was not performed by cost/schedule estimators within an estimating group and schedules were generally developed with minimal or no input from cost estimators.

Scheduling software, such as Micro Planner, was used to roll-up lower level schedules to the ADS level.

The Round I CQMA recommended that a central CEG be established to assure uniformity and consistency in the integration of the many work schedules.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

* The corresponding POC (III.A.1.4) was *met* for EM-50 activities.

In all cases, the schedule-estimating function was performed in conjunction with the cost-estimating function. Schedule-estimating software (e.g., TIMELINE, PMS4) was used in half of the cases. Scheduling was done to the subtask level and was based on experience with analogous tasks. This allowed internal management controls to be implemented effectively and to provide inputs to the Progress Tracking System (PTS) report. Critical paths were established, and milestones were linked to budgets.

Round II

The POC is met for EM-30 and EM-40 activities.

Schedules for EM-40 projects are driven by outside forces, primarily the Federal Facility Agreement and Consent Order. Scheduling for EM-30 and EM-40 projects is the responsibility of the assigned cost account/project manager who calls on individuals experienced with scheduling software to help develop the final schedules. Milestones are provided to the construction-cost estimators for use in construction-estimate escalation.

The EG&G training manual for cost account managers contains a section on scheduling.

* *The POC is met for EM-50 activities.*

The PI produces the cost and schedule estimates without the assistance of professional cost estimators. Security concerns, regulatory requirements, and legislation are considered in preparing the estimate. CCFs are produced when a change in schedule/milestone affects the cost. Schedules identifying the critical path for each project are developed by the PI. The schedule defined in the Program Execution Guidance (PEG) provided by DOE-HQ. The PEG also defines the schedule authorization and review and approval processes. When developing schedule estimates, the PI considers milestones, design, safety regulations and policies, climate (if applicable), and the approach for the final product.

III.A.1.5 Requirements for Preparation of Formal Cost Estimates

POC A.1.5

Formal cost estimates are prepared at all project phases including research and development, assessments, services, design, construction, operations, and/or maintenance. The cost estimates are prepared to a level of detail commensurate with the level of design.

DEAR; DOE Order 5700.2D; DOE/MA-0063 Vol. 6; *EM CAT Handbook*; FAR 36

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.5) was *met* for EM-30 and EM-40 activities.

The EG&G and WINCO CEGs produced formal construction cost estimates following DOE Order 4700.1. DOE-ID reserved the right to have an independent contractor compare/justify any INEL cost estimate.

The ER program follows the Comprehensive Environmental Response, Compensation, and Liability Act process. Formal estimates are required for the Remedial Investigation (RI), Feasibility Study, Remedial Design, Remedial Action, and Operations and Maintenance. The WM requirement for construction cost estimates follows DOE Order 4700.1 as mentioned above. Nonconstruction estimates follow the guidance provided by DOE-ID.

- * The corresponding POC (III.A.1.5) was *met* for EM-50 activities.

EM-50 did not require a "formal cost estimate;" therefore, such estimates were not prepared at INEL. However, the TTPs reviewed by the Team met the intent of this standard. The TTP was the only cost estimate used for contractual purposes between DOE/ID's M&O contractors and DOE-HQ EM-50. In the event of scope or budget changes, a modified TTP was submitted.

Round II

The POC is met for EM-30 and EM-40 activities.

EG&G and WINCO CEGs prepare formal estimates for construction projects when subcontracts are awarded and prepare EM-30 and EM-40 construction work packages. Cost account managers, WAG managers, and project managers prepare estimates for EM-30 and EM-40 non-construction work packages; the managers roll up the estimate summaries. Cost estimates for project baselines are developed and signed by the responsible individuals. Rust Geotec reviews estimates as requested by DOE-ID.

- * *The POC is met for EM-50 activities.*

Cost estimates are prepared at major stages of the project such as: proposal, work package, budget modification, mid-year, and year-end. These estimates are reviewed and approved by the M&O contractor, DOE-ID, DOE-HQ EM-50, and—in some cases—the DOE site that has the lead on the program.

III.A.1.6 Cost and Schedule Risk Analysis and Contingency Estimates

POC A.1.6

A cost and schedule risk analysis is performed at each phase of every EM-30, EM-40, and EM-60 program/project/task to ensure proper awareness of uncertainties and their potential impacts. Contingency estimates are based on the cost and schedule risk analysis.

For EM-50, risk/contingency analysis is performed for large-scale test demonstration projects that extend over a number of years and the results of which are expected to play a major role in environmental restoration activities, and that involve significant risks and uncertainties.

Responsibility for determining the need for risk/contingency analysis and for reviewing and acting on the results of the analysis is assigned in policy documents.

Cost and schedule risk analyses are prepared by appropriate program/project/task personnel in conjunction with Cost and Schedule Estimating Groups that prepare the cost and schedule estimates.

Contingency estimates are developed by the individuals responsible for preparing cost and schedule estimates. Contingency estimates are developed and separately tracked during each phase of the project.

DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE/MA-0063, Vol 6; *EM CAT Handbook*

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.6) was *partially met* for EM-30 and EM-40 activities.

All construction cost estimates include a form of cost/risk analysis generated by a cost estimator using an in-house analysis program.

We find three problems with EG&G's current contingency analysis approach.

- Application of this analysis is performed at too high a cost level.
- There is no documented basis for the contingency methodology used.
- Selection of an 18% risk of overrun to be the organizational standard is not documented or formally approved by DOE-ID or EG&G management.

For nonconstruction activities, contractors performing ER work do not perform formal cost and schedule risk analysis to support estimate contingency. All ADSs being prepared in Fiscal Year (FY) 1992 will have an overall contingency applied at the program level.

For nonconstruction activities, WM contractors do not apply contingency to any programmatic cost estimates. This appears to be the result of guidance from DOE-ID. However, contingency is applied to capital construction costs included in the WM ADSs.

The Round I CQMA recommended that:

- In situations where uncertainties exist in WM facilities operations, an allowance for change should be included in the estimating process as described in EM-30's *Interim Cost and Schedule Estimating Guidance*.
- A consistent, documented, and approved (by DOE-ID and contractor management) contingency approach be used by DOE-ID and its ER and WM program contractors.
- Specific contingency determinations should be made at as low a level of detail as is practical.

The INEL *Action Plan* stated that INEL would develop cost- and schedule-estimating procedures as recommended by the CQMA Team.

* The corresponding POC (III.A.1.6) was *not met* for EM-50 activities.

EG&G's *Program Management Plan for WTDD* stated: "Management reserve or contingencies included in the technical task proposal will not be included in the planned project budget." That is, the budget that the contractor managed did not include contingency.

The CQMA Team recommended that:

- DOE-HQ EM-50 evaluate the level of risk encompassed by all the EM-50-funded programs and categorize them by level of risk
- EM-50 consciously make funding decisions based on the nature of these risks
- Risk analysis be performed for all R&D and Demonstration, Test & Evaluation projects at INEL.

Round II

The POC is partially met for EM-30 and EM-40 activities.

Volume I of the *INEL Cost Estimating Guide* (see POC A.1.3) briefly discusses a contingency model that uses a risk level of 18% and is based on a weighted average that results in a 90% probability of underrun and 10% probability of overrun. There is no documentation to validate this model, nor is there any documentation on how to use the model. It appears that the estimator is to apply percentages based on judgment rather than a rigorous method.

The EM-40 contingency is applied at the program level at INEL. DOE/ID-10414: *Idaho National Engineering Laboratory Environmental Restoration Contingency Analysis* (November 1993) presents contingency rates for FY 1994-FY 2002 and is to be revised yearly. Objective, detailed analysis methods are not presented. Rather, the analyses described are subjective and depend on confidence ratings applied by the project manager. A weighted average is then for the total EM-40 program.

The EM-30 contingency is done only for construction project estimates. Contingency is not applied to operations and capital equipment estimates. Management reserve is tracked for operations and capital equipment projects through the change control process.

We recommend contingency analysis submitted with the estimates include a narrative describing the rationale for the factors applied.

We recommend the contingency model be validated.

- * *The POC is partially met for EM-50 activities.*

DOE-ID usually does not allow risk/contingencies in its estimates. Contingencies may be requested for any construction programs or for projects/programs in which there are technologies with a higher variance of risk.

We recommend that contingency estimates be included in all TTPs.

III.A.1.7 Qualifications of Cost Estimators

POC A.1.7

All formal/official cost estimates (e.g., estimates used for budgeting, defining cost and alternative studies, evaluating contractor estimates) are prepared by experienced cost estimators. These cost estimators possess the engineering/technical skills to understand the documented requirements (e.g., design criteria, architectural plans, engineering design, specifications, life-cycle operating requirements) and the experience to convert these to cost and schedule estimates.

DOE Order 5700.2D; DOE/MA-0046

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.7) was *partially met* for EM-30 and EM-40 activities.

Formal CEGs perform and review cost estimates for construction projects only. These groups have trained, experienced cost estimators with expertise in construction, operations, technical issues, and design. The personnel skills in these groups are diversified. Estimators are given the opportunity for formal training when available and appear to be proficient with in-house estimating tools. The CEGs at EG&G and WINCO are used to develop only construction estimates. For nonconstruction activities, the estimates are prepared by the technical project staff with assistance from central budget and finance staff and, when there is construction in the scope, the CEG.

Two significant efforts to assist the technical project staff in developing estimates were underway during the Round I CQMA.

- The EG&G CEG group developed a site-wide *INEL Cost Estimating Guide* to help ensure compliance with DOE cost-estimating standards and procedures and to provide a systematic methodology for preparing estimates.
- The EG&G ER program developed, with assistance from the CEG, a *Cost Estimating Handbook* containing suggested unit-price assumptions for ER activities.

The Round I CQMA report recommended that a central estimating be established within each organization and be responsible for developing estimating procedures and guidelines and reviewing all formal cost estimates. Contractor ER and WM technical personnel should continue to prepare the initial estimates, but an independent assessment (formal review and approval) should be performed by a central estimating group.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-

estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or developing its cost-estimating staff.

- * The corresponding POC (III.A.1.7) was *met* for EM-50 activities.

The only estimate prepared that could be considered formal in the EM-50 arena at INEL was the TTP submitted to DOE-HQ EM-50 via DOE-ID. TTP cost estimates were prepared by the PIs and supporting staff. If an EG&G TTP includes construction, a CEG was available.

Round II

The POC is met for EM-30 and EM-40 activities.

The required qualifications for estimators in M&O CEGs are documented in the position descriptions for estimators. The CEGs estimate construction projects.

EM-30 and EM-40 program and project estimates are performed by the cost account, WAG, and project managers. These individuals have gained the knowledge required to perform their functions through the day-to-day tracking of project costs. In addition, the *INEL Cost Estimating Guide* and the *Implementing PMPs* provide detailed definitions of scope.

The EG&G training manual for cost account managers contains a section on cost estimating.

- * *The POC is partially met for EM-50 activities.*

The majority of the PIs have technical skills but perform cost and schedule estimating. PIs are offered a Project, Planning and Control course to guide them in the cost-estimating process. The course, however, is optional. Professional cost estimators are not used in the process.

We recommend that DOE-ID make it mandatory that all PIs attend the Project, Planning and Control course and that cost-estimating professionals be hired.

III.A.1.8 Support Systems for the Preparation of Cost Estimates

POC A.1.8

The cost-estimating process is supported by systems (automated where appropriate) that provide both a check list for the estimators and the freedom to tailor the process to the estimate under preparation. The automated process comprises validated equations for cost build-up and any available historical data (actuals) for reasonableness checks.

DOE/MA-0046; DOE/MA-0063, Vol. 6; *EM CAT Handbook*

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.2.8) was *partially met* for EM-30 and EM-40 activities.

There is no consistent INEL-wide software support system for preparing cost estimates and forming scheduling packages for the project control system.

The Round I CQMA report recommended that consideration be given to standardizing cost-estimating and scheduling-/project-control software packages at INEL. A preceding recommendation to consolidate estimating/scheduling functions within INEL to eliminate duplication of effort and simplify the process is also relevant to this POC.

The INEL *Action Plan* reported that DOE-ID planned to formalize the estimating process at INEL with improved direction to its contractors. The direction would specify documentation requirements and include newly developed policy and procedures. Software was to be standardized once the DOE-ID reorganization was in place and prime contractor(s) selected. Further, a database was to be developed defining all software systems used by each M&O organization to support EM program cost and schedule estimating or to track cost; options for standard forms and software also were to be developed. DOE-ID planned to reach agreement(s) on standard software dna forms with its M&O contractor(s) and to implement the agreement(s).

- * The corresponding POC (III.A.1.8) was *partially met* for EM-50 activities.

Spreadsheet software was used by some PIs and their staffs to assist with the cost estimate. Schedule-estimating software (e.g., *TIMELINE*, *PMS4*) was used in half the cases. No policies mandated that an estimate be automated.

Round II

The POC is partially met for EM-30 and EM-40 activities.

INEL, in cooperation with DOE-ID, EG&G, and WINCO, developed a three-volume *Cost Estimating Guide*. Volume I covers construction, EM-30, and EM-40 projects; Volume II deals with EM-40 projects; and Volume III deals with EM-30 projects. Therefore, anyone seeking guidance for EM projects must consult multiple volumes. Volumes II & III contain work breakdown structures, UPBs, and peer review and approval procedures.

- There is no standard software used throughout INEL. The various groups in EG&G and WINCO use Lotus spreadsheets, WordPerfect forms, and other company-specific programs to develop cost estimates for INEL projects. For example, appendix A of volume III of the *INEL Cost Estimating Guide* notes that detailed cost estimating sheets are available for EM-30 projects as Lotus spreadsheets, WordPerfect tables, or Excel spreadsheets.

INEL ER cost-estimating software is being used, and an updated version is expected to be released soon. However this software is for EM-40 projects only and is not intended for EM-30 or construction estimates.

We **recommend** DOE-ID adopt standard software for cost and schedule estimates throughout all INEL programs and that training on the adopted software be provided (and required).

- Computerized databases generally are not available.

We **recommend** that computerized databases be developed—if necessary—and made available.

Suggestion for Future Consideration

Site-wide estimating guides should assist in the development of consistent estimates across INEL. However, forms are not standardized. For example, sample EG&G and WINCO forms in Volume II are not the same.

We **suggest** consolidating the cost estimating guidance of volumes I, II, and III of into one volume and standardizing forms. We also suggest that the work breakdown structure and UPB be separate documents; this will facilitate updating.

- * *The POC is partially met for EM-50 activities.*

WINCO's project control system software is Microsoft Excel. EG&G uses Dekker Trakker software. DOE-HQ uses the PTS for project control and data collection, but the PTS cannot validate data. The PTS is generally 6–8 weeks behind in its reporting, and occasionally data have been dropped from the system.

We **recommend** that a more reliable project control/database system be developed and that this system and a uniform estimating system be adopted by DOE-ID.

III.A.1.9 Cost-Estimating and Schedule-Development Forms

POC A.1.9

Standard cost- and schedule-estimating forms are developed, approved, and used throughout the organization. (DOE global basis is desirable, but the requirement is firm at the Operations Office level.)

DOE Order 1332.1A, DOE/MA-0046, *EM CAT Handbook*

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.4) was *partially met* for EM-30 and EM-40 activities.

Each contractor organization maintained a formal forms control system to control revisions and to update forms. Each organization used standard input/output estimating and scheduling forms. However, because of the many computer software packages used at the site, different documents were produced for the same information.

The Round I CQMA Team had difficulty in tracing contributing subpackages to the top-level estimate package.

The CQMA report recommended that:

- Consideration be given to adopting a software package to be used sitewide to help standardize forms among contractor organizations
- Contractors enhance traceability to provide a clear understanding of the specific elements that constitute a given ADS.

The INEL *Action Plan* reported that DOE-ID planned to formalize the estimating process at INEL with improved direction to its contractors; options for standard forms and software also were to be developed. DOE-ID planned to reach agreement(s) on standard software and forms with its M&O contractor(s) and to implement the agreement(s).

- * The corresponding POCs (III.A.3 and III.A.10) were *not met* for EM-50 activities.

Standard estimating forms were suggested for use internally by the DOE-ID M&O contractors for cost and schedule estimating; however there were no standard estimating form in use throughout INEL.

The Round I report recommended that standardized forms be incorporated into the cost-estimating process.

Round II

The POC is partially met for EM-30 and EM-40 activities.

Cost- and schedule-estimating forms are not yet standardized throughout INEL. Each of the organizations uses different forms. The *INEL Cost Estimating Guide* does not require standard forms. For example, volume III lists estimate worksheet forms for Lotus, WordPerfect, and Excel.

EG&G has standardized on Dekker Trakker as its basic project management tool. Interfaces with other management software, specifically the EG&G-developed Cost and Planning System, Micro Planner, and DOE's PTS, have been developed. Micro Planner is the most used scheduling software at this time.

We recommend DOE-ID require standard cost- and schedule-estimating forms and software throughout INEL and that training be provided—and required as necessary—on the adopted software.

- * *The POC is partially met for EM-50 activities.*

The M&O contractors use a standard format for reporting cost and schedule estimating in the TTPs, but there are no standard forms for reporting. There are no forms (and, consequently, no forms change control system) used throughout the organization.

We recommend that standard estimating forms be developed and a site-wide change control system be established to update the forms.

III.A.1.10 Effective Access to and Interaction and Communication With Other Organizational Entities

POC A.1.10

Cost and schedule estimators are integral parts of the program/project/task team. Cost and schedule estimators have an open channel of communication with other organizational entities including program/project/task management; research and development, technical, construction, contracting, and operations units; other estimating units; subcontractors; and DOE/HQ organizations. For all large-scale projects (i.e., those in excess of \$1.2M) and activities involving multi disciplinary design, construction, and operations, the interactions and channels of communication are established in appropriate directives.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.5.1) was *partially met* for EM-30 and EM-40 activities.

EG&G and WINCO had procedures that defined the process of construction cost estimating. Although the procedures did not specifically identify all interfaces, the role of the estimate requester is identified. Nonconstruction cost estimates were prepared by contractor technical project staff with assistance from budget and finance personnel. There were no formal directives establishing interfaces and access to other parts of the organization. Similarly, DOE-ID has no formal directives establishing personnel interfaces.

Despite the lack of formally documented interfaces, the interfaces among the estimator-other contractor organizational units and DOE-ID appeared to be functional and effective.

The CQMA report recommended that appropriate interfaces be specifically identified in the procedures.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

* The corresponding POC (III.A.4) was *met* for EM-50 activities.

There was good rapport, cooperation, and communication among the technical personnel, finance, and management personnel of each M&O contractor. There was good rapport, cooperation, and communication between the technical, finance, and management personnel of one contractor and those of the other. Internal, weekly status reporting was required by line management. Additionally, PIs communicated regularly (usually a weekly technical status report) with integrated demonstration/integrated program coordinators.

Round II

The POC is met for EM-30 and EM-40 activities.

Communication and interaction between DOE-ID and M&O organizational units appear to be effective with minimal communication directives required.

A noteworthy practice observed by the subteam is that INEL has formed several teams with membership from DOE-ID and M&Os to coordinate and direct cost- and schedule-estimating efforts. Examples of these teams are; Program Management Systems Development Initiative, Planning and Integration, Idaho Cost Estimating Team, and Federal Facility Agreement and Consent Order Cost Estimate Working Group.

* *The POC is met for EM-50 activities.*

There are weekly and monthly reports, conference calls, and mid-year and year-end closeout meetings. There is verbal communication on questions or concerns about the program and discussions on requests for more funding. The *Forecast Preparation Guidance* provides job descriptions and category rates to assist with the selection and estimating of personnel to perform the work.

III.A.1.11 Effects of External Changes on Cost and Schedule Estimates

Effects of External Changes on Cost and Schedule Estimates program, project, or task cost and schedule estimates may be impacted by external factors resulting from the negotiation of compliance agreements and contracts, changes in the Federal budget, and program-coordination actions. Such external factors may include changes in priorities; changes in standards for worker exposure, public exposure or cleanup; environmental restrictions; and changes in available funds.

POC A.1.11

Written procedures assure externally imposed changes are promptly brought to the attention of the program, project, or activity staff. These changes are not only reflected in revised technical and programmatic plans but also in revisions of the cost estimate. Cost and schedule estimators are involved in determining the cost and schedule impact of the DOE position on (e.g., compliance, interagency) agreements. Estimators receive feedback on results and subsequent amendments. Cost and schedule estimators are involved in budgeting, planning, and all contract cost and schedule negotiations.

DOE Order 4700.1, Change 1; DOE/MA-0046

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.8) was *met* for EM-30 and EM-40 activities.

EG&G and WINCO had procedures that defined construction cost estimating. The procedures included incorporating changes that might be caused by external factors. Such changes are brought to the attention of the CEG by way of a Construction Interface Document. The contractors had written procedures detailing the process to reflect externally imposed changes in the technical scope and budget estimates.

- * The corresponding POC (III.A.6) was *not applicable* to EM-50 activities.

Written procedures were in place for assuring that externally imposed changes were promptly brought to the attention of the project or activity staff. These changes were factored into revised technical and programmatic plans and were reflected in revised cost and schedule estimates. Cost estimators were involved in developing the DOE position on agreements. They received feedback on results and subsequent amendments. Cost estimators are involved in budgeting, planning, and all contract cost and schedule negotiations.

Round II

The POC is met for EM-30 and EM-40 activities.

External changes on cost and schedule estimates are tracked through change control procedures. Change control documents are signed off by all responsible parties. Estimators sign-off on estimates used to support change control. The estimators for EM-30 and EM-40 projects are usually the cost account/project managers.

- * *The POC is partially met for EM-50 activities.*

Idaho M&O contractors and DOE-ID site personnel provided timely TTP progress information (in report form) to DOE/HQ, but little feedback was received from DOE-HQ and that feedback was frequently untimely. DOE-HQ provided little feedback regarding cost and schedule information submitted in PTS reports.

The need for improved communication between the site (EG&G, WINCO, and DOE-ID) and DOE/HQ was identified.

III.A.2 Cost and Schedule Estimate Reviews

The quality of cost and schedule estimates is ensured through a systematic, comprehensive review and approval process. Feedback is provided at all project phases to improve quality.

III.A.2.1 Cost-Estimate Review and Approval Process

POC A.2.1

All formal cost and schedule estimates are internally reviewed and approved by appropriate personnel at each level of the DOE and contractor organizations. Cost estimates are subjected to peer and supervisory review and are reconciled within the Cost Estimating Group before release for external review.

DOE Order 5700.2D; DOE/MA-0046; DOE/MA-0063 Vol. 6

When DOE contracts directly, an Independent Government Cost Estimate is prepared, reviewed, and approved before negotiation or opening of contract proposals for all projects with costs above \$25,000 (discretionary below \$25,000). The Independent Government Cost Estimate is prepared, reviewed and approved based on a detailed analysis for architect/engineer work before contract negotiations are initiated.

FAR 36.203, FAR 36.605 and DEAR 936.606

Under M&O/National Laboratory contracts, a detailed, independent estimate of costs is prepared by the Cost Estimating Group for all construction work to be subcontracted. Also, a detailed, independent estimate of cost is prepared for architect/engineer work before negotiations.

DEAR 970

For all other services, when DOE procures directly, the cognizant Operations Office prepares an Independent Government Cost Estimate or carefully reviews, modifies as appropriate, and approves the estimate, whether or not submission to DOE Headquarters is required.

For all other services, the M&O Contractor/National Laboratory prepares an Independent Cost Estimate or carefully reviews, modifies as appropriate, and approves the estimate, whether or not submission to DOE is required.

For each level of review (DOE or M&O Contractor/National Laboratory) where there is reason to question or challenge any element(s) of cost, appropriate documentation is prepared and investigators are employed to resolve any points of contention in the estimate before approval and forwarding to higher authority.

DOE Order 4700.1, Change 1; DOE/MA-0063, Vol. 6; DOE Order 5700.2D

Observations, Discussion, and Recommendations

Round I

The corresponding POC (A.3.1) was *partially met* for EM-30 and EM-40 activities.

Significant effort was made to formally review and approve all segments of the cost and schedule process. Peer review, along with a required signature format, combined to make an acceptable process. Significant effort was made by the M&O contractors to comply with the requirements and procedures of DOE-ID and DOE-HQ for the overall checks-and-balance process when issuing and modifying subcontracts.

- * The corresponding POC (III.A.2.1) was *met* for EM-50 activities.

The EG&G review and approval process included documented lines of authority. WINCO met the POC although the lines of responsibility were not formally documented. Signature authority was required by the reviewers throughout the review process.

The CQMA Team recommended that WINCO's "Authority/Responsibility for Reviewing Cost Estimates/Schedules" be completed and reviewed by DOE-ID to determine whether the guidelines established were consistent with those required by DOE-HQ EM-50.

Round II

The POC is met for EM-30 and EM-40 activities.

The process for reviewing, approving, and forwarding cost estimates complies with the guidance cited as sources for this POC. The process is well defined. When a request is made, the cost estimator produces the estimate. The estimate passes through the contractor's review and approval chain. When a modification to the estimate is generated, the estimate goes through the change control process and the same review and approval process is used.

DOE-ID and its M&O contractors have documented guidance and procedures for preparing and reviewing cost estimates. Procedural directives are part of the *INEL Cost Estimating Guide*.

The *Guide* supplements DOE Order 5700.2D and applies to all organizations and individuals responsible for the development, documentation, and review of cost estimates prepared for DOE-ID projects.

- * *The POC is met for EM-50 activities.*

The PMPs document the authorization levels required for review, approval, and forwarding of estimates. Cost and schedule estimates are reviewed and approved by the M&Os' project managers, TPM, DOE-ID project managers, financial analysts, and the technical program officer. If questions arise or revisions are made, the estimate is returned to the PI for further investigation. If no changes are required, the estimate is forwarded to DOE-HQ for funding. The program threshold that initiates a review or revision to an estimate is usually a scope change; other thresholds are schedule changes, cost adjustments, and mid-year and year-end reporting.

III.A.2.2 Documentation of Authority and Responsibility for Reviewing Cost and Schedule Estimates

POC A.2.2

Documentation of the authority and responsibility for formal approvals and sign-off of cost and schedule estimates exists for both DOE Operations Offices and for M&O/National Laboratories contractor management. The documentation includes designation of the points in the project development sequence at which formal approvals of cost and schedule estimates are required. The minimum materials to be included in the cost and schedule review package are designated.

SEN-27-90; DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE Notice 4700.4A; DOE Notice 4700.5; DOE/MA-0063, Vol. 6

Criteria for designating those projects and activities (other than Major Systems Acquisitions and Major Projects) that require formal DOE and M&O or National Laboratories contractor management review, approval, and signature are documented.

SEN-27-90; DOE Order 4700.1, Change 1; DOE Notice 4700.4

Observations, Discussion, and Recommendations

Round I

The corresponding POC (A.3.2) was *partially met* for EM-30 and EM-40 activities.

With one exception, specific review and approval procedures did not exist for DOE-ID or its contractors. DOE-ID developed a draft Supplemental Directive, *Budget Validation Program*, which established the responsibilities for a budget validation effort. Included in the guidance was a budget submission check list to be used during the review process.

Despite the lack of specific procedures, the review and approval process was being performed appropriately within the contractor organizations and between the contractors and DOE-ID. provided by site personnel.

The Round I CQMA report recommended that specific procedures for the review and approval process be documented by both DOE-ID and its contractors and that the draft *Budget Validation Program* be finalized as a DOE-ID order.

INEL, in its *Action Plan*, stated that it would determine the need an cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

* The corresponding POC (III.A.2.2) was *partially met* for EM-50 activities.

EG&G had documented lines of authority. WINCO had verbal procedures for reviewing the cost estimate/schedule, but they were not formally documented. Signature authority was required throughout the review process. When a reviewer suggested a modification to the estimate, the estimate was recycled through appropriate sections of the process. Technical content was reviewed and evaluated by DOE-HQ EM-50 to determine whether the scope of the TTP met EM-50 mission needs.

The CQMA Team recommended WINCO's "Cost Estimate Review and Approval Process" be completed and reviewed by DOE-ID to determine whether the guidelines set forth were consistent with those required by DOE-HQ EM-50.

Round II

The POC is met for EM-30 and EM-40 activities.

The *INEL Cost Estimating Guide* and program directives document the authorities and responsibilities for the review of cost and schedule estimates for construction, waste management, and ER.

The *Guide* meets the intent of the POC and adequately provides documentation of authorities and responsibilities relevant to formal cost and schedule estimates at DOE-ID.

* *The POC is met for EM-50 activities.*

DOE-ID and M&O contractors have a written agreement on when, in the project development sequence, formal approvals of different levels are required for cost and schedule estimates. Employees of both DOE-ID and M&O contractors are fully aware of their responsibilities concerning the approval process and follow the appropriate procedures. If all required information for an estimate package has not been provided, the estimate will be rejected and returned to the PI for completion.

III.A.2.3 Cost and Schedule Estimate Quality Control Process

POC A.2.3

Cost-estimate quality control ensures that the following process is implemented:

- All assumptions (related to the estimation of costs and schedules) are verified for reasonableness and are documented.
- Cost quotes are documented. This documentation includes the time, date, company, company contact, and for how long the quote is good.
- Procedures for estimating project costs and schedules are reviewed to ensure that they are logical to other estimators and their supervisors.

- Estimates are compared to historical data (actual collected) from analogous projects when feasible.
- Changes in scope, design, definition, and schedule are adequately accommodated through reiteration of the cost- and schedule-estimating processes.
- Estimates that are challenged and found to be of poor quality are rejected, and the estimation process is repeated with modification of deficient areas.
- Estimates are prepared in accordance with the FAR, DEAR, and other appropriate DOE directives.
DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE Order 5700.6C; DOE/MA-0046; DOE/MA-0063 Vol. 6, FAR, DEAR

Observations, Discussion, and Recommendations

Round I

The corresponding POC (A.3.3) was *met* for EM-30 and EM-40 activities.

Cost-estimate assumptions were documented through back-up documentation, budget estimate basis sheets, Cost Account Plans, and work packages. Only the personnel who prepared the initial cost estimate could change the estimate, and all review comments were returned to those personnel for cost impact.

In addition to documentation of cost assumptions in the ADS support material, EG&G ER developed a handbook containing guidance on unit-price assumptions. The handbook provided a degree of consistency among ER cost estimates. WINCO also developed a document containing ER cost estimates and the unit-cost assumptions used in producing the cost estimates for the Idaho Chemical Processing Plant.

- * The corresponding POC (III.A.2.3) was *met* for EM-50 activities.

During the internal line management review, appropriate cost quality control measures were taken to meet the TTP guidance requirements. These measures included actions such as establishing ground rules and assumptions, pricing practices, and realism and sanity checks and meeting various regulatory requirements.

Round II

The POC is met for EM-30 and EM-40 activities.

Cost-estimate assumptions are documented in the Cost Estimate Support Data Recapitulation sheet, which is part of the documentation produced with the cost estimate. Interviews and document reviews show that responsible personnel are knowledgeable about the procedures that

control the quality of cost estimates. The *Guide* includes procedures for preparing credible, defensible, and standardized costs estimates for INEL.

The *INEL Cost Estimating Guide* defines and provides formal, specific guidance and procedures relevant to cost and schedule quality.

* *The POC is partially met for EM-50 activities.*

DOE-ID M&O project managers and TPMs review cost and schedule estimates for reasonableness, and their determination is based on historical data and personal judgment. When changes to an existing TTP occur, a CCF is generated. The change control board reviews, comments on, and directs the estimate either to DOE-HQ EM-50 for funding or to the PI for a change.

There is no written procedure to ensure that estimates are logical, nor is there a procedure for rejecting estimates for poor quality.

We **recommend** that a formal cost-estimating procedure be established and used by DOE-ID and the M&O contractors.

III.A.2.4 Cost Estimation Feedback and Iteration

POC A.2.4

Feedback is present in all phases of project cost and schedule estimating (design, advertising, award, construction, final costs) and provides "lessons learned" for improved cost estimating.

There is a system in place to ensure the following information is fed back to the Cost Estimating Group:

- Budget guidance and constraints
- Schedule milestones
- Design criteria
- Protests
- Public impact
- Other area construction activity/saturation
- Contract procedures
- Productivity and efficiency factors
- Changes to all of the above
- Actual award amount
- Change orders/claims
- Bid exceptions
- Lessons learned.

Essential feedback data may originate in other organizations involved in an integrated effort. Procedures are in place for assuring such data are available to all participating organizations.

DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE/MA-0046;
DOE/MA-0063, Vol. 6

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.6) was *partially met* for EM-30 and EM-40 activities.

EG&G and WINCO had procedures that defined construction cost estimating. The procedures did not specifically identify or establish feedback systems. Nonconstruction cost estimates were prepared by the technical project staff with assistance from budget and finance personnel. There were no formal directives establishing feedback systems. Similarly, DOE-ID had no formal directives establishing such systems.

Despite the lack of a formal, documented feedback system, there was a functional, effective feedback system. In construction estimating, for example, design or field changes were accomplished through the a Construction Interface Document detailing the need for and scope of the proposed change. The CEG then developed cost estimate related to the proposed change, which was used in negotiation with the construction subcontractor.

For nonconstruction activities, any proposed change to the baseline had to be submitted as a Change Request to a change control board for review and approval. Approved changes were tracked in a Change Control Log.

No recommendations were made in the Round I CQMA report.

INEL, in its *Action Plan*, stated that it would determine the need an cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

Round II

The POC is met for EM-30 and EM-40 activities.

INEL has a system for ensuring the feedback of information that affects cost and schedule estimates. The change control process for the INEL ER Program Baseline is documented in the *DOE-ID Environmental Restoration Program Change Control Charter* and is described in the Program Directives.

A "Construction Interface Document" is used to show an addition, deletion, change of scope to a project during the construction phase. In addition, cost/schedule estimators discuss issues in

a lessons-learned meeting, participate in modifications to estimates, and receive information on all phases of project cost estimating via a monthly progress report.

- * *The POC is met for EM-50 activities.*

Procedures address feedback during all phases of project cost and schedule estimating. DOE-ID receives such feedback from the PIs through weekly/monthly reports, conference calls, and lessons-learned meetings. Feedback and cost data become a resource for improving cost estimating.

III.A.3 Contracting Process and Procedures

Effective DOE cost management is supported by the participation of cost estimators in the full range of contracting related processes. These processes include the determination of contract characteristics, contract negotiations and modifications, contract monitoring and control, and the safeguard of the Formal Government Cost Estimates.

III.A.3.1 Selection of Contract Characteristics

POC A.3.1

Cost estimators are active members of the teams deciding the contract vehicles to be used to implement programs and projects. Cost estimators review the development and selection of standard and special clauses and receive feedback on the final standard and special clauses included in contracts. Cost estimators participate in the development of the Formal Government Cost Estimate.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.7) was *met* for EM-30 and EM-40 activities.

The construction cost estimator was a full member of the team that determined whether the project would be a fixed-price bid, small business set-aside, or cost-plus-award-fee contract. ICEs are produced and used as the Government-estimated costs to verify the reasonableness and the fairness of the bid process.

- * The corresponding POC (III.A.7) was *not applicable* to EM-50 activities.

This POC was determined to be not applicable (in most cases) because R&D and Demonstration, Test & Evaluation programs under the aegis of EM-50 generally did not support large-scale projects or activities involving substantial contracts/subcontracts.

Round II

The POC is met for EM-30 and EM-40 activities.

Cost estimators provide input to the selection of the contracting vehicle via the Cost Estimate Support Data Recapitulation sheet. In addition, cost estimators participate in the development of the Formal Government Cost Estimate and use Independent Cost Estimates to determine the reasonableness and fairness of the bid process.

III.A.3.2 Modifications After Contract Award

POC A.3.2

A system in place ensures that cost estimators are involved in all contract modifications, including negotiations, after contract award.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.9) was *met* for EM-30 and EM-40 activities.

- * The corresponding POC (III.A.8) was *met* for EM-50 activities.

Round II

The POC is met for EM-30 and EM-40 activities.

A system ensures that cost estimators are involved in all contract modifications including negotiations after contract award. Cost estimators must sign the original estimate and any modifications to it.

- * *The POC is met for EM-50 activities.*

PIs produce estimates at all stages of the contract. They initiate the original estimate, review subcontractor estimates, produce an estimate at each change after contract award, and provide the final estimates at year-end.

III.A.3.3 Cost Control During the Life of the Contract/Project

POC A.3.3

Cost and Schedule Estimating Groups promptly receive the latest programmatic information, technical requirements and schedule impacts that affect cost. Cost and schedule estimators automatically receive feedback of current actual costs and schedules for projects during the project life cycle. Cost and schedule estimators, on an as-requested basis, update project cost estimates and schedules and prepare cost-to-complete estimates as well as any change estimates required locally or by DOE/HQ.

DOE Order 5700.2D; DOE MA-0040

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.10) was *partially met* for EM-30 and EM-40 activities.

The contractors tracked project costs through the baseline budget and change control process. The software used for tracking costs in a project control system varied within and among the contractor organizations.

The Round I CQMA report recommended that the cost control process be enhanced by the site-wide standardization of software to promote consistent reporting and tracking of actual costs.

The INEL *Action Plan* did not include proposed action that specifically addressed this POC.

TTPs were resubmitted annually to request new FY funding. If the scope of the task was revised or if the funding request was modified by DOE-HQ EM-50, the content of the TTP was revised, passed through for approval by DOE-ID, and resubmitted to DOE-HQ EM-50.

Round II

The POC is met for EM-30 and EM-40 activities.

Cost/schedule estimators and program managers use CCFs, weekly project-status reports, and monthly reports to track costs. The change control documents are an important part of cost tracking and control during the life of the project. These documents are used to ensure distribution of the latest versions of design criteria, design documents, and contract documents.

The POC is met for EM-50.

Budget analysts provide actual data to PIs to assist them in the cost- and schedule-estimating process. If actual and budgeted costs (cost-to-complete) cause the schedule, scope, or cost to miss the baseline estimate, the PI must update the estimate or produce an explanation for this change.

III.A.3.4 Safeguard of the Cost Estimate

POC A.3.4

Reviewed and approved Formal Government Cost Estimates are stamped "For Official Use Only" and are safeguarded until bid or proposal opening. Cost estimates used for budget and decision making also are stamped "For Official Use Only" and are safeguarded against unauthorized disclosure. The Government cost-estimating process ensures that information is not released improperly or disclosed to contractors who may be involved in performing the work.

DOE/MA-0063 Vol. 6; FAR 36.203-204; FAR 36.605b; DEAR Part 936

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.13) was *met* for EM-30 and EM-40 activities.

The approved official Government Estimates were safeguarded until bid opening. Estimates were produced and stored in secure buildings.

- * The corresponding POC (III.A.13) was *met* for EM-50 activities.

When proprietary data, methodologies, or competitive bids were "business sensitive," the estimate and sensitive material were secured.

Round II

The POC is met for EM-30 and EM-40 activities.

Approved Government Estimates are produced and stored at secured buildings where Government security badges are required for entrance and access.

III.A.4 Special Cost Evaluations

DOE conducts special cost evaluations, including LCCA and value engineering (VE) studies, as a part of short- and long-term program/project planning and decision making. Cost estimators are consistently involved in planning, conducting, and reviewing these special cost evaluations.

III.A.4.1 Life Cycle Cost Analysis

LCCA involves the comparison of alternatives with respect to acquisition, construction, and operating and maintenance costs.

POC A.4.1

LCCA is routinely used in the development of the design and is an important decision-making tool for short-term and long-term project planning for EM-30, EM-40, and EM-60. For EM-50, LCCA is performed for high-cost demonstration programs in which the development, design, and construction is followed by a test program of significant cost and duration. Results of LCCAs are inputs to selecting project alternatives (e.g., new construction versus remodeling of an existing facility) and to evaluating design and construction alternatives. Cost Estimating Groups are routinely involved in the development of cost data for, and review of, LCCAs.

Responsibility for determining the need for an LCCA and for reviewing and acting on the results of the analysis is assigned in policy documents.

DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE Notice 4700.5;
DOE/MA-0063, Vol. 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.11) was *met* for EM-30 activities.

Engineering personnel in the contractors' design departments performed LCCAs for WM and ER projects. The CEG assisted in generating costs for LCCAs (but did not review or approve them). LCCA is required in the design criteria for subcontractors. ER activities at INEL were primarily concerned with the planning of contaminant assessments at the time of the Round I CQMA; therefore, LCCA was not applicable to ER.

- * The corresponding POC (III.A.11) was *not met* for EM-50 activities.

Life Cycle Cost Analysis (LCCA) was not routinely performed for TTPs at INEL.

The CQMA Team recommended that LCCA when a firm R&D direction has been determined.

Round II

The POC is met for EM-30 and EM-40 activities.

LCCA is performed and the results are used as a decision-making tool for management. EM-40 has documented specific requirements for life-cycle planning. These requirements are in accord with DOE Orders and Guidelines.

- * *The POC is met for EM-50 activities.*

LCCA is usually not required by DOE-ID. However, when LCCA is required, PIs are responsible for performing the LCCA. TTPs are funded 1 fiscal year at a time. Occasionally, TTPs that may require more than 1 year to complete will have a life-cycle cost estimate done to assist DOE-HQ in its decision making to fund the TTP, preferably through its life.

III.A.4.2 Value Engineering Studies

POC A.4.2

Value engineering studies are performed for both operations and construction activities at the earliest feasible phase of project concept development to assure the most cost-effective method, approach, or design. Value engineering studies are performed independently of the original design team (if feasible). The value engineering study team includes cost estimators.

Responsibility for determining the need for a value engineering analysis and for reviewing and acting on the results of the analysis is assigned in policy documents.

DOE Order 4010.1; OMB Circ. A-131; FAR 48.102C; FAR 52.248.1; Executive Order 12615

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.A.12) was *met* for EM-30 and EM-40 activities.

The EG&G Engineering Division was responsible for conducting VE studies and provided a cost estimator from its CEG VE functions. The ER and WM programs did not have their own VE programs.

- * The corresponding POC (III.A.12) was *partially met* for EM-50 activities.

VE studies were typically not performed as part of the developmental effort, but at least one VE was performed and another was planned. PIs and program managers relied on DOE-HQ EM-50 to perform VE studies.

The Round I report recommended that VE studies be considered once a firm R&D direction has been determined.

Round II

The POC is met for EM-30 and EM-40 activities.

EG&G has a VE program in which VE studies are conducted by a team that includes a cost estimator. VE studies are routinely performed as part of LCCA. In addition, direction for establishing a VE program and conducting a VE study are provided in the *INEL Value Engineering Guidance Document*, which is issued and maintained by the Value Engineering Oversight Committee.

- * *The POC is met for EM-50 activities.*

III.B INDEPENDENT COST REVIEW

III.B.1 Summary

Introduction

In Independent Cost Review (ICR) subteam evaluated a sample of the site estimates to determine their quality. The activity data sheets (ADSs), supporting estimates, and data were analyzed on site with the assistance of the estimators and authors of the data. The basis of each estimate and its documentation were the primary focus of the ICR subteam. The scopes of the tasks included in the estimates were used to identify the projects' cost drivers. Solely for the purposes of the ICR analysis, the subteam accepted, without change, the site estimates and technical and programmatic assumptions. The independent estimate and analysis of cost drivers was accomplished using parametric cost models, comparison with analogous tasks, and/or review of historical data.

The numbers generated in the ICR process are not intended to be used by the site as a substitute for its estimates. The ICR analysis is designed to test the reasonableness of the site's estimates.

General Site Description

The Idaho National Engineering Laboratory (INEL) is located 32 miles west of Idaho Falls, Idaho, and occupies 890 square miles of the northwestern portion of the Eastern Snake River Plain. The Bureau of Land Management classifies land at INEL for industrial and mixed use, and INEL has been designated as a National Environmental Research Park. The developed area within INEL is surrounded by a 500-square mile buffer zone used for cattle and sheep grazing. INEL land contains a substantial volume of silicic and basaltic volcanic rocks with relatively minor amounts of sediments. A series of basaltic lava flows are interbedded with sediments at varying elevations. The basalts immediately beneath the site are relatively flat and covered by 40-50 feet of alluvium. The Snake River Plain Aquifer underlies INEL and has been proposed as a sole-source aquifer pursuant to the Safe Drinking Water Act. INEL has semidesert characteristics with hot summers and cold winters. Normal annual precipitation is 9.1 inches with estimated evapotranspiration of 6-9 inches per year. Twenty distinctive vegetative cover types have been identified at INEL with the dominant species, big sagebrush, covering approximately 80% of the area. The variety of habitats at INEL support numerous species of reptiles, birds, and mammals.

INEL was proposed for listing on the National Priorities List on July 14, 1989, by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986. The final rule, which placed INEL on the National Priorities List, was published on November 21, 1989.

Site Observations

We observed found the following:

- Since the Round I Cost Quality Management Assessment, there has been a marked improvement in the cost-estimating process. Specifically, the site has adopted the development

and use of historical data. These data are documented in the *INEL Cost Estimating Guide* and are used as a guide for developing cost estimates.

- The *INEL Cost Estimating Guide* could perpetuate higher cost projections because it does not adjust historical cost to eliminate additional costs caused by schedule changes or other problems that may have caused actual costs to be higher than the estimate.
- The project work packages (WPs) that represent the site estimate contain insufficient data for the estimates to be considered well documented. The WP references the *INEL Cost Estimating Guide*, but in many instances, there is no direct correlation between the *Guide* and the WP activity.
- The *Guide* contains 543 pages. However, 432 pages are blank.
- INEL has developed a process to assess the need to perform a Remedial Investigation/ Feasibility Study. INEL refers to this as a Track 1 and Track 2 process. By working with the State of Idaho and the EPA, INEL has, in many cases, obviated the need for a Remedial Investigation/ Feasibility Study, an approximately 36-month process. Track 1 is an evaluation process, mainly a paperwork study of the site and contaminations, that takes approximately 6 months. Track 2 is a minimum sampling effort that takes approximately 18 months. This approach could lead to reduced costs and shorter schedules.
- The estimates for ADSs reviewed do not reflect a total project cost or a total estimated cost. However, future estimates will reflect total estimated life-cycle cost.
- There appears to be no single document that contains the cost estimate for an entire project from assessment through closeout. Several Department of Energy contractors are involved in the estimating process: EG&G for the assessment portion and M.K. Ferguson Idaho Co. and M.K. Environmental Services for the construction portion. Rust Geotec performs estimate reviews but does not compile information into one document.
- No independent or Government estimate, comparison, or reconciliation is performed on the estimates that EG&G and M.K. Ferguson of Idaho Company prepare for projects at INEL. Currently Rust Geotec performs reviews on Cost Account Program and WPs prepared by EG&G. The reviews involve using EG&G's *Cost Estimating Handbook* (historical database) and estimating standards such as Means and Richardson's. But the review still largely depends on the reviewer's knowledge and best judgment.
- The contingency value used for the Fiscal Year (FY) 1995 funding requirements was entered as a negative value. This value represents a reduction in funding and was used to reduce costs without having to adjust scope.
- The average contingency value used for each ADS in the Baseline Summary is approximately 6% of the base costs. This does not represent a reasonable value for cost estimates for future work. A more reasonable value would be between 20% and 30%, which is the range reflected in the *EM-CAT Handbook*. In addition, the contingency applied on a yearly basis varied from

year to year. The near-term values were higher than values for the out years (e.g., FY 1996-1999 ranged from 8% to 11.9% whereas FY 2000 was 1.3%). Normally, because less is known the further in time one projects, out-years should have the highest contingency application.

Site Recommendations

On the basis of our findings, we recommend that:

- The *INEL Cost Estimating Guide* include additional information. The additional information should include descriptions of the ranges in order to provide the users with information on how to determine a reasonable value from the given ranges.
- Abnormal historical cost should be removed from the cost ranges contained in the *Guide* or be documented to an extent that reflects the conditions for selecting these costs
- Responsibility for developing a complete document that includes estimates from all sources be assigned to a single organization
- INEL ensure that independent cost estimates are prepared and that reconciliations/comparisons are performed on all major acquisitions/tasks
- Rather than apply negative contingency to maintain status, the scope of work and/or schedule be modified to reflect changes in funding
- ADS contingency values be applied using current Department of Energy guidelines
- Professional estimators prepare/assist in the preparation and/or review WPs to ensure that the *INEL Cost Estimating Guide* is being used properly, references are correct, and costs are applied in a consistent manner
- ADS 28-E1 Operable Units 1-10 be revised to contain an accurate descriptive scope of work and reasonable costs.

III.B.2 ICR Estimate Review Process

The ICR Subteam reviewed the following ADSs:

- Office of Waste Management Projects
 - 14-E1 Treatment Evaluations and Demonstrations
 - 14-E2 Alpha LLW Treatment Facilities and Equipment
 - 14-E3 TRU Waste Treatment Facility and Equipment

• Office of Environmental Restoration Projects

- 28-E1 Assessment Test Area North
- 30-E1 Assessment Test Reactor Area
- 40-E1 Buried Waste Program.

Table III-1 shows project totals by ADS. Table III-2 provides information pertaining to the values reviewed for the ICR report. Details for the ICR analysis are found in appendix A.

TABLE III-1.—Project Totals by ADS

ADS#/TDD#	DESCRIPTION	ADS TPC (\$000)	SITE EST. (\$000)
14-E1	Treatment Evaluation and Demonstration	N/A	^a
14-E2	Alpha LLW Treatment Facilities and Equipment	N/A	324,259
14-E3	TRU Waste Treatment Facility and Equipment	N/A	289,944
28-E1	Assessment Test Area North	70,168	82,998 ^b
30-E1	Assessment Test Reactor Area	9,951	9,951
40-E1	Buried Waste Program	227,055	318,914 ^c
^a Included in 14-E2 and 14-E3 for analysis purposes.			
^b The site estimate represents costs for tasks that extend beyond the ADS time frame.			
^c The site estimate represents additional costs not reflected in the current baseline summary.			

TABLE III-2. —ICR Analysis of Site Estimates

ADS#/ TDD#	TASK DESCRIPTION	SITE ESTIMATE (\$000)	ICR ANALYSIS (\$000)
14-E1	Amount Analyzed Contingency Not Analyzed TPC for the ADS Scope ¹	N/A	
14-E2	Amount Analyzed Contingency Not Analyzed ² TPC for the ADS Scope	223,580 70,238 15,441 324,259	283,027 70,757 15,144 369,225
14-E3	Amount Analyzed Contingency Not Analyzed TPC for the ADS Scope	213,332 62,805 13,807 289,944	293,098 73,275 13,807 380,180
28-E1	Amount Analyzed Contingency Not Analyzed TPC for the ADS Scope	68,663 5,212 9,123 82,998	29,966 2,275 9,123 41,364
30-E1	Amount Analyzed Contingency Not Analyzed TPC for the ADS Scope	5,353 390 4,208 9,951	5,404
40-E1	Amount Analyzed Contingency Not Analyzed TPC for the ADS Scope	253,237 16,261 49,416 318,914	299,956 19,261 49,416 368,633
¹ Included in 14-E2 and 14-E3 for analysis purposes			
² Management Reserve = 5%			

A detailed ICR report for each of these ADSs is provided in appendix A.

III.C MANAGEMENT

Introduction

This section presents the results of the Management and Technical subteam's interviews with Department of Energy (DOE) Idaho National Engineering Laboratory (INEL) and Management & Operating (M&O) contractor personnel and the subteam's review of more than 40 documents. The documents reviewed included:

- Federal Facility Agreement/Consent Order (FFA/CO)
- *INEL Cost Estimating Guide* (volumes I-III)
- Environmental Restoration (ER) and Waste Management (WM) *Implementing Program Management Plans (Implementing PMPs)*
- *Idaho Chemical Processing Plan (ICPP) Implementation Strategic Plan*
- ER and WM *Strategic Plans*
- Office of Program Execution (OPE) Mission and Vision statements
- *INEL Site Treatment Plan*
- *Technical Site Information (TSI) Five-Year Plan*
- *Baseline Development Guidance*
- *Capital Assets Management Plan Report.*

In addition, the subteam reviewed numerous procedures, reports, meeting minutes, memoranda, training materials, and other documents.

The subteam interviewed 24 DOE Idaho Operations Office (DOE-ID) personnel representing a cross-section of DOE and contractor management. Of those interviewed, 11 were from DOE-ID and 13 were from M&O contractors: EG&G, Westinghouse Idaho Nuclear Company (WINCO), M.K. Ferguson, and Rust Geotec. Those interviewed included the DOE-ID program managers for the Office of Waste Management (EM-30), Office of Environmental Restoration (EM-40), and Office of Facility Transition and Management (EM-60), other managers, engineers, and program analysts. A list of interviewees is provided in appendix C.

All 19 management Performance Objectives and Criteria (POCs) were applicable to EM-30, -40, and -60; 18 were met and 1 was partially met. Of the 16 POCs applicable to the Office of Technology Development (EM-50, OTD), 9 were met and 7 were partially met.

Observations, Discussion, and Recommendations

DOE-ID has made noteworthy progress since the Round I Cost Quality Management Assessment (CQMA). This progress includes:

- The *INEL Cost Estimating Guide* has been expanded to include EM-30 activities and updated to include greater project detail, recent initiatives, and additional historical cost data.
- The level of detail in the scope definitions in the *INEL Cost Estimating Guide*, ER and WM *Implementing PMPs*, and the *D&D [Decontamination & Decommissioning] Long-Range Plan* provides a sound foundation for the preparation of reasonable, credible cost and schedule estimates.
- A FFA/CO Cost Estimating Working Group (comprising DOE-ID, M&O contractor, and regulatory agency staff) has been established to assist in defining and recognizing the impacts of ER costs.
- The *EM [Environmental Management] Program Cost Reduction Plan* has been prepared. The plan represents efforts to define cost-reduction actions and to implement the actions in an integrated manner throughout EM.
- The *Site Treatment Plan* identifies and evaluates treatment options for wastes generated throughout INEL.

Overall, DOE-ID and M&O contractor personnel demonstrate a cost-conscious culture and strive to fulfill the cost quality management tenets represented in the POCs. The Track 1 and Track 2 assessment process represents significant advancement in defining data quality objectives and needs in a way that enhances cost and schedule control.

EM's ADS [Activity Data Sheet] Prioritization effort is a noteworthy attempt to rank EM-30, EM-40, and EM-60 activities.

However, the relationships of each program and their projects are not considered in an integrated manner.

We suggest that DOE-ID, in conjunction with DOE-Headquarters (HQ) program offices, develop procedures, processes, and systems that would identify and resolve the cascade effect of changes in the various EM activities.

Contingency is managed at the programmatic level in EM-40, and EM-30 management reserve is tracked through the change control process.

- Maintaining and analyzing contingency/management reserve at this level makes it difficult to assess activity and technology risks at the project/task level and to analyze and develop estimates for contingency.

We recommend that DOE-ID develop, to the extent practical, procedures and methods to analyze risk and develop contingency estimates at the appropriate level.

- Many guidance and procedures documents have been prepared to assist in managing and conducting EM activities. Some of these documents have fulfilled their functions and made notable contributions to the conduct of EM activities. However, some have not contributed as much as was expected; others merely duplicate documents prepared for other programs.

We recommend that DOE-ID, should it be determined that expected benefits outweigh potential costs, review documents and, on a case-by-case basis, determine if a document should be revised to improve it, be combined with one or more other documents, or be eliminated.

III.C.1 Cost-Conscious Culture

A cost-conscious culture considers the cost-estimating process, budgetary constraints, technical scope, cost objectives, cost cutting initiatives, and the interaction and communication between DOE and M&O/National Laboratory/other DOE contractor in all phases of program/project management.

III.C.1.1 Defining and Managing the Scope of Work

POC C.1.1

DOE has developed, prepared, and provided a clear, concise, and complete scope of work to the M&O/National Laboratory/other DOE contractor.

The scope of work is further defined by the contracting organization in order to prepare cost estimates and schedules to be negotiated with DOE. The detailed scope, cost estimate, and schedule (initial baseline) are well defined, understood, and agreed upon by all involved parties.

DOE Order 4700.1, Change 1; DOE Order 5700.2D

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.1) was *partially met* for EM-30 and EM-40 activities.

WM programmatic requirements were adequately defined in the *Waste Management Program Management Plan* and associated documents. DOE-ID and its contractors used the *Waste Management Program Management Plan* to define and develop associated costs for specific operating tasks.

Because the WM scope definition system was relatively new and was evolving, the Round I CQMA report recommended that:

- DOE-ID continue to monitor the system and its implementation to ensure that the system incorporated an appropriate level of detail, thoroughness, and cost effectiveness
- DOE-ID continue to develop the skills of its staff in defining scope and in reviewing contractor-developed requirements
- DOE/ID and its contractors develop specific guidance, similar to the *ER Cost Estimating Handbook*, to assist in defining task-specific WM requirements.

For ER activities, work scopes, tasks, and milestones were clearly defined in the FFA/CO, contractor *Implementation Program/Project Management Plans*, and other documents.

The INEL *Action Plan* called for an evaluation of the DOE-ID Work Authorization and Control System (WACS) policy and procedure, particularly regarding the standard forms used and the information requirements imposed on DOE-ID program managers. On the basis of the evaluation, and required changes to WACS would be developed. The *Action Plan* also called for the development of DOE-ID procedure(s) for written guidance including minimum definition requirements for technical work, documentation detail, risk assessment, and lessons learned.

The Round I CQMA report recommended that:

- DOE/ID and the contractors develop additional written guidance defining specific questions to be raised and issues that would affect technical quality and cost
- EG&G continue with its plans to develop a historical record for and continue to update the *Cost Estimating Handbook*.

The INEL *Action Plan* called for an evaluation of the DOE-ID Work Authorization and Control System (WACS) policy and procedure, particularly regarding the standard forms used and the information requirements imposed on DOE-ID program managers. On the basis of the evaluation, and required changes to WACS would be developed. The *Action Plan* also called for the development of DOE-ID procedure(s) for written guidance including minimum definition requirements for technical work, documentation detail, risk assessment, and lessons learned.

- * The corresponding POC (III.C.1.1) was *not met* for EM-50 activities.

DOE-HQ EM-50 did not develop, prepare, or provide a clear concise, or complete scope of work to the contracting organization. As a result, INEL (and other sites) did not meet this standard.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

DOE has communicated EM-30, EM-40, and EM-60 scopes of work to the M&Os through various documents/correspondence/communications. Documents that present DOE's work requirements include:

- FFA/CO
- OPE mission and vision statements
- *EM Strategic Plan*
- *ER Program Major System Acquisition Project Plan*
- *ER Management Action Plan*
- *Waste Management Program Strategic Plan*
- *Life Cycle Planning Criteria for ER*
- *ER Planning and Integration Unit Business Plan*
- *Technical Site Information Five-Year Plan*
- *Capital Assets Management Plan Report*
- *Baseline Development Guidance*
- *INEL Site Treatment Plan.*

DOE's support needs are communicated in further detail and reinforced via correspondence and other written and verbal communication between DOE-ID staff and the M&Os. In addition to the frequent (at times, daily) contact (to address cost account and work package [WP] issues) between DOE-ID staff and their M&O counterparts, DOE defines scope in documents including:

- Baseline, WP, and cost account reviews and approvals
- Life-cycle planning review and approval forms
- Life-cycle cost (LCC) estimate review and approval forms
- INEL Cleanup Program presentation materials
- *Management Systems Development Initiative Action Plan*
- Miscellaneous project correspondence.

The M&Os further define the scope of EM-30, EM-40, and EM-60 efforts based upon the scopes of work defined by DOE-ID. The signatures of M&O personnel in the space provided on review and approval forms are acknowledgments of receipt. The M&Os' understanding of work scopes, cost estimates, and schedules is demonstrated in various documents, including:

- EM-30, EM-40, and EM-60 program baseline documents (which present requirements and cost and schedule estimates broken down to at least the cost account level)
- *Contractor Implementing PMPs*
- *Prior Planning—Call for Landlord Construction Projects*
- *ER Track 2 and Remedial Design/Remedial Action (RD/RA) guidance documents.*

The DOE-ID and M&O documents noted above generally accomplish their intended objectives. However, it should be noted that many of the documents listed were issued in the few months preceding the Round II CQMA.

We suggest, therefore, that all documents be periodically reviewed to ensure that they reflect EM's current requirements/initiatives and that the use of these materials by DOE-ID and M&O staff be monitored to maintain and enhance performance.

- * *The POC is met for EM-50 activities.*

DOE provides basic guidance on developing the work scope through the *Five-Year Plan* and in the *OWT Cost Account Preparation Guidance*. EG&G provides guidance on developing the work scope in the draft *OWTDP Program Management Plan* and in program guidance documents.

Based on *EM-50 OTD Program Guidance*, M&O contractors (EG&G and WINCO) expand and refine approved scopes of work. According to both DOE-ID and M&O personnel, OTD at DOE-HR (EM-50) occasionally initiates work scopes and adds or deletes tasks from work scopes proposed by M&O contractors.

Work scopes are typically 4–7 pages. Each is normally budgeted for less than \$1 million and typically has a budget of \$200,000–\$300,000. Each work scope contains the following sections:

- Purpose
- Background
- Approach
- Technical Progress
- Future Accomplishments
- Relationships to Other Projects
- Environmental Assessments
- Funding Basis
- Benefits
- Expected Performance
- Technology Transfer
- Facility Requirements
- Publications
- Key Issues
- Related Baseline Documents
- Description of Deliverables.

III.C.1.2 Cost and Schedule Objectives

The DOE program/project/task manager is responsible for developing cost and schedule objectives. These objectives (as well as technical objectives) are expressed and documented as part of the justification of need for each element of the program/project/task.

Cost objectives define the program/project/task elements for which estimates are to be prepared and against which expenditures are measured. Schedule objectives are a statement of the projected schedule by key-milestones-only and include a brief description of the impact, if any, on the project if the milestones are not met.

POC C.1.2

DOE has clearly defined and conveyed cost and schedule objectives to be met by the M&O/National Laboratory/other DOE contractors.

DOE Order 4700.5; DOE Order 4700.1, Change 1; DOE Order 5700.2D

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.2) was *met* for EM-30 and EM-40 activities.

DOE-ID clearly and specifically defined and conveyed its cost and schedule objectives for WM and ER activities. The objectives were communicated in the FFA/CO, PMPs, and WPs.

- * The corresponding POC (III.C.1.2) was *not met* for EM-50 activities.

DOE did not clearly define cost/schedule objectives to be met by the contractor. Contractors submitted scopes of work to be approved by DOE.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Cost and schedule objectives are defined and conveyed by DOE-ID at both the programmatic and project-specific level. Examples (documents and processes) of cost and schedule definition at the programmatic level include:

- ER "Life Cycle Planning Criteria"
- FFA/CO Cost Estimate Working Group findings and charter
- *Site Treatment Plan* (e.g., evaluation of various options including consideration of cost and schedule impacts)
- OPE Program and Business Management Integration Process
- EM Programs *Cost Reduction Plan*
- M&O Cost Reduction Improvement Program
- ER *Planning and Integration Unit Business Plan*
- Management Board meeting minutes and charter.

The DOE-ID and M&O documents that facilitate and demonstrate the definition and communication of cost and schedule objectives at the project-specific level include:

- ER and WM *Implementing PMPs*
- *INEL Cost Estimating Guide* (three volumes)
- Baseline Development Guidance (incorporates elements of the PMPs and *INEL Cost Estimating Guide*)

- INEL *D&D Long-range Plan*
- ADS documentation packages
- Track 2 and RD/RA Guidance
- Project control documents (e.g., schedules, milestone description, and log)
- Preparation and Maintenance of Cost Account Plans
- Program Management Directives addressing schedules, milestone description, and log; preparation and maintenance of cost account plans; and project cost estimating among other topics.

In addition, sample performance evaluations reviewed by the subteam demonstrate that the definition of, and performance against, cost and schedule objectives are provided at an individual level.

* *The POC is met for EM-50 activities.*

Cost and schedule objectives are communicated by EM-50 to the Field through the draft and final versions of Program Execution Guidance. Upon receipt of the draft PEG in August, the contractor has 30 days to prepare and submit detailed WPs for each technical task plan (TTP). The final PEG is issued by EM-50 in early October.

EM-50 defines cost objectives to DOE-ID through the FINPLAN.

At the beginning of each fiscal year, DOE-ID issues an Approved Funding Plan containing cost and schedule objectives. Contractor management and financial representatives sign/acknowledge the Approved Funding Plans.

Occasionally, EM-50 funding may not correspond to TTP cost proposals; funding may be higher or lower, depending on the availability of funds and technical priorities. Funding levels are communicated each month through the FINPLAN.

III.C.1.3 Cost-Cutting Initiatives

POC C.1.3

DOE encourages cost-cutting initiatives by all contractors. DOE provides incentives for positive cost performance through effective contract management.

DOE Order 4010.1; DOE Order 4700.5; DOE Order 4700.1, Change 1; DOE Order 5700.2D

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.2) was *partially met* for EM-30 and EM-40 activities.

DOE-ID has provided incentives, and further communicated the need, for cost-effective performance through contractor award fee evaluation criteria and performance objectives.

The Round I report recommended that DOE-ID reinforce the need for cost effectiveness through additional communications (e.g., item- or task-specific directives), further definition of evaluation criteria requirements, and continued and stringent monitoring of contractor performance against evaluation criteria.

- * The corresponding POC (III.C.1.2) was *not met* for EM-50 activities.

DOE did not encourage cost-cutting incentives or provide performance incentives.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Contractor cost-cutting initiatives are encouraged and directed by DOE-ID for all programs. One of the principal means to encourage cost-cutting initiatives is the use of award fee performance criteria to assess each contractor's performance in identifying and incorporating cost-cutting initiatives. The documents and processes that encourage and identify effectiveness in scope definition and project performance include:

- Activities of the FFA/CO Cost Estimate Working Group
- ER and WM *Implementing PMPs*
- *Site Treatment Plan*
- Cost Reduction Improvement and Quality Improvement Programs (which provide rewards to individuals who identify cost-reduction opportunities)
- OPE mission and vision statements
- ER Management Systems Development Initiative
- EM and WM *Strategic Plans*
- INEL D&D *Long-range Plan*
- INEL ER Program MSA *Project Plan*
- ADS/baseline development process (including specific identification of productivity savings)

- *EM Cost Reduction Plan*
- Actions of the EM Management Board.

III.C.1.4 DOE Approval of Cost Estimates, Funding Authorization

POC C.1.4

Responsibility for review and approval of official cost estimates for budgetary; program/project authorization; contract solicitation, award, and modification; and other programmatic purposes is clearly defined by organization and by title. Signature authority for program/project and/or contract expenditure is clearly defined at all organizational levels.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.F.5) was *partially met* for EM-30 and EM-40 activities.

Both DOE-ID and its contractor defined responsibilities for review and approval of cost estimates. Practice follows the requirements defined in procedures and guidelines.

The DOE-ID WM and ER PMPs defined the responsibilities for review and approval of estimates. The contractor Implementing PMPs further refines and implements the requirements.

The Round I CQMA report recommended that program-specific estimate review and approval procedures be developed and implemented and that the procedures incorporate independent validation of the work scope and cost basis.

In its *Action Plan*, INEL stated that it would develop DOE-ID cost- and schedule-estimating, budgeting, and progress reporting policies and procedures.

- * The corresponding POC (III.E.4) was *not applicable* to EM-50 activities.

Responsibility for reviewing and authorizing the programs resided at DOE-HQ EM-50; therefore, this POC is not applicable to DOE-ID EM-50 activities.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Responsibility for the review and approval of cost estimates and funding authorization is defined both broadly and specifically. Documents and procedures that demonstrate this responsibility from a broad perspective include:

- DOE-ID Project Management System Supplementing Order
- Program Directives
- Baseline development and change control guidance.

The documents and procedures noted above contain various checklists and forms that define specific review and approval responsibilities. These checklists and forms include:

- Life-cycle plan review
- LCC estimate review
- Baseline review and approval
- Baseline Change Proposal review
- EM Planning Budget and Control.

These checklists and forms require the signature of the designated contractor representative. DOE-ID staff said they use the *INEL Cost Estimating Guide* and other guidance documents developed by the contractors to assist in the review of cost estimates and the subsequent approval of funding authorizations. Various features of the *INEL Cost Estimating Guide* enhance DOE-ID's use of these guides to review cost estimates including incorporation of historical cost data and the use of peer/independent reviews in the development of cost estimates/budget requests.

III.C.1.5 Assignment of Cost and Schedule Baseline Responsibility Within DOE

POC C.1.5

Cost and schedule baseline responsibility for each program and all projects within a program is assigned to DOE EM program/project managers at an appropriate level in the organization. Authorities are delegated commensurate with the level of responsibility assigned. The limits of authority of DOE project managers to provide day-to-day direction and changes of contract work scope also are defined.

DOE Order 4700.1, Change 1, DOE Notice 4700.4, SEN-27-90

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.3) was *partially met* for EM-30 and EM-40 activities.

Cost and schedule responsibilities for both WM and ER programs and projects were assigned at appropriate levels within the DOE-ID organization.

As the ER program and the use of task-specific management for WM facilities operations were relatively new at INEL, the Round I CQMA report recommended that DOE-ID continue to develop the tools (e.g., handbooks, directives, and guidance) to facilitate DOE-ID management of contractor activities.

The INEL *Action Plan* stated that INEL would develop cost- and schedule-estimating procedures as recommended by the CQMA Team.

* The corresponding POC (III.C.3) was *met* for EM-50 activities.

Cost and schedule reporting and monitoring responsibility for each TTP was assigned to a DOE-ID employee who was responsible for passing on direction and information from DOE/HQ EM-50 and ensuring that it was acted upon.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Cost and schedule baseline responsibilities at DOE-ID are assigned to program/project managers at appropriate organization levels and with appropriate levels of authority. The basis for assigning responsibilities begins with the DOE-ID supplement to DOE Order 4700.1 (e.g., the section titled "Responsibilities and Authorities" refers to ID Order 1120.A1 and sets forth general assignments of responsibility). DOE-ID Program Directives, the *Management Systems Development Initiative Action Plan*, and change control procedures also establish baseline roles and responsibilities.

The checklists and forms identified in the discussion of the preceding POC identify the appropriate levels of responsibility and authority.

The subteam understands that a reorganization is underway.

We suggest, therefore, that the responsibilities and authorities defined be reexamined to ensure that they remain appropriate to program/project requirements.

* *The POC is partially met for EM-50 activities.*

The DOE-ID technical program manager (TPM) responsible for EM-50 programs at the site assigns program/project managers to each TTP. The program/project managers typically have degrees in science and engineering and have 3-20 years of professional experience. Each manager normally manages several TTPs. Managers' authority for technical and schedule issues is limited by established baseline change control standards.

Program/project managers have no real authority on funding issues; EM-50 retains all funding authority.

We recommend that EM-50 empower DOE-ID program/project managers with an appropriate level of funding authority.

III.C.1.6 M&O/National Laboratory/Other DOE Contractors Baseline Responsibility and Authority

POC C.1.6

The baseline responsibilities and limits of the independent authorities of M&O/National Laboratory/other DOE contractors are well defined and adhered to.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.4) was *partially met* for EM-30 and EM-40 activities.

Technical, cost, and schedule responsibility for WM and ER activities resided with DOE-ID. As exemplified in the WPs and related documentation and in the DOE-ID *Managing for Safety and Quality Manual*, DOE-ID personnel participate in scope, cost, and schedule reviews and determinations. Through a then relatively new (i.e., less than 1 year) procedures and directives for implementing the WP process, DOE-ID clearly defined the responsibilities, limits of authority, points of contact, and chain-of-command for its WM and ER contractors.

Because the procedures and directives were new, the Round I CQMA report recommended that DOE-ID and contractor management continue to evaluate the performance of these systems and implement any necessary adjustments to ensure continued effectiveness.

The INEL *Action Plan* stated that INEL would develop cost- and schedule-estimating procedures as recommended by the CQMA Team.

- * The corresponding POC (III.C.1.6) was *partially* for EM-50 activities.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The baseline responsibilities and authorities of the contractors are well defined and followed. The basis for this determination is the subteam's examination of the responsibilities and authorities defined in the following:

- Contractor Program Directives (particularly those addressing project control)
- Baseline Development Guidance
- Baseline Change Control procedures
- Contractor's Project Management Systems training and guidance
- ER and WM *Implementing PMPs*.

The forms used indicate appropriate levels of responsibility and authority.

- * *The POC is met for EM-50 activities.*

The following documents define the baseline responsibilities and limits of the M&O contractors:

- EM-50 program formulation and execution Standard Operating Procedures
 - "Preparing Program Baselines" (EM-50-2.1.1)
 - "Developing and Issuing Program Execution Guidance" (EM-50-2.2.1)
 - "Managing Baseline Change Control" (EM-50-2.2.2)
 - "Funds Management and Change Control" (EM-50-2.2.3)
- EG&G PMP draft)

- *EG&G Program Guidance*
- *OWT FY [Fiscal Year] 1994 Cost Account Preparation Guidance.*

EG&G and WINCO TPMs are responsible for baseline management.

III.C.1.7 Interaction and Communication Between DOE and M&O/National Laboratory/ Other DOE Contractor Project Management

POC C.1.7

Interactions between DOE and M&O/National Laboratory/other DOE contractor management personnel are defined, promulgated, and practiced. DOE's chain of command and points of contact for M&O/National Laboratory/ other DOE contractor counterparts are well-defined. This includes the limits of authority of DOE individuals to provide day-to-day direction and changes of contract scope of work.

DOE management and program/project/task managers participate in reviews to ensure that project planning is complete and adequate. They also ensure that costs and schedules are commensurate with the defined scope of work, baselines are maintained, and all inconsistencies are documented.

There is routine communication between DOE and M&O/National Laboratory/other DOE contractors.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.4) was *met* for EM-30 and EM-40 activities.

Interactions between DOE-ID and contractor WM and ER personnel were clearly defined and documented. Progress meetings followed established weekly and biweekly schedules. DOE-ID staff communicate routinely and frequently with State and Environmental Protection Agency personnel to ensure the timely and effective progression of ER activities and the FFA/CO's "bias for action."

- * The corresponding POC (III.C.1.4) was *partially met* for EM-50 activities.

EG&G had documented its guidelines regarding contractor/DOE communications; WINCO's documentation was in draft.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

DOE-ID and M&O contractor program/project managers stated that they have almost daily discussions on specific aspects of their projects and conduct weekly meetings to review progress

(including technical activities, cost and schedule conformance, and corrective actions to resolve potential or current problems/issues) on their programs/projects. Documentation that supports the interviewee's statements include EM-30, EM-40, and EM-60 monthly progress reports and weekly Project Control System (PCS) financial reports. The progress of EM-30, EM-40, and EM-60 construction/line item projects is reviewed on a daily basis as a part of general requirements for these activities.

* *The POC is met for EM-50 activities.*

Each TTP WP specifies formal contractor reporting requirements. These requirements typically include:

- Weekly status reports
- Monthly status reports
- Mid-year review presentations (More than 40 people participated in the last Buried Waste Integrated Demonstration (BWID) Program mid-year review meeting including representatives from EM-50 and EM-40 customers.)
- Annual/close-out reports
- Special reports associated with technical milestones.

Both DOE and contractor personnel stress that telephone communications and personal meetings are frequent and effective.

Formal change control thresholds limit the authority of DOE-ID managers to provide day-to-day direction to the contractors.

III.C.1.8 Role of M&O/National Laboratory/Other DOE Contractor in Cost and Schedule Estimating

POC C.1.8

Management, engineering, waste operations, and other functional organizations use cost and schedule implications as principal factors in making design, engineering, and business decisions.

The estimating community is continuously involved in all projects from the conceptual phase through project completion. The estimating community performs trade-off study analyses, cost-effectiveness analyses, and cost and schedule risk analyses.

Assessment reports are provided to management on a periodic basis and have sufficient visibility and analyses to help management make cost-effective decisions.

DOE Order 5700.2D; DOE/MA-0063, Vol. 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.5) was *partially met* for EM-30 and EM-40 activities.

With respect to WM GPP activities, DOE/ID and contractor personnel followed well-established procedures that incorporated cost and schedule considerations in making design, engineering, and business decisions. For WM operational activities, regulatory, cost, and schedule considerations were the principal factors in the decision-making process. The framework for all ER decisions is the FFA/CO, within which, decisions subsequently incorporate cost and schedule considerations.

With the exception of WM GPPs, the EG&G and WINCO CEGs had not actively participated in WM and ER projects. EG&G's CEG participated in the development of the ER *Cost Estimating Handbook*.

The Round I CQMA report recommended that the rigor of DOE Order 5700.2C embodied in the *INEL Cost Estimating Guide* be incorporated into the WP development and review process and that DOE-ID and its ER and WM contractors develop systems to independently review (on a sample of WPs) the scope and resource requirements developed as part of the WP preparation process.

Monthly assessment reports for both the WM and ER programs were submitted to DOE-ID by the contractors. The routine weekly and biweekly meetings conducted by the WM and ER programs provided the mechanism by which issues were identified and addressed.

Because the monthly reports and the monthly reporting program was a relatively new system, the Round CQMA report recommended that DOE-ID continue to monitor the utility the reports as a management tool and take any actions necessary to ensure long-term, effective use.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

- * The corresponding POC (III.C.1.5) was *partially met* for EM-50 activities.

All of the applicable functions called out in this POC were performed by the principal investigators (PIs). However, there was no documentation.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Cost estimates (down to at least the cost-account level) for EM-30, EM-40, and EM-60 non-General Plant Project/nonconstruction projects are initially prepared by program/project managers using the *INEL Cost Estimating Guide*. The cost information provided in the *Guide* is based on historical data as well as published cost-estimating handbooks (e.g., Means). An important feature of the *Guide* is its recognition that cost estimates should undergo a peer review by technical and cost-estimating staff (i.e., CEG) experienced in the particular technical requirement. The cost estimates also are subject to management review by the M&O and DOE-ID. In addition, estimates and proposed budgets are subject to review and "scrubbing" by the Management Board. Estimate preparation and review is documented in the support materials and checklists/forms provided in:

- Cost estimate support data recapitulation
- WP and baseline preparation and review documentation packages
- LCC estimate reviews
- Baseline change proposals.

Cost estimate reasonableness and credibility are a function of scope definition (particularly for the non-construction projects); therefore, the level of scope definition detail incorporated in the INEL EM-30 and EM-40 *Implementing PMPs* and the *D&D Long-range Plan* helps in the preparation of credible estimates and should be recognized as a notable practice. The scopes defined in these plans demonstrate an understanding and recognition of project requirements down to the sixth work breakdown structure (WBS) level.

Some RD/RA cost and schedule estimates were prepared by M&O local technical support staff while the remaining RD/RA cost estimates were prepared by cost estimators located at the contractor's headquarters office. The estimates prepared by the local staff were reviewed for reasonableness and completeness by the cost estimators at the contractor's headquarters office. The *INEL Cost Estimating Guide* and the *ER Implementing PMP* provide substantial scope definition detail, which, in conjunction with the M&O's technical expertise, facilitates the development of sound cost and schedule estimates.

Cost estimates for GPPs are prepared using "typical" DOE procedures (e.g., estimates prepared and reviewed by estimators and engineering personnel in accordance with well-established procedures).

EM-30, -40, and -60 cost and schedule estimates are considered in design, engineering, and business decisions. Documents, check lists, and procedures that support this observation include:

- *Site Treatment Plan*
- *EM and WM Strategic Plans*
- *Life Cycle Plan* and Cost Estimate Reviews
- DOE-ID and M&O project and budget review and approval processes
- Baseline change control procedures
- Management Board reviews
- DOE-ID *Life Cycle Planning Criteria for ER*

- Comprehensive Environmental Response, Compensation and Liability Act Record of Decision process.

DOE-ID and M&O interviewees confirmed that cost and schedule estimates are considered in the decision-making process.

* *The POC is partially met for EM-50 activities.*

The M&O contractors' PIs prepare cost and schedule estimates based, primarily, on their technical knowledge and professional experience.

PIs, however, have little formal training or available guidance on cost and schedule estimating. PIs rarely use the M&O CEG because the group lacks experience and expertise in Research & Development (R&D) cost issues.

We recommend that all PIs be required to take formal training in cost and schedule estimating. The training programs should be tailored to the unique needs associated with TTP planning and management.

Cost and schedule estimates are reviewed by senior-level program managers, TPMs, and product managers (responsible for one of five major development areas). In addition, DOE-ID project managers and EM-50 management review cost and schedule estimates prepared by the PIs.

In the FY 1995 PEG, Clyde Frank announced that he will require LCC estimates to be prepared for all new technologies developed by EM-50. The costs will be compared to the LCC of comparable conventional technologies. These cost estimates and analyses will be conducted by the M&O contractors.

We recommend that at least one professional cost estimator be hired and trained in TTP cost and schedule estimating. The individual should be a Federal employee or should be hired under the Ecology and Environment support contract to DOE-ID. The cost estimator(s) should be accessible to DOE program/project managers to review cost and schedule estimates associated with TTPs, change control proposals, and LCC estimates.

III.C.1.9 Oversight of Subcontractors

M&O/National Laboratory/other DOE contractor issues subcontracts to qualified contractor organizations to obtain additional support of the defined scope of work.

POC C.1.9

Subcontractors are provided with and adhere to all of the cost- and schedule-management guidance developed by DOE and the M&O/National Laboratory/other DOE contractor, or they independently demonstrate a cost-conscious culture.

The M&O/National Laboratory/other DOE contractor assumes responsibility for awarding subcontracts to candidates that demonstrate cost-conscious principles.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.2.6) was *partially met* for EM-30 and EM-40 activities.

Subcontractors were required to adhere to the cost and schedule management guidance of each M&O contractor and to support the management and reporting systems used by each M&O contractor to monitor program performance. EG&G ER staff developed subcontract agreements for analytical support that incorporated penalties for schedule delays and technical inadequacies.

The Round I CQMA report recommended that WM and ER contractors continue to develop specific guidance and subcontract articles that unequivocally define cost-effectiveness requirements. In addition, the scopes developed for subcontractors should continue to be reviewed by technical and program management staff to ensure that there is no opportunity for misunderstanding that could lead to delays and subsequent cost increases.

The INEL *Action Plan* stated that INEL would develop cost- and schedule-estimating procedures as recommended by the CQMA Team.

- * The corresponding POC (III.C.1.6) was *met* for EM-50 activities.

The responsibility for monitoring subcontracts rested with the PI, who was assisted by the M&O's financial office. Given the position of the PI, this is appropriate.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

M&O contractor representatives confirmed that subcontractors are required to conform with the cost- and schedule-management guidance under which the M&Os operate. To ensure adherence, specific contract terms addressing cost and schedule reporting and performance are incorporated in subcontract agreements. Subcontracts to support the EM-30, EM-40, and EM-60 programs and projects are awarded using competitive procurements. To the extent practical, subcontracts are awarded on a firm-fixed-price basis (particularly for EM-30, EM-40, and EM-60 construction and line-item activities). Major subcontractor activities focus on construction projects, RAs, and ER assessment projects.

Within the EM-40 assessment program, the M&Os have awarded a series of competitively bid basic ordering agreement (BOA) subcontracts covering a variety of support services. As requirements are defined, the BOA subcontractors are generally requested to submit their proposed costs for the required services. The use of BOAs in this manner:

- Reduces the costs associated with repeatedly soliciting support services

- Tends to lower overall costs because the subcontractors can anticipate a larger overall commitment
- Encourages subcontractors to demonstrate cost and schedule control or risk being eliminated from consideration for further work
- Maintains lower costs through the use of "mini-competitions" (i.e., the subcontractors must continue to maintain a competitive edge).

As an example, well-drilling and installation services are provided through a series of BOAs. Cost are controlled because the drilling subcontractors do not have to attempt to recoup certain fixed expenses (e.g., medical monitoring and mobilization) on one project. In addition, the drilling subcontractors have an incentive to reduce unit costs in anticipation of a longer-term subcontract relationship.

Section 5 of the *INEL ER Program MSA Project Plan* (particularly applicable to RAs) provides a further demonstration of the intent to procure the services of subcontractors that demonstrate cost-conscious principles. This section describes the goals of the EM-40 program acquisition strategy including encouraging the issuance of fixed-price contracts, enhancing technology exchange, and improving EM-40 program-management control.

* *The POC is met for EM-50 activities.*

EG&G representatives estimate that roughly 50% of their budgets are subcontracted out or distributed through grants. Each subcontract is linked to a specific TTP. The PI is responsible for managing and overseeing subcontractors.

The M&Os select subcontractors using competitive procurements. A technical panel formally evaluates and ranks proposals against established criteria. These criteria normally include technical capability, management (including cost management) expertise, and proposed cost. A procurement officer selects the subcontractor—usually based on the results of the technical panel's evaluation. The M&Os typically award firm-fixed-price subcontracts especially when clear and well-defined scopes of work can be established. Fixed-labor-rate subcontracts also are used. Two of the PIs interviewed expressed concern that the procurement office sometimes takes up to a year to award subcontracts.

The subcontracts require subcontractors to submit monthly reports; other deliverable requirements also are specified. PIs indicated that they conduct telephone conversations with their subcontractors at least one each week and arrange for face-to-face meetings two or more times each year.

Universities receive either grants or subcontracts. They typically are selected on a sole-source basis because of the specific, unique capabilities and expertise they can bring to certain TTPs. Normally, reporting requirements are less stringent for universities than for other organizations.

III.C.2 Organizational Structure

POC C.2

The organizational structure provides clearly defined functional relationships and interfaces between the line organizations and the estimating group. Cost estimates are prepared or coordinated by the professional cost- and schedule-estimating community to ensure accurate, current, and complete estimates.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.3) was *partially met* for EM-30 and EM-40 activities.

EG&G, WINCO, and M.K. Ferguson of Idaho Company (MK-FIC) have CEGs that prepare cost estimates for capital projects. The WM and ER programs at each contractor prepare the estimates for the ER and WM programs. A sample of the EG&G WM program estimates was reviewed by the EG&G CEG. The WINCO ER program estimates for FY 1992-1998 were independently reviewed by Bechtel. The EG&G ER program did not have estimates reviewed by the EG&G CEG.

DOE/ID WM and ER programs did not prepare estimates and did not have dedicated CEGs. DOE-ID ER had a support contractor (UNC-Geotech) available that had estimate review expertise. However, the CQMA Team did not receive any documentation demonstrating that estimates have been reviewed by this support contractor.

The Round I CQMA report recommended that the EG&G WM and ER and WINCO WM programs incorporate an independent estimate using professional cost estimators.

INEL, in its *Action Plan*, stated that it would determine the need and cost/benefit of adding cost-estimating professionals. Assuming a need could be determined and that benefits outweighed costs, INEL intended to: develop staffing requirements and a development plan for cost-estimating professionals; develop formal, written responsibilities, roles, and charter for cost estimators; and make estimating skills available by hiring or development of its cost-estimating staff.

* The corresponding POC (III.C.2) was *met* for EM-50 activities.

Cost estimates at INEL were prepared by the most knowledgeable person (the one with the most previous experience), typically the PI, and supporting expert staff. The estimates were based on historical data, engineering judgment, and vendor quotations.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The M&Os organizational structure and procedures (e.g., the project details provided in the *Implementing PMPs* and the cost-estimate review and approval processes provided in the *Cost Estimating Guide* and Program Directives) provide clearly defined cost-estimating interfaces. While the structure and procedures for non-construction efforts do not necessarily incorporate a separate estimating group, the assorted management, technical, and peer (including the central CEG) reviews and approvals are defined. The guidance and coordination provided by the FFA/CO Cost Estimate Working Group also help ensure the preparation of accurate, current, and complete estimates. The structure, points of coordination, and interfaces associated with the preparation of cost estimates for construction/GPP projects follows well-established procedures. These procedures are defined in the project/program documents associated with these efforts (e.g., value engineering, MSA requirements)

* *The POC is partially met for EM-50 activities.*

Each M&O has established clearly defined functional relationships between the program groups and the CEGs.

- The CQMA team had difficulty finding current organization charts, perhaps because both DOE-ID and the M&Os have reorganized over the past 2 years. Some interviewees were not aware that there are current organization charts.

We recommend that current organization charts be distributed.

- Program groups seldom use the CEGs. Normally, the program groups develop and review their own cost estimates.

We recommend that DOE-ID provide for at least one professional cost estimator to support reviews of TTP cost estimates and change control proposals. This individual should be located within the Ecology and Environment office.

III.C.3 Cost- and Schedule-Management Controls

Under DOE Order 2250.1D, Cost and Schedule Control Systems Criteria were used to evaluate management systems on selected contracts, primarily Major Systems Acquisitions and Major Projects. DOE replaced DOE Order 2250.1D with the DOE Notice 4700.5, PCS Guidelines, which provides more comprehensive guidelines and requires application of these guidelines to all construction and environmental projects (not just Major Systems Acquisitions and Major Projects). This assures:

- Accountable project managers are responsible for appropriate application of project controls.
- Control is maintained because greater emphasis is placed on control of technical, schedule, and cost baselines and baseline changes.
- Project controls are applied to all projects.

- Project controls are applied according to the needs of the specific project commensurate with technical, schedule, and cost risks.

Cost and schedule controls vary from general baselining and tracking to fully implemented PCS guidelines.

DOE Order 1332.1A, Uniform Reporting System, provides guidance on DOE reporting requirements and the use of cost and schedule reports for analyzing contract performance status.

III.C.3.1 Cost and Schedule Controls

POC C.3.1

Appropriate cost- and schedule-control measures are selected for each program/project/task based on the magnitude of cost, level of risk, level of national or DOE interest, and (in some cases) phase of design. DOE Operations Office, DOE Headquarters, and contractor responsibility for cost and schedule controls are clearly assigned and documented. Cost and schedule controls for all programs/projects/tasks are fully implemented.

DOE Order 4700.1, Change 1; DOE Order 5700.2D; DOE Notice 4700.5

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.4.1) was *met* for EM-30 and EM-40 activities.

The EG&G, WINCO, and MK-FIC WM and ER program cost and schedule control systems and monthly reporting systems were fully implemented.

The Round I CQMA Team noted that DOE was implementing new PCS guidelines for managing and controlling DOE projects. The new guidelines were to replace the Cost/Schedule Control System Criteria for reporting cost and schedule performance in major contracts. Draft policy had been issued for comment, and implementation guidance was being developed.

- * The corresponding POC (III.C.3.1) was *met* for EM-50 activities.

The TTPs submitted to DOE-HQ EM-50 represent baselines from which tasks are managed. DOE-ID has assigned staff to specific TTPs.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

M&O cost account managers prepare detailed cost and schedule estimates for EM-30, EM-40, and EM-60 activities. These estimates, which address work scope at the sixth WBS level or lower, are (as described in preceding POC discussions) subject to management, technical, and peer review and approval. These detailed estimates are aggregated to develop the baselines. DOE-ID assigns project managers for each major activity (e.g., Waste Area Group, task

descriptive document, WP) based upon the complexity and risks associated with the activity. The project managers work with the M&O cost account/project managers to oversee work performance.

The primary project-management tools are the monthly progress reports and the quarterly review packages. However, reflecting the need to manage the projects at a more detailed level than is possible using these progress reports, contractor staff use cost account and WP financial information, provided on a weekly basis, as their day-to-day management tools. This information, which is updated weekly, provides a variety of financial details including the identity of individuals billing to the project and current accruals. Training and guidance in the use of this progress management information has been provided to M&O EM project/cost account managers.

Although the EM-30 monthly progress reports are being revised to report down to the control-account level (a level above the WP level), several DOE-ID and M&O interviewees confirmed that day-to-day project management, as described above, is performed using the project financial information available at the cost-account level of detail.

* *The POC is met for EM-50 activities.*

PIs develop detailed schedules and cost estimates at the beginning of each fiscal year for each TTP. The budgets and schedules specified by EM-50 in the PEG constitute the baseline. DOE-ID assigns a program/project manager to each TTP. The M&Os assign a PI to each TTP.

Each M&O uses a formal cost and schedule control system. EG&G uses Dekker Trakker software, and WINCO uses Excel software. Initially, Lockheed will use Dekker Trakker. These systems are used to generate monthly status reports for each TTP. They generate earned value analyses of budgets, expenditures, and schedules.

III.C.3.2 Contingency Management

DOE management is responsible for the control of cost and schedule contingencies for construction and EM projects. If all or part of this responsibility is delegated to the M&O/National Laboratories/other DOE contractors, procedures for this control are documented by the contractor and made available to DOE in a timely fashion.

POC C.3.2

DOE, through a close examination of the cost and schedule risk assessments, makes cost and schedule contingency budget allocation and dissemination decisions. If DOE delegates responsibility to the M&O/National Laboratory/other DOE contractor, the M&O/National Laboratory/other DOE contractor makes the decision on when the contingencies should be used, ensures that the contingency estimates are appropriately reduced at each phase of the project, documents the use of contingencies, and notifies DOE in a timely manner.

DOE/MA-0046; DOE/MA-0063, Vol. 6; EM Policies on Cost and Schedule Estimating and Analysis

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.4.2) was *partially met* for EM-30 and EM-40 activities.

The DOE-ID WM and ER programs managed all contingency funding. The DOE-ID WM program did not develop an allowance for change for facilities operations activities. DOE-ID ER estimated contingency at the program level. But, at the time of the Round I CQMA, ER was very early in the implementation of its program and only 4 months into its first year tracking to a baseline.

The Round I CQMA report recommended that:

- ER program contingency funding be developed at a lower level as the program matured and as each Waste Area Group becomes more like an individual project
- In situations where uncertainties exist in WM operations, an allowance for change be included in the estimating process as described in the EM-30 *Interim Cost and Schedule Estimating Guidance*.

The INEL *Action Plan* stated that INEL would prepare contingency analysis study/evaluation and determination and prepare a written contingency policy to be implemented at INEL for the FY 1996 Budget Request.

- * The corresponding POC (III.C.3.2) was *partially met* for EM-50 activities.

Contingency, as a form of risk analysis, was addressed for some of the TTPs reviewed by preparing conservative estimates.

The CQMA Team recommended that:

- Risk analysis be performed for all R&D and Demonstration, Test & Evaluation projects at INEL
- Formal risk assessment be performed routinely as a part of the review process
- Programs be categorized according to their level of risk
- DOE-HQ EM-50 consciously make funding decisions based on the nature of these risks.

Round II

The POC is partially met for EM-30, EM-40, and EM-60 activities.

The INEL *Cost Estimating Guide* discusses a model that can be used to estimate contingency. In addition the *Site Treatment Plan* references the analysis of risks in determining contingency for technology options. For construction projects, the EM-30, EM-40, and EM-60 M&O

contractors (with the review and approval of DOE-ID project managers) estimate contingencies in accordance with DOE's well-established requirements for such projects.

For non-construction projects, however, contingency is estimated at the program level for EM-40, and EM-30 tracks management reserve through the change control process.

We **recommend** that DOE-ID pursue, to the extent practical within DOE-HQ programmatic requirements, efforts to identify and evaluate risks and to estimate contingencies at more definitive project levels (e.g., at the WP level).

* *The POC is partially met for EM-50 activities.*

The 1994 OWT Cost Accounting Preparation Guidance (prepared by EG&G), specifies that each project will be required to build in a contingency reserve to be held as undistributed budget for internal management-control purposes. The contingency reserve is to be no more than 10% of total authorized funds.

- None of the program/project managers or PIs interviewed were aware of this requirement. They indicated that they do not explicitly identify contingency in their cost estimates.

We **recommend** more effective dissemination and implementation of OWT guidance.

We **recommend** that contingency estimates be included in all TTP cost estimates.

- DOE-ID maintains an overall management reserve fund that includes funds from closed out projects and money for unsubmitted work plans. While this management reserve fund constitutes a type of contingency fund, it cannot be used without EM-50 authorization.

We **recommend** that approved contingency funding be maintained by DOE-ID. In addition, DOE-ID should be authorized to use some specified level of contingency funds through the baseline change control process.

III.C.3.3 Baseline Change Control Process

POC C.3.3

The change control system or change control process is defined, documented, implemented, and effective and produces clear and well-documented rationale for changes. An independent check estimate of the impact of the change is accomplished and reconciled with the approved baseline (including cost, schedule, and technical baselines) program. The independent check estimate and the cost baseline will include or consider, as appropriate, the (impact on) total life-cycle cost for all proposed changes to programs/projects (including projects extending beyond the long-range planning period). The change impact is then reviewed and approved by the program/project manager, presented to the appropriate manager, and submitted to DOE.

DOE 4700.1, Change 1; DOE Notice 4700.5

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.4.3) was *partially met* for EM-30 and EM-40 projects.

The DOE-ID and contractor WM and ER change control process were defined, documented, and effectively implemented. All changes were reviewed and approved by the contractor project manager, contractor management, and DOE depending on the classification of the change. However, independent check estimates were not prepared for changes, and changes only considered the current FY and not the impact on the LCC.

The Round I CQMA report recommended that Class I and II changes receive independent check estimates to validate the cost impact and that LCC impacts associated with the changes be included in the change control process as appropriate.

The INEL *Action Plan* stated that INEL would develop cost- and schedule-estimating procedures as recommended by the CQMA Team.

- * The corresponding POC (III.C.3.3) was *met* for EM-50 activities.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The baseline change control process is managed at the levels designated in change control guidance using information that originates at the M&Os. Baseline change control procedures are defined in the "Project Control" section of the Program Directives, the *Implementing PMPs*, and in program guidance. Other documents and procedures that demonstrate that the change control process is defined, documented, and implemented include:

- Change Control Form for the Upgrade of WM Safety Analysis Reports
- Baseline Change Proposal for OCVZ Record of Decision
- Baseline Change Control Review Elements/Responsibilities,
- Baseline Change Proposal forms
- EM-30, EM-40, and EM-60 Baseline Change Proposals.

The change control process also incorporates estimation and consideration of the impacts on LCC and schedules.

Cost and schedule estimates are prepared and reviewed in the manner described at POC C.1.8.

- * *The POC is partially met for EM-50 activities.*

The baseline change control process is managed by EG&G for both itself and WINCO. The process is well defined in the draft *PMP* and in program guidance. In FY 1994, the change control board, which normally convenes monthly, considered approximately 80 change control proposals from EG&G and four from WINCO.

The composition of the change control board depends on the classification of the change proposal. For Class III changes (referred to as housekeeping changes), the product manager (e.g., Buried Waste Integrated Program, Supercritical Fluids) is the sole board member. For Class II changes (normally changes in a contractor's milestone—but not an EM-50-imposed milestone), the product manager and the TPM are the board members. For Class I changes (anything greater than Class II), the board consists of the product manager, TPM, and DOE-ID technical program officer.

The PI prepares the cost estimate associated with the proposed change. The cost estimate is reviewed for reasonableness by the product manager and the DOE-ID program/project manager.

- Professional cost estimators normally do not review these cost estimates.

We recommend that a professional cost estimator be added to the DOE-ID organization to review cost estimates associated with change control proposals.

- The Class I change control board does not approve any change to funding baselines until EM-50 formally authorizes the funding change in the FINPLAN.

We recommend that DOE-ID receive some level of authority to address necessary cost changes.

III.C.3.4 Maintaining Technical, Cost, and Schedule Baselines: DOE

POC C.3.4

To assure the integrity of project cost management, baselining is required regardless of the selection of the cost-control system. The program/project manager maintains the technical, cost, and schedule baselines. The management control systems and other documentation are revised to include approved changes to the technical, cost, and schedule baselines.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POCs (III.D.4.1 and III.D.4.3) were *met* for EM-30 and EM-40 activities.

The EG&G, WINCO, and MK-FIC WM and ER program cost and schedule control systems and monthly reporting systems are fully implemented. The DOE/ID and contractor WM and ER change control process is defined, documented, and effectively implemented. All changes are reviewed and approved by the contractor project manager, contractor management, and DOE depending on the classification of the change.

- * The corresponding POCs (III.C.3.1 and III.C.3.3) were *met* for EM-50 activities.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

EM-30, EM-40, and EM-60 project/cost account managers are responsible for developing and maintaining the technical, cost, and schedule baselines in accordance with the requirements presented in the PMPs, Program Directives, baseline guidance, *ER Management Action Plan*, and program/project management guidance. Baselines have been established for EM-30, EM-40, and EM-60 activities, and activities within these programs are managed against these baselines. As described in the discussion of the preceding POC, change control procedures are used to adjust (as appropriate to the change level) the established cost and schedule baselines.

III.C.3.5 Cost Management Control System

POC C.3.5

The cost management control system is well-defined and implemented and supports the program/project/task manager with timely and accurate cost and schedule status information necessary to effectively manage the program.

DOE Order 2250.1C; DOE Order 1332.1A, Change 1; DOE/MA-0295, DOE Notice 4700.5

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.F.5.1) was *partially met* for EM-30 and EM-40 activities.

DOE-ID, EG&G, WINCO, and MK-FIC had cost-management control systems that used earned-value performance measurement techniques and that produced monthly reports. The systems included fully implemented change control systems that were effective in tracking changes from the established program baselines.

The Round I CQMA report recommended that program-specific procedures and directives for EG&G WM and ER and WINCO WM programs be developed and implemented and that an independent progress measurement be incorporated into the reporting process to ensure objectivity and accuracy in the reports.

In its *Action Plan*, INEL stated that it would develop DOE-ID cost- and schedule-estimating, budgeting, and progress reporting policies and procedures.

- * The corresponding POC (III.E.5) was *met* for EM-50 activities.

EG&G's management control system was documented in its *Procedures Manual* (Volume III, Section 20). WINCO's was found in its *Policy Directives* (No. 1-09).

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

EM-30, EM-40, and EM-60 costs and schedules are well-defined and maintained within the M&Os' management control systems (e.g., Dekker Trakker and MicroPlanner) at the cost-account level. While the monthly reports present details at levels above the cost account level (e.g., EM-30 program progress reports are to be presented at the control-account level beginning October 1, 1994), the systems maintain project details at the cost-account level. Examples of control system reports and statements of interviewees indicate that projects/programs are being managed at the control-account level by M&O project/cost account managers and that DOE-ID coordination and oversight (by DOE-ID project managers) is being provided at the same level.

* *The POC is met for EM-50 activities.*

Both M&O contractors use software systems for cost management control. EG&G uses Dekker Trakker software, and Lockheed, at least initially, also will use it. WINCO uses Excel software.

These systems provide monthly reports for each TTP and provide earned value analyses of cost and schedule data. Reports are typically available on the 10th of each month and cover the preceding month.

III.C.3.6 Management Control System Reports

POC C.3.6

A sound management control system produces budgetary, performance status, change proposal, and other reports that are provided to program/project/task management, cost analysts, financial control personnel, management, and DOE. Reports from this system are accurate, timely, and complete, and they convey all the pertinent information required to thoroughly understand the program/project/task and make informed decisions.

DOE Order 4700.1, Change 1; DOE Order 1332.1A; DOE Notice 4700.5, and SEN 27-90; Project Control System Guidelines Implementation Reference Manual, Interim, December 1992; DOE/MA-0063, Vol. 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.D.4.4) was *met* for EM-30 and EM-40 activities.

The DOE-ID WM and ER programs produced accurate, timely, monthly reports that were used for assessing program status. Contractors also produced appropriate management control system reports.

* The corresponding POC (III.C.3.4) was *met* for EM-50 activities.

EG&G's management control system was documented in its *Procedures Manual*, Volume III, Section 20. WINCO's was found in its *Policy Directives* No. 1-09.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The management control systems used to support EM-30, EM-40, and EM-60 activities provide the information needed to provide effective project/program management. In addition to the information presented in the monthly progress reports, the M&O cost account/project managers are provided weekly reports presenting various project details at the cost-account level. While the monthly reports provide useful oversight information, the weekly reports are the tool that supports effective day-to-day project management so that potential problems can be identified and resolved quickly. M&O cost account/project managers maintain frequent communication with their DOE-ID counterparts and discuss the progress of their projects at weekly meetings.

The management control systems also support variance identification and analysis. Training on the M&O Project Management System (provided to cost account/project managers) includes guidance and training in variance analysis.

* *The POC is met for EM-50 activities.*

Both EG&G and WINCO issue monthly progress reports to DOE-ID. The reports cover technical, cost, and schedule status. These reports address each TTP and provide earned value analyses—including variances—of cost and schedule data. The reports generally are available on the 20th of each month and cover the previous month. They are intended primarily for DOE and contractor management above the PI level. EG&G has issued formal guidance on preparing monthly status reports.

However, most DOE-ID program/project managers do not use these reports. Instead, they use Progress Tracking System (PTS) input reports prepared for their TTPs, which usually are available on the 10th of each month. The PTS input reports provide the same information and analyses as the monthly progress reports, which cover all TTPs.

The vast majority of the personnel interviewed indicated that they do not use the PTS reports issued by EM-50 for INEL TTPs because:

- The PTS reports are received approximately 6 weeks after month-end, making the information too old to be used as an effective management tool.
- The PTS reports commonly contain errors due to data entry or system translation problems.
- DOE-ID personnel cannot down-load appropriate sections of the PTS database to conduct special analyses or to prepare exception reports.
- PTS system revisions and upgrades provided to the Field often do not work properly and require excessive time and effort to have corrections made.
- In general, the PTS is not user-friendly.

Suggestion for Future Consideration

DOE-ID and its contractors generate comprehensive progress reports monthly. Much of the information in these reports duplicates the information in the PTS input reports but, because it is so old, cannot be used as a management tool.

We suggest, as a cost-saving initiative, that DOE-ID and its contractors generate comprehensive progress reports quarterly (or even semiannually) instead of monthly.

III.C.4 Policies, Procedures, and Guidelines

III.C.4.1 Requirements Definition

POC C.4.1

Policies and procedures require definitive documentation of programmatic objectives, requirements, standards, and specifications (commensurate with the program phase) to support the level of cost estimation, budgeting, and control activity required.

Policies and procedures are clear and concise. They are known to, and understood by, all appropriate personnel. Implementation (practice) is consistent with policy and procedure directives.

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.F.2) was *partially met* for EM-30 and EM-40 reports.

DOE-ID, EG&G, WINCO, and MK-FIC had procedure programs and program/project implementation plans in place that were generally being followed in the conduct of WM and ER program activities.

The Round I CQMA report recommended that EG&G and WINCO continue to develop and implement program-specific procedures and directives.

In its *Action Plan*, INEL stated that it would develop DOE-ID cost- and schedule-estimating, budgeting, and progress reporting policies and procedures.

- * The corresponding POC (III.E.1) was *met* for EM-50 activities.

EG&G's *Project Management Plan for the WTDD [Waste Technology Development Directives]* and in WINCO *Policy Directives* require defining 1) measurable technical and economic objectives in terms of design criteria or performance capability, 2) schedule objectives for major tasks on the critical path showing their relationships to the WBS elements, and 3) cost objectives for the various levels of the WBS and their relationship to the total project cost provided in the project plan.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Policies and procedures for the EM-30, -40, and -60 programs are clearly defined and communicated to all involved staff. Documents and guidance that demonstrate the clarity and conciseness of the policies and procedures include:

- ER and WM *Implementing PMPs*
- Program directives (particularly the directives addressing project control)
- Project Management System training
- *DOE-ID ER Management Action Plan*
- *INEL ER Program MSA Project Plan*
- EM and WM *Strategic Plans*
- *INEL Cost Estimating Guide*.

It should be noted that many of these documents were issued within the few months preceding the Round II CQMA. The EM-30 *Implementing PMP* is a September 1993 draft; interviewees indicated that the document was submitted to DOE-HQ last year and that they are waiting for comments/authorization to issue the PMP in final.

We suggest that documents be periodically reviewed to ensure that they reflect EM's current requirements/initiatives and that the use of these materials by DOE-ID and M&O staff be monitored to ensure compliance.

We suggest that WM staff continue efforts to obtain DOE-HQ approval of, or comments on, the PMP and, as appropriate, incorporate all recent initiatives and developments.

* *The POC is partially met for EM-50 activities.*

The documents providing fundamental programmatic objectives, requirements, standards, and specifications include:

- EM *Five-Year Plan*
- EM-54 and EM-55 "Call for Technical Task Plans" (FY 1995 call issued December 1993)
- EG&G *PMP* (draft)
- EG&G *Program Guidance*
- *Office of Waste Technology FY-1994 Cost Account Preparation Guidance* (prepared by EG&G)

Most of those interviewed did not use the *Cost Account Preparation Guidance* in preparing their TTP WPs.

We recommend that DOE-ID ensure that the *Cost Account Preparation Guidance* is distributed to all appropriate personnel and that more effective use of the guidance be made.

We recommend that the draft PMP be updated and finalized and that it include a list of available DOE and contractor policy and procedure documents. The PMP also should describe the purpose of each policy and procedure document.

III.C.4.2 Budget Guidance

POC C.4.2

Policies and procedures define the level of detail, accuracy, and documentation required to support budgetary cost estimates for each programmatic phase. Implementation guidance and practice are consistent with policies and procedures.

DOE Order 4700.1, Change 1; DOE Order 5700.2D, SEN-25A-91; FYP Guidance to Field

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.F.3) was *not met* for EM-30 and EM-40 activities.

Formal, approved policy or procedures that define the level of detail, accuracy and documentation required to support budgetary cost estimates had not been developed or implemented at DOE-ID, EG&G, WINCO, or MK-FIC for either the WM or ER programs.

The Round I CQMA report recommended that DOE-ID and its contractors formalize the guidance that was used to develop the FY 1992 budget planning. The policies and procedures resulting from that formalization should define the level of detail required for budget documentation.

In its *Action Plan*, INEL stated that it would develop DOE-ID cost- and schedule-estimating, budgeting, and progress reporting policies and procedures and that it would approve the final draft of the *DOE-ID Budget Formulation and Validation Manual*.

* The corresponding POC (III.E.2) was *met* for EM-50 activities.

The required level of detail was described, and budgets were assigned at six WBS levels, in the guidance issued by DOE-HQ EM-50.

INEL contractors generated a more comprehensive PMP than required by DOE-HQ EM-50; the Plan defined the levels of detail, level of accuracy, and documentation required to manage and monitor project performance effectively.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

EM-30, -40, and -60 budgets are developed using detailed cost estimates, which in turn are aggregated to prepare the baselines. Documents and procedures that define budgetary support requirements (i.e., level of detail, accuracy, and documentation) include:

- Baseline development and change control guidance
- "Prior Planning—Call for Landlord Construction Projects"
- EM-30 and EM-40 *Implementing PMPs*
- Program directives
- Project management training.

Cost estimates (which are the basis for the budgets) are generally developed at the cost-account level; preparation of estimates at this level ensures sufficient detail is available to develop credible budgetary cost estimates.

* *The POC is met for EM-50 activities.*

EM-54 and EM-55 annually issue a formal "Call for Technical Task Plans," which defines the level of detail and the specific documentation required to support budgetary cost estimates. For selected/tentatively approved TTPs, EM-50 issues PEG, the framework for detailed WPs to be prepared by the contractors.

Implementation guidance (see C.4.1) is provided by the contractors.

III.C.4.3 Cost-Estimating Guidance and Tools

POC C.4.3

Cost estimating guidance manuals, handbooks, software models, and other tools are in place, definitive, and used for each cost-estimating activity.
Cost-estimating tools are validated.

DOE/MA-0063

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.F.4) was *partially met* for EM-30 and EM-40 activities.

The engineering CEGs for EG&G, WINCO, and MK-FIC followed formal cost-estimating procedures. The WM and ER programs at DOE-ID, EG&G, and WINCO had not developed formal, approved policy and procedures for cost estimating. DOE-ID personnel did not prepare estimates; the *ER/WM Managing for Safety and Quality Manual* outlined their responsibilities in reviewing estimates prepared by others.

Although the EG&G ER program *Cost Estimating Handbook* was a significant resource for preparing ER cost estimates, the *Handbook* was not a substitute for adequate definition of scope. Further, there was a danger in providing the kind of information contained in the *Handbook* to

personnel who did not know how to use it properly. The estimating tools and software used by EG&G, WINCO, and MK-FIC varied.

The Round I CQMA report recommended that:

- Program-specific estimating procedures be developed for the WM and ER programs
- Procedures incorporate the general requirements of DOE Orders 5700.2C and 4700.1, including associated guidance contained in DOE/MA 0046 and DOE/MA 0063 as appropriate
- *Environmental Restoration Program Cost Estimating Handbook* be updated to reflect recent cost history and be structured to serve as an extension of the *INEL Cost Estimating Guide* so that the professional estimating process rigor, consistency, traceability, and standardization embodied in the INEL-wide document could be incorporated with the technical and unit-cost data contained in the ER program document.

In its *Action Plan*, INEL stated that it would develop DOE-ID cost- and schedule-estimating, budgeting, and progress reporting policies and procedures.

- * The corresponding POC (III.E.3) was *met* for EM-50 activities.

WINCO's *Policy Directives* addressed some of the areas for this standard, but comprehensive documentation of cost-estimation procedures for EM-50 tasks at WINCO was not available). EG&G's *Program Management Plan for the WTDD and Procedures Manual* (section 20) provided guidelines for generating a cost estimate. Given the nature of R&D tasks, much of the data that support the R&D estimates do not come from manuals and handbooks. The CQMA Team considered staff experience and expertise to be a viable substitute.

The Team recommended that WINCO generate a comprehensive cost-estimation document for EM-50 tasks and have DOE-ID review it.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Cost-estimating guidance manuals have been developed and are used for EM-30, -40, and -60 cost-estimating activities. The primary cost-estimating resource used by M&Os and DOE-ID staff is the *INEL Cost Estimating Guide*. This guide is particularly useful for preparing cost estimates for non-construction projects. Using this guide in conjunction with the *Implementing PMPs/Strategic Implementation Plan* provides the mechanism for preparing reasonable, accurate cost estimates to the cost-account level or lower. In addition to providing site historical cost data, the *Guide's* estimate-development forms recognize that cost data from other sources (e.g., Means or computer databases) may be used. The M&O contractors use various software packages to develop and report their cost estimates.

The use of various software packages, however, leads to reporting and tracking inconsistencies.

We suggest that DOE-ID direct the new M&O contractor to identify and evaluate software packages and to implement the selected package.

Cost estimates for construction projects are prepared using handbooks and software models "typical" (i.e., used throughout DOE and developed over a number of years) to DOE construction-cost estimating activities.

* *The POC is partially met for EM-50 activities.*

EM-53 provides the Field with TTP Version 3.2 System Software to help prepare TTPs. The software includes a screen (described on p. 2-11 of the users manual) to help prepare cost estimates.

Most of the PIs interviewed do not use this software, apparently because it does not work well.

We recommend that the TTP System Software be debugged or upgraded as necessary and that PIs be trained to use the software.

A few DOE program/project managers and contractor PIs have taken courses in project management training, including a segment on cost estimating.

The PIs interviewed were not aware of guidance or tools to help them to estimate or manage costs. The *Cost Account Preparation Guidance* is a useful tool to help prepare/review cost estimates, but none of the program/project managers or PIs use it.

We recommend that project management and cost estimating/management training courses be developed that are tailored to the needs of program/project managers and PIs. Such courses should be mandatory.

We recommend that guidance documents and tools be broadly disseminated and that a list of available documents and tools be included in appropriate DOE and contractor management plans (and that other media [e.g., computer bulletin boards]) be used as well.

III.D TECHNICAL EVALUATION

Introduction

This section is based on a review of documents and interviews of Department of Energy (DOE) Idaho Operations Office (DOE-ID) and contractor personnel conducted by the Management and Technical Subteam. More than 30 documents were reviewed, including the Federal Facility Agreement/Consent Order (FFA/CO), Waste Management (WM) and Environmental Restoration (ER) *Implementing Program Management Plans* (PMPs), *Idaho Chemical Processing Plant (ICPP) Implementation Strategic Plan*, Remedial Design (RD)/Remedial Action (RA) guidance, *Site Treatment Plan*, *INEL [Idaho National Engineering Laboratory] Environmental Restoration Program Review*, *INEL Cost Estimating Guide*, *Environmental Restoration at the INEL, Track 2: Guidance for Assessing Low Probability Hazardous Sites at the INEL*, *Project Management System for INEL*, *Final Remedial Design/Implementing Remedial Action Work Plan—Test Reactor Area Warm Waste Pond Interim Action OU2-10*, and training materials. The subteam also reviewed numerous other guidance documents, procedures, memoranda, and reports. A list of documents reviewed is included in appendix D.

The subteam interviewed 20 people, including DOE-ID program managers and EG&G, M.K. Ferguson of Idaho, and Westinghouse Idaho Nuclear Company (WINCO) project/cost account managers. A list of the individuals interviewed by the subteam is included in appendix C.

All technical Performance and Criteria (POCs) were addressed during the interviews and document reviews. Of the eight technical POCs, the Office of Waste Management (EM-30), Office of Environmental Restoration (EM-40), and Office of Facility Transition and Management (EM-60) met seven and partially met one. The Office of Technology Development (EM-50) met three and partially met five.

Observations, Discussion, and Recommendations

INEL's multiple Management & Operating (M&O) contractors will be replaced by a single integrated contractor (Lockheed) on October 1, 1994. This single "ownership" of M&O programs/projects should help DOE-ID streamline the reporting process. Lockheed has already committed to reducing the schedule and costs of ER activities.

The subteam noted the following significant achievements:

- . INEL made notable progress in streamlining the ER process using the Track 1 and 2 assessment processes.
- . The ER Implementing PMP has been revised to reflect changes in personnel titles, organization, and regulatory requirements.
- . Environmental Management (EM) and WM *Strategic Plans* have been completed. The plans present the objectives, strategies, planning baseline assumptions, and proposed courses of action to achieve programmatic goals (including cost-effectiveness). The plans also present INEL's strategic objectives, including seeking technology improvements that are feasible, innovative, and cost-effective.

Although technology risk assessment (TRA) is performed as part of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Feasibility Study and Remedial Design processes, the contingency analysis is neither clearly defined nor expanded.

We recommend that professional staff, trained to perform TRAs and contingency analyses, participate in preparing cost estimates and that DOE-ID (to the extent practical within DOE-Headquarters [DOE-HQ] requirements) develop procedures to incorporate TRA with contingency analysis and cost estimation.

III.D.1 Technical Approach

III.D.1.1 Technical Objectives

POC D.1.1

Technical objectives are defined in project planning documents and reflect DOE mission requirements as stated in the *Five-Year Plan* and/or other DOE mission requirements documents. References to mission requirements are defined and documented.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.1) was *met* for EM-30 and EM-40 activities.

For both WM and ER activities, technical objectives are clearly defined in planning documents and reflect DOE/ID mission requirements.

- * The corresponding POC (III.D.1.1) was *met* for EM-50 activities.

Integrated demonstration/integrated program (ID/IP) coordinators were advised of the mission requirements for their programs by DOE-HQ EM-50. The coordinators determined and/or requested proposals for task ideas for their respective ID/IP. A scope of work, therefore, was initially defined by the principal investigator (PI) in conjunction with an ID/IP coordinator. Technical task plan (TTP) objectives reflect the mission requirements of DOE-HQ EM-50 as discussed in the *Five-Year Plan*.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

INEL's EM-30, -40, and -60 technical objectives are defined in the following planning documents:

- FFA/CO
- *Track 2: Guidance for Assessing Low Probability Hazardous Sites at the INEL*
- RD/RA guidance

- ER and WM Implementing PMPs
- ICPP *Implementation Strategic Plan*.

Program mission objectives are well defined in these documents and in Office of Program Execution mission and vision statements, *EM Strategic Plan*, and the *Technical Site Information Site Plan*. A clear understanding of the technical objectives and mission requirements was evident during our interviews with DOE-ID and M&O ER, WM, and Landlord Program staff.

- * *The POC is met for EM-50 activities.*

Technical objectives are defined in the "Call for Technical Task Plans" issued by EM-54 and EM-55 each fiscal year.

III.D.1.2 Data Quality Objectives

POC D.1.2

For programs/projects/tasks involving data collection activities, Data Quality Objectives (DQOs) are established to determine the necessary quantity and quality of data needed to achieve the technical objectives. DQOs reflect an appropriate level of data and help avoid unnecessary data collection. The process by which the DQOs are established is documented.

EPA Data Quality Objectives for Remedial Response Activities

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.2) was *met* for EM-30 and EM-40 activities.

The need for and development of DQOs are discussed in section 5 of the *FFA/CO Action Plan* and in EG&G's *ER Cost Estimating Handbook* Sections 2.3, which specifically refers to the of the Environmental Protection Agency (EPA) guidance document EPA/540/G-87, 2.4, and 2.5. The *Handbook* includes several questions and statements that encourage the user to evaluate existing data and to limit data collection to only that level needed to support decisions.

- * The corresponding POC (III.D.1.2) was *met* for EM-50 activities.

EG&G had a documented program directive addressing DQOs, and the TTPs reviewed incorporated DQO principles that adhered to EPA guidance.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

INEL's EM-30, -40, and -60 activities are performed using well-defined criteria to determine the quantity and quality of data needed to meet technical objectives. Documents that demonstrate, from a cost quality management perspective, the use of DQOs to achieve technical objectives include:

- *Track 2: Guidance for Assessing Low Probability Hazardous Sites at INEL* (which describes procedures and decision-making practices that maximize the use of available data)
- FFA/CO (which specifically defines a "bias for action" for all parties)
- *Warm Wastewater Pond Interim Action of OU2-10*
- *Capital Asset Management Plan Report.*

From a purely technical perspective, the DQO logic process is well-defined and identifies precision, accuracy, representativeness, comparability, and completeness parameters. The *Sampling and Analysis Plans* provide specific guidance to ensure that collected data are assessed for usability.

The development of cost-effective DQOs also is fostered by a variety of procedures including the award fee performance criteria and the Cost Reduction Incentive Program.

* *The POC is partially met for EM-50 activities.*

PIs provide formal specifications for equipment specification and performance standards in requests for proposal issued to prospective subcontractors.

However, no requirement exists in DOE-ID or contractor organizations to develop DQOs for data collection activities. In addition, we found no examples of formal DQO processes at INEL for EM-50-related activities.

We recommend that the contractor develop formal guidance on the use of DQOs in formulating development tools.

III.D.1.3 Development and Definition of Technical Scope

POC D.1.3

The process for developing and defining technical scope assures that relevant technical factors or conditions are considered for achieving the technical objectives and defining the technical baseline. This process is reflected in available program/project/task documentation. The documentation also recognizes, to the extent possible, relevant uncontrolled factors and acknowledges that unknown factors or conditions could have a significant impact on the long-term technical success and cost of the program/project/task.

DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.3) was *partially met* for EM-30 and EM-40 activities.

The WM and ER program/project/task documentation indicated that relevant technical factors were considered in defining technical baselines and supporting the achievement of technical objectives. The ability to define scope in a manner that promotes cost effectiveness and to communicate the need for a cost-conscious culture is further demonstrated by the performance improvement programs of EG&G and WINCO.

The Round I Cost Quality Management Assessment (CQMA) report recommended that DOE-ID and contractor staff in both the WM and ER programs continue their efforts to enhance scope definition and identify areas for cost savings. These efforts could be strengthened through the development of additional guidance to clearly identify and communicate "lessons learned" and to formalize the questions to be asked when defining technical work requirements.

The INEL *Action Plan* called for an evaluation of the DOE-ID Work Authorization and Control System (WACS) policy and procedure, particularly regarding the standard forms used and the information requirements imposed on DOE-ID program managers. On the basis of the evaluation, and required changes to WACS would be developed. The *Action Plan* also called for the development of DOE-ID procedure(s) for written guidance including minimum definition requirements for technical work, documentation detail, risk assessment, and lessons learned.

- * The corresponding POC (III.D.3) was *met* for EM-50 activities.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The process for developing and defining the technical scope of EM-30, -40, and -60 activities is well-defined. Documentation that demonstrates this observation—particularly as it relates to the identification and characterization of relevant factors—includes:

- ER and WM Implementing PMPs (which identify the actions under which relevant factors and conditions are identified and characterized)
- ICPP *Implementation Strategic Plan*
- *Track 2: Guidance for Assessing Low Probability Hazardous Sites*
- Remedial Investigation and Feasibility Study work plans
- RD/RA work plans.

These documents present procedures and practices to assist staff in developing and defining technical scope, including: assessing the quality of existing data; classifying operable units based on the quality and quantity of data available; characterizing contaminated media; assessing pathways; and identifying, screening, and evaluating technically and economically viable remedies and technologies.

- * *The POC is met for EM-50 activities.*

The technical scope is developed and proposed by the M&O PIs. Technical scope is reviewed and refined by DOE-ID and EM-50. If the technical scope is approved by DOE, the PI develops the work scope more fully based on the Program Execution Guidance (PEG) and *Cost Account Preparation Guidance*.

The PIs network with personnel at other DOE sites to prevent duplication of effort. In fact, many of the development programs are coordinated efforts among several DOE sites. The relationship of proposed TTPs to activities ongoing at other sites and the potential benefits to DOE sites are specifically documented in the TTP work packages (WPs).

III.D.2 Work Breakdown Structure

The work breakdown structure (WBS):

- Identifies technical elements needed for costing purposes
- Demonstrates consistency across all program/project/task elements
- Demonstrates traceability through incorporation and summation of all cost elements.

POC D.2

The Work Breakdown Structure identifies all technical elements relevant to the technical scope. The Work Breakdown Structure is communicated to the cost estimator and is used in developing cost estimates.

DOE/MA-0046; DOE/MA-0063, Vol. 6; DOE/MA-0295

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.4.1) was *met* for EM-30 and EM-40 activities.

The ER and WM contractors at DOE-ID had implemented WBS systems that identified technical elements, were consistent across all elements, reflected requirements and objectives, and were traceable across all elements.

- * The corresponding POC (III.D.1.4.1) was *met* for EM-50 activities.

The TTPs had defined WBSs associated with the technical scope and linked to a cost account. EG&G's procedure 20.10 described "Work Breakdown Structure and Responsibility Assignment."

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

The WBSs for EM-30, -40, and -60 efforts are uniformly implemented and well documented. The WBSs, which identify actions to the sixth level, are defined to the activity data sheet (ADS) level. Contractors consistently use WBS identifiers on all appropriate management and tracking documents (e.g., baseline documents), ADS budget sheets, cost estimates, and program reports. Scheduled milestones are identified in the WBS, which includes DOE-HQ, DOE-ID, and

contractor numbering systems. Most program/project management staff are well trained in using the WBSs.

- * *The POC is met for EM-50 activities.*

The contractor provides guidance on WBS development and implementation for TTPs in the *Cost Account Preparation Guidance*, and the EG&G PMP.

TTPs and WPs use a formal WBS for all technical work proposed. The WBS structure is consistent with the structure used by EM-30 and EM-40 to show the relationship of appropriate technical activities.

III.D.3 Analysis

The POCs in this subsection focus on the technical decision process used by the management of M&O/National Laboratory in making decisions affecting the scope of work, cost and schedule, and associated activities and tasks. Additionally, DOE evaluates analytical tools used during the process. These tools may include risk assessment, Life Cycle Cost Analysis (LCCA), and trade-off studies.

III.D.3.1 Technology Risk Assessment

POC D.3.1

Programs/projects/tasks include technology risk assessment. Technology risk assessments are performed in both the selection and application of technologies to determine the most cost-effective actions. These assessments are coordinated with the cost estimator; the resulting information is conveyed to the cost estimator and is included, as appropriate, in the cost estimate as a factor or component of the contingency analysis.

EM CAT Handbook; DOE/MA-0046; DOE/MA-0063, Vol. 6; DOE Order 4700.1, Change 1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.4.2) was *met* for EM-30 and EM-40 activities.

WM GPP technology risks were assessed in accordance with the well-defined standards for construction activities. The EG&G and WINCO WM operational WP development, review, and approval process provided a mechanism to identify, evaluate, and incorporate technology risks in making WM operational decisions and developing scopes and requirements.

- * The corresponding POC (III.D.1.4.2) was *partially met* for EM-50 activities.

Although the nature of Research & Development and Demonstration, Test and Evaluation programs/projects makes technological risk evaluation essential for quality cost management, formal TRAs were not required for EM-50 projects and, therefore, were not performed. This

POC was partially met because risk assessments, based on the experience of the PIs, were performed informally.

The CQMA Team recommended that formal technical risk assessments be considered when cost and schedule estimates are prepared.

Round II

The POC is partially met for EM-30, EM-40, and EM-60 activities.

With respect to EM-40 activities, TRA is incorporated in the CERCLA Feasibility Study and RD processes incorporated in the FFA/CO. The analysis of technology risks is presented in the CERCLA Record of Decision. The TRA performed as part of EM-40 activities addresses risks related to public health, regulatory compliance, implementability, generation of secondary contaminants, effectiveness, operations, and costs. These considerations reflect substantial recognition of technology risks.

With respect to EM-30 and EM-60 activities, useful guidance on the assessment of technology risks is presented in "Preferred Option Selection Process" in the *INEL Site Treatment Plan*. This document provides useful information for evaluating technology risks associated with nonconstruction projects (e.g., identifying and evaluating off-site treatment options). Technology risks are considered to be a part of the contingency analysis for construction projects. This analysis is documented as a part of the very well-defined estimate-development procedures typical of the DOE construction process.

However, the subteam was unable to demonstrate that costs associated with technology risks were included in the contingency analysis. In fact, contingency is only estimated and applied at the EM-40 programmatic level. The *ER Contingency Analysis Report* addresses risks related to the stage of a project, but the report does not specifically address technology risk contingency analysis. Nor was the subteam able to demonstrate that the costs associated with technology risks are included in the management reserve analysis for EM-30 and EM-60 nonconstruction projects.

We recommend that DOE-ID and its M&O contractor develop systems engineering and methodology guidance to incorporate TRA into the contingency analysis.

We recommend that professional staff, trained to perform TRA and contingency analysis, participate with cost estimators in preparing the cost estimate.

* *The POC is partially met for EM-50 activities.*

Informed risk evaluations are conducted for some of the technologies under development.

However, there is no formal requirement to conduct TRAs at INEL and no TRA protocol is available.

We recommend that formal procedures to assess technology risks be adopted. These procedures could serve as a framework when comparing technologies under development to appropriate "conventional technologies."

III.D.3.2 Technical Decision Process

POC D.3.2

The technical decision process is rigorous and disciplined and demonstrates that technical decisions are based on cost-effectiveness, total cost, schedule performance, technical performance, regulatory compliance, resource constraints, risk analysis, task and evaluation planning, and life-cycle cost.

DOE Order 4700.1, Change 1; DOE Order 4010.1

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.2.5.1) was *partially met* for EM-30 and EM-40 activities.

The WM and ER decision-making processes were, to varying levels of rigor, disciplined and considered cost effectiveness, risks, and performance. WM GPPs followed well-defined, established procedures for development, design, and construction activities. The WPs for WM operational activities provided a mechanism for addressing cost, schedule, performance, and risks in the technical decision-making process. The WP signature page indicated responsibility to address this standard's criteria in the technical decision-making process.

The ER technical decision-making process is rigorous and well-disciplined.

The Round I CQMA recommended that:

- DOE-ID, EG&G, and WINCO WM operations staff include specific documentation of the considerations incorporated in the technical decision process for each task/WP and guidance
- DOE-ID, EG&G, WINCO, and M.K. Ferguson of Idaho Company (MK-FIC) ER programs incorporate historical information and "lessons learned" in the *Cost Estimating Handbook*, include formal and specific documentation of the considerations addressed in the technical decision process, and provide additional guidance on the questions/issues to be addressed.

The INEL *Action Plan* called for an evaluation of the DOE-ID Work Authorization and Control System (WACS) policy and procedure, particularly regarding the standard forms used and the information requirements imposed on DOE-ID program managers. On the basis of the evaluation, and required changes to WACS would be developed. The *Action Plan* also called for the development of DOE-ID procedure(s) for written guidance including minimum definition requirements for technical work, documentation detail, risk assessment, and lessons learned.

* The corresponding POC (III.D.1.5.1) was *partially met* for EM-50 activities.

Initial technology feasibility analyses were made by the contractors. DOE-HQ EM-50 and ID/IP coordinators then further reviewed the technical proposals. Final decisions on which technologies should receive funding were made by DOE-HQ EM-50. However, once technologies were funded, subsequent technical decisions were addressed only by the TTP PI. This is because cost-effectiveness, schedule performance, technical performance, resource constraints, test and evaluation planning, risk assessment, and life-cycle cost (LCC) were not addressed by DOE-HQ EM-50 in a consistent and demanding manner.

The CQMA Team recommended that cost-effectiveness studies, schedule performance, technical performance, resource constraints, test and evaluation planning, risk assessment, and LCCA should be performed in a dedicated and rigorous manner.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

As incorporated in the FFA/CO, the technical decision process for EM-40 activities flows, in large part, from the Track 1 and Track 2 assessment processes. The EM-40 technical decision process addresses both technical criteria and regulatory requirements. The FFA/CO, in which the schedule for completed remedial activities is bound by agreement, provides the framework for the technical decision process. The *INEL Cost Estimating Guide* and ER Implementing PMP provide WBSs that detail the steps to be followed in reaching technical decisions and defining scopes of work. Documents (e.g., the *ER Management Action Plan*, RD/RA guidance, and the *ER Major System Acquisition Project Plan*) and procedures (e.g., Management Board reviews, DOE-ID and DOE-HQ reviews, *EM Program Cost Reduction Plan*, and the Cost Reduction Incentive Program) are mechanisms that ensure that regulatory requirements, resource constraints, cost- and schedule-effectiveness, LCCs, risks, and performance are addressed in the technical decision process.

The EM-30 and EM-60 technical decisions processes are based primarily on regulatory compliance requirements and site usage requirements (refer to the *Capital Assets Management Plan Report*). The *INEL Cost Estimating Guide*, WM Implementing PMP, and ICPP *Implementing Strategic Plan* identify the work elements that are the basis for defining technical decisions. Documents (e.g., the *EM Program Cost Reduction Plan*, *Value Engineering Study to Improve Waste Management Planning and Integration Processes*, and *INEL Site Treatment Plan*) and procedures/processes (e.g., DOE-ID and DOE-HQ reviews, *Life Cycle Plan* review, and LCC Estimate review) provide the means for considering cost, schedule, risk, performance, compliance impacts, and resources requirements in EM-30 and EM-60 technical decisions.

* *The POC is partially met for EM-50 activities.*

To date, the technical decision process has focused more on technical and schedule issues than on cost. However, in issuing the most recent PEG, Clyde Frank has directed that LCCs be determined for technologies under development. The results will be used to compare developing technologies with appropriate "conventional technologies."

Technical decisions at INEL are made jointly with potential end users (e.g., EM-30 and EM-40 program managers) and EM-50.

We recommend that the contractor develop formal guidance for preparing LCCAs for emerging technologies. We also recommend that DOE-ID use professional cost estimators in reviewing and supporting the preparation of LCCAs.

III.D.4 Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) is a method of ensuring quality, accuracy, and credibility of products, processes, and data associated with a scope of work such as the following:

- Sampling and analysis
- Design
- Construction
- Operations and Maintenance
- Preparation of cost and schedule estimates.

POC D.4

Program/project/task documentation includes Quality Assurance/Quality Control requirements. The requirements are included in the scope of work and are coordinated with the cost estimator. The cost estimate considers and includes the cost for Quality Assurance/Quality Control.

DOE Order 5700.6C

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.3) was *partially met* for EM-30 and EM-40 activities.

The various ER and WM management plans, contractor procedures/directives, ER *Cost Estimating Handbook*, and the DOE-ID *Managing for Safety and Quality Manual* clearly identified QA/QC requirements.

EG&G ER QA/QC costs were assigned to a program-management function and not necessarily tracked against a particular task. Although QA/QC requirements were incorporated in, and were an integral part of ER activities, the Round I CQMA report recommended that task-specific cost estimates specifically recognize QA/QC requirements. The report further recommend that all contractors ensure that QA/QC costs can be tracked on a program-, project-, and task-specific basis to further the development of a historical record.

The INEL *Action Plan* evaluate Quality Control costs to determine whether the costs should be separately estimated at the task level.

* The corresponding POC (III.D.2) was *met* for EM-50 activities.

Documentation of the quality assurance requirements was in WINCO "Policy Directive No. 8-01, Quality Assurance" and in EG&G's *Program Management Plan for the WTDD*, Section 10, "Quality Assurance." QA/QC concepts are discussed in TTP task descriptions where applicable. TTP Instructional Guidance requires that the TTP task description for technology development tasks describe the experimental design, quality assurance, data analysis, and other tools employed to assure data quality.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

QA/QC scope of work requirements for EM-30, -40, and -60 projects and tasks are identified in the *INEL Cost Estimating Guide* and the ER and WM Implementing PMPs. Defining QA/QC scope of work requirements, which are the basis for developing program and project cost estimates, ensures that the costs for QA/QC are identified and incorporated in program/project estimates, baselines, and budgets.

From a more technical perspective, the ER Implementing PMP identifies the Quality Program Plans of the M&O contractors and states that the ER program will follow the standards and requirements in DOE Order 5700.6C, DOE-ID Order 5700.6D, EPA Quality Assurance Management Staff (QAMS-005/80), ASME NQA-1, and DOE Order 5820.2A.

To save time and money, a standard *Quality Assurance Project Plan* has been developed for EM-40 projects and tasks. This plan can be amended as needed to reflect the unique requirements and conditions of specific projects. QA/QC requirements for ER RD/RA are defined in the RD/RA guidance.

WM QA/QC requirements are recognized in the WM Implementing PMP, which states that the program will follow the QA/QC requirements in DOE Orders 4700.1, 5700.6C, and 5820.2A.

The work plans and estimates reviewed by the subteam demonstrate a clear understanding of QA/QC requirements and the incorporation of QA/QC costs in program/project estimates.

* *The POC is partially met for EM-50 activities.*

EM-50 has issued 11 Standard Operating Procedures that comprise a Quality Management System for implementation by the Operations Offices and National Laboratories. EG&G has issued an *Idaho Quality Manual* and a *Quality Program Plan* for the Engineering Research and Applications Department.

The TTPs do not include specific quality control steps, nor do associated cost estimates explicitly reflect QA/QC activities. PIs, however, review and evaluate subcontractor/vendor Quality Assurance Programs.

We recommend that the TTP be modified to include a section for QA/QC steps. We also recommend that the cost of conducting QA/QC be included in the TTP and WP cost estimates.

III.D.5 Health and Safety

POC D.5

Program/project/task documentation includes Health & Safety requirements. The requirements are included in the scope of work and are coordinated with the cost estimator. The cost estimate considers and includes the cost for Health & Safety.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, U.S. EPA, Oct. 1985

Observations, Discussion, and Recommendations

Round I

The corresponding POC (III.E.4) was *partially met* for EM-30 and EM-40 activities.

The various ER and WM management plans, contractor procedures/ directives, *ER Cost Estimating Handbook*, and the *DOE/ID Managing for Safety and Quality Manual* clearly identified Health and Safety (H&S) requirements.

EG&G ER H&S costs were assigned to a program management function and not necessarily tracked against a particular task. Although H&S requirements were incorporated in, and were an integral part of ER activities, the Round I CQMA report recommended that task-specific cost estimates specifically recognize these requirements. The report further recommended that all contractors ensure that H&S costs can be tracked on a program-, project-, and task-specific basis to further the development of a historical record.

The INEL *Action Plan* evaluate Health & Safety costs to determine whether the costs should be separately estimated at the task level.

* The corresponding POC (III.D.3) was *met* for EM-50 activities.

Contractor *Project Management Plans* described how environmental, safety, and health requirements were identified in the risk-assessment phase of the project and the practices that were to be followed in the course of the project work and closeout. Considerations of these requirements is included in the cost estimate. Projects conducted in laboratories and/or in facilities are subject to Occupational Safety and Health Administration regulations.

Round II

The POC is met for EM-30, EM-40, and EM-60 activities.

Health & Safety (H&S) scope of work requirements are described in the *INEL Cost Estimating Guide* and the ER and WM Implementing PMPs. Specific H&S requirements are defined in project H&S plans; EM-40 activities are performed under a site-wide H&S plan, which is amended for each project with an attachment describing site-specific conditions and requirements.

Among the Orders followed during the development of program/project/task plans to ensure compliance with the H&S requirements are: DOE 5400.1, DOE 5440.1D, DOE 5480.19, DOE 5480.23, DOE 5481.1, DOE 5481.1A, 5481.1B, DOE-5484.1, and DOE-ID 5484.1A.

All projects conducted in the laboratories and facilities are subject to Occupational Safety and Health Administration requirements. WBSs for EM-30, -40, and -60 activities include H&S requirements. Cost account/project managers indicated that H&S requirements are defined in the scopes of work and that their associated costs (e.g., preparation of plans, field investigation requirements) are included in project cost estimates.

* *The POC is partially met for EM-50 activities.*

The EG&G draft PMP states that all activities and approved projects will be completed in accordance with the OWTD *Safety and Health Program*, and DOE-OTD-92-035.

The *Idaho Health and Safety Plan* is referenced in the "Related Baseline Documents" section of some TTPs, but none of the TTPs reviewed presented information on any special H&S risks or proposed mitigation measures specific to the TTP.

We **recommend** that the format of the TTP be modified to include a "Special Health and Safety Factors" section that will address any potential H&S problems associated with each TTP. The cost of implementing any H&S activities should be included in the TTP and WP cost estimates.

APPENDIX A
INDEPENDENT COST REVIEW ANALYSIS
BY ADS

APPENDIX A: INDEPENDENT COST ANALYSIS BY ADS

This appendix includes the Independent Cost Review (ICR) Subteam analysis and supporting estimate of each activity data sheet reviewed. The independent check estimates generated through the ICR process test the reasonableness of the site estimates and drive out any apparent discrepancies or deficiencies. The numbers generated through the ICR process are not intended to be used by the site as a substitute for its estimate.

WP 14-E1, 14-E2, 14-E3: Treatment Evaluation and Demonstration

General Description

The Idaho Waste Processing Facility (IWPF) will be designed, constructed, and placed in operation to process and package transuranic (TRU) waste for shipment to a permanent repository. The IWPF phase I and II originally made up AU 14-E1. Changes in strategy were made in early Fiscal Year (FY) 1994. At that time, Technical Task Description 14-E1 was divided into three task descriptive documents; 14-E1 was renamed Treatment Evaluation and Demonstration, 14-E2 became Alpha Low-Level Waste (LLW) Treatment, and 14-E3 was titled Transuranic (TRU) Waste Processing.

AW 14-E1 is to aggressively pursue bench-scale treatment technologies being considered for treatment of α -LLW while using Idaho National Engineering Laboratory (INEL) capability. Activities will be integrated with those of the Private Sector Participation Initiative and the Office Technology Development. Criteria will be defined for private-sector treatment of α -LLW, the Alpha LLW Treatment Project, and the TRU Waste Processing Project. Applicable technology research for the Department of Energy (DOE) performed under the direction of the Office of Technology Development will be assessed and used where feasible. GNAIL 14-E1 contains five work packages:

- Strategy integration (program administration, program integration, environmental support, and waste acceptance criteria)
- Engineering Studies (process options and waste stream characterization)
- Thermal Treatment Process Development and Demonstration (design, cold testing, and demonstration analysis)
- Non-Thermal Treatment Demonstration (work package documentation; select and design the demonstration, modifications, and installation; environmental and safety documentation; waste for demonstration; perform demonstrations; and reporting and evaluation of results)
- Thermal Treatment Demonstration Capital Equipment (procure/modify/install).

NARL 14-E2 is to provide project formulation, conceptual design, and title design that precede construction of a facility to treat and process waste currently in storage; 27,000 cubic meters (m^3) of α -LLW (mixed and un-mixed) at the INEL, and 5,600 m^3 of "regional" α -LLW at Hanford, Los Alamos National Laboratory, and other DOE facilities. The Alpha LLW Treatment Project also may also 60 m^3 of mixed LLW generated annually at INEL if other planned treatment facilities prove impractical. (The Alpha LLW Treatment Project does not include treatment of unmixed LLW.)

The project is planned as a Major System Acquisition (MSA) with a construction start in late FY 2004 and operations commencing in late FY 2007. For planning purposes, the stand-alone facility is to be located near Radioactive Waste Management Complex. A 14-E2 contains two work packages:

- Alpha LLW Treatment
- Alpha LLW Treatment Capital Equipment.

A 14-E3 is to provide project formulation of a facility to repackage and provide limited treatment of TRU waste currently in storage; 37,000 m³ of TRU waste at INEL and 20,000 m³ of "regional" TRU at Hanford, Los Alamos National Laboratory, and other DOE facilities.

TRU wastes are to be retrieved, repackaged as appropriate, certified, and shipped to the Waste Isolation Pilot Project (WIPP) for final disposition. When the WIPP will open is not known, and disposal may not begin until about calendar year 2000.

This project is planned as an MSA with a construction start in early FY 2007 and operations commencing in late FY 2009. IMP 14-E3 contains one work package: TRU Waste Processing.

Analysis Performed

The Independent Cost Review (ICR) Subteam interviewed project managers and cost estimators and reviewed and analyzed data.

The Subteam used an approach that provides life cycle cost estimates for various treatment processes. This program uses the extensive analysis work performed by Morrison Knudson Corporation in conjunction with INEL under DOE contract DE-AC07-76ID01570. The results of this work were published as *Waste Management Facilities Cost Information (WMFCI) Reports* (October 1992). These reports included multiple (capacities) estimates for each process for various types of waste. To address variations in these capacities and to estimate interim capacity costs, regression techniques were used to develop curves. The results of the analyses provided smooth curves covering all capacities. These regression curves were computerized for use by the ICR Subteam to allow consistency in their application of life-cycle costs. This technique has been determined to provide estimates with a range of +/- 35%.

The site estimates used were obtained from Reports DNS-62-93 and DNS-08-94. The estimates for the α -LLW and TRU waste assume stand-alone facilities. However, variations to this approach are being evaluated. All estimated costs are in 1994 dollars.

Scope of Evaluated Tasks

The scope of each task evaluated is shown by task number.

Task 1: 14-E1 Treatment Evaluations and Demonstration

Task 2: 14-E2 Alpha LLW Treatment Facilities and Equipment

Task 3: 14-E3 TRU Waste Treatment Facility and Equipment.

Scope of ICR Analysis

The following is a brief description of the scope of the ICR analysis for each task by task number.

Task 1: The values associated with this task have been included in tasks 2 & 3 for analysis purpose.

Task 2: The ICR Subteam used the WMFCI Report.

Task 3: The ICR Subteam used the WMFCI Report.

ICR Results

Table A-1 summarizes the results of the ICR analysis.

TABLE A-1.— Summary of ICR Analysis of DS 14-E1, 14-E2, 14-E3:
Treatment Evaluation and Demonstration

TASK #	SITE EST. (\$000)	ANALYSIS TYPE	ICR EST. (\$000)	DIFFERENCE	
				\$000	%*
1**					
2	308,818	WMFCI	353,784	(44,966)	(15)
3	276,137	WMFCI	366,373	(90,236)	(33)
TOTAL	584,955		720,157	(135,202)	(23)
*Percent difference is absolute difference divided by the site estimate.					
**Included in Tasks 2 and 3 for Analysis Purpose.					

The following comments on the estimates for each task, by task number, primarily explain the differences between the site and the ICR Subteam estimates:

Task 1: N/A

Task 2: The site estimate was within the WMFCI estimating range of +/- 35%.

Task 3: The site estimate was within the WMFCI estimating range of +/- 35%.

Observations

- An Independent review being performed by INEL personnel of these estimates, which should highlight in more detail the differences between the site and the ICR estimates, is underway.
- The estimates and ICR analysis were developed based on preliminary design concepts for two stand-alone facilities. However, alternative concepts are being evaluated.

Recommendations

The ICR subteam makes the following recommendations:

- All estimates for processing facilities should be reviewed by an independent organization.
- The TRU (Task 3) site estimate should be reviewed to determine whether it reflects the costs associated with the quantities and requirements for TRU processing.

ADS 28-EG: Assessment of Test Area North Waste Area Group 1

General Description

The assessment of Test Area North includes the assessment and characterization of ten operable units (OUs) containing 79 potential release sites through Record of Decision (ROD) in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. The assessment activities will be performed in conformance to regulatory authority of CERCLA and the Resource Conservation and Recovery Act as described in the Federal Facility Agreement and Consent Order.

Current planning includes characterization of the four remaining OUs with RODs being required for all the OUs, either separately or combined into the Waste Area Group 1 comprehensive Remedial Investigation/Feasibility Study (RI/FS) assessment ROD and the resulting Remedial Design(s)/Remedial Actions(s).

Analysis Performed

The Independent Cost Review (ICR) Subteam interviewed project and program managers and reviewed and analyzed historical data. The Subteam members then prepared several estimates using a variety of tools and attempted to reconcile the differences between its estimate and the (activity data sheet) ADS estimate.

Scope of Evaluated Tasks

The scope of each task evaluated is shown by task number.

Task 1: OUs 1-07B Test Area North Groundwater Remediation

Task 2: OUs 1-10 Comprehensive RI/FS including Project Management for the Remediation of OUs 01-03: TSF-18 Rad Tank (5 yd³), TSF-26 PM-2A Tanks (21 yd³), TSF-38 Bottle Site (45 yd³) and OUs 01-06: LOFT-01 Diesel Fuel Spill (10,000 yd³) and TSF-08 Mercury Spill (5 yd³).

Scope of ICR Analysis

The following is a brief description of the scope of the ICR analysis for each task by task number.

Task 1: The ICR Subteam used the Cost of Remedial Action (CORA) Model to develop the basic costs and the FAST-CO Model for applying escalation, multiple-year operations, and project support costs.

Task 2: The ICR Subteam used the RACER 2 Model to compute the costs for this task.

ICR Results

Table A-2 summarizes the results of the ICR analysis.

TABLE A-2.—Summary of ICR Analysis of ADS 28-E1: Assessment of Test Area North Waste Area Group 1

TASK #	SITE ESTIMATE (\$000)	ANALYSIS TYPE	ICR ESTIMATE (\$000)	DIFFERENCE	
				\$000	%*
1	37,126	CORA/FAST	27,823	9,303	25
2	31,537	RACER 2	1,143	30,394	96
TOTAL	68,663		29,966	39,697	58
*Percent difference is absolute difference divided by the site estimate.					

The following comments on the estimates for each task, by task number, serve primarily to explain the differences between the site and the ICR subteam estimates:

Task 1: The site estimate shown above has been revised to approximately \$33M. It is based on a revised flow of 1,000 gallons-per-minute (gpm), which is reflected in the Fiscal Year (FY) 1995 plan. The new estimate is within 17% of the ICR estimate.

Task 2: The site's total project cost was be \$33.65M including contingency and escalation. This amount brings the unit cost to \$3,340/yd³ (\$33.65M/ 10,076 yd³). The costs computed by RACER 2 Model for remediation is \$1.143M or \$113/yd³. The costs computed by the RACER 2 Model are substantiated by a recent (completed FY 1994) contract at the Kansas City Plant where 14,500 yd³ of polychlorinated-biphenyl-contaminated material was excavated and loaded into 20-yd³ trucks for \$126/yd³. The site of the Kansas City Plant project was steeply sloped, contained high moisture content, and was a clay/rock/debris mix. The transportation and disposal, which included a 714-mile haul, added \$345/yd³. The task described for the remediation at the Idaho National Engineering Laboratory is to excavate contaminated materials, haul them to a disposal area, and cap on site using on-site materials as appropriate. The site estimate proposed for this work is excessively high for the described scope of work. No information is provided to show that exceptionally hazardous or difficult conditions exist.

Observations

TASK 1

The original estimate, \$37M, prepared by M.K. Ferguson of Idaho Company (MK-FIC) was for a flow of 10,000 gpm. After discussion with MK-FIC, it was determined that the current flow is 1,000 gpm, which yields a revised cost of \$33M. These values are reflected in the FY 1995 plan according to MK-FIC personnel. The ICR Subteam's original evaluation at 10,000 gpm produced an estimate considerably higher than the site estimate; however when the flow was reduced to 1,000 gpm, the estimates were within the estimating range.

TASK 2

The site estimate does not reflect the tasks associated with the scope of work.

Recommendations

The ICR Subteam makes the following recommendations:

TASK 1

The technology and estimate should be reviewed by an independent organization to determine the reasonableness of both the flow and cost.

TASK 2

Construction-type activities should be estimated by a professional staff that incorporates an internal review and approval process. Project managers should participate in the process so that the scope is accurately written and understood. Project managers should review the results for reasonableness.

ADS 30-EG Test Reactor Area Assessment and Remediation (WAG-2)

General Description

The Test Reactor Area houses extensive facilities for studying the effects of radiation on materials, fuels, and equipment. Activity Data Sheet (ADS) 30-EG contains 51 identified release sites that are being investigated. A priority site at Waste Area Group (WAG) 2, the Warm Waste-Water Pond, was originally designed to receive low-level radioactive wastewater. The Warm Waste-Water Pond underwent Interim Action in Fiscal Year (FY) 1993 and cleanup of the surrounding surface soils was completed in FY 1994.

Analysis Performed

The Independent Cost Review (ICR) Subteam interviewed project and program managers and reviewed and analyzed historical data. Subteam members then prepared several estimates using a variety of tools and attempted to reconcile the difference between its estimate and the ADS estimate.

Scope of Evaluated Tasks

The scope of the task evaluated is given below.

Task 1: Comprehensive Remedial Investigation/Feasibility Study (RI/FS) to determine and remediate contamination of the ground-water plume for the identified site.

Scope of ICR Analysis

The following is a brief description of the scope of the ICR analysis for the task.

Task 1: The RACER 2 Model was used to estimate the comprehensive RI/FS for ground-water contamination involving five wells at a depth of 550 feet.

ICR Results

Table A-3 summarizes the results of the ICR analysis.

TABLE A-3.—Summary of ICR Analysis of ADS 30-EG Test Reactor Area Assessment and Remediation (WAG-2)

TASK #	SITE EST. (\$000)	ANALYSIS TYPE	ICR EST. (\$000)	DIFFERENCE	
				\$000	%*
1	2,359	RACER 2	2,810	(51)	(2)
TOTAL	2,359		2,810	(51)	(2)
*Percent difference is absolute difference divided by the site estimate.					

The following comment explains the differences between the site and the ICR subteam estimates:

Task 1: The site estimate was within the normal range of $\pm 20\%$.

Observations

None.

Recommendations

None.

ADS 40-EG: Radioactive Waste Management Complex (WAG-7)

General Description

The Radioactive Waste Management Complex (RWMC) contains several subsurface disposal and aboveground storage areas for radioactive waste. Waste Area Group (WAG) 7 contains 10 surface disposal areas being investigated that represent several of the most technically challenging remediation problems to solve at the Idaho National Engineering Laboratory (INEL). One operable unit in the RWMC, Pit 9, represents the first attempt at INEL to effectively and permanently remediate radioactive subsurface waste. Proof-of-process tests were conducted in Fiscal Year 1993 to identify the best method with which to remediate the subsurface waste.

Analysis Performed

The Independent Cost Review (ICR) subteam interviewed project managers and cost estimators and reviewed and analyzed data.

The Subteam used an approach that provided life-cycle cost estimates for various treatment processes. This program uses the extensive analysis work performed by Morrison Knudson Corporation, in conjunction with INEL, under Department of Energy contract DE-AC07-76ID01570. The results of this work were published as *Waste Management Facilities Cost Information (WMFCI) Report* (October 1992). These reports included multiple (capacities) estimates for each process for various types of waste. To address variations in these capacities and to estimate interim capacities, regression techniques were used to establish curves. The results of the analyses provided smooth curves covering all capacities. The regression curves were computerized for use by the ICR subteam to allow consistency in their application of life-cycle costs. This technique has been determined to provide estimates with a range of $\pm 35\%$.

The site estimates used were obtained from Reports DNS-62-93 and DNS-08-94. The estimates for the Alpha and transuranic wastes assume stand-alone facilities. However, alternatives to this approach are being evaluated. All estimated costs are in 1994 dollars.

Scope of Evaluated Tasks

The scope of the task evaluated is shown below.

Task 1: Pit 9

Scope of ICR Analysis

The following is a brief description of the scope of the ICR analysis for the task evaluated.

Task 1: The ICR subteam used the *WMFCI Report*.

ICR Results

Table A-4 summarizes the results of the ICR analysis.

TABLE A-4.— Summary of ICR Analysis of ADS 40-EG: Radioactive Waste Management Complex (WAG-7)

TASK #	SITE EST. (\$000)	ANALYSIS TYPE	ICR EST. (\$000)	DIFFERENCE	
				\$000	%*
1	253,237	WMFCI	299,956	(44,438)	(18)
<i>TOTAL</i>	<i>253,237</i>		<i>299,956</i>	<i>(44,438)</i>	<i>(18)</i>
*Percent difference is absolute difference divided by the site estimate.					

The following comment on the estimates explains the differences between the site and the ICR Subteam estimates:

Task 1: The site estimate was within the WMFCI estimating range of +/- 35%.

Observations

Details for the current estimate were not available because they are considered sensitive due to contact negotiations.

Recommendations

None.

APPENDIX B

TECHNICAL TASK PLAN
SUMMARIES

1000

APPENDIX B:

TECHNICAL TASK PLAN SUMMARIES

This appendix contains descriptions of the technical task plans (TTPs) reviewed by the Cost Quality Management Assessment team. As appropriate, the following information is provided for each TTP.

- TTP number and title
- Project description
- Site contractor
- Proposed length of project
- Fiscal year budget(s)
- Total cost
- Significant findings.

TTP ID1-4-10-02: Borehole Permeater for Monitoring

Project Description

Risk assessment and environmental restoration require accurate estimates of transport properties and contaminant distributions in the vadose and saturated zones. The Borehole Permeater will be capable of introducing water flows into the subsurface over a range of negative and positive pressures while monitoring the flow rate of injection or, in a second mode, will introduce water into the subsurface at a user-specified flow-rate while monitoring pressure. The flow rate and pressure data sets will be used to compute estimates of hydraulic properties as a function of pore water pressure. The technology developed in the first year of this proposal serves to provide controlled pressures and flow rates suitable for estimating hydraulic and transport properties throughout the vadose zone. The tasks required to develop the technology are:

- Document the design and data quality objectives (DQOs) for Borehole Permeater I.
- Once design and DQOs have been documented, Borehole Permeaters will be constructed and installed at the field sites where hydraulic properties have been estimated from previous studies.
- Where previous studies are not readily available, field trails will be conducted to compare conventional shallow-surface methods with Borehole Permeater results and to establish the long-term monitoring performance of the Borehole Permeater (i.e., conformity to DQOs).
- Provide a report containing final design and test results.

Work to be conducted in the second year of this proposal will extend the operation of the Borehole Permeater for operation below the water table. Plans for the second year include developing designs and DQOs for a second generation of waterproof Borehole Permeaters that can be submerged and operated at depths exceeding 10 meters below a water table.

To estimate chemical transport properties of the subsurface, a third generation of Borehole Permeaters will be required. The Borehole Permeaters will be capable of introducing water at a specified concentration while obtaining pore-water chemical data at an adjacent point. Plans for the third year of work include developing and documenting a design for a Borehole Permeater capable of simultaneously injecting water and solutes over an area of a borehole while extracting the water over adjacent areas. The extractor portion of the instrument will be capable of obtaining solute samples in addition to monitoring the flow rates and pressure of the extracted water. All instruments measure pressure and/or provide a given flow rate. Data quality will be ensured by using off-the-shelf pressure transducers in standard electronic configurations. Flow rates will be monitored using pumps driven with stepper motors equipped with independent shaft indicators.

Site Contractor

EG&G Idaho

Proposed Length of Project
Through FY 1996

FY 1994 Budget
\$150K

FY 1995 Budget
\$200K

FY 1996 Budget
\$175K

Total Cost
\$525K

Significant Observations

The Technical Task Plan is the development and deployment of a Borehole Permeater that will allow the full length of a borehole to be used for characterization and monitoring activities. Being able to sample open boreholes also provides an early warning system because contaminants can be detected and concentrations quantified before the groundwater becomes contaminated.

Instrumentations made available through the technology proposed here can be used to impact all site characterizations, site monitoring, and risk assessment projects involving contaminant migration through the vadose zone and the aquifer and can optimize environmental monitoring programs at any hazardous-waste site.

TTP ID4-4-20-01: Light Duty Utility Arm Decontamination System and End Effector

Project Description

This Technical Task Plan (TTP) is a roll up of TTP ID2-2-20-02 and TTP ID2-3-20-02. The objective is to support the Westinghouse Hanford Company (WHC) Light Duty Utility Arm (LDUA) System Lead to develop and demonstrate the LDUA System at Hanford, and to submit a work plan outlining detailed planning for Fiscal Year (FY) 1994 work scope during the first 30 days of the fiscal year.

Actions to complete include:

- Provide decontamination system design and hardware for LDUA System.
- Integrate decontamination system with Tank Laser Interface and Confinement (TLIC) subsystem provided by WHC.
- Implement Cooperative Research and Development Agreement (CRADA) with decontamination vendor to develop special nozzle design and recirculation features in accordance with requirements for LDUA, end effectors, and the TLIC subsystems.
- Provide demonstration of LDUA decontamination system at Idaho National Engineering Laboratory (INEL) in FY 1994.
- Work with WHC to provide required environmental and safety documentation for decontamination system equipment.
- Work with Pacific Northwest Laboratories to test hardware for LDUA laser rangefinder end effector and participate in development testing at Hanford in FY 1994.
- Develop high-resolution laser rangefinder inspection technology for LDUA end-effector application.
- Develop multifunctional, nondestructive examination end effector for underground storage tank sidewall inspection applications.
- Provide technical support to LDUA procurement.
- Provide design-review packages and participate in LDUA System design review including conceptual, preliminary, and detailed design review in FY 1994.
- Initiate technology transfer activities to support deployment of a second LDUA System at INEL. (INEL plans to provide funding to WHC to procure second arm through WHC contract).

- Investigate tank interface and operational requirements specific to the INEL tanks and provide applicable design information to LDUA subsystem cognizant engineer for consideration in LDUA design activities.
- Provide draft functional and operational requirements for deploying LDUA system in INEL tanks.
- Provide letter report outlining detailed planning for INEL technology transfer of LDUA System.

The following are standard IDC Deliverables:

- Weekly highlight status to IDC (each Friday)
- Preliminary work plans for FY 1994 to system lead (November)
- Mid-Year Review package (March)
- Monthly technical and schedule report to the IDC/system lead (5th day of the month after the period covered)
- FY 1994/1995 planning session attendance(first and fourth quarters FY 1994)
- Protech Information Profile update (April)
- Full TTP to DOE-Headquarters (within 30 days after receipt of funding)
- Courtesy copies of all draft papers to DOE-HQ program manager (60 days before presentation or publication).

Site Contractor

Westinghouse Idaho Nuclear Company

Proposed Length of Project

Through FY 1994

FY 1994 Budget

\$900K

FY 1995 Budget

\$0

Total Cost

\$900K

Significant Observations

The LDUA Technical support, Decontamination/System Radiation Sensors/CRADA, Laser Rangefinder, Tank Integrity/Surveillance System Development, and LDUA INEL Specific Interface reduce personnel exposure, reduce risk to the environment, promote faster performance of tasks with a substantial reduction in operation cost, and enhance ability to retrieve waste in a timely manner.

Faster operation resulting from the development of this programmable characterization system will reduce the overall cost of cleanup.

TTP ID4-2-12-01: Pyrochemical Treatment of Idaho Chemical Processing Plant HLW Calcine: Continue Development

Project Description

Establish the feasibility of a pyrochemical treatment process for the Idaho Chemical Processing Plant. Propose an integrated process demonstration and associated Demonstration, Test & Evaluation schedule for implementation starting in Fiscal Year (FY) 95 under EM-30 funding if the process is shown to be feasible. Conduct testing to close technical issues regarding the feasibility of the existing proposed flowsheet, including: separation of cesium and cadmium by volatilization; chlorination and separation of zirconium, aluminum, and boron; and operating conditions for molten salt processing with possible separation of strontium. Describe the proposed process in terms of significant materials and chemical species and their mass balances. The principal investigator is providing technical support on cobalt dicarbollide technology as requested by the Department of Energy-Headquarters.

Deliverables include:

Monthly reports to the Integrated Program Coordinator (10th of each month)

Highlights that emphasize significant accomplishments or imminent activities (e.g., trips, meetings, presentations) to the Integrated Program Coordinator (at least twice each month)

Annual progress report to the Integrated Program Coordinator (by June 1). The ESPIP must justify its projects to EM-50 each year; this report will be used for that purpose.

Courtesy copies of any technical papers submitted for publication to the Integrated Program Coordinator.

Site Contractor

Westinghouse Idaho Nuclear Company

Proposed Length of Project

Through FY 1994

Prior Year Actual

\$798K

FY 1994 Budget

\$700K

FY 1995 Budget

\$0

Total Cost

\$1,498K

Significant Observations

This process has the potential to reduce the amount of high-level waste that would require disposal in a Federal repository by up to 30 fold.

The program involves subcontract work by Lawrence Livermore National Laboratory. Results of this joint effort could be applied to contaminated materials across the DOE complex if their composition is compatible with a molten salt process.

TTP ID1-4-20-07: Innovative End Effectors to Minimize Dust

Project Description

This task shall evaluate the conceptual design options of two retrieval end effectors and select the one that will most likely reduce dust generation with minimal reduction on production capabilities and cost effectiveness. The selected end-effector design will be fabricated and tested at the Idaho National Engineering Laboratory (INEL) Cold Test Pit. This task shall interface with Technical Task Plan (TTP) ID1-4-20-06, Automated Waste Conveyance System, to ensure design and test objectives are integrated for field testing.

A draft Technology Preparedness and Status Report shall be prepared by the Principal investigator (PI) and transmitted to the Buried Waste Integrated Demonstration (BWID) Program Office within 30 days of funding authorization.

An environmental checklist will be completed and transmitted to the BWID Program Office within 30 days of funding authorization. National Environmental Policy Act (NEPA) compliance for INEL activities will be coordinated through the BWID Program Office. The PI shall provide technology-specific support to the BWID program office, NEPA, and safety compliance efforts.

The BWID program will integrate demonstration/testing technical objectives with related technology demonstrations to maximize data collection opportunities as appropriate. PI support to this effort will be requested by BWID. Draft test plans will be submitted to the BWID Program Office for programmatic and technical review and approval. Comments on the test plans will be resolved by the PI prior to BWID approval.

Quarterly technical reviews for the BWID program office shall be included (kickoff meeting, midyear peer review, technology workshop, year-end close-out) in the TTP.

The PI shall provide weekly status (scope, schedule, cost) and monthly report input (by the 20th day following reporting period) to the BWID program office.

Site Contractor

EG&G Idaho

Proposed Length of Project

Through Fiscal Year (FY) 1996

FY 1994 Budget

\$532K

FY 1995 Budget

\$0

FY 1996 Budget

\$0

Total Cost

\$532K

Significant Observations

Use of a zero-contamination-release dumping operation eliminates the potential contamination release out of the top of the tunnel and the need for a tunnel to direct the waste into the dumpster.

The information gained can be used on a larger scale demonstration involving manned and remote excavators and cold test pits in out-years.

TTP ID1-4-20-19: Cryogenic Cutting System Demonstration (BWID)

Project Description

This task shall enhance and demonstrate cryogenic jet cutting technology for Buried Waste Integrated Demonstration (BWID) application (pretreatment of retrieved waste).

The hardware for low-pressure and high-pressure subsystems will be acquired and installed. The subsystem configurations will be tested and documented. Existing nozzle designs will be tested for effectiveness and modified to improve performance. Modified nozzle designs will be evaluated at both high and low pressures on a variety of materials. Test results shall be documented.

A draft Technology Preparedness and Status Report will be prepared by the principal investigator (PI) and transmitted to the BWID Program Office within 30 days of funding authorization.

An environmental checklist will be completed and transmitted to the BWID Program Office within 30 days of funding authorization. National Environmental Protection Agency (NEPA) compliance for Idaho National Engineering Laboratory activities will be coordinated through the BWID Program Office. The PI shall provide technology-specific support to the BWID Program Office, NEPA, and Safety compliance efforts.

The BWID program will integrate demonstration/testing technical objectives with related technology demonstrations to maximize data collection opportunities as appropriate. PI support to this effort will be requested by BWID. Draft test plans shall be submitted to the BWID program office for programmatic and technical review and approval. Comments on test plans will be resolved by the PI prior to BWID approval.

Quarterly technical reviews for the BWID Program Office shall be included (kickoff meeting, midyear peer review, technology workshop, year-end close-out) in the technical task plan.

The PI will provide weekly status (scope, schedule, cost) and monthly report input (by the 20th day following reporting period) to the BWID Program Office.

All tasks and activities will be conducted in accordance with all applicable laws, orders, and regulations.

The PI shall support and cooperate with the BWID Program Office in meeting programmatic requirements necessary for the successful fulfillment of the BWID mission.

A technical performance review shall be conducted for all the field testing and demonstration technologies to ensure demonstrability of the technology prior to fieldwork.

Site Contractor

EG&G Idaho

Proposed Length of Project

Through FY 1994

FY 1994 Budget

\$395K

FY 1995 Budget

\$0

Total Cost

\$395K

Significant Observations

Deployment of the system and validation of the data generated will allow deployment on hazardous and radioactive waste sites. Cryogenic cutting can aid in reducing the size of objects at the dig face or as a Demolition and Decommissioning activity and deployment of a cryogenic jet cutting capability on a gantry crane throughout the entire range of motion of the crane. The two projects may make use of the same hydraulic power unit and liquid nitrogen storage tank if the systems are adjacent.

APPENDIX C

INDIVIDUALS INTERVIEWED BY FUNCTIONAL AREA

APPENDIX C:

INDIVIDUALS INTERVIEWED BY FUNCTIONAL AREA

C.1 Individuals Interviewed on the Cost/Schedule Estimating Process

Anderson, Brian	Team Leader	DOE-ID
Baxter, William	Manager	EG&G
Bumbarry, Robert	Engineering Manager	EG&G
Cahn, Lorie	Scientist	Geotech
Cleveland, Jack	Manager	WINCO
Craig, Darin	Cost Schedule Controller	EG&G
Craiglow, Carol	Scientist	Geotech
Cutler, Craig	Manager	EG&G
Dooley, Kirk	Project Manager	EG&G
Durante, Linda	Cost Estimator	WINCO
Fantana, Ron	Manager	DOE-ID
Gale, Leland (Joe)	Manager	EG&G
Green, Kirk	Manager	EG&G
Green, Timothy	Manager	EG&G
Hastings, Kent	Program Analyst	DOE-ID
Hugo, Karl	Project Manager	DOE-ID
Jensen, Nolan	Manager	DOE-ID
Kroupa, Patti	Physical Scientist	DOE-ID
Loewenberg, Terry	Project Manager	EG&G
Magleby, Mary	Unit Manager	EG&G
Mascarenas, Carol	Program Manager	WINCO
Michael, David	Manager	EG&G
Morton, Cheryl	Unit Manager	EG&G
Norris, David	Sr. Project Control Rep.	EG&G
Reyes, Benny	Manager	EG&G
Seggerty, Brian	Acting Manager	Geotech
Seward, Belinda	Technical Leader	EG&G
Sivill, Terry	Cost Estimator	EG&G
Stoddard, Diane	Cost Estimator	EG&G
Troester-Solbrig, Debbie	Engineer	DOE-ID
Webber, Frank	Program Manager	MK-FIC
Wells, Jerry	Project Control Engineer	DOE-ID

C.2 Individuals Interviewed on the Independent Cost Review

Bruce, James	Project Manager	Geotech
Craig, Darin	Cost Schedule Controller	EG&G
Dooley, Kirk	Manager	EG&G

Gale, Leland (Joe)	Engineering Specialist	EG&G
Green, Kirk	Manager	EG&G
Green, Timothy	Manager	EG&G
Hastings, Kent	Program Analyst	DOE-ID
Higgins, Lynn	Project Manager	MK-FIC
Fantana, Ron	Manager	DOE-ID
Jensen, Nolan	Manager	DOE-ID
Kroupa, Patti	Physical Scientist	DOE-ID
Loewenberg, Terry	Project Manager	EG&G
Michael, David	Manager	EG&G
Parker, Alan	Program Manager	MK-FIC
Shropshire, David	Cost Estimator	EG&G
Sivill, Terry	Cost Estimator	EG&G
Stoddard, Dianne	Cost Estimator	EG&G

C.3 Individuals Interviewed on Management, Technical, & Policy

Baumer, Andrew	Manager	EG&G
Case, Joel	Acting Program Manager	DOE-ID
Dahl, Elizabeth	Budget Analyst	DOE-ID
Durante, Linda	Cost Estimator	WINCO
Green, Lisa	Program Manager	DOE-ID
Hastings, Kent	Program Analyst	DOE-ID
Judd, Thayne	Unit Manager	EG&G
Lucas, Jim	Project Engineer	EG&G
Mascarenas, Carol	Program Manager	WINCO
Mikkola, Andrew	Industrial Specialist	DOE-ID
Miles, Enoch	Director	DOE-ID
Morton, Sheryl	Unit Manager	EG&G
Ozaki, Calvin	Manager	EG&G
Parker, Alan	Project Manager	MK-FIC
Price, Joe	General Engineer	DOE-ID
Shafer, Doug	Technical Leader	EG&G
Tiernan, Mike	Manager	EG&G
Wells, Jerry	Project Control Engineer	DOE-ID
Williams, Alice	Manager	DOE-ID
Yates, John	Baseline Control Support	EG&G

C.4 Individuals Interviewed on the EM-50 Technology Review

Armstrong, Aran	Project Manager	DOE-ID
Bingham, Dennis	Project Investigator	EG&G
Bonzon, Christine	Special Assistant	EG&G
Burrell, Neil	Program Manager	DOE-ID
Christensen, Cal	Project Investigator	WINCO
Fielding, Paul	Fiscal Manager	EG&G
Friesen, Carl	Project Manager	DOE-ID
Griebenow, Bret	Manager	WINCO

Krivanek, Kenneth
Mason, David
Merrill, S. Kenneth
Nobel, Charles
Peterson, Gary
Schneider, George
Sisson, Buck
Smiley, Lois
Todd, Terry
Trudel, Patrick
Williams, Tom

Program Manager
Budget Analyst
Technical Program Manager
Project Manager
Project Manager
Program Manager
Project Investigator
Program Analyst
Principal Investigator
Project Manager
Program Manager

E&E, Inc.
WINCO
EG&G
DOE-ID
DOE-ID
DOE-ID
EG&G
DOE-ID
WINCO
DOE-ID
DOE-ID

APPENDIX D

DOCUMENTS REVIEWED

APPENDIX D:

DOCUMENTS REVIEWED

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APPENDIX E
TEAM MEMBERS

APPENDIX E: TEAM MEMBERS

Team Leader

Tom Russell

Department of Energy, EM-24

Process Subteam

Clarke Hemphill

Army Corps of Engineers

Carolyn Harris

Capstone Corporation

ICR Subteam

Larry Cheney

CAPSTONE Corporation

Wayne Stanley

CAPSTONE Corporation

Barbara Deck

Mason & Hanger

Management/Technical Subteam

David Soltis

A.T. Kearney

Abe Chehab

CAPSTONE Corporation

EM-50 Technology Subteam

Jack Peel

CTAC

Jim Levin

A.T. Kearney

Myrna Robinson

CAPSTONE Corporation

Support

Stephen B. Weiner

CAPSTONE Corporation

Dan Peters

CAPSTONE Corporation

James Garred

CAPSTONE Corporation

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APPENDIX F

LIST OF ACRONYMS

APPENDIX F:

LIST OF ACRONYMS

ADS	activity data sheet
BOA	basic ordering agreement
BWID	Buried Waste Integrated Demonstration
CAMP	<i>Capital Assets Management Plan</i>
CAP	Cost Account Program
CAPS	Cost and Planning System
CCF	change control form
CEG	cost-estimating group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CORA	Cost of Remedial Action [cost model]
CQMA	Cost Quality Management Assessment
CRADA	Cooperative Research and Development Agreement
D&D	Decontamination & Decommissioning
DOE	Department of Energy
DOE-HQ	Department of Energy-Headquarters
DOE-ID	Department of Energy-Idaho Operations Office
DQO	data quality objective
E&E	Ecology & Environment
EM CAT	Environmental Management Category
EM	Office of Environmental Restoration and Waste Management
EM-24	Office of Engineering and Cost Management
EM-30	Office of Waste Management
EM-40	Office of Environmental Restoration
EM-50	Office of Technology Development
EM-60	Office of Facility Transition and Management
EPA	(U.S.) Environmental Protection Agency
ER	[Office of] Environmental Restoration
FAST-CO	Friedman Analysis of Systems Technique-Cost of Ownership
FFA/CO	Federal Facility Agreement/Consent Order
FS	Feasibility Study
FY	fiscal year
gpm	gallons per minute
HLW	high-level waste
ICPP	Idaho Chemical Processing Plant
ICR	Independent Cost Review
ID/IP	integrated demonstration/integrated program
INEL	Idaho National Engineering Laboratory
IWPF	Idaho Waste Processing Facility
LCC	life-cycle cost

LCCA	Life Cycle Cost Analysis
LDUA	Light Duty Utility Arm
LLW	low-level waste
M&O	Management & Operating (contractor)
m ³	cubic meter(s)
MK-FIC	M.K. Ferguson of Idaho Corporation
MP	Major Project
MSA	Major System Acquisition
NEPA	National Environmental Protection Act
OPE	Office of Program Execution
OTD	Office of Technology Development
OU	operable unit
PCS	Project Control System
PEG	Program Execution Guidance
PI	principal investigator
PMD	Program Management Directive
PMP	<i>Program Management Plan</i>
PNL	Pacific Northwest Laboratory
POC	Performance Objective and Criteria
PTS	Progress Tracking System
QA/QC	Quality Assurance/Quality Control
R&D	Research & Development
RA	Remedial Action
RD/RA	Remedial Design/Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RI	Remedial Investigation
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
T&M	Transition and Management
TAN	Test Area North
TDD	technical task description
TLIC	Tank Laser Interface and Confinement
TPM	technical program manager
TPO	technical program officer
TRA	technology risk assessment
TRU	transuranic waste
TSI	Technical Site Information
TTP	technical task plan
UPB	unit price book
VE	value engineering
WAG	Waste Area Group
WBS	work breakdown structure
WHC	Westinghouse Hanford Company
WINCO	Westinghouse Idaho Nuclear Company
WIPP	Waste Isolation Pilot Project

WM	Office of Waste Management
WMFCI	Waste Management Facilities Cost Information
WP	work package
WTDD	<i>Waste Technology Development Directives</i>
yd ³	cubic yards