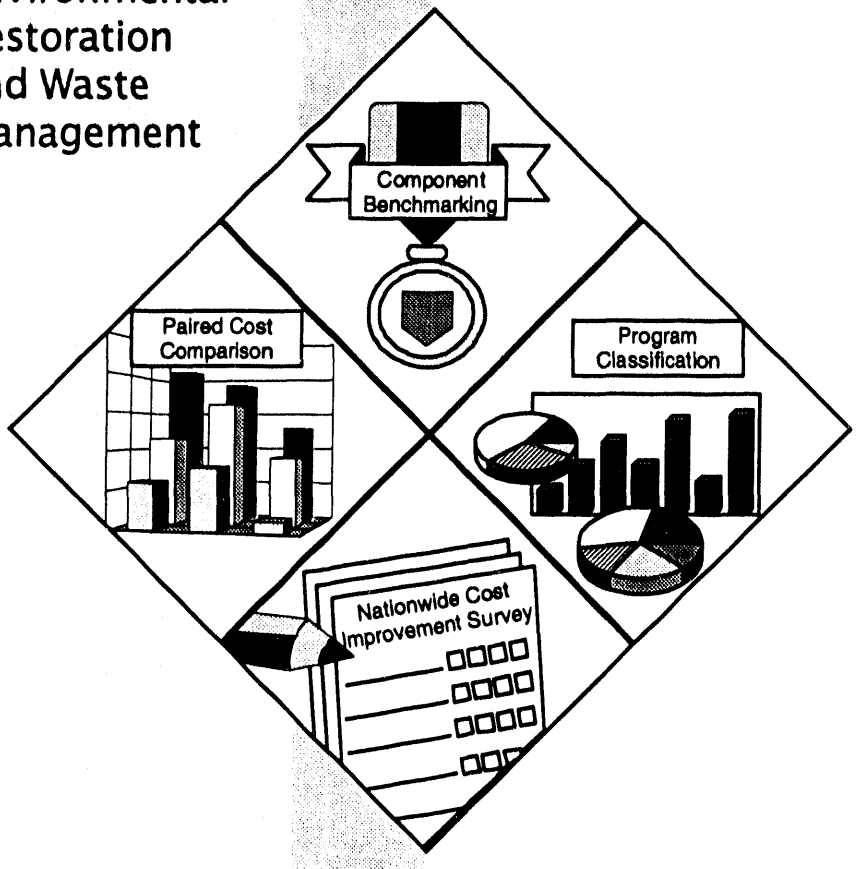
DOE/EM-0106P

Benchmarking for Cost Improvement

U.S. Department of Energy

Office of Environmental Restoration and Waste Management



Final Report

September 1993

Department of Energy
Washington, DC 20585

The following report describes the design, execution and outcome of the Benchmarking for Cost Improvement initiative. I am gratified not only by the excellent insights and actions contained in the final report but also the manner in which the initiative was conducted. The unique, systematic approach used to examine areas for cost improvement stands out as an example of the type of analytical capability the Department of Energy (DOE) and the public can rely on to better understand the real problems faced by the agency and reach consensus on effective solutions.

Benchmarking, in the broadest sense, is an effective tool that can be used to improve the Office of Environmental Restoration and Waste Management's (EM) costs and processes. The technique features diagnostic tests that illuminate the underlying causes of cost and process inefficiencies not just the symptoms. This study is a first, but significant, step that reinforces the fundamental processes of cost estimating and cost control with an ongoing cycle of cost improvement.

Many interested parties contributed to the benchmarking initiative, providing input that improved both the design and the execution of the initiative. The enthusiasm clearly marked by the level of effort and interest in this study can provide the momentum needed to create the necessary environment for achieving improvement. I intend to create a centralized coordinating function within EM to act on the actions and recommendations in the report and to identify a strategy for monitoring, measuring, and reporting the success of these efforts.

I want to thank the DOE personnel and interested parties who worked so hard on these very difficult issues over a very short period of time. Our ability to build upon successes and learn from our mistakes is key to achieving the vision that, by the year 2000, DOE's Environmental Management Program will serve as the benchmark for all public management at the Federal level.

Sincerely,

Thomas P. Grumbly
Assistant Secretary for Environmental
Restoration and Waste Management

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Benchmarking
is "the practice of being
humble enough to admit someone
else is better at something, and being wise
enough to try to learn how to match
and even surpass them at it."

- The International
Benchmarking
Clearinghouse

EXECUTIVE SUMMARY

The U.S. Department of Energy's (DOE) Office of Environmental Restoration and Waste Management (EM) conducted the Benchmarking for Cost Improvement initiative with three objectives:

- Pilot test benchmarking as an EM cost improvement tool.
- Identify areas for cost improvement and recommend actions to address these areas.
- Provide a framework for future cost improvement.

The benchmarking initiative featured the use of four principal methods; interested parties contributed during both the design and execution phases.

- Program Classification
  DOE environmental restoration projects and waste management activities were classified and analyzed numerically based on a small set of categorical descriptors.
- Nationwide Cost Improvement Survey
  More than 3,300 individuals with experience or direct interest in the EM Program were given an opportunity (more than 2,100 responded) to provide opinions on issues and approaches that EM should explore to improve costs.
- Paired Cost Comparison
  Selected DOE projects/activities of varying complexity were compared in a pair-wise fashion to similar processes/activities conducted by both non-DOE Federal government agencies and private corporations to determine the magnitude of and explain the reasons for differences in unit costs.
- Component Benchmarking
  A single high-cost process (the monitoring of hazardous materials tanks) that forms an integral part of both environmental restoration projects and waste management activities was compared with similar processes conducted by both a non-DOE Federal government agency and a private corporation to explore both cost and process differences.

The benchmarking initiative was conducted on an accelerated basis. Of necessity, it considered only a limited set of data that may not be fully representative of the diverse and complex conditions found at the many DOE installations. The initiative generated preliminary data about cost differences and it found a high degree of convergence on several issues. Based on this convergence, the report recommends cost improvement strategies and actions. This report describes the steps taken as part of the benchmarking initiative and discusses the findings and recommended actions for achieving cost improvement. The results and summary recommendations, reported below, are organized by the study objectives.

Objective 1: Pilot test benchmarking as an EM cost improvement tool.

Result: The benchmarking initiative demonstrated that benchmarking, including mutually beneficial partnerships with other Federal agencies and commercial organizations and the involvement of interested parties, can be performed cost-effectively to yield valuable results.

Result: Based on experience from the private and public sectors, DOE can expect approximately 15-25% savings on selected processes and activities if benchmarking is properly implemented and utilized.

Objective 2: Identify areas for cost improvement and recommend actions to address these areas.

Result: The benchmarking initiative identified several programmatic areas in which DOE can improve costs by taking action. These areas were confirmed by convergence of findings from the nationwide cost improvement survey, the paired cost comparison and the component benchmarking elements.

Cost Improvement Area 1: Productivity can be increased by providing incentives in contracts and improving DOE contracting practices.

Cost Improvement Area 2: DOE can expect to decrease environmental restoration and waste management costs by eliminating unnecessary requirements and inappropriate DOE Orders.

Cost Improvement Area 3: Cost and schedule performance are hampered by lengthy reviews of documents, delays in approval, and inefficient organizational structures.

This report acknowledges existing efforts to address these areas and provides specific recommendations for focusing those efforts.

Objective 3: Provide a framework for future cost improvement.

An EM-directed benchmarking program should operate at two levels. First, the benchmarking program should address programmatic issues that offer significant opportunities for system-wide cost improvement.

Second, the EM program should facilitate cost improvement efforts in the field and should serve as a forum for sharing cost improvement and benchmarking results.

Both DOE staff and interested parties have stated that "we know what the problems are; what we need to do is act." By implementing the recommendations contained in this report and building on its growing relationships with benchmarking partners, EM can better control programmatic costs and more effectively expend taxpayers' dollars.

Study Report

"The process of searching out and emulating the best can fuel the motivation of everyone involved, often producing breakthrough results."

Robert C. Camp,
Xerox Corp.

INTRODUCTION

The United States Department of Energy (DOE) established the Office of Environmental Restoration and Waste Management (EM) in 1989 to consolidate responsibility for environmental remediation and compliance under one top-level management organization. Since then, EM has been developing the programs and project management tools necessary to perform its work. In the natural evolution of such a large and complex program, attention and effort are shifting from the design, development, and implementation of basic management systems to the issues of programmatic effectiveness and efficiency, including cost improvement. Toward that end, EM has begun a number of cost improvement efforts, including the Benchmarking for Cost Improvement initiative, the subject of this report. The benchmarking initiative was formulated in May 1993 with direction from EM Headquarters to complete an initial study by September 7, 1993.

Initiatives developed by the new Federal administration added definition and shape to the Benchmarking for Cost Improvement initiative. These include President Clinton's focus on reinventing government and Vice President Gore's National Performance Review, an effort to identify ways to cut costs and improve the quality of government services.

Impetus for the benchmarking initiative was provided by critical reviews over the last two years by various government agencies, including: the General Accounting Office; an interagency review team led by the Office of Management and Budget and the U.S. Army Corps of Engineers; DOE's Office of Procurement, Assistance, and Program Management; and DOE's Office of Environmental Restoration and Waste Management. In addition, a preliminary scoping study by the Office of Environmental Restoration identified a need to systematically examine areas in which DOE may pay more for environmental restoration projects than do other agencies or private companies.

Some DOE staff and interested parties have expressed the view that "we know what the problems are; what we need to do is act." However, significant actions affecting a complex, long-term, multi-billion dollar program must be based on empirical data. One of the benefits of the benchmarking initiative was the ability to test some of the widely held perceptions about EM costs so that efforts to reduce costs are focused on real problems most likely to optimize savings.

The initiative achieved each of its three main objectives:

- Pilot test benchmarking as an EM cost improvement tool.
- Identify areas for cost improvement and recommend actions to address these areas.
- Provide a framework for future cost improvement.

These objectives were achieved using the overall benchmarking initiative framework depicted in Figure 1.

PUBLIC PARTICIPATION

The benchmarking initiative benefited from contributions made by interested parties. More than 140 people attended the kickoff meeting in Washington, D.C. on June 22, 1993, to review the proposed scope and objectives of the initiative. The meeting focused diverse perspectives on cost issues, including the views of DOE/EM Headquarters and Operations Office managers; DOE/EM contractors; States; Tribal Governments; the executive and legislative branches of the Federal government;[1] national and local interest groups; and other interested parties. Based on suggestions made at the kickoff meeting, the project's scope and objectives were pared down to what could be achieved within the set schedule, which called for a report by September 7. Interested parties contributed

[1] Representatives from the Office of Management and Budget, Environmental Protection Agency, Army Corps of Engineers, Congressional Budget Office, General Accounting Office, and Congressional Research Service were in attendance.

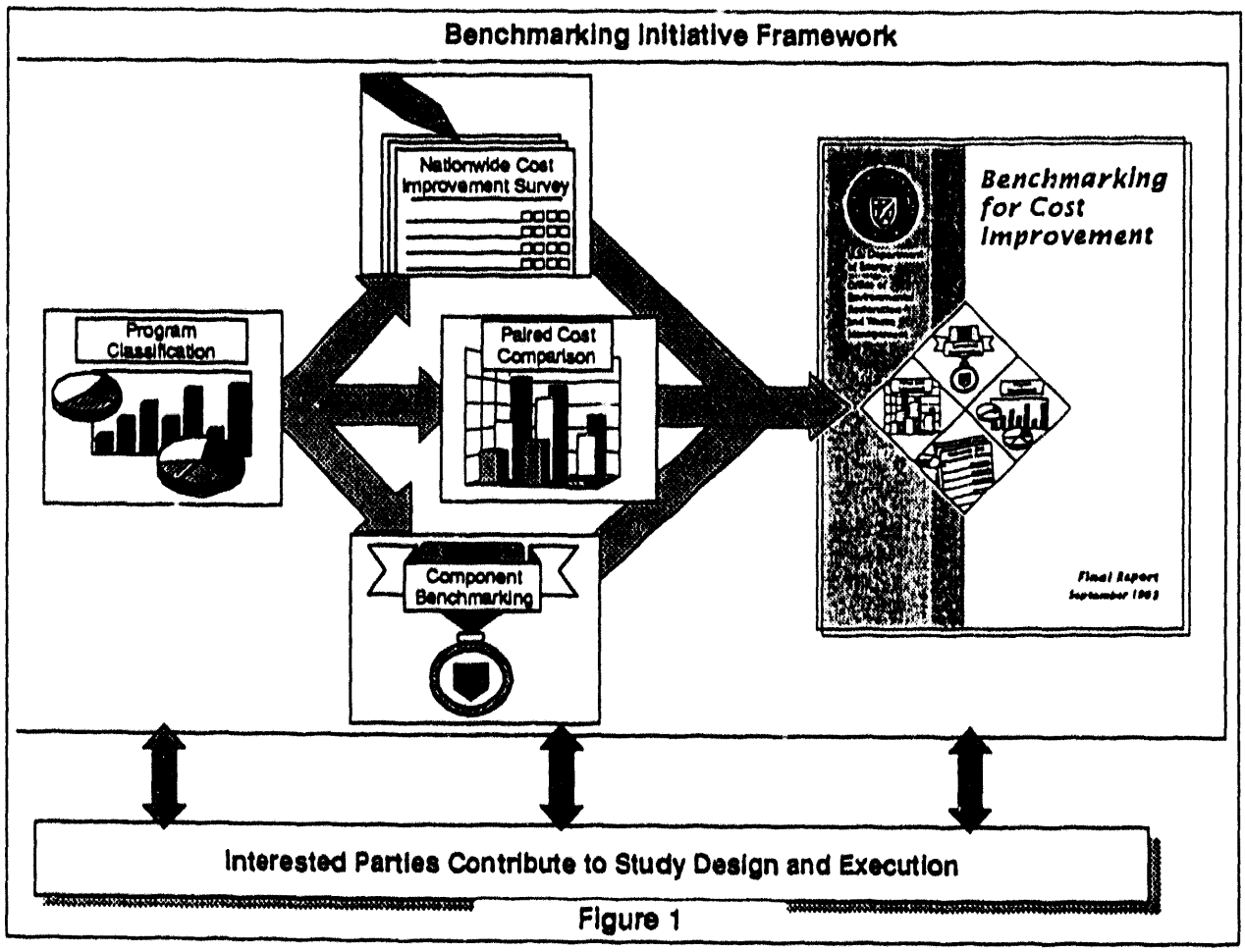


Figure 1

comments on the first draft of this report (see Appendix E for a summary of these comments).

METHODOLOGY

Benchmarking is recognized in both the public and private sectors as a proven tool for achieving cost improvement. The benchmarking project team designed and employed a multi-method benchmarking approach for identifying potential areas for cost improvement. The schedule for the study is depicted in Figure 2. The selection of a multi-method approach was based on the premise that the final convergence of results from several study elements would produce stronger results than could be achieved by any single approach. These study elements are described as follows.

1. *Program Classification of EM Activities*

Distinct criteria were used to categorize environmental restoration projects and waste management activities. The program classification framework focused on criteria describing waste type, functional activity, project type, project stage, funding distribution, and type of problem. The results of this analysis will serve as a resource for targeting future cost improvement opportunities (see Appendix A).

2. *Nationwide Cost Improvement Survey*

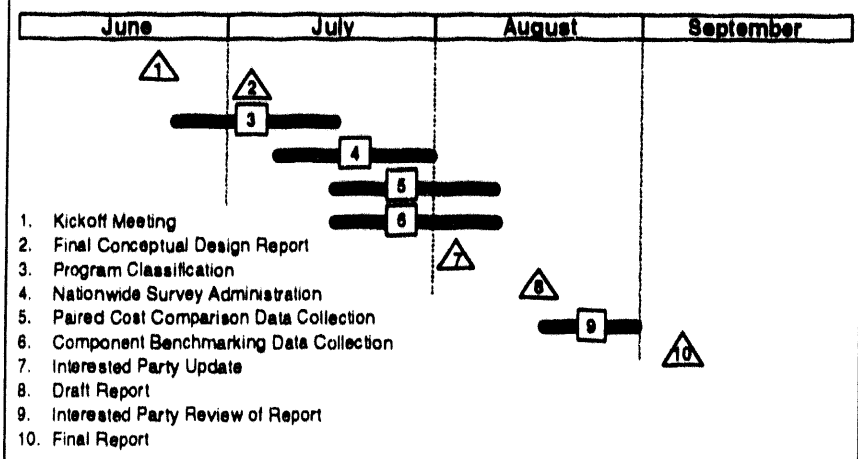
The survey asked more than 3,300 individuals to provide an opinion on issues and approaches that EM should explore to improve costs. In addition to answering questions about cost estimating practices, resources, regulatory requirements, and programmatic issues, respondents submitted written cost improvement suggestions. More than 2,100 people responded resulting in the most comprehensive record to

date on factors contributing to DOE costs and potential areas that DOE could pursue in cost improvement initiatives (see Appendix B).

3. *Paired Cost Comparison*

The paired cost comparison isolated and compared the cost of similar projects and activities to gain an understanding of disparities in cost performance. The paired cost comparison determined and explained differences between DOE and non-DOE projects and waste management activities. Originally, more than 20 projects and activities were to be compared. However, at the benchmarking kickoff meeting, participants recommended that this list be narrowed to meet the study schedule and provide an opportunity for meaningful public involvement. Consequently, projects and activities were selected for comparison from the following four categories (one per category) on the basis of graded regulatory complexity: standard construction; underground storage tank removals; Resource Conservation and Recovery Act (RCRA) closures; and the operation of a hazardous waste storage facility (see Appendix C).

Benchmarking Initiative Schedule



1. Kickoff Meeting
2. Final Conceptual Design Report
3. Program Classification
4. Nationwide Survey Administration
5. Paired Cost Comparison Data Collection
6. Component Benchmarking Data Collection
7. Interested Party Update
8. Draft Report
9. Interested Party Review of Report
10. Final Report

Figure 2

4. *Component Benchmarking*

Component benchmarking compares the processes and associated cost of a very specific task or function of one organization to a similar process of another organization that is recognized as "best in class" to identify opportunities for process and cost improvements. The project team decided to study a single high-cost process common to both environmental restoration projects and waste management activities. Participants at the benchmarking kickoff meeting identified selection criteria and potential components for benchmarking. Among other criteria, participants agreed that the component selected should be based on available data and relevant to future EM activities.

The project team ultimately chose to study the monitoring of hazardous materials tanks containing between 1,000 and 25,000 gallons of liquid, sludge, or slurry waste. The tanks contained hazardous material, as defined by the United States Environmental Protection Agency and regulated by RCRA.

Following the selection of this benchmarking component, the project team requested and collected data on an analogous process from benchmarking partners, and examined the magnitude and source of performance disparities (see Appendix D).

RESULTS

The results, reported below, are organized by the study objectives.

Objective 1: Pilot test benchmarking as an EM cost improvement tool.

Result: The benchmarking initiative demonstrated that benchmarking, including mutually beneficial

partnerships with other Federal agencies and commercial organizations and the involvement of interested parties, can be performed cost-effectively to yield valuable results.

Table 1 illustrates the value-added characteristics of the multi-method benchmarking initiative. The challenge now is to transfer the findings of this initiative into actions.

- The program classification element resulted in identifying certain high frequency and high dollar projects and activities within the environmental restoration and waste management program. The classification element can help future efforts to identify opportunities for cost improvement and can support the distribution of lessons learned to similar projects and activities. A discussion and summary of results from the program classification element is presented in Appendix A.

- The survey received an enthusiastic response demonstrating an interest in programmatic cost improvement from management, Federal employees, DOE contractors, and other interested parties. More than 60% (2,100) of the surveys were returned and more than 85% of survey respondents took the time to provide specific suggestions for cost improvement. Appendix B provides a discussion of the survey and summarizes the results.

- Partners from the public and private sector were identified for both the paired cost comparison and component benchmarking elements. During the implementation of the initiative, these partners assisted DOE by providing the necessary data to conduct cost comparison and component benchmarking analyses. Preliminary results not only show opportunities for cost improvement but also show that, for selected activities, DOE is competitive with these partners. This initiative demonstrated the willingness of benchmarking partners to work with DOE in identifying opportunities for cost improvement. The paired cost comparison and the component benchmarking elements are discussed in Appendices C and D respectively.

Result: Based on experience from the private and public sectors, DOE can expect approximately 15-25% savings on selected processes and activities if benchmarking is properly implemented and utilized.

In the benchmarking initiative, the results of the paired cost comparison and the component benchmarking elements confirm that DOE can expect to realize 15-25% savings on selected processes and activities. However, the benchmarking project team cautions that realization of such savings will only be achieved if benchmarking is implemented effectively (see discussion below) and if certain programmatic areas for cost improvement are addressed expeditiously.

Table 1 - Value-Added Characteristics of the Multi-Method Benchmarking Approach

METHOD	DATA TYPE	VALUE-ADDED	KEY QUESTION
Program Classification	Objective	Prioritization	Where are most of the costs?
Nationwide Cost Improvement Survey	Subjective	Perceptions of interested parties	What do interested parties think?
Paired Cost Comparison	Objective	Performance disparities	Is there a DOE / non-DOE disparity?
Component Benchmarking	Objective/Subjective	Process differences	What best practices can be adopted or adapted?

Benchmarking is defined by the General Accounting Office as "measuring performance against that of best-in-class installations or companies, determining how the best-in-class achieve performance levels, and using the information as the basis for strategies and implementation."[2] Grounded in principles of quality management, benchmarking focuses on improving performance through improving processes.

Table 2 illustrates the standard steps of benchmarking. The program classification element categorized program activities and measured whether most EM costs are included in a selected set of projects, activities, or classes. The nationwide cost improvement survey also focuses on gaining a baseline understanding by assessing perceptions about cost improvement and cost issues. This method taps into the knowledge of both DOE-affiliated and non-DOE interested parties to help determine what to benchmark (step 1) and to identify the key performance variables related to cost (step 2). Their participation increases the quality of the effort and facilitates implementation.

Table 2 - Standard Steps of Benchmarking

PHASE	STEP
Planning	1. Determine what to benchmark 2. Identify key performance variables 3. Identify benchmarking partners 4. Determine data collection method 5. Collect data
Analysis	6. Understand performance disparities 7. Predict future performance levels
Integration	8. Communicate findings and gain acceptance 9. Establish functional goals and implementation plans
Action	10. Implement and monitor progress 11. Measure results against interested party needs 12. Recalibrate benchmarks

To identify and explain cost and process differences between DOE and non-DOE projects and activities, the paired cost comparison method identifies partners (step 3), collects data using appropriate accounting methods (steps 4 and 5), and identifies potential performance disparities (step 6) at the project level. If performed in series, this method also can determine what should be benchmarked at a more detailed component level. Finally, component benchmarking progresses through the benchmarking steps of Table 2 (steps 1 through 9) at the component level, resulting in the identification of practices that are likely to contribute to superior performance. For improvement to take place, these practices must be adopted or adapted (steps 10 through 12) through a sound project management / implementation framework based on the principles of quality management and benchmarking. Such a framework is provided in this report.

Objective 2: Identify areas for cost improvement and recommend actions to address these areas.

Result: The benchmarking initiative identified certain programmatic cost areas that DOE can improve by taking action. These areas were confirmed by convergence of findings from the nationwide cost improvement survey, the paired cost comparison, and the component benchmarking elements.

While initiatives are already under way to address these findings, these results should reinforce the importance of these particular cost improvement areas and provide a mechanism for prioritizing and potentially enhancing existing cost improvement initiatives (see Appendix F for a summary of cost improvement initiatives).

Cost Improvement Area 1: Productivity can be increased by providing incentives in contracts and improving DOE contracting practices.

[2] U.S. Congress, General Accounting Office, Quality Management: Survey of Federal Organizations, (GAO/GCD-93-9BR, October 1992).

Respondents to the nationwide cost improvement survey identified outdated and ineffective contracting practices as the highest potential opportunity (out of 26 candidates) to reduce cost growth and/or cost overruns. In addition, contracting practices ranked as the second most frequent contributor to cost growth and overruns in the DOE EM programs according to respondents.

The paired cost comparison found that certain types of contracts are more effective in certain circumstances. For example, the initiative found that competitive bidding enables DOE to achieve cost competitiveness with its non-DOE Federal government and private industry partners. The cost of constructing a metal pre-engineered storage building and placing a clay cap was 17 percent higher for DOE than private industry and 30 percent lower than the non-DOE Federal government partner.

The component benchmarking team found that contractors working for other Federal government partners are encouraged to find opportunities for cost improvement in the contracting arena. The private industry benchmarking partner, when procuring contractor support, uses strong incentive programs for improving contractor performance. As an example, its largest contractor's performance is measured in the areas of safety, deadlines, cost, and productivity. Bonuses are available each quarter to the contractor and are distributed to members of self-managed teams and awarded according to criteria that mirror those for the contractor as a whole. By using such incentives, the industry benchmarking partner experienced productivity increases from 30 to 70 percent.

Recommendations for Cost Improvement Area 1

- Give a high priority to the DOE Contract Reform Team initiative.[3]
- Establish tangible, outcome-oriented evaluation criteria for cost plus award fee contracts. The Contract Reform Team should work with environmental restoration and waste management personnel in developing these criteria.
- Expand the use of fixed unit price or fixed price contracts when the scope of work can be adequately defined.
- Examine a variety of costly and rigid contracting practices, such as the requirement that Environmental Restoration Management Contractors absorb existing Management & Operating contractor staff at their present salary and benefit levels.
- Reduce the layering of contracts.

Cost Improvement Area 2: DOE can expect to decrease environmental restoration and waste management costs by eliminating unnecessary requirements and inappropriate DOE Orders.

Several survey questions addressed issues relating to regulatory standards and requirements and DOE requirements. Three of the top five activities that respondents felt had a strong potential for reducing costs involved DOE requirements and regulatory standards. These issues were: changes in DOE Orders, DOE reporting requirements, and the required National Environmental Policy Act documentation process. In addition, a strong theme regarding overlapping regulatory requirements and inappropriate DOE Orders appeared in the narrative responses.

The paired cost comparison found that DOE requirements, in some cases, raise the total cost of a project beyond that of non-DOE Federal government organizations. These requirements pertain to functions such as regulatory compliance and project management. Requirements related to these functions also change often contributing to increased cost.

The component benchmarking team was told that new DOE rules and regulations were often issued without a full understanding of the relationship between costs and benefits associated with implementing the rules and regulations.

[3] Further discussion of the Office of Environmental Restoration and Waste Management's approach to contracting reform is provided in testimony by Assistant Secretary Grumbly before the House Science, Space and Technology Subcommittee on Energy, July 15, 1993.

One example is the new RADCON manual. It is believed that implementation of the new manual may cost five to seven million dollars across the complex.

Recommendations for Cost Improvement Area 2

- DOE should convene an ad hoc panel composed of DOE-affiliated and non-DOE interested parties, including regulators and DOE personnel, to review overlapping requirements. The panel should review all existing and proposed DOE Orders for their specific applicability to EM and consider both the cost and benefit of requirements and regulations before revision and/or issuance.

- Existing initiatives focusing on evaluating DOE Orders requiring National Environmental Policy Act compliance and National Environmental Policy Act / Comprehensive Environmental Response, Compensation and Liability Act integration should receive high priority.

Cost Improvement Area 3: Cost and schedule performance are hampered by lengthy reviews of documents, delays in approval, and inefficient organizational structures.

Strong responses to open-ended questions in the nationwide cost improvement survey suggest that current DOE organizational structures and management practices lead to inefficient program implementation.

The component benchmarking team found the need for a clear definition of the roles and responsibilities of the DOE management structure. The sites noted a lack of continuity among various personnel in DOE, as well as in their interpretation of program requirements. In addition, DOE's decision-making process dictates the type of environmental requirements and documentation, often resulting in lengthy front-end reports. One environmental restoration project identified by the component benchmarking team required more than thirteen separate reports and a lengthy review process.

At the industry site visited, several middle-management layers were removed during the past five years in an effort to improve organizational performance, as well as to reduce costs. In addition, decision-making authority has been pushed to the lowest level of the organization. One result of this approach is that all workers and all individual departments are involved in the overall success of the company. For example, if a worker in one department detects problems with another department's equipment, the worker is more likely to notify the other department under a system of decentralized decision-making.

Recommendations for Cost Improvement Area 3

- Support existing initiatives to clarify roles and responsibilities, and divisions of authority between the Headquarters and the Operations or Project Offices.

Other Cost Improvement Areas:

While convergence was achieved only in the previously mentioned areas, benchmarking results provided additional data suggesting other possible areas with cost improvement potential. Appendix B highlights specific recommendations that were provided by survey respondents to address these and other issues. The other significant areas for cost improvement that were identified during the benchmarking initiative are listed below.

- *Changes in the scope of projects, either in physical size or in cleanup criteria, appear far too often and are very costly (cited by the survey as the number one reason (out of 26) for high DOE cost growth and/or cost overruns).*

- *Indirect costs contribute substantially to overall higher costs for DOE projects (cited by the paired cost comparison).*[4]

- *Funding delays cause inefficiencies in program implementation, resulting in increased costs (cited by the survey as the fourth highest reason (out of 26) for high DOE cost growth and overruns).*

[4] An Indirect Cost Subteam, which is part of the DOE Contract Reform Team, currently is developing recommendations on indirect cost issues.

- *The existing nuclear culture found at DOE sites leads to more stringent safety requirements than for non-DOE sites, resulting in increased costs (cited by the paired cost comparison).*

Objective 3: Provide a framework for future cost improvement.

The third objective of the benchmarking initiative is to provide a framework for future cost improvement activities. There are a number of ongoing and recently completed Headquarters and Operations Office activities focused on cost improvement (summaries of these activities as well as other related EM cost improvement studies are provided in Appendix F). As EM continues its cost improvement efforts, steps should be taken to ensure that new initiatives are integrated with these ongoing activities.

An EM-directed benchmarking program should operate at two levels. First, the benchmarking program should address programmatic issues that offer significant opportunities for system-wide cost improvement. These programmatic cost improvement issues should be prioritized in terms of their potential for reducing costs and the likelihood that a real and permanent change will be affected. The findings reported in the previous section of this report embody a number of these programmatic issues. As the results of the paired cost comparison and component benchmarking demonstrate, these programmatic issues surface at all levels of cost and process analyses.

Second, the EM program should facilitate cost improvement efforts in the field and should serve as a forum for sharing cost improvement and benchmarking results. Headquarters can assist in identifying benchmarking partners, consult on benchmarking methods and techniques, and coordinate the transfer of cost improvement experiences throughout the EM complex. However, an important lesson from this initiative is that benchmarking must be conducted and applied in the field. Operations Offices and contractors must be active leaders and participants in the benchmarking process.

Several cautionary notes are in order. Benchmarking is aimed at long term, continuous cost improvement. Benchmarking is not a budgeting activity nor is it of high value in an accelerated, short-term cost improvement program. Furthermore, benchmarking is best applied to specific activities that offer the greatest opportunity for change and improvement. Appendix D describes the process employed in this study to identify candidate activities. In the near term, EM would be better served by targeting a small number of activities for benchmarking than by mobilizing a large-scale effort to benchmark every dimension of the program. Finally, DOE must reciprocate by serving as a partner for other organizations involved in benchmarking. As this initiative demonstrated, DOE offers good, and in some cases best, practices in certain areas.

The EM benchmarking program should have the following objectives:

- To develop action plans to address the programmatic recommendations that are outlined in this report. An emphasis should be placed on integrating new cost improvement activities with ongoing initiatives.

- To serve as a clearinghouse for cost improvement and benchmarking activities across the DOE/EM complex. The clearinghouse should provide materials on benchmarking techniques, analyze program trends to identify candidate areas for cost improvement, disseminate the results of cost improvement and benchmarking activities,[5] and assist EM programs in identifying benchmarking partners.

- To involve interested parties in benchmarking activities, as appropriate.

- To provide an annual report on benchmarking activities.

[5] The International Benchmarking Clearinghouse, which is a subdivision of the American Productivity and Quality Center, provides a similar set of services to members. Development of an EM cost improvement and benchmarking program would benefit from the experiences of this organization.

Table 3: Proposed Major Activities for EM Benchmarking Program

Activity	Timeframe
Develop Action Plans for Key Programmatic Cost Issues	Fall 1993
Establish Headquarters Clearinghouses	Winter 1993
Develop Plans for Involving Interested Parties	Winter 1993
Develop Annual Report Highlighting Benchmarking Activities	September 1994

A framework for a successful benchmarking program should be designed to facilitate a Headquarters role that acts as a central-coordinating function and a field role that enables Operations Offices to conduct their own benchmarking activities.

Proposed near-term milestones for an EM benchmarking program are shown in Table 3. Actions associated with these milestones are discussed as follows.

Action 1: Develop action plans for key programmatic cost issues.

Action plans should be developed for key programmatic areas that were identified in the benchmarking initiative as having significant potential to improve DOE costs. These areas include DOE contracting practices; requirements and DOE Orders; and lengthy review of documents, delays in approval, and inefficient organizational structures.

Action 2: Establish clearinghouses in Headquarters line organizations.

Separate clearinghouses should be established for both the Office of Environmental Restoration and Office of Waste Management. These clearinghouses should act as information resources, provide materials on benchmarking techniques, assist in analyzing program trends to identify candidate areas for cost improvement, and disseminate results of cost improvement and benchmarking exercises. All Headquarters benchmarking activities should be directed toward assisting Operations Offices in conducting their own site-specific cost improvement and benchmarking activities.

Action 3: Develop plans for involving interested parties in benchmarking program activities.

Each involvement plan should focus on specific actions and decisions, employ established involvement mechanisms, and enable interested parties to contribute early and effectively.

Action 4: Develop annual report highlighting benchmarking activities.

At the end of each fiscal year, Headquarters should develop a report that highlights benchmarking research, studies, and other activities that have contributed to EM cost improvement efforts.

If properly implemented, the costs for implementing the benchmarking program will be far outweighed by the savings incurred through the program initiatives. A report that describes the results of the program and documents the outcomes of the benchmarking activities should be due in September 1994.

CONCLUSION

As noted earlier, both DOE staff and interested parties have stated that "we know what the problems are; what we need to do is act." By implementing the recommendations contained in this report and building on its growing relationships with benchmarking partners, EM can better control programmatic costs and more effectively expend taxpayers' dollars.

Appendices

"It
is important
to remember that
behind all of the planning
and organizing and analyzing activities
that define the benchmarking experience lie
the fundamental objectives of learning
something new and bringing new
ideas into an organization."

- Michael Spendolini
The Benchmarking
Book

APPENDIX A: SUMMARY OF THE PROGRAM CLASSIFICATION

INTRODUCTION

The program classification exercise yielded a basic framework that categorizes environmental restoration projects and waste management activities. The results will aid in focusing future cost improvement efforts. In this section, a basic categorization of environmental restoration projects and waste management activities based on current scope and funding assumptions is presented. In addition, lessons learned about the classification process and recommendations for future activities is presented.

The program classification element yielded preliminary results based on the following categorizations:

Environmental Restoration

- FY94 funding by subproject type (Figure A-1) -- this analysis breaks down preliminary FY94 funding by subproject type. "Subproject" is a term used by the Office of Environmental Restoration to describe a level six element in the Environmental Restoration Programmatic Work Breakdown Structure. All subprojects in the work breakdown structure are grouped into one of the following six categories: Remedial Actions (RA), Decontamination and Decommissioning (D&D), Program Management (PM), Long-Term Surveillance and Maintenance (S&M), Landlord (LL), or Treatment/Storage/Disposal (T/S/D).

- Cumulative five year planning estimates by cumulative number of environmental restoration subprojects (Figure A-2) -- this analysis shows cumulative estimated costs for the five year planning window plotted against the cumulative number of subprojects ordered from largest dollar to smallest dollar.

- Frequency of problem types associated with remedial action and decontamination and decommissioning subprojects (Figure A-3) -- this analysis categorizes problem types associated with subprojects into one of 13 different categories. Many subprojects had multiple problem types associated with their scope and were categorized accordingly.

- Frequency of remedial action and decontamination and decommissioning project type (Figure A-4) -- this analysis summarizes the number of projects based on the following breakdown: operable unit, closure, corrective measure unit, decontamination and decommissioning project, uranium mill tailing project (UMTRA), formerly utilized site remediation project (FUSRAP), potentially responsible party (PRP) site project, or a support project.

- Stage of each remedial action and decontamination and decommissioning project (Figure A-5) -- this analysis summarizes the approximate stage of each remedial action and decontamination and decommissioning project.

- Frequency of waste class occurrence by project (Figure A-6) -- this analysis resulted in a summary of the frequency of occurrence of different waste types for environmental restoration projects.

These variables were selected based on the availability of data and their similarity to variables used in other classification studies including the Office of Environmental Restoration's Technology Needs Assessment[1] and the Environmental Protection Agency's CERCLIS Characterization Project.[2]

Waste Management

- Preliminary FY94 budget estimates by function (Figure A-7) -- this analysis breaks down the FY94 estimate by waste management function including: treatment, storage, disposal, waste minimization, characterization, packing and transportation, technical support, and other support functions.

- Preliminary FY94 budget estimates by waste type (Figure A-7) -- this analysis shows how the preliminary FY94 budget will be distributed by waste type including: high level waste (HLW), spent nuclear fuel (SNF), transuranic waste (TRUW), low level waste (LLW), low level mixed waste (LLMW), hazardous waste (HAZW), and sanitary waste (SANW).

These categories were selected based on availability of data.

The classification element highlights high-cost and high-frequency areas in the environmental restoration and waste management programs for cost improvement. The benchmarking project team recognizes the constraints of this classification effort, however, imposed by the uncertainties in program costs, funding priorities and program scope. For example, decontamination and decommissioning activities (D&D) are known to be underrepresented in the environmental restoration figures (Figures A-1 through A-6) since much of the D&D scope is deferred or remains unknown.

METHODOLOGY

The benchmarking project team collected information for the classification task through DOE Headquarters personnel and by reviewing DOE literature and databases. Characterization was conducted at a high level to find common descriptors among activities within each program. The literature and databases utilized for the classification element include Activity Data Sheets, site characterization information, a preliminary environmental restoration performance measurement system, Site-Specific Plans, release site reports, and project baselines. Quality assurance and quality control (QA/QC) checks were conducted on data records to ensure accuracy and consistency of results.

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[1] Office of Environmental Restoration, U.S. Department of Energy, Technology Needs Assessment, (DOE/ID/12584-92 Vol. 2, August 1991).

[2] Office of Solid Waste and Emergency Response (OS-230), U.S. Environmental Protection Agency, SUPERFUND CERCLIS Characterization Project: National Results, (EPA/540/8-91/080, November 1991).

PUBLIC INVOLVEMENT

Interested parties had limited participation in the benchmarking initiative classification element. The classification variables were based primarily on data availability from existing DOE documentation. Interested party comments were addressed, however, during the review and comment period. Some sample comments on the preliminary draft were:

- "Don't underestimate the opportunities to improve costs in small-dollar activities. For example, while hundreds of environmental restoration projects may independently represent a small portion of the program, they collectively account for 50% of the total program costs. DOE may find model cost improvement activities in smaller projects that can subsequently be extended to larger-dollar projects."

- "Make it clear that the funding-based profiles reflect current or near-term (five year) funding projections. If the total program is considered, other activities (e.g., decontamination and decommissioning) may represent a greater share than the information suggests."

GENERAL RESULTS

General results of the classification element include the following:

- Program management and support projects in both the environmental restoration and waste management programs represent greater than twenty percent of the program costs for the periods reviewed.

- Buildings, structures, tanks, and disposal areas are the most frequently encountered problem types in the environmental restoration program.

- FY94 funding in the Office of Environmental Restoration is focused on remedial action projects. These projects are predominantly concentrated in the assessment phase and are for the most part CERCLA-regulated operable units.

- Fifty percent of the environmental restoration program's costs are concentrated in 7 percent of the subprojects.

- FY94 funding in the Office of Waste Management shows six times as many dollars allocated for high-level waste management than hazardous waste management.

- When examined by waste type, current waste management activity costs are concentrated in high-level waste management.

- When examined by function, the majority of waste management activity costs are concentrated in waste treatment.

DETAILED RESULTS

Environmental Restoration Projects

The figures that follow present the results of the classification element analysis. The data should be considered preliminary at this time and subject to change based on scope changes and modified program direction.

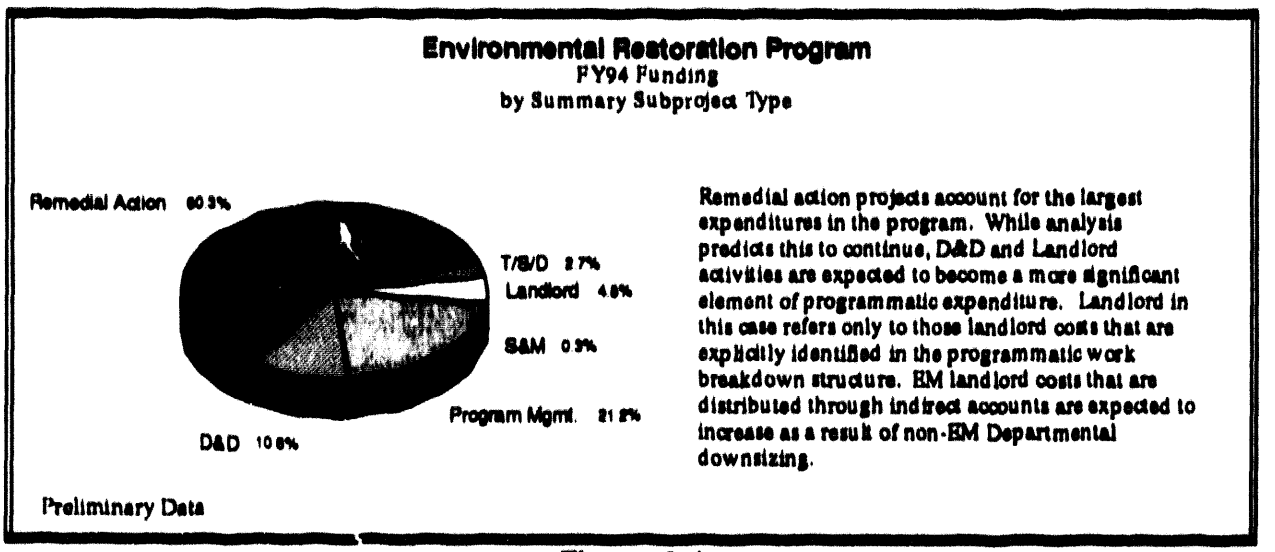

Figure A-1

Figure A-1 shows that more than 20% of environmental restoration costs are program management-related in FY94. Interested parties noted that the FY94 allocation of resources underrepresents the total program requirements for D&D, because in a resource constrained environment, D&D activities are often slipped to out years.

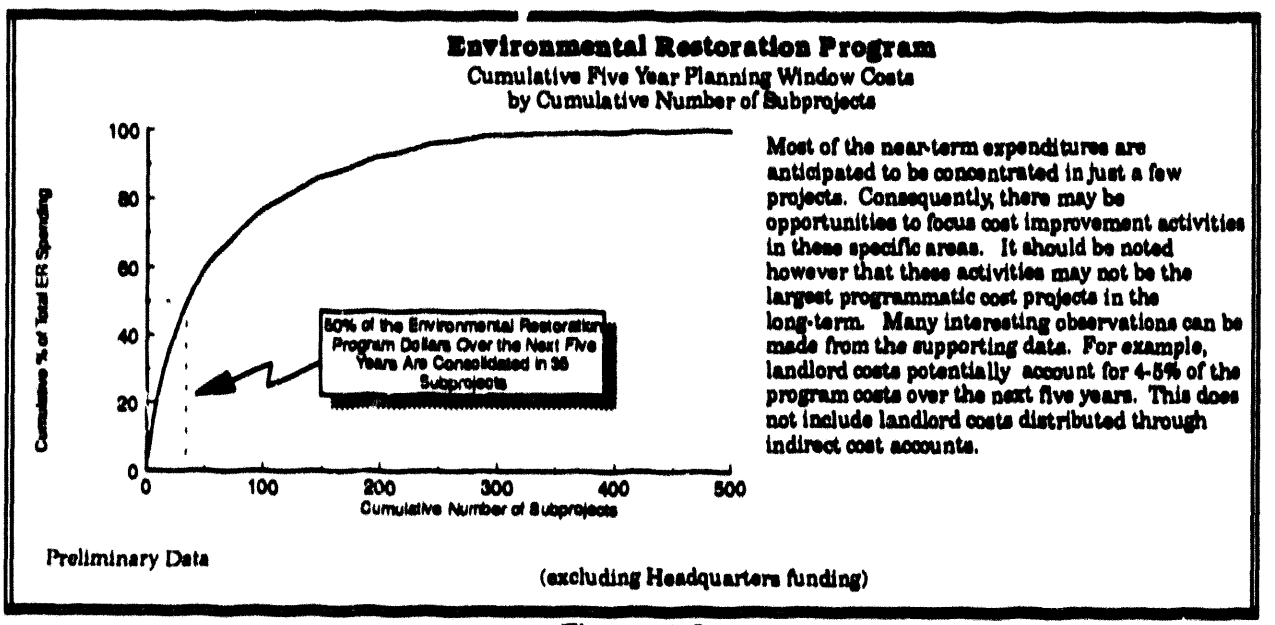

Figure A-2

Figure A-2 shows the relationship between total environmental restoration spending and the cumulative number of subprojects. This figure indicates that 50% of all environmental restoration costs will be concentrated in only 35 subprojects over the next five years. This suggests that cost improvement initiatives focused on these projects could result in large dollar savings.

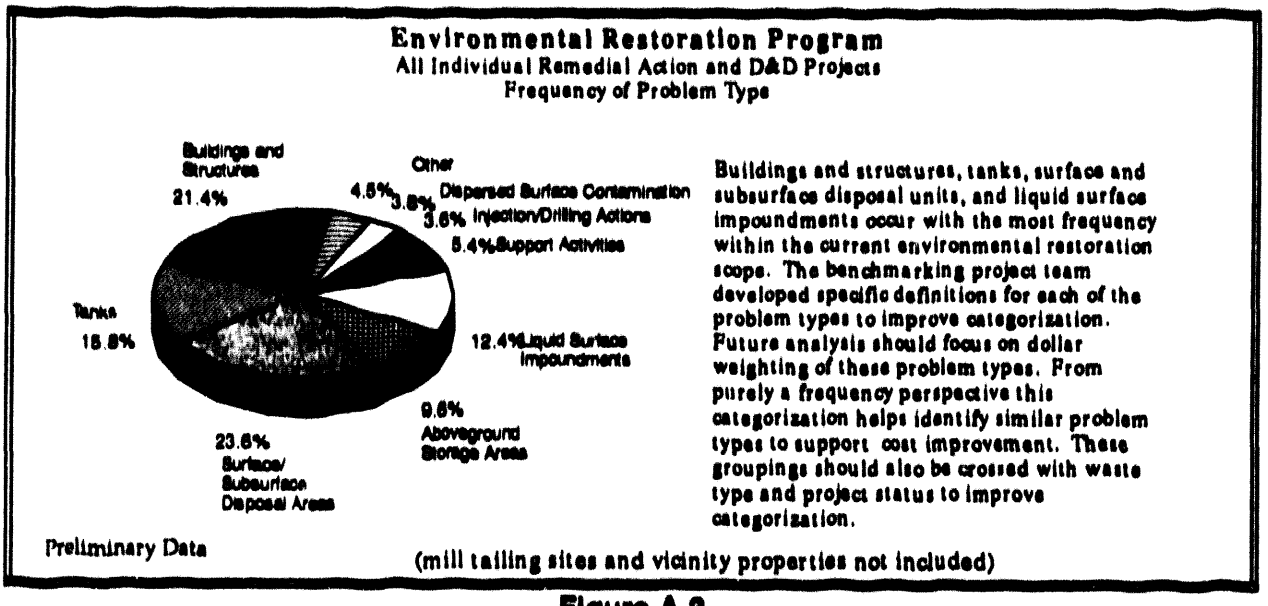

Figure A-3

Figure A-3 shows the frequency of problem types as they occur in the environmental restoration program. These frequencies have not been weighted by dollar. Nonetheless, such an analysis supports future targeting of cost improvement initiatives based on problem type. A more detailed analysis along similar lines could support an improved targeting of new technologies.

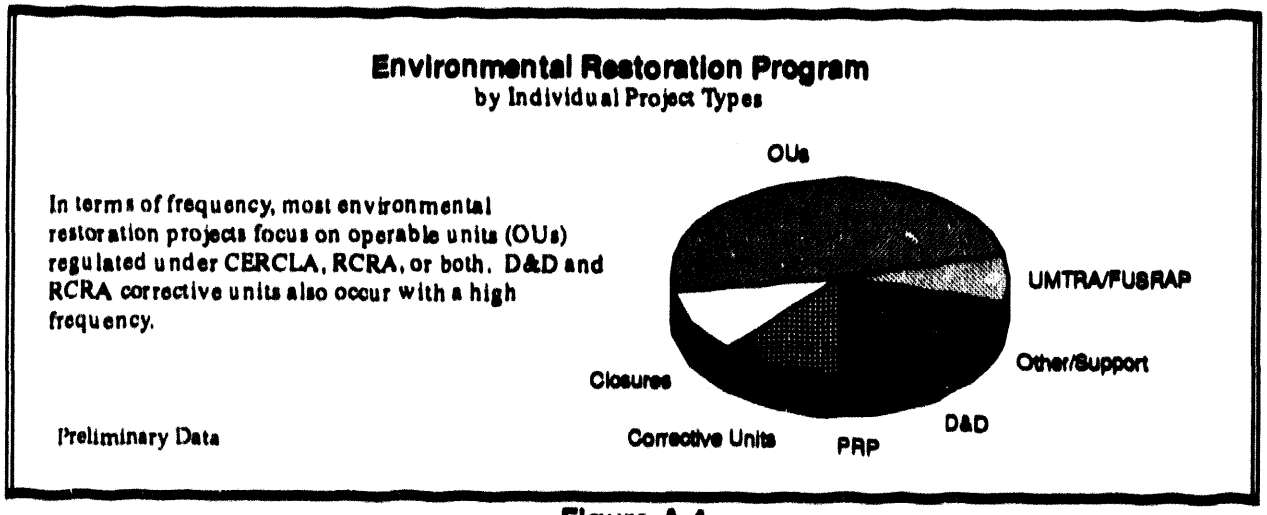

Figure A-4

Figure A-4 suggests opportunities for cost improvement based on regulatory requirements and project type. The current environmental restoration program is comprised for the most part of CERCLA-based operable units and D&D projects. The environmental restoration program overall is still in its early stages. As shown in Figure A-5, EM should balance the focus of near-term efforts to reduce cost with long-term cost initiatives aimed at addressing the program's life cycle cost.

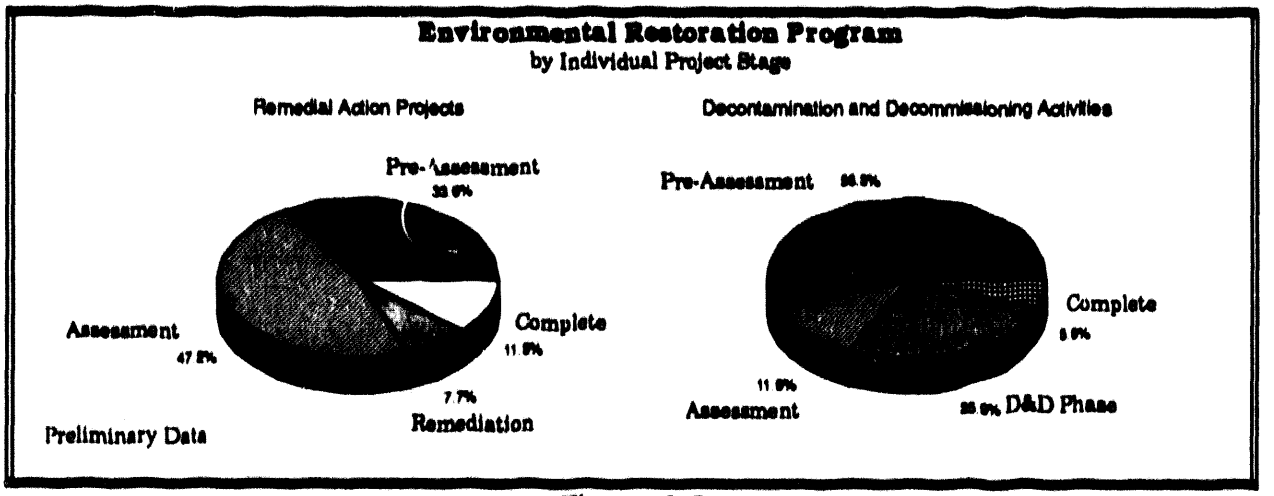

Figure A-5

Figure A-6 shows the frequency of waste type in the environmental restoration program. The figure suggests that hazardous, mixed, and low level waste is being addressed through more than half of the environmental restoration projects in the EM program. Dollar weighting of the waste categories is necessary prior to making any conclusions on cost improvement based on waste type.

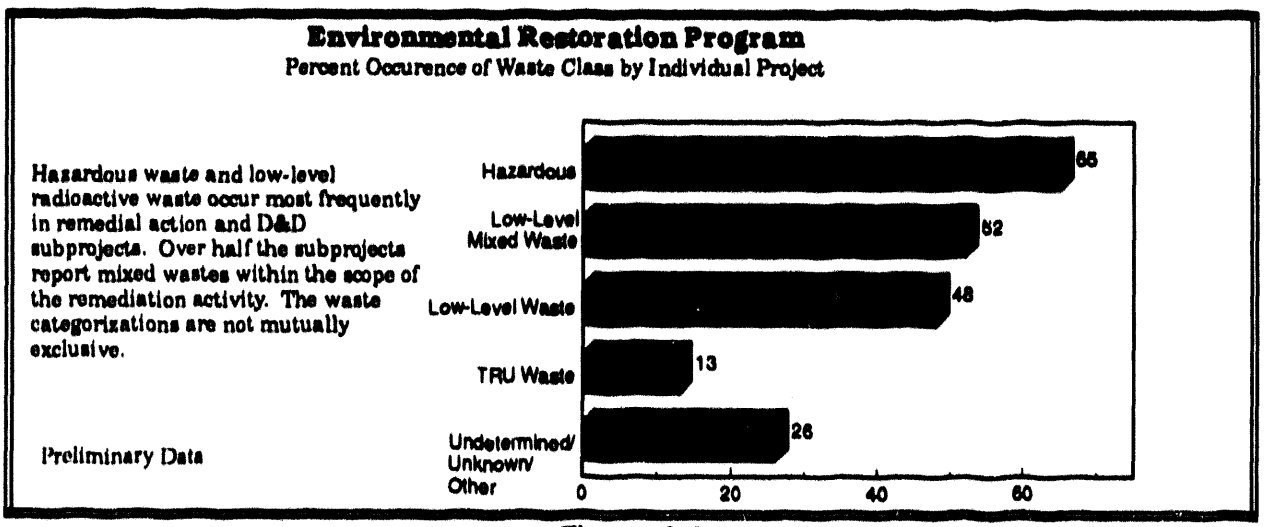

Figure A-6

Waste Management Activities

The waste management program is currently dominated by efforts to treat, store, and dispose of high level radioactive and transuranic waste. As with environmental restoration, a large portion (about 25%) of the preliminary estimated FY94 costs will go to program support including technical and program management formulation, execution, and evaluation activities. The funding allocation may change to some degree as the Office of Waste Management becomes responsible for a greatly expanded waste stream of radioactive material from Office of Environmental Restoration remedial action projects. Program support costs also can be expected to be reduced as DOE and its interested parties converge on a national strategy and complete the required planning and National Environmental Policy Act compliance activities.

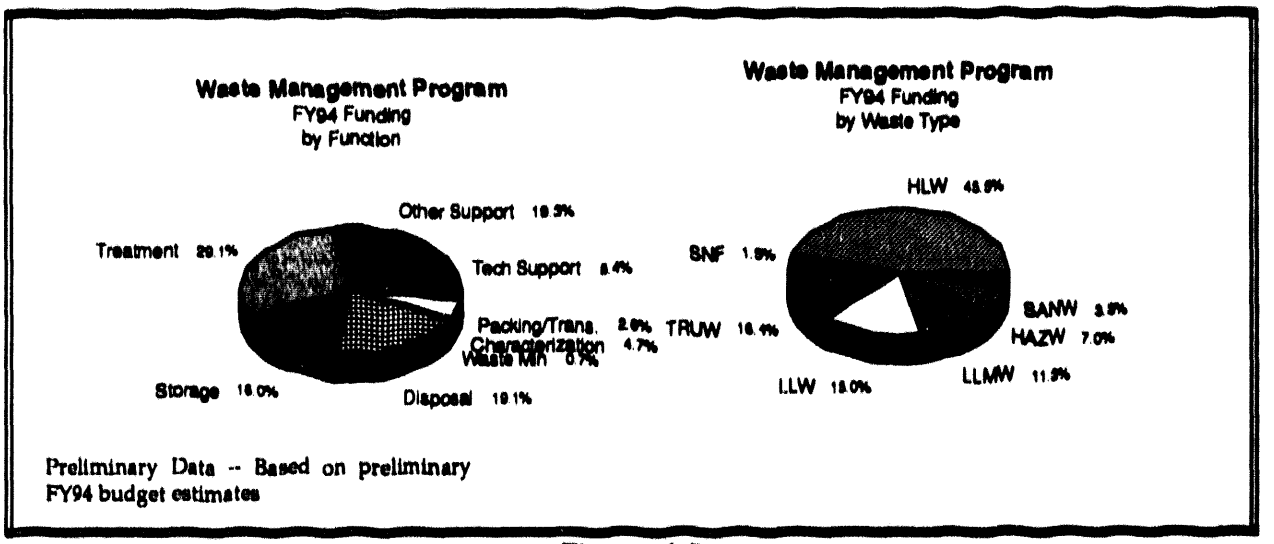

Figure A-7

An effort is made in the program classification to express currently dominant activities within the waste management program. Figure A-7 is taken from Office of Waste Management's planning data for FY94.

CONCLUSION

The classification element for the benchmarking initiative yielded results related to the distribution of costs and activity types within the environmental restoration and waste management programs. Additional efforts to dollar-weight the categorization criteria may reveal additional opportunities to improve costs. Currently, the results can provide preliminary guidance on areas to investigate for cost improvement and support the distribution of lessons learned for similar project and activity types.

APPENDIX B: SUMMARY OF THE NATIONWIDE COST IMPROVEMENT SURVEY

INTRODUCTION

One element of the benchmarking initiative was a nationwide cost improvement survey soliciting perceptions on issues that affect the costs of environmental restoration projects and waste management activities. A copy of the survey is shown in Figure B-1. The overall objective of the survey was to collect and evaluate the views of a large sample of individuals from various organizations and backgrounds, and with differing interests in the EM program. The first part of the survey (Questions 1-7) contained questions relating to work experience and educational background of the respondents. Part two sought to identify areas that contribute to cost growth (Question 8) and to evaluate those same cost issues according to their potential for reducing cost growth if DOE implemented a cost improvement initiative directed at each issue (Question 9). Part three consists of two open-ended questions (Questions 10 and 11) that asked respondents to identify the single most important action that DOE could implement to reduce cost growth and to provide an example of a recently implemented EM action that resulted in cost savings. The answers to these questions were evaluated to assist EM in better understanding the attitudes of interested parties and in designing future actions directed toward reducing and/or controlling the costs of environmental restoration and waste management activities. This appendix summarizes the survey results.

METHODOLOGY

A survey instrument was initially designed by the benchmarking project team and then revised based upon comments received from interested parties during and immediately following the benchmarking initiative kickoff meeting. The survey instrument included both closed and open-ended questions. Likert scales (summated ratings) were employed for the closed-ended questions to facilitate data analysis. The instrument was limited to four pages to encourage a larger response.

The survey mailing list was compiled from several sources, including attendees at the Waste Management '93 Conference, participants at the benchmarking initiative kickoff meeting, and distribution lists maintained by DOE organizations. The survey was sent to 3,319 potential respondents throughout the United States. An alert letter announcing the survey was sent immediately prior to the survey; follow-up letters were sent after the survey was mailed; and phone calls were made to potential respondents. Several respondents subsequently made copies of the survey and sent them to other people in their organization or to other interested parties. Thus far, 2,100 surveys have been returned (a response rate of more than 63%). Of those, results from 1,849 surveys have been recorded and analyzed.

OMB No. 1910-0200

BENCHMARKING FOR COST IMPROVEMENT

PART I: *The following questions relate to your work experience and educational background.*

1. ***Check the option that best describes the type of organization with which you are currently affiliated:***

DOE EM-30 (WM)	___	U.S. EPA	___	National Laboratory	___
DOE EM-40 (ER)	___	U.S. DOD	___	University or College	___
DOE HQ, not EM-30 or 40	___	Indian Tribe	___	Environmental Group	___
DOE HQ Contractor	___	Other Federal Agency	___	Citizen's Group	___
DOE Operations Office	___	State or Local Government Agency	___	Other _____	
DOE Field Operations Contractor	___	Private Sector, not DOE affiliated	___		

2. ***Does your work currently involve addressing costs associated with DOE environmental restoration and/or waste management activities?***

Yes ___ No ___

3. ***What is the primary focus of your work?***

Environmental Restoration ___ Waste Management ___ Both ___ Neither ___

4. ***Which of the following best describes your current role in your organization?***

Cost Estimator	___	Scientist	___	Regulator	___
Policy Analyst	___	Engineer	___	Professor	___
Lawyer	___	Public Official	___	Laborer	___
Financial Analyst	___	Project Manager	___	Other _____	

5. ***Please check your highest level of education:***

High school or less	___	Two-year college degree	___	Masters degree	___
Some college	___	College/university degree	___	Ph.D.	___

6. ***How many years of professional work experience do you have?*** ___

7. ***Please provide your name and address (not required):***

_____
_____
_____
_____
_____

PART II: *The following questions ask you to evaluate various cost issues with respect to their frequency of occurrence (Question 8) and their potential to reduce cost growth and overruns (Question 9). Please respond to each cost issue by checking one box per line. Blank lines are provided to include overlooked cost issues.*

8. ***How often do the following contribute to cost growth and/or overruns in environmental restoration and/or waste management activities within the DOE complex?***

From what perspective are you answering this question? Environmental Restoration ☐ Waste Management ☐ Both ☐

	Very Often	*Often*	*Some-times*	*Rarely*	*Never*	*Don't Know*
COST ESTIMATING						
Lack of estimating model and/or benchmarking data	☐	☐	☐	☐	☐	☐
Increase in direct costs (e.g., labor and equipment)	☐	☐	☐	☐	☐	☐
Increase in indirect costs (e.g., overhead costs)	☐	☐	☐	☐	☐	☐
Inadequate contingency allowance	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐
PROGRAMMATIC						
Change in project/program scope	☐	☐	☐	☐	☐	☐
Funding delays	☐	☐	☐	☐	☐	☐
DOE contracting practices	☐	☐	☐	☐	☐	☐
Inadequate site assessment/waste characterization	☐	☐	☐	☐	☐	☐
Litigation and/or liability	☐	☐	☐	☐	☐	☐
Inadequate performance tracking/management systems	☐	☐	☐	☐	☐	☐
Unrealistic deadlines	☐	☐	☐	☐	☐	☐
Inadequate communication/coordination between sites & DOE HQ	☐	☐	☐	☐	☐	☐
Inadequate communication/coordination among sites	☐	☐	☐	☐	☐	☐
Delays in regulatory response (e.g., EPA approvals)	☐	☐	☐	☐	☐	☐
Unavailability of treatment, storage, and disposal facilities	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐
RESOURCES						
Shortage of qualified personnel	☐	☐	☐	☐	☐	☐
Ineffective project/program oversight	☐	☐	☐	☐	☐	☐
Inadequate personnel training	☐	☐	☐	☐	☐	☐
Inadequate technologies	☐	☐	☐	☐	☐	☐
Shortage of equipment and materials	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐
REGULATORY						
Changes in regulatory standards and requirements	☐	☐	☐	☐	☐	☐
Changes in DOE Orders	☐	☐	☐	☐	☐	☐
DOE reporting requirements	☐	☐	☐	☐	☐	☐
Other-than-DOE reporting requirements	☐	☐	☐	☐	☐	☐
NEPA documentation process	☐	☐	☐	☐	☐	☐
Unusual oversight requirements (e.g., safety and security)	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐

Figure B-1: Nationwide Cost Improvement Survey

9. *If DOE implemented a cost improvement initiative directed at each of the following, what is the potential for achieving reductions in cost growth and/or overruns in DOE environmental restoration and waste management activities?*

From what perspective are you answering this question?	Environmental Restoration ☐	Waste Management ☐	Both ☐

	Excellent	*Good*	*Fair*	*Poor*	*Don't Know*
COST ESTIMATING					
Lack of estimating model and/or benchmarking data	☐	☐	☐	☐	☐
Increase in direct costs (e.g., labor and equipment)	☐	☐	☐	☐	☐
Increase in indirect costs (e.g., overhead costs)	☐	☐	☐	☐	☐
Inadequate contingency allowance	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
PROGRAMMATIC					
Change in project/program scope	☐	☐	☐	☐	☐
Funding delays	☐	☐	☐	☐	☐
DOE contracting practices	☐	☐	☐	☐	☐
Inadequate site assessment/waste characterization	☐	☐	☐	☐	☐
Litigation and/or liability	☐	☐	☐	☐	☐
Inadequate performance tracking/management systems	☐	☐	☐	☐	☐
Unrealistic deadlines	☐	☐	☐	☐	☐
Inadequate communication/coordination between sites & DOE HQ	☐	☐	☐	☐	☐
Inadequate communication/coordination among sites	☐	☐	☐	☐	☐
Delays in regulatory response (e.g., EPA approvals)	☐	☐	☐	☐	☐
Unavailability of treatment, storage, and disposal facilities	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
RESOURCES					
Shortage of qualified personnel	☐	☐	☐	☐	☐
Ineffective project/program oversight	☐	☐	☐	☐	☐
Inadequate personnel training	☐	☐	☐	☐	☐
Inadequate technologies	☐	☐	☐	☐	☐
Shortage of equipment and materials	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
REGULATORY					
Changes in regulatory standards and requirements	☐	☐	☐	☐	☐
Changes in DOE Orders	☐	☐	☐	☐	☐
DOE reporting requirements	☐	☐	☐	☐	☐
Other-than-DOE reporting requirements	☐	☐	☐	☐	☐
NEPA documentation process	☐	☐	☐	☐	☐
Unusual oversight requirements (e.g., safety and security)	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

PART III: *The following questions ask you about specific cost reduction measures.*

10. *What is the single most important action that DOE could implement to reduce cost growth and/or overruns in environmental restoration and waste management activities without jeopardizing health and safety?*

Focus of Action:	Environmental Restoration ☐	Waste Management ☐	Both ☐

Category (check most appropriate):

Cost Estimating ___ Resources ___
Programmatic ___ Regulatory ___

Brief description:

11. *Please provide an example of a recently implemented action for an environmental restoration or waste management program that resulted in cost savings and that could be replicated within DOE.*

Focus of Action:	Environmental Restoration ☐	Waste Management ☐	Both ☐	I am unaware of any such action ☐

Category (check most appropriate):

Cost Estimating ___ Resources ___
Programmatic ___ Regulatory ___

Brief description:

12. *Please check this box if you wish to receive an executive summary of the results:* ☐

THANK YOU FOR PARTICIPATING!

Figure B-1: Nationwide Cost Improvement Survey

PUBLIC INVOLVEMENT

The benchmarking initiative is an example of DOE's effort to seek the participation of interested parties, both within DOE and external to DOE. This survey incorporated public involvement throughout its design and implementation. On a larger scale, the survey invited more than 3,300 people to voice their thoughts, concerns, and ideas about how DOE may improve costs, cost growth, and/or cost overruns in environmental restoration projects and waste management activities. More than 2,100 people responded.

RESULTS

DOE-related respondents (DOE Headquarters, Operations Offices, related contractors, and national laboratory personnel) comprise 82.4% of the total responses. Of the 82.4%, the largest single organization type was Operations Office Contractors, comprising approximately 29% of total responses. The remaining 17.6% of respondents represent the Environmental Protection Agency, Department of Defense, Tribal Governments, other Federal Agencies, state or local government agencies, private sector (non-DOE affiliated), universities, environmental groups, citizen groups, and others. People from a variety of roles were surveyed. Approximately 35% of respondents identified themselves as project managers; engineers and scientists comprised 30% of respondents. Approximately 81% of respondents stated that their current work involves costs associated with environmental restoration projects or waste management activities. Thirty-seven percent indicated that environmental restoration is the primary focus of their work, 22% said waste management was their primary focus; and 36% said both environmental restoration and waste management were their primary focuses. Basic demographic information is provided in Figure B-2.

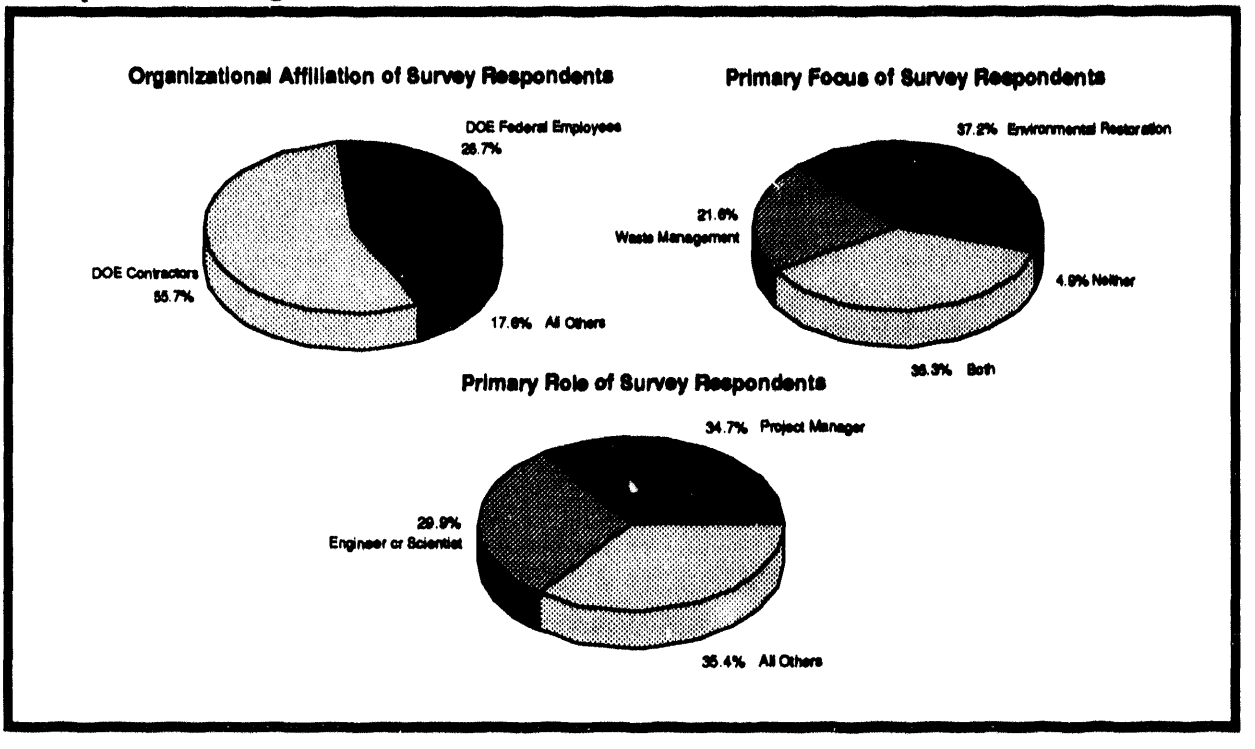

Figure B-2: Demographic Characteristics of Survey Respondents

Questions 8 and 9 addressed 26 cost issues (depicted in Table B-1) within four major categories: COST ESTIMATING, PROGRAMMATIC, RESOURCES, and REGULATORY. Respondents were asked to evaluate various cost issues with respect to their frequency of occurrence in contributing to cost growth and/or cost overruns (Question 8). A five-point Likert scale was used and coded for analytical purposes (Very Often=1, Often=2, Sometimes=3, Rarely=4, Never=5). The mean and standard deviation from all respondents are shown in Table B-1 and are ordered from the lowest (most frequent contributor to cost growth) to the highest (least frequent contributor) mean value.

Table B-1: Survey Ranking of Issues Contributing to Cost Growth and Overruns

Overall Rank	Issue	Mean	Standard Deviation
1	Change in Project/Program Scope	1.99	0.84
2	DOE Contracting Practices	2.09	0.95
3	Delays in Regulatory Response	2.32	0.94
4	Unrealistic Deadlines	2.36	0.95
5	Funding Delays	2.36	0.97
6	National Environmental Policy Act Documentation Process	2.39	1.02
7	Unusual Oversight Requirements	2.41	1
8	DOE Reporting Requirements	2.48	1.02
9	Inadequate Communications & Coordination between Sites & Headquarters	2.49	0.99
10	Unavailability of Treatment, Storage, and Disposal facilities	2.49	1.05
11	Changes in Regulatory Standards & Requirements	2.5	0.9
12	Lack of Estimating Models	2.52	0.95
13	Changes in DOE Orders	2.61	0.94
14	Increase in Indirect Costs	2.61	0.96
15	Inadequate Site Assessment / Waste Characterization	2.61	0.98
16	Inadequate Contingency Allowance	2.66	0.95
17	Increase in Direct Costs	2.7	0.92
18	Ineffective Oversight	2.7	0.98
19	Inadequate Communications between Sites	2.77	1.03
20	Shortage of Qualified Personnel	2.81	0.98
21	Performance of First-of-a-Kind Technologies	2.93	0.97
22	Inadequate Performance Tracking / Management Systems	3.02	1.01
23	Other-than-DOE Reporting Requirements	3.05	0.91
24	Inadequate Personnel Training	3.14	0.9
25	Litigation and/or Liability	3.21	0.99
26	Shortage of Equipment	3.48	0.84

Respondents also were asked to evaluate the same cost issues for their potential to reduce cost growth and/or overruns if DOE were to implement a cost improvement initiative directed at each issue (Question 9). A four point Likert scale was employed and coded (Excellent=1, Good=2, Fair=3, and Poor=4). Table B-2 summarizes the mean and standard deviation for all responses. The table is ordered from the lowest (greatest potential for cost improvement) to the highest (least potential for cost improvement) mean value.

Table B-2: Survey Ranking of Issues with Potential to Reduce Cost Growth and Overruns

Overall Rank	Issue	Mean	Standard Deviation
1	DOE Contracting Practices	1.96	0.9
2	Changes in DOE Orders	2.11	0.97
3	Change in Project/Program Scope	2.15	0.93
4	DOE Reporting Requirements	2.16	0.97
5	National Environmental Policy Act Documentation Process	2.17	1.01
6	Changes in Regulatory Standards & Requirements	2.17	1.02
7	Unusual Oversight Requirements	2.2	1
8	Funding Delays	2.23	0.93
9	Unrealistic Deadlines	2.24	0.92
10	Inadequate Communications and Coordination between Sites and Headquarters	2.32	0.95
11	Unavailability of Treatment, Storage, and Disposal facilities	2.33	0.99
12	Delays in Regulatory Response	2.36	1
13	Ineffective Oversight	2.37	0.93
14	Inadequate Site Assessment/ Waste Characterization	2.4	0.91
15	Lack of Estimating Models	2.43	0.92
16	Performance of First-of-Kind Technologies	2.48	0.96
17	Inadequate Communications between Sites	2.51	0.95
18	Increase in Indirect Costs	2.53	0.97
19	Inadequate Contingency Allowance	2.54	0.88
20	Shortage of Qualified Personnel	2.54	0.95
21	Inadequate Performance Tracking/ Management Systems	2.66	0.94
22	Inadequate Personnel Training	2.71	0.87
23	Other than DOE Reporting Requirements	2.75	0.91
24	Increase in Direct Costs	2.76	0.84
25	Litigation and/or Liability	2.91	0.91
26	Shortage of Equipment	3.01	0.86

Since Question 9 focuses on potential areas for implementing cost improvements, a more detailed analysis of the responses to this question was conducted. Tables B-3, B-4, and B-5 display the mean responses to the top ten cost improvement activities (as presented in Table B-2), split by various respondent characteristics. In these three tables, a one way analysis of variance (ANOVA) was conducted to identify the issues for which there was a significant difference in responses by the groups. Table B-3 shows the differences among the views of DOE employees, DOE contractors, and other interested parties. Table B-4 displays the differences between respondents with a primary focus on environmental restoration, on waste management, or on both issues. Table B-5 focuses on the differences among the views of Federal employees and contractors at Headquarters and at Operations Offices. Statistically, there is no significant difference in mean scores for many of the issues. Issues that have a less than one in 100 chance (0.01) in having the same means scores are gray-shaded in the following tables.

Table B-3: Comparison of Issues with Potential to Reduce Cost Growth and Overruns by Organizational Affiliation of Respondent

Issue	Overall		DOE		Contractors		Interested Parties		One-Way ANOVA	
	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	F-Ratio	Sig.
DOE Contracting Practices	1	1.96	1	1.99	1	1.94	1	1.84	2.06	0.13
Changes in DOE Orders	2	2.11	3	2.11	2	2.11	5	2.19	7.06	0.01
Change in Project/Program Scope	3	2.15	6	2.2	3	2.12	2	2.05	0.55	0.58
DOE Reporting Requirements	4	2.16	8	2.21	4	2.13	10	2.29	8.03	0
National Environmental Policy Act Documentation Process	5	2.17	2	2.07	9	2.23	14	2.37	17.75	0
Changes in Regulatory Standards & Requirements	6	2.17	4	2.15	5	2.17	6	2.2	1.46	0.23
Unusual Oversight Requirements	7	2.2	5	2.16	8	2.22	16	2.39	9.02	0
Funding Delays	8	2.23	10	2.32	6	2.18	4	2.17	2.59	0.08
Unrealistic Deadlines	9	2.24	11	2.32	7	2.2	15	2.37	3.38	0.03
Inadequate Communications/ Coordination between Site and Headquarters	10	2.32	12	2.36	10	2.3	9	2.26	3.68	0.03

Table B-4: Comparison of Issues with Potential to Reduce Cost Growth and Overruns by Respondent's Focus of Work

Issue	Overall		Environmental Restoration		Waste Management		ER/WM		One-Way ANOVA	
	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	F-Ratio	Sig.
DOE Contracting Practices	1	1.96	1	1.89	1	2.02	1	1.92	2.29	0.1
Changes in DOE Orders	2	2.11	2	2.04	7	2.22	3	2.14	4.45	0.01
Change in Project/Program Scope	3	2.15	7	2.2	2	2.09	2	2.08	3.19	0.04
DOE Reporting Requirements	4	2.16	3	2.06	9	2.28	6	2.23	8.07	0
National Environmental Policy Act Documentation Process	5	2.17	5	2.16	3	2.16	9	2.25	1.42	0.24
Changes in Regulatory Standards & Requirements	6	2.17	4	2.13	10	2.3	4	2.14	3.77	0.02
Unusual Oversight Requirements	7	2.2	6	2.18	8	2.27	7	2.23	1.07	0.34
Funding Delays	8	2.23	8	2.25	5	2.2	5	2.2	0.52	0.6
Unrealistic Deadlines	9	2.24	9	2.28	4	2.19	8	2.25	0.92	0.41
Inadequate Communications and Coordination between Sites and Headquarters	10	2.32	13	2.37	6	2.22	10	2.29	2.86	0.06

Table B-5: Comparison of Issues with Potential to Reduce Cost Growth and Overruns by Headquarters versus Operations Office Personnel

Issue	Overall		Headquarters		Operations Offices		One-Way ANOVA	
	Rank	Mean	Rank	Mean	Rank	Mean	F-Ratio	Sig.
DOE Contracting Practices	1	1.96	1	1.96	1	1.96	0	0.97
Changes in DOE Orders	2	2.11	6	2.2	2	2.07	5.25	0.02
Change in Project/Program Scope	3	2.15	3	2.11	4	2.17	1.19	0.28
DOE Reporting Requirements	4	2.16	8	2.24	3	2.12	4.13	0.04
National Environmental Policy Act Documentation Process	5	2.17	2	2.1	8	2.2	2.67	0.1
Changes in Regulatory Standards & Requirements	6	2.17	4	2.16	5	2.17	0	0.97
Unusual Oversight Requirements	7	2.2	7	2.23	7	2.18	0.93	0.34
Funding Delays	8	2.23	10	2.33	6	2.18	6.72	0.01
Unrealistic Deadlines	9	2.24	9	2.3	9	2.21	2.86	0.09
Inadequate Communications and Coordination between Sites and Headquarters	10	2.32	12	2.34	10	2.31	0.37	0.55

More than 1,500 respondents provided suggestions and/or comments addressing one or more actions that they feel DOE could implement as major components in a cost improvement program (Question 10). More than half of the comments/suggestions received were categorized by the respondents as dealing with PROGRAMMATIC issues. Although not all suggestions and comments have been thoroughly evaluated to date, several themes have emerged within the PROGRAMMATIC category. Eleven preliminary themes are quoted below, along with selected comments/suggestions from the respondents addressing each theme.

1. **Changes in the scope of the projects, either in physical size or in cleanup criteria, appear far too often and are very costly. Provide clearer goals and objectives.**

   - Changes in project/program scope seems to be a particularly vulnerable area of cost growth. A program/project should start with a well defined, well thought-out plan of what is supposed to be accomplished and by what means.

   - Take more time and do a more thorough job scoping the project to reduce the number of changes in the contract once it is in place and working.

   - Do not impose any new DOE Orders or regulations upon projects after the projects are estimated/planned.

   - Improve site characterization/assessment results. More time spent on this phase of restoration will save time and money in the future of the project. It will also reduce the number of scope changes.

2. **Remove regulatory overlap and delays.**

   - The greatest cost savings could be realized if DOE (and government in general) would change its internal requirements -- e.g., National Environmental Policy Act for CERCLA sites.

   - Eliminate National Environmental Policy Act requirements for RCRA/CERCLA actions and develop alternative evaluation documents to address environmental impacts.

   - Remove overlapping DOE requirements. The Environmental Restoration program is adequately guided by CERCLA and other regulations, (i.e., Clean Air Act, Clean Water Act, RCRA); there is no need for another layer of Federal regulations.

   - All programmatic and regulatory goals of National Environmental Policy Act could be satisfied by meeting CERCLA requirements. National Environmental Policy Act causes projects to be delayed -- not to mention it would be a great savings to all of DOE.

   - Decrease the National Environmental Policy Act approval time; or allow design (preliminary and final) to be performed in parallel with the National Environmental Policy Act approval process.

- Eliminate road mapping, Safety Analysis Reports, and National Environmental Policy Act requirements for Environmental Restoration work. DOE needs to revisit National Environmental Policy Act to make sure that its interpretation is in line with that of other Federal organizations. For instance, when complying with RCRA, can there be an exception made so that each subproject does not require an Environmental Impact Statement or Environmental Assessment?

- Eliminate excessive DOE requirements. For example, the Environmental Protection Agency accepts CERCLA and National Environmental Policy Act as equivalent, but EM practice requires that both be done in parallel. This leads to unnecessary, redundant efforts. DOE is its own worst enemy in the implementation of Environmental Restoration activities.

3. **Environmental restoration is not a nuclear activity and should not be regulated as such. DOE needs more appropriate Orders to deal with these types of activities.**

   - Stop treating "Environmental Restoration" as a nuclear activity! Stop implementing DOE Orders where CERCLA/RCRA rules are in effect.

   - Apply DOE Orders only by exception. Unless subject is an operating nuclear facility, many shouldn't be applied to most Environmental Restoration / Waste Management activities. In many cases state and Federal requirements are adequate.

   - Exempt routine Environmental Restoration activities from "nuclear facility" status.

   - Thoroughly review DOE policies and Orders with respect to whether they make sense to apply to restoration activities. For example, Conduct of Operations is directed (designed for) fail-safe operation of nuclear reactors; not all aspects make sense in a restoration setting.

   - Provide consistent direction from Headquarters that focuses on environmental/safety risk, as opposed to unrealistic application of nuclear reactor/nuclear Navy "standards."

4. **Have longer budgeting cycles to match long-term planning and the long-term nature of the projects.**

   - We need regular, reliable, predictable funding because of the long-term nature of most environmental projects. This does not necessarily mean more funding. We just need consistent programs, not a yearly scramble, and no 6-month delays in awards.

   - Provide continuous funding for a project from initiation to completion. Stop-and-go funding is tremendously wasteful and seems to be a pattern within Environmental Restoration.

- If funding could be dedicated on a multi-year basis for line item projects rather than annual partial funding, it would be realistic to hold the project/program management parties (DOE, Government Owned Contractor Operated, contractor) responsible and accountable for budgets and schedules.

5. **There is too much Headquarters oversight. Give the Operations Offices greater decision-making authority, including the power to deal with regulators and other project issues.**

   - Rather than moving toward DOE-wide matrixed activities, move back toward project organization. Establish "independent" projects with clear goals and clear lines of responsibility and authority in DOE. Reduce "oversight" functions and "empower" lower levels of DOE.

   - Reduce the amount of DOE/Headquarters micromanagement of Operations Offices. Responding to Headquarters requests deters field personnel from achieving their missions. The amount of redundant paperwork, requests, and assessments overwhelms field staff such that they can't do their jobs -- this results in delays. Give Operations Offices more autonomy with minimal DOE/Headquarters interference. Headquarters should monitor, not manage, Operations Offices.

   - Environmental restoration and waste management activities take place in the field, not at Headquarters; therefore, sufficient authority to make agreements with the Environmental Protection Agency and the states should be delegated to DOE's Operations Offices, so that they can act as equals with the Environmental Protection Agency's field organizations and the state regulators.

6. **A unified, long-term, overall EM mission would help reduce duplication.**

   - DOE should look at Waste Management Programs in a more global fashion. For example, there is only one specification for vitrified high-level waste forms (borosilicate glass); however, three sites (Hanford, West Valley, and Savannah River) are currently researching, designing, and developing facilities independent of each other, resulting in some duplicated efforts. Some duplicated efforts occur with the glass melter design, glass canister design, and canister weld closure design. Minimizing the research and design efforts would greatly reduce cost and/or overruns without jeopardizing health and safety.

   - Establish consistent, sensible guidance/precedence for programmatic issues of DOE facilities, such as: future land use; use of risk assessment; risk assessment methodology (health and environmental); and allowable limits and cost for unit risk reduction.

   - Changes in scope or indecision by DOE have resulted in the most significant cost growth. DOE has not solidified its position on the best methods for treatment, storage, and disposal for most waste forms. This has resulted in

changes of course in midstream and no common ground to exchange information between sites. Each site follows its own path.

- Establish good cost, schedule, and scope baselines for all activities, both project and operations, and actively manage to these baselines, including pulling back carry-over funds. All of EM could be baselined using a systems engineering approach to see how activities support each other and how project needs are dependent on other projects which may have been canceled or delayed. This approach could help set priorities among sites and stop wasting money on unneeded or delayed activities.

7. **Revise contracting practices. Provide for more competitive contracting and use fixed price rather than cost-plus contracts.**

- A high degree of detailed characterization can be used to accurately define the scope of work, so that fixed price contracts can be awarded.

- Commission the best overall "solution" and manage the projects carefully with qualified personnel. Contracting the cheapest solution is usually the most expensive in the end. When inexperienced staff manage the low bidder (who is often not well qualified), the result is overruns, delays, and repeated work.

- Get rid of "cost plus" contracts. Go to fixed cost. No matter how large or small a Management & Operating bid is for a project, we have to pay total project cost even if it is double or triple the bid due to the contractor's error.

- Site characterizations should be performed to characterize, not completely define, existing conditions. Then contracts should be written to allow for progress when the unexpected is found.

- Set up quantifiable performance measures for the contracting organizations and hold them accountable. This does not mean micro-management or more Federal employees. It does mean true performance measurements and appropriate response to that performance.

8. **Better communication is needed between DOE and the Environmental Protection Agency and other regulatory agencies.**

- If DOE could expedite approvals through the Environmental Protection Agency, field work could proceed. As it is now, work plans are taking more than a year for approval, leaving DOE the choice of halting all work on that project or proceeding, at risk, with the field work. Both of these are expensive.

- Establish a firm policy on future land use so that projects could proceed with a definite direction.

- Declare a moratorium on remedial planning, pending establishment of national concentration-based cleanup criteria jointly approved by the Environmental

Protection Agency and DOE, and then set aggressive time limits for completion of remediation at individual sites.

- Insist upon and develop a risk-based clean-up and storage/treatment strategy (as opposed to a regulation-based strategy). Improve communication with the Environmental Protection Agency to remove regulatory restrictions and implement an affirmative action clean-up strategy, thereby reducing the level of effort required for non-value added work and removing hindrances to improvement of clean-up and treatment/storage technologies.

- Often the need for and extent of proposed work far exceeds that required for minimized risk to environmental or human health. Often far too much is done or proposed. We must look at realistic and achievable risk management and risk reduction per dollar spent and stop doing clean-up merely for clean-up sake. We need heavy use of risk assessment.

9. **Standardization across sites is critical along with a sharing of information and technologies.**

- Provide a mechanism for integrating remediation and waste management requirements, schedules, and storage/disposal facilities across the complex. This integration would eliminate inconsistencies, redundancy, and duplication of effort, and provide for a focused and cost-effective program.

- Communications with DOE Headquarters and other sites -- DOE should be able to eliminate double-dip and also other sites need to know what is being done and has been done elsewhere to assist DOE in getting the most for its money.

- Share technology, instead of each site doing their own thing. The DOE sites all suffer from the "not invented here" syndrome. This is a big waste of taxpayers' money because of local pride and parochial attitudes.

- Improved nationwide coordination of needs, activities, policies, and coordination to better define scopes, streamline planning, and contracting, focus use of results, and eliminate redundant or unneeded expenditures. (Not a tracking or estimating program, but a changed culture and management role).

10. **More realistic schedules must be established, along with minimizing the "due-by-Friday" mentality.**

- Develop well-defined work scopes; establish schedules that are realistic (taking into account realistic amounts of time for regulatory interactions, public involvement, and possible litigation); resource-load those schedules; and obtain contractor support using the schedules. We now carry too high a mortgage with too many contractors pursuing unachievable schedules.

- Develop realistic, as opposed to optimistic, schedules. Obtain a secure funding profile. The key is to develop a firm technical basis to support design and a

sound technical design prior to construction. Start-up testing should only confirm laboratory/pilot-plant studies. Interested parties should be brought on board at the inception.

- The single most important action DOE could implement would be the establishment of realistic schedules for major projects. Without these, cost estimates will never be accurate and actual costs will always increase with delays. SUMMARY -- More planning up front.

11. **Establish early public involvement.**

- Involve stakeholders (Environmental Protection Agency, state, and Contractor) early to pick the best course of action.

- DOE management should sit down with all important players (Environmental Protection Agency, states, Tribes, interest groups, etc.); and all must agree on a realistic, long-term approach to attacking individual problems. Until there is more general agreement on what should be tried with each particular problem, the stop-start cycle that begins when unrealistic agreements and schedules are put forth will continue. Equally important will be DOE's ability to come up with good systems to implement the agreed-on approaches.

- Educate or orient the affected public (regulators and legislators too) about the level of risk involved. Broad education and advertising designed to inform and place risk in perspective have great potential.

- An emphasis from the beginning of a project to determine what the public concerns are and to develop answers to those concerns will result in a progressive, more streamlined restoration process. Regulatory agencies will not have public pressure to delay approval; in fact public support may result in an accelerated approval by outside agencies.

- DOE must develop consensus among stakeholders as to acceptable programmatic procedures that will achieve agreed-upon results of acceptable uncertainties within acceptable costs. For example, decide (agree) on a process for deciding when enough site characterization has been done.

- DOE does not create the regulations. It must learn to understand that the regulatory process drives everything and therefore must develop a better process of working within the regulations early in the planning process.

Question 11 solicited input from respondents on successful cost improvement activities. Approximately 900 respondents provided examples of recently implemented actions that they feel could be replicated within DOE. Examples were received from both within and outside the DOE complex. While most of the examples deal with general PROGRAMMATIC issues, there also were several that addressed other categories. Selected examples from each category follow.

Cost Estimating

- Richland recently implemented a Resource Pricing Module. This is a computer system which allows Richland to prepare cost estimates at their lowest level before submitting budgets to DOE-Headquarters. It allows for quick rework should anyone change the budget scenario. It also provided detail backup to meet numerous audits. Thus I would suggest DOE implement a detail system like this and then make a minimum of changes to it.

- Cost estimating handbook developed at Idaho National Engineering Laboratory is exemplary.

- Idaho cost estimating team development of an environmental restoration specific cost estimating process that includes a system for collection of actual costs.

- Office of Waste Management Cost and Schedule Engineering Long-Range Plan.

Programmatic

- Use of Monte Carlo techniques in decision analysis of site-cleanup options at a Superfund site: Criterion of probability of exceeding requirements compared to cost led to acceptance by all parties of a lower cost option.

- Implementation of the Total Quality Management process at McClellan Air Force Base in California.

- Allowance to dispose of Low Level Radioactive Waste at a commercial facility. (Envirocare of Utah, waste from the Formerly Utilized Sites Remedial Action Program.)

- Look outside DOE. Hughes Missile Systems Co. adapted a Department of Defense Risk Management framework to successfully identify and control risks on a major multi-installation reconfiguration and transition.

- Recent consolidation of Environmental Restoration & Waste Management at all Oak Ridge facilities (into one central division) will result in a more streamlined organization and will reduce redundant services and overhead costs.

- The solid waste information tracking system was developed and implemented at Hanford. This system is now being transferred to over 10 other DOE sites saving them the development cost. This is over $1 to 2 million per site.

- A reduction of the number of wells sampled at Lawrence Livermore National Laboratory (Environmental Restoration Division) was implemented by the use of a sampling algorithm, which examined the data and determined the sampling

frequency. This saved the Environmental Restoration Division at least a half million dollars per year.

- The Technology Information Exchange Workshop brings Environmental Restoration workers (not managers) together to share technology successes and failures. At the last workshop participants identified areas of cost saving: Hanford saved at least $10,000 in travel costs by conducting a site survey for Environmental Impact Statement at the workshop; Nevada Test Site estimated saving $1.5 million from learning about a new monitoring well technology. And an estimated $150,000 in development costs will be saved by examining an existing HAZWRAD database.

- Series of tech application tours and workshops were utilized to bring all interested parties together to discuss and formulate plans to expedite activities involving remediation at a Department of Defense site under an Environmental Protection Agency RCRA Corrective Action Plan. This was facilitated and managed by a DOE Program Manager at a National Laboratory. The result was implementation of a corrective measure using new practices developed by DOE and others at least 2 years ahead of schedule with a cost saving of about $1,000,000.

- Performing the National Environmental Policy Act & CERCLA documentation review & approval cycle simultaneously with careful coordination among all interested parties appears to have expedited the process. This strategy is not widely used. The streamlined approach for environmental restoration (SAFER) includes this concept.

- I recently did a partial in-house design for a ground water pump and treatment system. This allowed me to write a scope of work to put out to contract that contained enough information that "off the shelf" components could be utilized. I also sent it out to contractors that typically were used as subcontractors by our bloated prime contractors. We realized savings of over 60%!

- McClellan Air Force Base, the Air Force, Environmental Protection Agency, and state used a team approach to develop cleanup standards prior to beginning the work. It's been a notable success.

- Brookhaven National Laboratory's Office of Environmental Restoration issues fixed price contracts for all work. It seems to reduce costs for us, so why not try it complex-wide.

- Formerly Utilized Sites Remedial Action Program requested a DOE-Headquarters exemption from being classified as a "Nuclear Facility." This will remove the nuclear reactor or high-level radioactive requirements from a program solely involved in low-level RAD environmental restoration.

- Use of a commercially available, portable decontamination facility that uses carbon dioxide. The unit leased for 3 months, during which time the facility was

able to decontaminate a great deal of tools and equipment that was destined for a Low-Level Waste burial box.

- $25K in additional sampling led to better defined cleanup boundaries of a site at Kansas City, for a savings of $2 million in excavation and disposal costs.

- Risk reduction (benefit) cost analysis on fire suppression for polychlorinated biphenyls (PCB) storage. The analysis resulted in cancellation of the project and $7 million savings.

Resources

- Use of sonic drilling and/or cone penetrometer. Demonstrated at Hanford successfully and available under contract via industry.

- Utilization of backhoes, rather than drilling, for near surface soil sampling; less than or equal to 30 ft depth.

- Westinghouse Hanford Company has put into operation a new mobile automated radiological survey unit. This unit can survey at speeds greater than 100 times previously used with sensitivities far greater than previously used. Estimated cost savings for next year - $1.8 M.

- In the first use of its type, in situ, slurry-phase bioremediation has been successful in cleaning up a hazardous-waste lagoon at the French Superfund site in Texas. Initial cleanup plans called for incineration, but the 90 potentially responsible parties banded together to form the French Limited Task Group and reached an agreement with the Environmental Protection Agency to allow bioremediation, following successful bench-scale and pilot studies. Incineration was estimated to cost $75 million-$125 million, compared with about $45 million for bioremediation.

- Used ground water flow & transport models to reduce pump & treat cleanup time from >100 years to less than 50 years.

- A new laundry was built at Hanford under privatization. Private costs to build were $4 million against $20+ million for DOE to build the same thing.

- Application of patented technology for separating radioactive contamination from soil there by reducing amount of soils to be stored at disposal sites. Significant reduction in storage costs.

Regulatory

- Obtained regulatory concurrence for a process to identify unnecessary monitoring wells, and eliminate them from the monitoring program. For FY93 at the Rocky Flats Plant, this was a 116 well cutback with about $2M in savings.

- Texas Bureau of Radiation Control was able to promulgate a "Below Regulatory Concern" low-level radioactive waste limit. This has saved institutional waste generators hundreds of thousands of dollars.

- Public review of RCRA driven corrective action to a burial ground at our site brought out the fact that the cost ($140 M) to benefit (negligible) considerations should have stopped any further action towards remediation. The site cost savings: approx. $80 M.

SUMMARY OF RESPONSES

The nationwide cost improvement survey used two types of questions to gain information on cost improvement issues and recommended actions. The first type of questions asked respondents to rate cost issues on how often they contribute to cost growth and/or overruns and the potential for a DOE initiative targeted at each cost issue to improve costs. The second type of question was open-ended. The questions queried respondents about the single most important cost improvement action DOE could implement and about recently implemented environmental restoration and/or waste management programs that resulted in cost savings that could be replicated within DOE.

Responses to both types of questions were reviewed and separated into six broad areas. Summaries of the responses in all six areas are provided below, with a discussion of specific actions suggested by the respondents that DOE could take to reduce cost growth and/or overruns.

1. **Changes in the scope of the projects, either in physical size or in cleanup criteria, occur far too often and are very costly. Provide clearer goals and objectives.**

   The respondents strongly emphasized that scope changes are a frequent contributor to cost growth and/or overruns. Furthermore, they believe that an initiative directed toward minimizing changes in scope would have a very strong potential for stabilizing costs. Respondents also feel (as do the benchmarking initiative team members) that more firmly established scopes of work are highly correlated with other cost issues identified in the survey. For example, stable scopes of work are correlated with improved contracting practices, which also happens to be the second most frequently cited issue causing cost growth and/or overruns. As stated by one respondent, "a high degree of detailed characterization can be used to accurately define the scope of work so that fixed price contracts can be awarded." Other respondents noted the relationships between a stable scope of work, a fixed regulatory environment, and fixed EM programmatic objectives.

   Survey respondents indicated that an initiative directed at minimizing changes in scope would have a strong potential for reducing cost growth and/or overruns. As noted above however, respondents also pointed out the strong cause-and-effect relationships between changes in scope and other, more specific cost issues. Therefore, any initiative directed toward one must also address the other.

Due to the strong reciprocal relationships among scope of work and other identified cost issues, the benchmarking initiative team recommends that the scope-of work issue be addressed by remaining more specific, well-defined, and focused on specific cost issues, and then integrating the benefits from the specific issues into the establishment of more stable scopes of work.

2. **Outdated and ineffective DOE contracting practices lead to increased cost.**

Respondents to the nationwide cost improvement survey identified DOE contracting practices as having the greatest potential for achieving reductions in cost growth or overruns. The standard deviation which is a measure of the dispersion of the responses around the mean, was the lowest for all 26 issues.

DOE should revise its cor tracting practices to provide for more competitive contracting using fixed price rather than cost-plus contracts. Increased efforts to ensure a high degree of detailed characterization can be used to accurately define the scope of work, thus allowing fixed price contracts to be awarded. Brookhaven National Laboratory's Office of Environmental Restoration uses fixed price contracts for all types of work and has succeeded in reducing its costs.

3. **More realistic schedules must be established, along with minimizing the "due-by-Friday" mentality.**

Respondents identified unrealistic deadlines as the fourth highest-ranking cost issue contributing to cost growth and/or overruns.

DOE should work more closely with contractors and Operations Offices when agreeing upon schedules for completion. Appropriate planning should take into account realistic amounts of time for regulatory interactions, public involvement, and possible litigation, and to determine resource availability. Realistic schedules will minimize cost overruns resulting from overtime costs and redundant activities due to poor planning.

4. **Have multi-year funding cycles match long-term planning and the long-term nature of the projects.**

Respondents identified funding delays as the fifth highest ranking cost issue contributing to cost growth and/or overruns.

DOE must establish funding cycles that are regular, reliable, and predictable, to match the long-term nature of most environmental projects. This does not necessarily mean more funding. Funding should be consistent with program size, without monthly delays and yearly scrambles. DOE should provide continuous funding for a project from initiation to completion. Intermittent funding is tremendously wasteful and a contributor to cost overruns. Dedicated multi-year funding for line item projects, rather than annual partial funding, would make it possible to hold the project/program management parties (i.e., DOE, Government Owned Contractor Operated, contractors) responsible and accountable for budgets and schedules. This would encourage management to focus on the bottom line.

5. **Changing, overlapping, conflicting, and inappropriate DOE requirements and other regulatory standards contribute to DOE program cost increases.**

Several survey questions addressed issues relating to the relationships between other Federal/state regulatory standards, and requirements and DOE requirements. Three of the top five potential areas for cost improvement identified requirements and regulations, including: changes in DOE Orders, DOE reporting requirements, and National Environmental Policy Act documentation process. In addition, overlapping regulatory requirements and inappropriate DOE Orders were particularly prominent themes among the comments provided by respondents.

One recurring theme was that DOE stop treating environmental restoration as a nuclear activity. Many DOE Orders should not be applied to more environmental restoration and waste management activities. In many cases state and Federal requirements (i.e., CERCLA/RCRA) are in effect, therefore duplicating the reporting requirements. A thorough review of DOE policies and Orders should be taken to determine whether they are appropriate in a restoration context. Not all Orders apply to restoration activities; for example, the Conduct of Operations is directed at the fail-safe operation of nuclear reactors. The Department of the Navy and the Department of the Army do not require conformance to National Environmental Policy Act for their CERCLA activities. If DOE were to adopt this policy, savings would be in the millions of dollars per year.

DOE should review DOE, state, and Federal regulations to identify and eliminate overlapping and redundant requirements. The environmental restoration program is adequately guided by CERCLA and other regulations (e.g., Clean Air Act, Clean Water Act, RCRA), eliminating the need for additional Federal regulations. For example, the Environmental Protection Agency accepts CERCLA and National Environmental Policy Act as equivalents but EM practice requires that both be performed in parallel. This leads to redundant efforts. All programmatic and regulatory goals of National Environmental Policy Act could be satisfied by meeting CERCLA requirements. One project waited approximately 1.5 years for a National Environmental Policy Act categorical exclusion decision. As a result, the escalation rates in the cost estimate were improperly applied and the delay led to a project cost overrun. In a recent project, approval was given to begin project design while awaiting Environmental Protection Agency approval. The project remained on schedule, with a more efficient use of funding as a result.

6. **Current organizational structures and management practices lead to inefficient program implementation.**

Several specific questions addressing management practices and resources were asked in the nationwide cost improvement survey. None of these specific cost issues were thought to contribute as much to cost growth and/or overruns as the cost issue in the other finding areas. However, there was a very strong theme relating to organizational structure and management practices in the comments from the respondents.

In order to eliminate duplication of effort, DOE must clearly define the roles and responsibilities of the Operations Offices and Headquarters Offices and determine the overall mission of EM. Recent consolidations into one division of environmental restoration and waste management activities at all Oak Ridge facilities has resulted in a more streamlined organization, thereby reducing duplicate services and overhead costs.

DOE should encourage increased communication among Headquarters, Operations Offices, and state and Federal agencies to expedite approvals and eliminate duplicate efforts. For example, DOE, Los Alamos National Laboratory and Sandia National Laboratory, have entered into monthly management meetings with Environmental Protection Agency and the New Mexico Environmental Department. This has reduced the number of problems by identifying them up front and has helped expedite the "real" work. Increased communications between Savannah River and Hanford have reduced cost for Hanford. Increased communication develops close working relationships and commitments among all levels.

DOE should move away from DOE-wide matrixed activities and toward project organization. Establish "independent" projects with clear goals and clear lines of responsibility and authority in DOE. In general, DOE should reduce the DOE Headquarters oversight functions and empower the Operations Offices. Environmental restoration and waste management activities take place in the field, not at Headquarters. Therefore, sufficient authority to make agreements with the Environmental Protection Agency and the state should be delegated to the Operations Offices so that they can act as equals with the Environmental Protection Agency's field organizations and the state regulators.

CONCLUSION

It is recommended that DOE consider developing and implementing cost improvement initiatives incorporating the above findings. While such efforts are being planned, evaluation of the survey responses (as well as the integration of the additional 252 surveys received after the deadline for this report) will continue to add suggestions for cost improvement initiatives. Tabulation and further evaluation of the comments and examples provided by the respondents will also continue in an effort to provide additional guidance, where appropriate for new initiatives or changes in DOE and EM operating practices.

APPENDIX C: SUMMARY OF THE PAIRED COST COMPARISON

INTRODUCTION

The purpose of the paired cost comparison was twofold:

1. To demonstrate that the paired cost comparison methodology, as a component of benchmarking, is an effective technique in identifying and explaining cost differences and drivers.

2. To identify and explain cost and process differences for environmental restoration projects and waste management activities between U.S. Department of Energy (DOE) and non-DOE organizations.

Project selection was based on a stratified limited sample. This means that data were gathered from a small set of contributing organizations and therefore do not represent a statistically valid sample. As a result, any cost or process differences identified from the paired cost comparison are considered preliminary.

METHODOLOGY

Project Categories

The project categories used in the initiative were identified and agreed upon during the benchmarking initiative kickoff meeting. The selection of the specific project categories was based upon assumed availability of project data, likelihood of comparability (i.e., the project or activity at DOE must be very similar to the projects or activities outside of DOE to which they will be compared), and a graded approach regarding the level of regulatory complexity (i.e., the projects or activities selected must exhibit a broad range of regulatory complexity, from very low to moderate to very high). The selected project categories were as follows:

- Standard construction
- Underground storage tank system removal
- RCRA Closure
- Operations of a hazardous waste storage facility

The graded approach was adopted due to participant requests that the degree to which performance differences are attributable to the environmental nature of the work be studied. The project categories selected for the initiative range from no environmental considerations (e.g., standard construction) to categories involving a high degree of environmental considerations (e.g., RCRA closure).

Project Selection Criteria

Project selection criteria were developed after the benchmarking initiative kickoff meeting in order to help the contributing organizations identify candidate projects. The benchmarking project team determined that a broad set of criteria would give the contributing organizations the flexibility needed to organize and present their best-documented projects, while still offering the study team candidate projects that could be used to conduct a meaningful comparison.

The selection criteria were identified by project category as follows:

Standard Construction

- Either an office building or warehouse
- Project completed within the past three to four years
- Size approximately 10,000 to 50,000 square feet

Underground Storage Tank System Removal

- Petroleum tanks (gas or diesel)
- Project completed within the past three to four years
- Size of tank(s) approximately 10,000 gallons

RCRA Closure (Environmental Restoration Project)

- RCRA Closure (either landfill or pond)
- Project completed within the past three to four years

Hazardous Waste Storage Facility (Waste Management Operational Activity)

- Operations of a permitted hazardous waste storage facility

These criteria were sent to each organization that expressed an interest in participating in the study. The project team also followed up with phone calls to answer questions and ensure that potential participants understood the criteria.

Technical Approach

The steps taken to complete the paired cost comparison were as follows:

1. Develop data requirements for the projects and activities that will be compared. Specific information, such as work element descriptions, direct and indirect cost amounts, and explanations, were included in the data requirements.

2. Select projects and activities for study. This step included contacting potential study participants to discuss the study and the types of projects being offered by the study participant.

3. Collect, categorize, and collate the data. The benchmarking project team conducted site visits to DOE, commercial, and non-DOE Federal government organizations to collect and discuss the project data. This information was categorized and collated. Data were collected through site visits, mailed responses, and other sources.

4. Analyze the results. The benchmarking project team collected and examined costs for 30 projects. From those projects, 11 were selected for use in the comparison. The projects selected represent those judged most comparable, based on an evaluation of technical and cost data provided by each participating organization. All of the data were normalized to adjust for regional differences in material and installation (labor) costs, using the City Cost Indices provided in the Means Cost Data Book. All costs were escalated to the first quarter of 1993 using DOE-approved escalation rates.

Using work definition documents provided by the contributing organizations, cost elements were identified and analyzed. Each contributor collected costs according to a structure that varied in organization and level of detail. These costs were grouped into cost elements for purposes of the paired cost comparison. Cost or work elements that were not comparable across all projects within a category, such as treatment of contaminated soil resulting from underground storage tank removals, were not used for the paired cost comparison.

Organizationally, costs were analyzed at the same level. For DOE projects, the cost to the DOE (i.e. the Management & Operating contractor cost) was compared to the cost for the non-DOE Federal government or private entities at the same organizational level.

Data collection, categorization, and collation were performed concurrently with analysis.

PUBLIC INVOLVEMENT

Interested parties had an important impact on the paired cost comparison, beginning with its design. The original design included a full review of 24 categories of projects and activities. During the benchmarking initiative kickoff meeting in Washington, D.C., the participants suggested that this design was not achievable within the schedule and did not provide them with an opportunity to participate. As a result, the paired cost comparison was redesigned to incorporate their suggestions, while still meeting the intent of the original paired cost comparison design. The resulting paired cost comparison responds to the suggestions and values expressed by participants at the benchmarking initiative kickoff meeting.

GENERAL RESULTS

This initiative showed that comparisons could be made among components of projects performed by different organizations and that groups of cost drivers could be identified and explained for those differences. Additionally, the paired cost comparison provided data that experienced personnel could use to identify the cost and process differences of DOE and non-DOE organizations. The paired cost comparison methodology also identified cost elements in which differences did not exist.

The following results support the objective of demonstrating that the paired cost comparison methodology is an effective technique for identifying and explaining cost differences and drivers:

- DOE standard construction costs varied by 16.8% when compared to those of private industry.

- The costs for placing the clay cap portion for a pond closure project were identifiable and could be compared. The construction costs among the three cap construction projects were similar, with the major project cost differences associated with the level of project oversight.

- Comparison of the RCRA-permitted hazardous waste storage facility was the most difficult. However, comparison of performance on the basis of labor cost was judged feasible and valid. The DOE cost was less than that of the non-DOE Federal government organization.

The following results support the objective of addressing cost and process differences of DOE versus non-DOE organizations for environmental restoration projects and waste management activities:

- DOE and non-DOE Federal government underground storage tank removal project costs are higher than those in private industry when the cost of meeting government programmatic requirements are added to the comparison.

- DOE-EM contracting and Management & Operating contractor cost collection practices, while more detailed than those of other organizations, add to the real and apparent high cost of EM projects when compared to non-DOE organizations. Within the DOE-EM program, costs for common support activities to operate DOE sites, such as security, on-site transportation, and general maintenance, are collected and allocated to the projects. Other government and private industry organizations in the sample incur costs for services similar to those of the DOE, but generally do not allocate these costs to projects. As a result, the DOE cost appears higher.

The data collected for this initiative did not include the cost of management personnel other than those working directly on the project. In the case of government projects (both DOE and non-DOE), this meant excluding the cost of Federal employees with line management responsibilities (i.e., including only the cost of contractors). In the case of private industry projects, this meant excluding corporate charges and overhead associated with similar functions.

The following figures summarize the comparisons made in each of the four project categories on a unit cost basis. The project elements shown in the following figures represent those aspects of work that were deemed common among the projects, thus forming an "apples to apples" comparison.

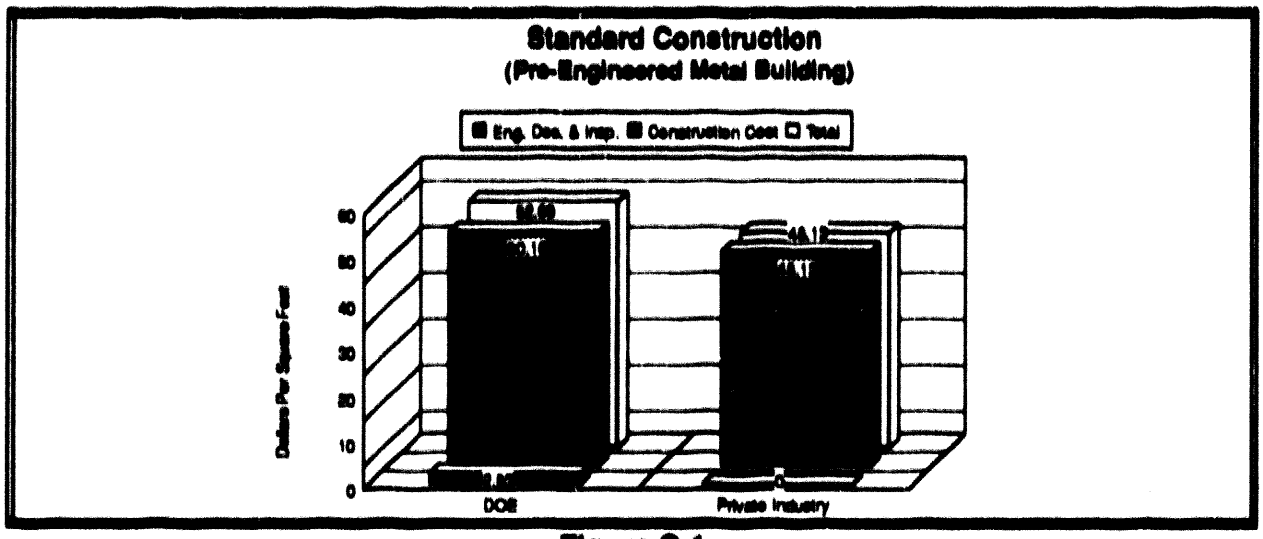

Figure C-1

The type of project selected for comparison was a warehouse constructed using pre-engineered metal building systems. The comparison of total cost, construction cost, and engineering design and inspection, performed on a dollars-per-square-foot basis, showed that DOE and private industry costs are nearly equal (see Figure C-1). The absence of engineering, design and inspection cost for private industry is attributed to less detail in private industry cost collection.

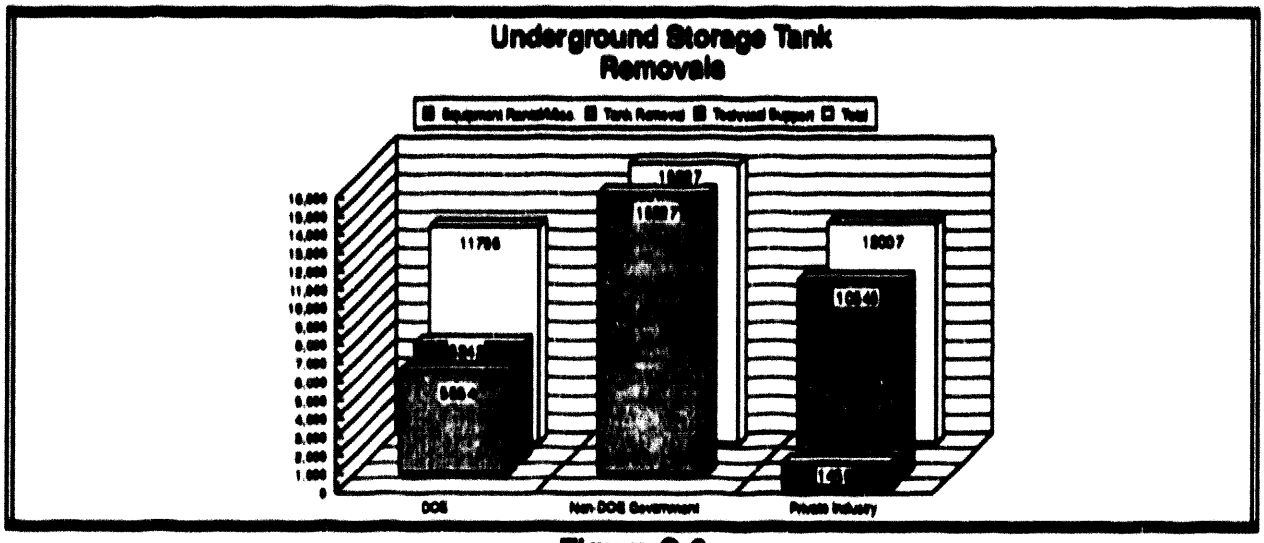

Figure C-2

Figure C-2 presents a comparison of similar elements, such as physical tank removal, technical support (e.g., sampling/analysis and project management), and equipment rental. It shows that total DOE cost is comparable with private industry, but lower than the non-DOE Federal government organization. However, this comparison ignores costs associated with programmatic activities. In the case of DOE, activities such as management, training, and reporting are allocated to the project and would increase the per-tank cost. A discussion of these differences is provided later in this appendix.

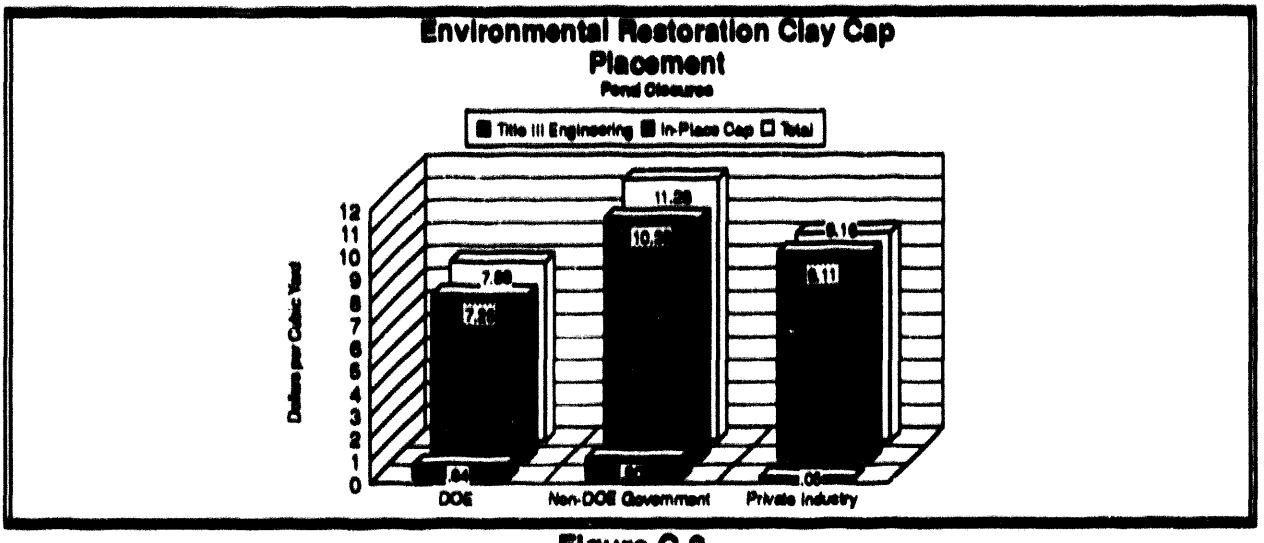

Figure C-3

The second type of project compared (see Figure C-3) was a pond closure. The only comparable components common to all projects were the cost of the clay cap placement and associated Title III (inspection and testing) services. The findings here are consistent with those from the first two project type categories in that the direct cost (unburdened by programmatic factors) of construction within the DOE is very competitive with that of non-DOE Federal government and private industry organizations.

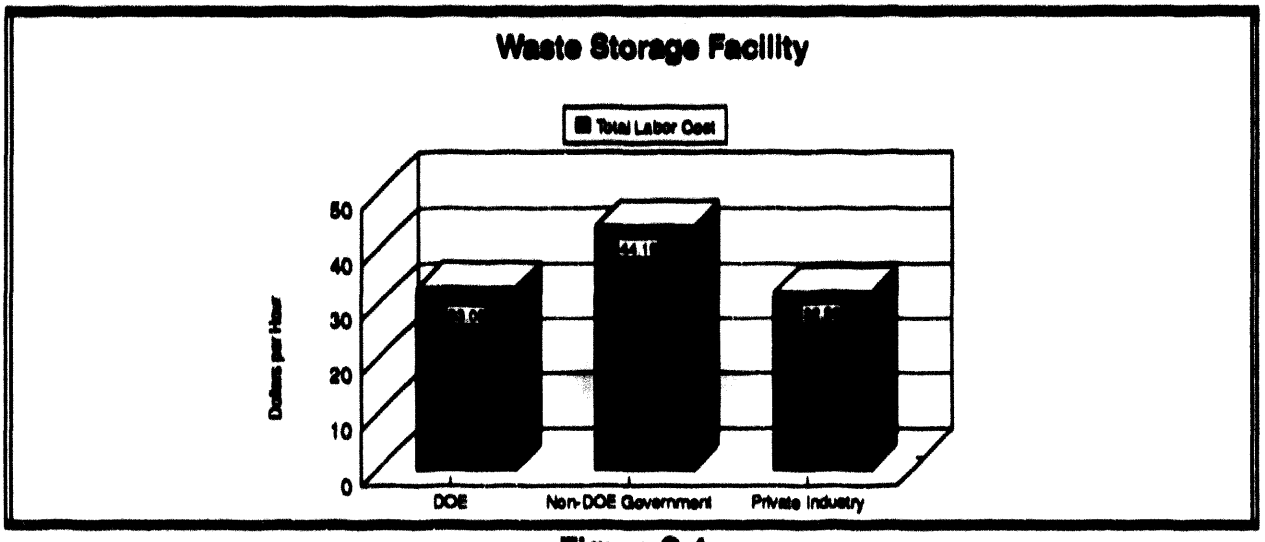

Figure C-4

The cost of operating a RCRA-permitted hazardous waste storage facility for one year also was analyzed. Unit labor rates were used as the comparable cost element because there was too much variability in waste streams and size and types of facilities to make meaningful comparisons such as dollars per ton of waste stored (see Figure C-4).

DETAILED RESULTS

This section provides the analysis used in the comparisons.

Standard Construction

The benchmarking project team reviewed costs for eight constructed and completed buildings. The type of buildings and related costs that were reviewed were:

- Pre-engineered one-story metal buildings
- Four-story, steel-framed office buildings

The pre-engineered metal building was selected for cost comparison. This type of constructed building was built for both the DOE and a private company using fixed price contracts. Consideration was also given to the type of operations to be carried out in the pre-engineered metal building. In order to eliminate numerous possibilities for cost variances attributable to operating functions, a storage-type building was selected among the metal buildings.

Building costs were escalated to January 1993, and costs were also normalized for the project's geographic area. Data were not adjusted for economies of scale. The costs were compiled up to, but not including, the owner's costs (i.e., no Federal or, in the case of a private owner, corporate management costs).

As shown in Table C-1, the square foot costs for the buildings selected were $45.13 and $52.69. DOE costs were $7.56 per square foot (16.8%) greater than the private company's cost.

Table C-1
Pre-Engineered Metal Building Cost Data

Cost Category	DOE	Private Industry
Year	1987	1991
Area (sq. ft.)	51,440	12,000
Construction Cost ($ per sq. ft.)	$39.63	$38.11
Engineering, Design, & Inspection ($ per sq. ft.)	$2.00	N/A
Total Cost ($ per sq. ft.)	$41.63	$38.11
Normalized and Escalated Construction Cost ($ per sq. ft.)	$50.16	$45.13
Normalized and Escalated Engineering, Design, & Inspection ($ per sq. ft.)	$2.53	N/A
Normalized and Escalated Total Cost ($ per sq. ft.)	$52.69	$45.13
Notes	Escalation = (1.032)*(1.032)*(1.023) *(1.022)*(1.009) = 1.124 "Means" weighted average for Material and Installation = .888	Escalation = (1.009) "Means" weighted average for Material and Installation = .852

Underground Storage Tank

As expected, underground storage tank information was available. However, many organizations managed their underground storage tank removals as a program, meaning that costs were collected on a functional, not on a per tank, basis. For instance, the cost of removing 10 tanks from a particular site was known, but the actual cost of removing an individual tank was not. This meant that the unit cost developed for this comparison was an average cost.
The benchmarking project team reviewed tasks and costs related to the removal of underground storage tanks. Costs and tasks at approximately 11 sites (about 96 tanks) were reviewed. Empty tanks that previously contained petroleum-related products were analyzed.

Some of the tanks in the DOE and non-DOE Federal government underground storage tank program leaked product into the soil to some extent. Soil remediation costs are not included in the cost analysis, although removal of the contaminated soil is included. This was the general criteria used to select the type of tank to be used in the analysis.

As shown in Table C-2, the DOE site kept more detailed records of the individual tasks than the other organizations. Using the scope information provided for the other projects, similar scope elements were identified and compared. This information is shown in the shaded area of the table and carried forward to Table C-3, Underground Storage Tank Removal Cost Data.

Costs shown in Table C-3 were escalated to January 1993, and also were normalized for the project's geographic area. The costs were compiled up to, but not including, the owner's costs (i.e., no Federal or, in the case of a private owner, corporate management costs).

As shown in Table C-3, the normalized and escalated total cost per tank among the projects compared is similar. Tables C-2 and C-3 indicate that although individual project tasks are not specifically itemized for the non-DOE Federal government and private industry projects, similar tasks and costs appear to be included in the non-DOE Federal government and private industry cases.

Environmental Restoration Project

The benchmarking project team reviewed technical and cost data for four pond closure projects. Because of the wide variations in the as-built conditions of the projects, the benchmarking project team determined that the only feasible and valid comparison was between the cost of placing a clay cap over each pond. Of the three projects selected for comparison, the cost element of providing the clay cap was common; the placement volume of clay was similar; each contract type was fixed price; and the closure was completed over hazardous wastes.

The three caps used in the initiative had a cap depth of 24 inches; and necessary compaction, construction engineering, and testing were performed while the clay cap was being placed. The cap placed for the DOE project had a long-haul distance included with the costs of the cap placement. These haul costs were omitted when compiling the costs in order for the benchmarking project team to be able to compare similar components and costs among the three projects.

Table C-4, Clay Cap Placement Cost Data, shows the placement volume of the clay for each cap and the unit costs associated with the clay placement. Costs shown in Table C-4 are escalated to January 1993, and are also normalized for the project's geographic area. The costs were compiled up to, but not including, the owner's costs (i.e., no Federal or, in the case of a private owner, corporate management costs). Also, feasibility study costs were not included. As shown in Table C-4, the total cost ($/cubic yard) for each of the three caps are very similar. Any normalized and escalated total cost ($/cubic yard) for a cap is within 22% of the average costs of the three caps. The unit cost for clay cap placement on the DOE project is lower than the unit price for the same work on the other two projects studied.

Table C-2
Underground Storage Tank Removal Detailed Cost Data

Cost Category	DOE	Non-DOE Federal Government	Private Industry
Year	1992	1990	1990
Tank Removal	$262,061	$430,511	$7,714
Project Management	$30,933		
Ground Penetrating Radar	$11,641		
Equipment Procurement Maintenance	$58,141		
Soil Sampling/Analysis	$132,373		
Sludge Sampling/Disposal	$37,853		
Product Removal/Disposal	$23,585		
Equipment Rental Miscellaneous			$1,067
Tank Cut-down	$109,144		
Safety Analysis Plan	$402		
Health and Safety Plan	$507		
Program Management	$380,466	$42,000	
Total	$1,047,106	$472,511	$8,781
Number of Tanks	49	25	1
% leakers	30%	32%	100%
Notes	% leakers was provided by DOE and is an assumed amount	Non-DOE Federal government was a firm fixed price contract	Equipment Rental/ Misc. includes: - Safety Meetings - Consumables - Backhoe Rental Private tank removal includes: - Physical Removal - Excavation - Backfill

Table C-3
Underground Storage Tank Removal Cost Data

Cost Category	DOE	Non-DOE Federal Government	Private Industry
Year	1992	1990	1990
Tank Removal ($ per tank)	$5,348	$17,220	$7,714
Tech Support ($ per tank)	$6,011		
Equipment Rental / Miscellaneous ($ per tank)			$1,067
Total ($ per tank)	$11,359	$17,220	$8,781
Normalized & Escalated Tank Removal ($ per tank)	$5,554	$15,226	$10,548
Normalized & Escalated Tech Support ($ per tank)	$6,242	$0	$0
Normalized & Escalated Equipment Rental / Miscellaneous ($ per tank)	$0	$0	$1,459
Normalized & Escalated Total ($ per tank)	$11,795	$15,226	$12,007
	"Means" weighted average for Installation = 0.963	"Means" weighted average for Installation = 1.166 Escalation = (1.022)*(1.009) = 1.031	"Means" weighted average for Installation = .754 Escalation = (1.022)* (1.009) = 1.031

Table C-4
Clay Cap Placement Cost Data

Cost Category	DOE	Non-DOE Federal Government	Private Industry
Year	1991	1990	1991
Placement Volume (CY)	34,000	45,000	30,000
In-Place Cap ($/CY)	$7.11	$7.76	$7.40
Title III Engineering (inspection and testing) ($/CY)	$0.63	$0.67	$0.41
Total Cost ($/CY)	$7.74	$ 8.43	$7.81
Normalized and Escalated In-Place Cap ($/CY)	$7.25	$10.38	$9.11
Normalized and Escalated Title III Engineering ($/CY)	$0.64	$0.90	$0.50
Normalized and Escalated Total Cost ($/CY)	$7.89	$11.28	$9.62
Notes	Escalation = (1.011)*(1.009)= 1.02 Half escalation factor of 1.022/2 - 1.011 for 1991 was used because schedule data indicated project completion in middle of 1991. Means weighted average for installation = 1.00. Long haul distance & cost eliminated from	CM cost @ 7% of construction = $0.47 Proctor test, 3% of construction = $0.20 Profit by contractor is included in in-place cap cost at 15% Clay material provided & short haul to site. Escalation = (1.022)* (1.009) = 1.031. Means weighted average for installation = .771	Clay material provided & short haul to site. Escalation = (1.011)*(1.009)= 1.021 Half escalation factor of 1.022/2 = 1.011 for 1991 was used because schedule data indicated project completion in middle of 1991. Means weighted average for Installation = .829

Waste Management Operational Activity

The benchmarking project team reviewed tasks and costs related to the operations of a hazardous waste (non-radioactive) storage facility. Seven hazardous waste storage operations were reviewed. Due to varying types of facilities, amounts of wastes handled, types of wastes handled, and functions at each operation site, the review concentrated on the compilation of a worker's hourly rate. Three facilities were analyzed according to their hourly labor costs, as shown in Table C-5, Waste Storage Facility Cost Data.

Necessary technical and administrative personnel hourly labor rates were compiled, along with the storage facility operating personnel's hourly labor rates. Excluded from the comparison were costs for security, fire protection, capital improvement, and space recharging.

The costs shown in Table C-5 are for the beginning of 1993 and have been normalized for the facility's geographic area. The costs were compiled up to, but not including, the owner's costs (i.e., no Federal or, in the case of a private owner, corporate management costs).

As shown in Table C-5, the labor cost ($/hr.) for each of the three facilities are similar. The normalized cost ($/hr.) for the operation shows more variance than the labor cost.

Table C-5
Waste Storage Facility Cost Data

Cost Category	DOE	Non-DOE Federal Government	Private Industry
Year	1993	1993	1993
Labor Cost ($ / HR)	$31.23	$35.00	$34.86
Normalized Cost ($ / HR)	$33.05	$44.19	$30.26
Notes	Means weighted average for Installation = 0.945	Means weighted average for Installation = 0.792	Means weighted average for Installation = 1.152
	All above labor costs include: supervision, overhead, utilities controller, environment, safety & health purchasing, sales tax general management, facilities maintenance information systems, fringes and overhead Rates do not include: Profit for private operations Special requirements		

Factors that Contribute to Cost Differences

Up to this point in the paired cost comparison analysis, cost comparisons have been made between similar elements of work to demonstrate that fair comparisons can be made. This section will discuss the differences that can exist between projects and the reasons for those differences. This is important because comparisons that do not reconcile this data appropriately will result in an incorrect conclusion and result in an unfair comparison.

From the information obtained and used in the paired cost comparison, the study team was able to isolate comparable cost elements for direct comparison and identify cost elements for exclusion from the direct comparison. Cost differences can be examined by using some of the excluded information from the underground storage tank removal comparison. One of the costs that was excluded from the direct comparison was the program management cost associated with the DOE and non-DOE Federal government projects. Table C-6 presents this information.

Table C-6
Program Management Cost Data

Cost Category	DOE	Non-DOE Federal Government	Private Industry
Program Management (PM) Cost	$380,466	$42,000	not available[1]
PM cost as $ per tank	$7,765	$1,680	not available[1]
Normalized PM cost as $ per tank	$8,063	$1,485	not available[1]
Unit cost used in the comparison	$11,795	$15,226	$12,007
Total Cost Including PM	$19,858	$16,711	$12,007

[1] The absence of program management data from the private industry partner is attributed to the absence of a data collection mechanism, not to an absence of program management.

The DOE program management costs include the following:

- Full-time program manager to plan and manage the underground storage tank program.
- Worker training in areas such as safety, Occupational Safety and Health Administration and hazardous materials to increase worker safety and health.
- Management reporting including DOE Order 4700.1, Project Management Systems, reporting to the Operations Offices, and reporting to the Environmental Protection Agency, state, and Headquarters levels.
- Regulatory compliance including National Environmental Policy Act compliance.
- Project planning and control document preparation and maintenance.

These program management functions associated with underground storage tank removals all relate to good management practices, increased worker safety through training, and regulatory compliance.

The non-DOE Federal government program management costs include contract monitoring activities such as:

- construction management
- contract administration
- testing

Both DOE and non-DOE Federal government organizations handled the underground storage tank removals on a program level pulling multiple tanks per year. The private industry project used for the comparison, however, represents a single tank removal. Therefore, program activities, such as those listed above, were not elements of cost in the information provided for the private industry project.

The significance of the information presented in Table C-6 is that without careful analysis, it could be incorrectly concluded that DOE costs are higher when compared to the other two organizations. This would be a biased comparison since this type of comparison would be for dissimilar work.

CONCLUSION

Within the EM program, project characteristics, regulatory frameworks, cost control systems, contracting practices, and many other factors contribute to the way projects are managed and actual costs are tracked. This means that conducting cost comparisons between projects, particularly when compared to other non-DOE organizations that have a different set of operating processes, is time-consuming and takes considerable expertise. If done incorrectly, a comparison of actual project costs between organizations can lead to pitfalls such as:

- Not recognizing that the actual costs reported are at an organizational level that may not include certain management costs.

- Not recognizing that indirect costs included in the total cost may include an allocation for overhead activities such as security and general maintenance that may not be included in the actual cost of another organization.

- Using a pre-defined unit cost such as dollars per ton to compare operations such as waste storage facilities only to discover that facility design, operator organization, regulations, and waste stream types and volumes vary by too much for this sort of comparison to be meaningful.

- Not identifying the impact that programmatic and regulatory requirements have on the actual cost and failure to identify the organizational elements with direct control over these requirements.

Cost comparisons provide a useful means of determining whether the cost of goods and services paid is fair in comparison to the rest of the industry. Also, cost comparisons can identify areas of cost differences that can be subsequently addressed. However, the staff conducting the comparisons should have a complete technical knowledge of the areas being compared and a thorough understanding of cost estimating and analysis.

APPENDIX D: SUMMARY OF THE COMPONENT BENCHMARKING

INTRODUCTION

A comprehensive component benchmarking process measures the performance of "best-in-class" organizations, determines how these organizations achieve their performance levels, and uses the information as the basis for measurable self-improvement in performance. It complements the strategic planning objective of cost improvement by offering a unique way to establish goals, design strategies, and measure improvement against these goals. Benchmarking is based on the premise that if a partner or competitor in industry can achieve superior performance in some area, then such performance is possible and should be adopted as a goal. The key challenge is to either adopt or adapt the partner's practices in order to achieve this goal and associated performance levels.

Benchmarking is grounded in principles of quality management in that its focus is on the process as a means to achieve bottom-line results. Table D-1 indicates that the magnitude of benchmarking's impact can vary considerably among different cost elements and activities. Companies that initiate comprehensive benchmarking programs focused on long-term results typically experience performance improvements and cost reductions of 15 to 25 percent. With a similar commitment, DOE should achieve comparable results.

Table D-1 - Savings Resulting From Benchmarking

Company	Result
[1]Oryx Energy	Decreased personnel and transportation costs by 21%
[2]Xerox	Reduced service labor cost by 30%, increased distribution productivity by 5-10%
[3]General Motors	Saved 50% on material movement cost
[4]Hewlett-Packard	Reduced development time by more than 50% on two new products

Table D-2 illustrates the steps to a generic component benchmarking process, and how those steps were adapted by the benchmarking project team. The component benchmarking analysis iterated through the process at the most detailed level, as illustrated by the second column in Table D-2.

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1 Biesada, Alexandra, "Benchmarking," Financial World, Sept., 1991, pp. 28-32.

2 Mittelstaedt, Robert E., "Strategic Benchmarking: How to Learn from Best-In-Class Practices," National Productivity Review, Summer 1992, p. 303.

3 Biesada, Alexandra, "Benchmarking," Financial World, Sept., 1991, pp. 28-32.

4 Watson, Gregory H., ***Strategic Benchmarking: How to Rate Your Company's Performance Against the World's Best***, (New York, John Wiley & Sons, Inc., 1993), p. 106.

Table D-2 - Component Benchmarking Process

Benchmarking Step	Specific Benchmarking Process
1. Select component	Selected tank monitoring
2. Define key performance variables	Focused on cost
3. Identify benchmarking partners	DOE Sites A and B, Non-DOE Federal, Commercial
4. Determine data collection method	Survey and field visits
5. Collect data	Benchmarking project team visited partners
6. Determine and understand current performance gaps	Benchmarking project team conducted analysis
7. Predict future performance levels	Not applicable
8. Communicate findings	Report to interested parties
9. Establish goals	Not applicable - demonstration project
10. Implement actions and monitor progress	Not applicable
11. Measure results	Not applicable
12. Recalibrate benchmarks	Not applicable

The benchmarking initiative was successful in demonstrating a cost improvement technique that supports DOE's cost-reducing objectives, providing anecdotal data to support survey and paired cost comparison findings, identifying a "best-in-class" performer as a partner for DOE, and identifying performance targets and associated best practices that serve as potential sources for significant cost improvement.

Given the apparent variability in the cost of tank monitoring processes among DOE sites, each site should be treated as a separate entity rather than in the aggregate. Improvement through benchmarking should therefore be pursued on a site-by-site basis, with DOE Headquarters serving in a role analogous to that of the International Benchmarking Clearinghouse, facilitating site/partner interaction and serving as both a storehouse of benchmarking data and a lessons learned distributor. In addition, benchmarking process training and workshops could be developed to ensure consistent application of techniques across the complex.

METHODOLOGY

Selection of Benchmarking Component

The participants at the kickoff meeting identified the following selection criteria and potential benchmarking components:

Criteria	Components
Consistent with Paired Cost Comparison	Drilling Holes
Data Available	Lab Analysis of Core Sampling
Feasible within Schedule	Interim Storage of Hazardous Waste
Relevant to Future	Hazardous Waste Tank Monitoring
Crosscut Environmental Restoration and Waste Management	Operation of Hazardous Waste Incinerator
Generalize Across Complex	Water/Sanitary Plant Operation
Frequency of Practice	Underground Storage Tank Removal
High Unit Cost	Subsurface Disposal of Low-Level Waste
Opportunity for Reduction in Cost	Preparation of Work Plans
Discrete Component	Characterization Process for Decontamination & Decommissioning
High Regulatory Complexity	Management Cost
	Independent Closure Verification
	Confined Entry Practices
	Laboratory Analysis of Volatile Organic Compounds Samples

The benchmarking project team worked with Environmental Restoration and Waste Management managers at DOE Headquarters to refine the list of criteria and to determine the most suitable and feasible study component based on the selection criteria. The component ultimately selected was Monitoring of Hazardous Materials Tanks, with the following characteristics:

- Tank size between 1,000 and 25,000 gallons containing liquid/sludge/slurry
- Hazardous material, as defined by the Environmental Protection Agency and regulated by RCRA

The selected component was not in one of the project categories examined in detail by the initiative's paired cost comparison method. This resulted in less cost detail and a lower degree of confirmation than would have been possible in a sequential, multi-method approach.

Selection of Partners

DOE sites and partners were selected based on the existence of appropriate tank monitoring programs and the availability of data. One non-DOE Federal agency partner was selected from among six Federal agencies that the benchmarking project team contacted, and one commercial partner was selected from among 19 potential firms. The benchmarking project team also visited two DOE sites. Data collected from all four participants using a detailed survey instrument is summarized for the purpose of this report into four categories: tank characteristics, process characteristics, regulatory characteristics, and cost characteristics.

The private industry partner was selected on the basis of information obtained from the International Benchmarking Clearinghouse showing that company's performance to be among the best in its class. The DOE participants and non-DOE Federal government participant were selected based on data availability and willingness to participate in the study. Consequently, there are uncorrelated differences in tank characteristics, such as the presence of nuclear materials in DOE tanks not present in the tanks of the non-DOE Federal and private industry partners.

Reliability and Validity

In benchmarking, investigators must be able to measure the magnitude of performance disparity and to determine why disparity exists. Validity, or determining that a measure actually reflects what it is presumed to measure, is quite important. Two DOE sites were used to increase data validity. Given the apparent differences between these sites, DOE in the future should either treat each site as an independent benchmarker or obtain necessary statistical samples to obtain a DOE aggregate. For example, in a complex-wide study of tanks, DOE would need a sample of at least 80 tanks out of 5,000 to obtain statistically reliable data.[5]

To maximize reliability, the survey team used a pre-visit survey, a detailed data collection instrument, and a structured interview. However, it was necessary to rely on the participants to provide accurate data and, in the area of cost, the benchmarking project team was not able to confirm the degree of comparability among cost data. Additionally, as shown in Tables D-3 through D-6, tank characteristics varied considerably among the benchmarking participants.

PUBLIC INVOLVEMENT

The participation of interested parties in component benchmarking was both comprehensive and ongoing. Participants in kickoff meeting breakout sessions helped to identify the selection criteria and proposed benchmarking components. Interested parties also reviewed the draft report and provided comments to the benchmarking project team. The team responded to these comments, making changes to the report where appropriate.

[5] Sample size based on Military Standard 105D, Acceptance Sampling, Tables 1 and 2A, for general inspection levels.

GENERAL RESULTS

Measurement of Performance

The wide range of characteristics found among the benchmarking participants prohibits the selection of a "best" performer (on a cost basis) within the framework of this initiative. However, the benchmarking project team concluded that the private industry partner accomplished many elements of tank monitoring that were common to all participants using the fewest resources and at the lowest cost. Consequently, most of the practices associated with superior performance were obtained from the private industry partner. The initiative also found that cost differences between DOE Site B and the non-DOE Federal partner were not as great as expected (approximately 50%) given the addition of nuclear requirements at DOE Site B.

Tank monitoring performance was categorized by the benchmarking project team as follows: cost, health and safety, efficiency, effectiveness, productivity, innovation, job satisfaction, and quality. In explaining differences in unit costs, health and safety were probably the most significant factors. The existence of radioactive materials in the DOE tanks results in additional requirements and procedures, which in turn yield higher costs. Another significant factor is the effort of DOE sites to modernize aging facilities to current standards in order to achieve zero risk and a desired safety culture. DOE's internal rules, standards, orders, and guides differentiate it in terms of procedure (and therefore cost) from other agencies with non-nuclear and external rules and regulations. In terms of potential cost savings, quality was seen as a significant factor. While the DOE sites were in the process of implementing quality management, the commercial partner demonstrated how the application of extensive quality management practices had produced significant improvements in cost performance.

DETAILED RESULTS

Component Characteristics

Component benchmarking was conducted on the monitoring of hazardous materials tanks. Information was collected from all benchmarking partners and is summarized in four tables:

Table D-3, Tank Characteristics:	Physical characteristics and monitoring equipment
Table D-4, Process Characteristics:	Organizational and operational characteristics of tank monitoring
Table D-5, Regulatory Characteristics:	Identity of regulatory organizations, basis of regulatory authority, accountability, and responsibility for compliance
Table D-6, Cost Characteristics:	Basis of operational cost environment, including identification of established cost-effective practices and cost savings opportunities

Table D-3 - Tank Characteristics

Category	DOE SITE A	DOE SITE B	Non-DOE Fed.	Industry
Size	3,000 gal.	12,000 gal.	8,000 gal.	12,000 gal.
Construction	Steel, vaulted underground	Carbon steel, above ground	Steel, above ground	Carbon Steel, above ground
Contents	Sulfate, fluorides, chlorides, and uranium	Radioactive and PCB contaminated lube oil,	Diesel fuel	Cyclohexane and residuals
Secondary Containment	Tank and piping	Tank and loading area	Tank and piping	Tank only
Environment	Part of system of four	One of two similar	Stand-alone unit	In tank farm with other
Monitoring Equipment	Alarms: high and low level, low flow, sump, sparge. Process monitoring computer takes readings every two minutes	Non-alarmed, pressure relief device, and nitrogen blank. Glass tube visual level monitor	New electronic leak monitoring system with level and leak alarms routed to two different locations	High level alarm and high/high level alarm that shuts down all entry points

Table D-4 - Process Characteristics

Category	DOE SITE A	DOE SITE B	Non-DOE Fed.	Industry
Monitoring	Contractor	Contractor	Contractor	Industry
Oversight of Monitoring Process	Contractor	Contractor	Federal	Industry
Visual inspection	No visual inspection possible. Inspected indirectly by level and volume monitoring instruments	Tank, dike, foundation, bolts, pipes, valves, fittings, structural support, level indicator, and pressure relief valves for leaks, corrosion, defects, cracks, etc.	Structural integrity (stress, strain), tank integrity (leaks, dents, cracks), alarm systems, and secondary containment (free of debris)	Structural integrity, tank integrity, alarms, secondary containment, sump areas, and eye wash. Test relief devices once a year and hydrostatic every 5 years
Rain Water Removal	Not applicable	Contain and test. If contaminated, treat	Contain and test. If contaminated, treat	Contain and test. If contaminated, treat; if not, drain
Safety and Training	Extensive program	Standard DOE Health and Safety training	Data not available	Extensive program

Table D-5 - Regulatory Characteristics

Category	DOE SITE A	DOE SITE B	Non-DOE Fed.	Industry
Regulators	RCRA, internal DOE Orders, policy directives, requirements manuals, Standard Operating Procedures, and department procedures	RCRA, Clean Air Act, and Federal Facility Compliance Act, DOE rules, standards, Orders, and guides	Fed - Federal Facility Compliance Act, Federal Occupational Safety and Health Administration Contractors - state, Water Commission and Air Control Board RCRA and Occupational Safety and Health Administration (more strict than Federal), local sewage and air quality standards	Environmental Protection Agency (RCRA) with some research lab exemptions, state, Water Commission and Air Control Board, inspection by city and county twice each month
Regulations	RCRA inspections once a day, six daily monitorings, facility inspection once a month, 24-hour coverage	Verification of contents, air, rain water, Occupational Safety and Health Administration standards, permit inspections	Ability to visually inspect or tank must have a liquid sensor, secondary containment of pipes and tank	Treated as industrial site by state regulators
Regulator Relationship	Usually reactive	Interactive	Proactive and interactive	Proactive and interactive
Regulatory Change Pace	Data not available	Frequent changes in DOE requirements and Orders	Water quality stable for ten years, air quality updated every 2-3 years	Laws getting tighter. Example: must now control drug precursors
Accountability	Data not available	Specified in permit	Worker who fails to correct a non-compliance can	Company officials subject to legal action for violations
Enforcement	DOE pays any fines	DOE pays any fines	Charged to Fed or contractor	Industry pays fines
Cost effect of regulatory change	Significant	Significant	Significant	Significant

Table D-6 - Cost Characteristics

Category	DOE Site A	DOE Site B	Non-DOE Fed.	Industry
Cost comparability	Direct labor for operators and supervisors, rad con techs and engineers, and support personnel	Operator time and overhead for all monitoring duties	Data not available	Includes operator time, training, and overhead at 34%
Funding	Funding received through 3-year budget and funding process. Funds are incrementally released from numerous sources	Funding received through 3-year budget and funding process. Funds are incrementally released	Funding for Environmental Safety & Health included in operating budgets, no separate environmental budget	Funding from departments. Costs of waste management charged back to departments producing waste
Major Cost Driver	DOE Orders and regulations, extensive training and high qualification standards for operators	DOE enhancements of Federal Facility Compliance Act and other regulatory requirements	State and local regulations	Research facility develops new chemicals that must be categorized and monitored
Current Cost Saving Methods	Employee suggestions, such as paperwork reduction. Crews operate as a process team and implement Total Quality Management principles	Collecting data to improve the Work Breakdown Structure and locating areas for cost improvement, such as replacing 24-hour operator coverage with alarms	Building Emergency Action Plans consolidate requirements for variety of regulatory-driven documentation into one useful tool for each building	Labs trained on source separation. Contingency plans prepared in case permits are not approved Waste Management involved in up-front design process
Cost Saving Opportunities	Implement a graded approach to reduce direct costs; weigh cost benefits against risk level	Cost estimating is being conducted in conjunction with a new cost effectiveness program	Electronically monitor all tanks from duty station	Measuring pipe thickness using ultrasound equipment

The benchmarking project team observed many examples of different processes among the benchmarking participants. For example:

1. The non-DOE Federal agency has inadequate resources to oversee the tank monitoring process beyond periodic audits of contractor logs.
2. The safety and training program for tank monitoring at DOE Site A is in addition to rigorous qualification standard training, including health and safety access training and occupational safety training (e.g., radiation, fissile material handling, and Occupational Safety and Health Administration requirements).
3. The cost associated with regulatory change at DOE Site A is increased by procedural requirements, such as the need for seven signatures on each change.

4. The cost of cleanup associated with fines or penalties assessed against the Federal permit holder at the non-DOE Federal site can be deducted from the contractor's award fee by the contracting officer.
5. At DOE Site B, personnel work interactively with state regulators, however, DOE often accepts regulations up front and then spends valuable time throughout the implementation process seeking exemptions and changes.
6. The private industry site exhibited a greater willingness to invest in sophisticated equipment if long-term savings are expected than did the non-DOE Federal site.

Practices that Led to Superior Performance

Practices can be categorized as direct (related specifically to tank monitoring) or supporting (related to general operations). The practices are defined in Table D-7 and illustrated in Figure D-1.

Table D-7 - Superior Performance Practices

Direct Practices	Actions
Customer/supplier relationship with analytical lab	Adopt Total Quality Management approach for inputs and outputs of testing process
Document consolidation	Develop single documents that satisfy multiple agency reporting requirements
Proactive requirements management	Work with legislators and agency committees during the regulatory development process
New technology deployment	Expend additional funds when necessary to ensure long-term cost-savings, and maintain flexibility in complying with future regulations
Ultrasound technology	Find weak spots in tank walls and supply pipes before failures and leaks occur
Supporting Practices	**Actions**
Contractor incentives	Reward performance improvements in the areas of safety, deadlines, budget, and productivity
Reduction of management layers	Streamlining can succeed by not only reducing costs, but also improving performance
Employee involvement in decision-making	Push decision-making authority to the lowest appropriate level
Continuous process improvement philosophy and implementation	Undertake a continuous process improvement program
Proactive regulator interaction	Work out differences at the start of the compliance process instead of seeking exceptions later

Supporting Practices (contd.)	**Actions** (contd.)
EPA Requirement Modification	The recent closure of large number of military bases may lead to streamlining of some clean-up process compliance steps
Capital equipment investment	Design procurement processes to reduce delays in acquiring needed equipment
Reverse appraisal	Give employees a role in the performance appraisal processes for their supervisors
Employee suggestions/incentive programs	Provide a continuous opportunity for input by those actually performing the work
Community involvement	A "Good Neighbor" policy pays dividends when public hearings or special permits are required

Transfer of Practices to DOE

The benchmarking initiative found that many of the management practices used by the benchmarking partners surveyed for this study can be adopted or adapted to the Department's specific needs in the interest of improving cost performance. Figure D-1 illustrates the relative feasibility of implementing practices identified by the benchmarking project team as well the relative cost savings potential and relative risk to health and safety associated with these practices.

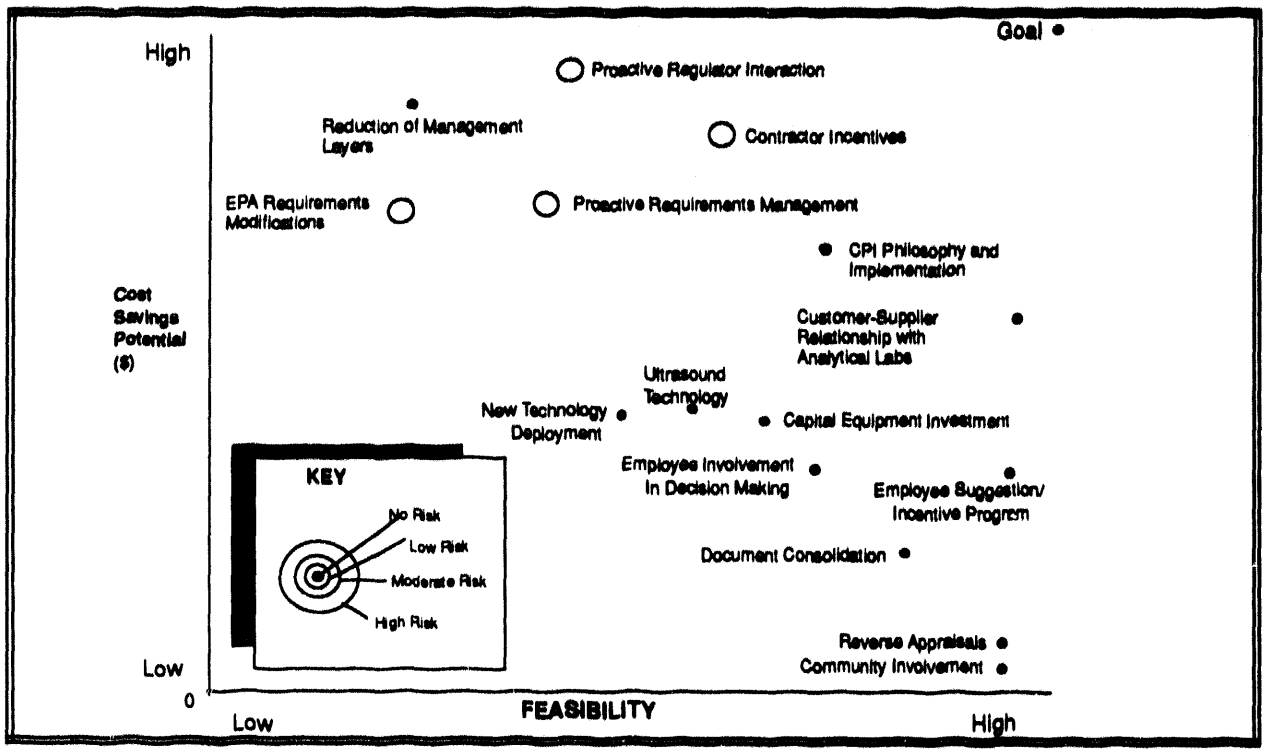

Figure D-1 Areas for Cost Improvement

Relative differences in potential cost savings, feasibility of implementation, and risk to safety and health are shown for 15 practices identified as a result of component benchmarking. For example, the benchmarking initiative predicts that reverse appraisals offer no environmental, safety and health risk and are highly feasible to implement. However, they offer less opportunity for relatively near-term cost improvement than does analytical laboratory interaction based on quality management principles and practices. The actual placement of points and circles in Figure D-1 was determined as follows: (1) **areas for cost improvement** - identified directly from partners' practices which they felt led to significant cost improvement; (2) **level of environmental safety & health risk** - assigned according to an experience-based perception of how DOE would assess risk for each alternative, based on Federal risk minimization guidelines and rules and DOE policies; (3) **cost savings potential** - determined from partners' reports of relative savings among improvement alternatives; (4) **relative feasibility** - based on our experience with DOE's past implementation efforts. Full-scale benchmarking between specific DOE Operations Office personnel and, for example, industry personnel, can quantify these measures of cost, risk, and feasibility, and thereby validate this preliminary analysis.

CONCLUSION

The benchmarking project team successfully demonstrated the applicability of component benchmarking to the EM Program and therefore recommends the adoption of this method. The challenge now is to transfer the findings of this initiative into action, prioritize additional areas to benchmark, and iterate through the process to achieve the kinds of performance results experienced by the partner organizations.

APPENDIX E: ADDITIONAL SUGGESTIONS AND COMMENTS PROVIDED BY INTERESTED PARTIES

Numerous interested parties contributed considerable time and effort to the benchmarking initiative. Many of their suggestions, particularly those offered at the kickoff meeting, were incorporated in the design and execution of the project and have improved it tremendously. Other suggestions offered also were valuable, but were not incorporated because they did not fit into the current scope of work. To ensure that these additional suggestions from the kickoff meeting (as well as suggestions from a report accompanying the survey sent to DOE by Bechtel National, Inc.) are retained and made available to EM as it plans both for the follow-on to this project and for any future cost improvement efforts, they have been gathered together in Appendix E. Interested parties also contributed constructive comments on the August 17, 1993 Benchmarking for Cost Improvement Draft Report; these comments also are summarized in this appendix.

ADDITIONAL SUGGESTIONS FROM THE KICKOFF MEETING:

APPROACHES

- Assemble a high-level panel to examine individual issues such as procurement or contracting practices.
- Apply the benchmarking initiative to learn how EM activities contribute to risk reduction.
- Focus on unquantifiable, larger policy and process problems, of which the details are symptoms. For example, while the preliminary scoping study examines the cost of drilling a well, the real question is whether the well should have been drilled in the first place.
- Focus on how to solve problems within the regulatory framework that currently exists.
- Focus cost improvement at the Operations Office level, and compare Operations Offices with each other on the aggressiveness with which they drive down costs.

SPECIFIC ACTIONS

- Reduce or eliminate security requirements for guards where they are not required by the current mission.
- Improve project management through the use of checklists.
- Provide cost estimators in the field with access to more and better cost data.

- Resolve the issue of guaranteed employment for all workers at DOE sites.
- Conduct a cost-benefit analysis of activities to ensure that taxpayers receive value for dollars spent.
- Reduce or eliminate unneeded or duplicative layers of the DOE bureaucracy.
- Take action on problems and learn from experience. Many roadblocks to cost control have previously been reported to EM Headquarters by Operations Office personnel.
- Identify where changes to the Superfund law would improve costs so that proposed modifications can be developed for the forthcoming Comprehensive Environmental Response, Compensation, and Liability Act reauthorization effort.

ADDITIONAL SUGGESTIONS BY BECHTEL NATIONAL, INC.:

CUMBERSOME AND EXPENSIVE DOCUMENT REVIEW PROCESS

Documents are often viewed as ends rather than means, and their extensive review consumes time -- but adds marginal or no benefit.

INADEQUATE ADVANCE PLANNING AND DECISIONS ON KEY ISSUES

Planning is inadequate on issues such as:

- future uses of sites
- approach to be used for waste treatment and disposal
- definition of cleanup criteria ("How clean is clean?")

FLAWED COST ACCOUNTING STRUCTURE / INADEQUATE PROJECT CONTROL SYSTEMS

The lack of common work scopes and cost assumptions complicates cost comparisons both within DOE and with other organizations. Also, DOE's trending and change control management systems are inadequate to aid in identifying, controlling, and explaining changes in cost estimates as projects evolve.

EXPENSIVE DOE REQUIREMENTS

DOE oversight and detailed management of environmental restoration activities is substantially greater than that practiced by other Federal agencies with environmental restoration

responsibilities. The DOE approach is characterized by a large number of audits, a considerable amount of detailed oversight, and imposition of requirements (as expressed in Secretary of Energy Notices, DOE Orders, interpretations by auditors and Tiger teams, etc.) that extend, in many instances, substantially beyond the requirements of the basic laws and regulations covering environmental restoration.

INCOMPATIBLE PHILOSOPHIES AND ORGANIZATIONAL APPROACHES

Operating procedures developed for DOE's weapons production mission are difficult to apply to environmental restoration and are unnecessarily expensive.

ADDED EXPENSE OF RETRAINING AND "FORCED USE" OF FORMER OPERATIONS / PRODUCTION PERSONNEL FOR ENVIRONMENTAL RESTORATION WORK

In comparing its costs to those of other organizations, DOE must formally acknowledge and segment direct added retraining costs and consider the effects of reduced efficiencies from using retrained workers.

COMMENTS ON THE AUGUST 17, 1993 BENCHMARKING FOR COST IMPROVEMENT DRAFT REPORT

The Benchmarking for Cost Improvement Draft Report was mailed on August 17, 1993 to 178 interested parties. These included participants at the June 22 kickoff meeting, as well as others who had expressed interest in being kept up-to-date on the benchmarking initiative. Several interested parties provided comments on the draft report.

Initial feedback came from response cards that had been included with the draft report. The card asked people to indicate whether or not they intended to send detailed comments; to describe their initial response to the draft; and/or to provide their general opinion of the draft. Of the thirty-seven people who returned cards, ten indicated they would not review the draft. In addition to the 27 people who returned comments as proposed, five additional reviewers also submitted comments. Reviewers who submitted written comments included the U.S. Army Corps of Engineers; the Yakima Indian Nation; several interest groups; and industry.

The benchmarking project team established a comment resolution system to record, compile, and respond to comments. A complete comment resolution log is available to interested parties. Overall, the comments were positive and constructive.

Most respondents said that the benchmarking initiative was a useful beginning for DOE in addressing cost issues. Respondents generally remarked favorably on the process of benchmarking and expressed interest in seeing benchmarking developed further at DOE. One respondent requested an explanation of why benchmarking was selected, while others were very supportive of its use. Although the concept of benchmarking was well received, respondents questioned the completeness of the data, given the tight time constraints under which the report was developed.

Several respondents complimented the benchmarking project team for developing a unique benchmarking approach and compiling a large amount of information in a short period of time. One wrote, "The Benchmarking for Cost Improvement Draft Report contained a wealth of excellent ideas and deserves to be studied carefully." Other respondents indicated that they were happy to have the opportunity to comment on the draft and participate in the benchmarking initiative.

The comments offering constructive criticism proved most valuable in revising the report. Several respondents wanted more thorough definitions of terms such as "benchmarking," "direct cost," and "funding delays." Respondents asked questions and offered technical recommendations regarding the elements of the benchmarking initiative. They expressed concern that the underlying methodology and findings contained in the paired cost comparison were not consistent with those from the component benchmarking analysis. They noted that the report failed to make clear whether the costs examined in the component benchmarking were direct or total costs. Respondents also requested clarification of the significance and implications of the paired cost comparison exercise results.

Respondents expressed concern that the benchmarking initiative may be just another study that remains on the shelf at DOE. They questioned whether the benchmarking initiative had a clear commitment from DOE Headquarters for implementation and argued that for the report to be truly useful, it must lay out a blueprint for implementation. These respondents advocated using the executive summary to spotlight strategies and action plans to address areas for cost improvement. One respondent recommended that the report state more clearly the areas for potential cost improvement and explain the concrete uses for the report. Some respondents who felt that the results as stated in the draft were inconclusive suggested that the clarity of the results could be enhanced in future benchmarking initiative efforts by expanding data collection.

The questions posed by the draft report attracted the attention of several respondents. One respondent agreed that DOE Orders and National Environmental Policy Act requirements contribute to DOE cost growth, but noted that action on this front is more difficult than the report indicates. While acknowledging overlap between National Environmental Policy Act and CERCLA requirements, one respondent expressed reservations about completely removing the EM program from National Environmental Policy Act compliance. A respondent recommended the following options for question two: the revision of "EM Master" Orders, the use of graded requirements, and simplification of National Environmental Policy Act requirements and approval within DOE.

Regarding the draft report's treatment of DOE contracting practices, one respondent stated that the draft report "missed the mark." In addition to being unsatisfied with the discussion on management and operating contractors and subcontractors, the respondent noted that other types of contract vehicles should not be overlooked. To increase contractor accountability, the respondent recommended involving the Site Specific Advisory Boards in evaluating contractor performance and award fees. Some respondents were receptive to the idea of encouraging fixed price instead of cost plus contracting. However, one respondent was uncomfortable with the idea of greatly expanding the use of fixed price contracts, maintaining that the application

of fixed price contracting may prevent full realization of cost savings during the site characterization phase, as in the case of the "observational approach."

The organization of the report received a mixed response. Some readers were overwhelmed by the volume of information presented; they suggested that detailed explanations, background information, and results be relegated to an appendix. One respondent requested a chronology, to appear as an appendix, listing milestones and describing their significance to the benchmarking initiative. The respondent suggested that the chronology also include the plan for future benchmarking initiative efforts to help accomplish EM's mission. Others stated that the main body of the report was too vague and could use more detailed information. One respondent noted that the suggestion of a multi-year project budgeting for addressing funding delay was "buried" in an appendix.

Respondents also made many substantive comments on the next steps for the benchmarking initiative. A respondent suggested using "root cause" techniques as a next step in order to improve DOE's understanding of the reasons for high costs. Another respondent suggested the establishment of a national data base of cost savings experiences from DOE sites. Respondents also suggested that interested parties should be involved in drafting action plans based on the results of the benchmarking initiative.

APPENDIX F: MAJOR STUDIES ADDRESSING COST IMPROVEMENT FOR EM

The following annotated bibliography identifies reports on cost initiatives that are relevant to the Department of Energy's Office of Environmental Restoration and Waste Management. These efforts either focused on or were closely related to the topic of cost improvement. The bibliography is arranged in reverse chronological order.

U.S. Department of Energy, Secretary's Contract Reform Team, Indirect Cost Subteam, Ongoing
This report will contain an assessment of indirect costs at the Operations Offices. The Indirect Cost Subteam, that is conducting the study, comprises four separate review groups: (1) The Management Team will review DOE management participation and management and operating contractor counterpart activities in planning, control, and approval of indirect cost funded activities at production and laboratory sites. (2) The Accounting Team will analyze the contractor's accounting system to review both direct and indirect costs, to review activities and costs in the indirect pools, and to identify specific activities for in-depth transaction analysis. (3) The Procurement Team will review contract documents for compliance with Federal Procurement Regulations, Cost Accounting Standards, and other contractual guides and procedures. (4) The Activity-Specific Team will perform an in-depth evaluation of indirect cost management pools and processes and their relation to required indirect support levels, as well as the potential for cost improvement.

U.S. Department of Energy, Office of Oversight and Self Assessment, Functional Cost Reduction Initiative, Ongoing
Formerly known as the Cost Reduction Opportunities Assessment (see below) initiative, this study team is identifying opportunities for cost savings.

Richland Operations Office, Hanford Environmental Restoration Program Optimized Baseline Project, Ongoing
The Optimized Baseline Project is a new way of achieving the goals of the Hanford Environmental Restoration Program by working more cost-effectively within the funding limits established by Congress, while providing meaningful opportunities for stakeholder involvement in program decisions. This report describes the process by which the programmatic, regulatory, and technical issues were selected and analyzed.

U.S. Department of Energy, Office of Waste Management, Draft Cost and Schedule Estimating Guide, December 1993
This document introduces Activity Based Costing techniques for the estimation of operations activities. The purpose of the guide is to assist DOE Operations Offices and Management and Operating contractors in preparing credible, well-documented cost estimates.

Idaho Operations Office, Construction Project Cost Reduction Action, July 1993
Key areas for construction cost reduction were identified and a long-term cost improvement program was implemented. The study analyzed 26 projects, identified 135 cost drivers and targeted the 15 most significant cost drivers for cost reductions.

U.S. Department of Energy, EM, Cost Reduction Task Force, July 1993
The Cost Reduction Task Force is a focal point for identifying opportunities, including targets for cost reductions and efficiency improvements, within EM that have either short-term and/or long-term benefits; to identify performance measures; to outline steps needed to implement actions; and to track progress.

U.S. Department of Energy, Office of Waste Management, Draft Cost and Schedule Engineering Long Range Plan, April 1993
This document defines the processes that the Office of Waste Management is currently utilizing and the initiatives under development to ensure that future cost estimates are traceable, defensible, realistic, and accurate. This plan is part of the Office of Waste Management Cost Engineering Program.

The MITRE Corporation, Findings and Recommendations from an EM-40 Program Review, April 1993
The MITRE Corporation conducted an intensive, top-level review ("red team review") of existing Office of Environmental Restoration policy, guidance, and procedures in order to identify gaps, potential implementation problems, inconsistencies, and other areas for improvement in the environmental restoration program. Specific recommendations for to improving the environmental restoration program are included in this report.

The American Society for Macro-Engineering, A Strategy of Basic Transformation of the Environmental Restoration Program, March 1993
On July 20, 1992, a panel convened by The American Society for Macro-Engineering conducted a strategic review of the Environmental Restoration and Waste Management program. The panel focused on identifying a strategy, an organizational structure, and a set of management systems that would be effective over the long term in helping the environmental restoration program achieve its goals. This report describes the panel's transformation strategy for the Office of Environmental Restoration.

Federal Facilities Environmental Restoration Dialogue Committee, Recommendations for Improving the Federal Facility Environmental Restoration Decision-Making Process and Setting Priorities in the Event of Funding Shortfalls, February 1993
This report evaluates methods to reinvigorate the way the cleanup process is managed. The report concentrates on the discussion of the Federal Facilities Environmental Restoration Dialogue Committee, created by the Environmental Protection Agency to develop consensus policy recommendations and to ensure that clean-up decisions reflect the priorities and concerns of all interested parties. The committee's recommendations focus on improving the dissemination of Federal Facilities Environmental Restoration-related information; improving public involvement in key Federal Facilities Environmental Restoration decisions, with special emphasis on the use of site-specific advisory boards; and improving consultation on Federal Facilities Environmental Restoration funding decisions and on setting priorities in the event of funding shortfalls.

Massachusetts Institute of Technology / Los Alamos National Laboratory Research Team, Making Progress In Cleaning Up DOE's Weapons Complex: Issues of Organization and Management, January 1993
This report presents the results of a research study that identified the perceptions of interested parties about the main issues of organization and management confronting DOE in carrying out its program of environmental restoration and waste management at the nuclear weapons complex. A framework for those issues was developed to help readers understand their origin and consequences.

The Office of Management and Budget and the Defense Contract Audit Agency, Summary Report of the SWAT Team on Civilian Agency Contracting: Improving Contracting Practices and Management Controls on Cost-Type Federal Contracts, December 1992
This report assesses and summarizes the findings of the SWAT Teams, that were created in June 1992 to examine and assess the contract administration and auditing practice of 12 civilian agencies, including DOE. The findings of the SWAT Teams are divided into three areas: contract administration, contract audit, and contract cost principles.

U.S. Congress, General Accounting Office, DEPARTMENT OF ENERGY: Status of Reporting Compliance for DOE's Major System Acquisitions, August 1992
This report provides information on the status of DOE's compliance with documentation and reporting requirements for its Major System Acquisitions. It also examines whether certain key documents (mission needs statement, project plan, and independent cost estimate) for each Major System Acquisition have been approved by senior DOE management. Approval of these documents is required prior to commencement of field work on an Major System Acquisition.

Pacific Northwest Laboratory, Environmental Restoration and Waste Management Manpower Needs Assessment: U.S. Department of Energy Complex, June 1992
This study assesses the supply and demand for 53 scientific, engineering, and technical occupations relevant to EM. These assessments were made by examining budget projections and the input of program/project and human resources managers. Quantitative projections of full-time equivalent employee slots for each occupation were developed for 1993-97. Qualitative assessments of the factors that affect recruitment, staffing, and retention were also reported.

U.S. Congress, General Accounting Office, NUCLEAR WASTE: Status of Actions to Improve DOE User-Fee Assessments, June 1992
The Nuclear Waste Policy Act of 1982 requires DOE to develop a deep underground repository for the safe, permanent disposal of civilian- and government-owned nuclear wastes. This report is a follow-up on the actions taken by DOE to implement recommendations made in a June 1990 report on DOE's periodic assessments of whether the fees charged to utilities operating nuclear power plants are adequate to cover the costs of the civilian nuclear waste disposal program.

Office of Management and Budget / U.S. Army Corps of Engineers / Environmental Protection Agency / Department of Defense / Department of Justice / Department of Energy / Interagency Review of the DOE Environmental Restoration and Waste Management Program, April 1992

The purpose of this study was to determine the level of funding needed in FY 1993 for each EM Operations Office to comply with all Federal, state, and local government legal requirements; to comply with all DOE Orders that establish standards for environment, safety and health management; and for prudent investments in other discretionary and management activities, such as upgrading administrative buildings and information systems. The study also reviewed the cost estimates supporting EM's proposed budget, including both direct and indirect costs.

U.S. Army Corps of Engineers, Supplemental Report on Cost Estimates, April 1992

This report is a supplement to the "Interagency Review of the DOE Environmental Restoration and Waste Management Program." It provides additional detail on the cost analysis study. The report examines several different cost drivers, including direct costs, overhead and administrative expenses, and contingency.

U.S. Congress, General Accounting Office, NUCLEAR HEALTH AND SAFETY: More Can Be Done to Better Control Environmental Restoration Costs, April 1992

This report examines the degree of cost growth associated with DOE's environmental restoration program, as well as steps that DOE can take to better manage, and thereby control, cost growth. The report recommends that DOE complete its baselining of the environmental restoration program, develop guidance on cost estimating for all of DOE, establish a reliable management information system, and exchange lessons learned information.

U.S. Congress, General Accounting Office, NUCLEAR HEALTH AND SAFETY: Increased Rating Results in Award Fee to Rocky Flats Contractor, March 1992

A 1989 General Accounting Office report had previously examined award fees earned by contractors at the Rocky Flats Site. The report had recommended that DOE restructure its award fee process to reduce the level of discretion exercised in making the final award decisions. The March 1992 report focuses on the award fee given to EG&G for its performance at the plant from April through June 1991.

Milton Russell, E. William Colglazier, and Mary R. English, Waste Management Research and Education Institute, University of Tennessee, Hazardous Waste Remediation: The Task Ahead, December 1991

This segment of a multi-volume series reports on two companion research efforts: a quantitative assessment of prospective resource requirements for completing the nation's hazardous waste remediation task; and a qualitative analysis of the views of those immediately involved in or affected by Superfund cleanup processes at individual sites. The study estimates that the cost of environmental restoration in all areas of the country will range in cost from $400 billion to $1.7 trillion over the next 30 years.

U.S. Congress, General Accounting Office, ENERGY MANAGEMENT: Tightening Fee Process and Contractor Accountability Will Challenge DOE, October 1991
This report discusses three major issues surrounding DOE's appraisal process for management and operating contractors. The issues addressed include: (1) the effectiveness of DOE's use of performance objectives to set expectations and to evaluate contractor performance; (2) the effectiveness of DOE's use of data from on-site reviews to evaluate contractor performance for award fee purposes; and (3) the effect of DOE's new award fee regulations on the performance evaluation and award determination process.

U.S. Congress, General Accounting Office, ENERGY MANAGEMENT: Contract Audit Problems Create the Potential for Fraud, Waste, and Abuse, October 1991
In January 1990 the General Accounting Office began implementing a special auditing effort to help ensure that areas vulnerable to fraud, waste, abuse, and mismanagement are identified and that appropriate corrective actions are taken. DOE's contracting practices represent one of 16 areas being examined. This report discusses (1) audit coverage of DOE's management and operating contractors and DOE contracts, (2) the problems that may occur when contract audit activity is not performed, and (3) factors that have impeded contract audit coverage.

Los Alamos National Laboratory, A Compendium of Cost Data for Environmental Restoration Technologies, Methods, and Processes, August 1991
This report provides a representative sample of aggregate cost information on environmental restoration treatments applied to hazardous, radioactive, and mixed waste sites. The data consists of actual remedial costs, as well as existing engineering cost estimates. The study recognizes that various sources were used for this information and identifies different methods and procedures used to obtain the cost estimates.

U.S. Department of Energy, Office of Oversight and Self Assessment, Cost Quality Management Assessments, July 1991
The Cost Quality Management Assessment initiative used teams for evaluating the cost estimating and cost management practices of DOE management and operating contractors, and of the national laboratory organizations that conduct programs under the cognizance of EM. The mission of the Cost Quality Management Assessment Teams was to conduct independent assessments of the cost and schedule estimating processes used to develop funding requirements for the EM Five-Year Plan, as well as to provide a baseline of EM costing capability. The assessment process examined various policies, procedures, and routine work practices of the EM organizations and their contractors, as they pertain to cost estimating and cost-effective conduct of work. The original Cost Quality Management Assessment study concentrated on the Operations Offices and Management and Operating contractors. A follow-on study, which was recently completed reviewed cost management practices of EM Headquarters.

U.S. Department of Energy, The HAZRISK Cleanup Report (Preliminary Draft), February 1991

This study attempts to build a better basic understanding of the factors that drive hazardous waste cleanup cost and schedule, and the factors that lead to deviations from the actual cost and schedule estimates. The report also attempts to design a simple and easily applied methodology for setting appropriate cost estimate contingencies for hazardous waste cleanup projects in the project cycle. The report uses a database of over 150 completed assessments of cleanup projects for DOE, the Environmental Protection Agency, Superfund, and industry.

U.S. Congress, Office of Technology Assessment, Complex Cleanup, February 1991

Under a request by the Senate Committee on Armed Services, the Office of Technology Assessment conducted a study to examine contamination and public health problems at the nuclear weapons complex and to investigate technological and other approaches to solutions. This report analyzes current and proposed methods of waste management and environmental restoration and evaluates major DOE programs. It also examines EM's cost estimates in an attempt to determine the mechanisms by which DOE estimates environmental restoration costs, to examine the divergence between those estimates and actual costs incurred, and to assess the implications of those findings for policy-makers. The report discusses the prospects for improvement and describes certain initiatives that could enhance those prospects.

U.S. Congress, General Accounting Office, NUCLEAR HEALTH AND SAFETY: DOE's Award Fees at Rocky Flats Do Not Adequately Reflect ES&H Problems, October 1989

This report evaluates the extent to which environment, safety, and health matters were considered in determining the award fees given by DOE to its contractor, Rockwell International Corporation, at the Rocky Flats Plant in Colorado.

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Compendium of Costs of Remedial Technologies at Hazardous Waste Sites, October 1987

The purpose of this document is to record and analyze the actual expenses incurred during remedial responses for seven major types of engineering technologies. The study uses "bottom-line" numbers that represent the ultimate cost of the responses. The data for this study is derived from a series of 31 case studies of actual hazardous waste remedial responses. The study also lists the major factors that cause the cost movements.

Putnam, Hayes & Bartlett, Inc., Preliminary Results Regarding Cost Escalation at Superfund Sites, September 1987

This study identifies and quantifies factors that lead to cost differences between record of decision estimates, remedial estimates, and actual remedial costs. The study examined 18 sites and collected 11 different data sets, ranging from feasibility studies to final cost summaries.

U.S. Department of Energy, DOE Independent Cost Estimate Staff, Historical Cost Evaluation of Selected DOE Projects

This evaluation presented the results of macro-level analyses of selected DOE projects aimed at identifying pertinent trends and factors which affect estimated project costs. This report also attempted to draw generalized conclusions which might be considered for further investigation. Finally, guidelines were provided for assessing contingency adequacy while developing or reviewing project cost estimates and schedules at all stages of a project.

APPENDIX G: BENCHMARKING INITIATIVE PROCESS SUGGESTIONS

This appendix contains suggested improvements to the benchmarking initiative methodology that should be applied to future benchmarking efforts, as well as aspects of the initiative that were valuable and worth repeating. The individual suggestions are grouped under broad initiative process categories.

OVERALL PROJECT

ALLOW MORE TIME IN EACH PHASE OF THE INITIATIVE.

The logistics involved in planning for and executing such a wide-ranging initiative are enormously complex. More time should be allotted for consulting with interested parties, identifying partners, conducting the site visits, and performing the analysis. If additional time is unavailable, the objectives of each element of the initiative should be carefully matched to the initiative schedule. This would improve the degree to which the overall project objectives are targeted and would permit more time for data analysis.

CONDUCT THE ELEMENTS IN SEQUENCE, NOT IN PARALLEL.

Conducting the elements of such an initiative in sequential phases would allow for a more targeted approach to identifying potential areas for cost improvement and provide factual support for ideas about what drives costs in those areas. For example, a mail survey could provide a high-level indication of the areas about which people are most concerned. A paired cost comparison could then follow, comparing projects in order to provide detailed cost information about those areas. Finally, a component benchmarking exercise could focus on management practices, policies, or procedures that contribute to cost increases.

DEVELOP HIGHLY SPECIFIC PROJECT SELECTION CRITERIA.

Due to schedule constraints, it was necessary to provide general project selection criteria in order to allow participating organizations to gather the most easily accessible data that would meet the selection requirements. However, the generic selection criteria yielded a choice of projects that were only partially comparable. The benchmarking project team selected the best available projects, but could only compare portions thereof. For future studies, it would be beneficial to develop a more detailed set of project specifications. This would provide a better initial project selection pool and allow more complete project comparisons.

INVOLVING INTERESTED PARTIES

FOSTER AWARENESS OF DOE'S RELATIONSHIP WITH TRIBAL GOVERNMENTS.

All organizations working on DOE initiatives must be made aware of DOE's government-to-government relationship with Tribal Governments. The organizations and the project overall should interact with Tribes as sovereign governments which have unique interests and concerns, and not as members of the public or citizen interest groups. In particular, they must be aware of the need for full Tribal participation in the Federal decisionmaking process, in accordance with the Federal trust responsibility and consistent with the DOE American Indian Policy.

STREAMLINE THE DELEGATION AND PERFORMANCE OF TASKS TO INVOLVE INTERESTED PARTIES EARLY.

Streamline the delegation and performance of tasks, such as approving invitation lists and making initial phone calls to interested parties. This would permit more advance notice about meeting dates and might allow the representatives of some groups that would otherwise be under-represented (such as regulatory agencies, local citizen groups, and Tribal Governments) to adjust their plans in order to participate or to suggest substitutes.

INTERESTED PARTY INPUT INTO THE BENCHMARKING PROCESS CONTRIBUTES MATERIALLY TO ITS SUCCESS.

Interested parties at the kickoff meeting strongly expressed their views that the original scope of work for the paired cost comparison could not be achieved within the schedule. Working with interested parties, the benchmarking project team was able to develop an achievable scope of work that still met the overall intent of the benchmarking initiative, as well as the expectations of interested parties.

VISITING SITES

FOR COMPONENT BENCHMARKING, USE A STRUCTURED METHODOLOGY SUPPORTED BY APPROPRIATE MANAGEMENT TOOLS, INCLUDING CHECKLISTS AND SURVEYS.

PROVIDE AS MUCH INFORMATION AS POSSIBLE PRIOR TO THE VISIT.

This practice assures that appropriate facilities and people are being contacted and informs partners about the kind of data require

PREPARE AN OVERVIEW BRIEFING.

Assume that partners know nothing about the initiative and (depending on the audience) prepare a short, informal discussion, or a more formal presentation.

CONDUCT SITE VISITS WITH THE PEOPLE MOST KNOWLEDGEABLE ABOUT THE PROJECT.

This practice is necessary to gain a clear understanding of the project and all contributing costs. Face-to-face interviewing and data-gathering techniques can be used to obtain real-time information about costs.

DEVELOP PERFORMANCE INDICATORS TO HELP EXPLAIN REASONS FOR COST DIFFERENCES.

For example, DOE pays for state health and safety inspectors to reside at some DOE facilities. Thus inspections are more frequent and more costly than those in private industry. Developing performance indicators for these types of activities would help DOE explain the reasons for cost differences and to ask for comments and suggestions.

GATHERING DATA

THE COST OF OPERATIONS DATA IS OFTEN CONSIDERED SENSITIVE.

Industry and DOE contractors are concerned about contract competition so sources and data must be protected. A greater number of participants would help in this area. The objectives and likely benefits of the initiative must be stated clearly to provide comparisons only with comparable data.

REQUIRED INFORMATION MAY BE NESTED WITHIN SENSITIVE DOCUMENTS.

Companies may be reluctant to release entire documents so the project team must be specific about actual data needed.

END

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