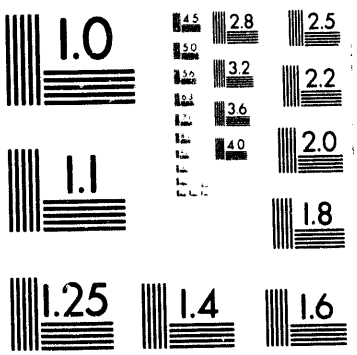
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Stakeholder Involvement in DOE's Cost Improvement Initiative for Environmental Restoration and Waste Management Activities

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DISCLAIMER

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ABSTRACT

The U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management (EM) designed and executed the Benchmarking for Cost Improvement (Benchmarking) initiative to understand and control costs. The results of the nationwide survey component of the Benchmarking initiative are presented. The goal of the nationwide survey was to identify the issues that most frequently contribute to the cost growth and/or cost overruns on DOE programs and to develop a framework in which those issues may effectively be addressed. Stakeholders were asked to evaluate 26 cost issues organized in four categories (COST ESTIMATING, PROGRAMMATIC, RESOURCES, and REGULATORY) in terms of how frequently each contributes to cost growth and/or overruns. Respondents also provided written suggestions when asked to identify the single most important action that DOE could implement to reduce cost growth and/or overruns. Finally, they were asked to provide an example of a recently implemented cost-saving action that could be replicated within DOE. EM can better control programmatic costs and more effectively spend taxpayers' dollars by implementing the recommendations of the Benchmarking stakeholders and by building on its relationships with them.

INTRODUCTION

The U.S. 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 management organization. Since then, EM has been developing the programs and necessary project management structure. In the natural evolution of such a complex, long-term, billion-dollar program, attention and effort are now shifting from the design, development, and implementation of basic management systems to the issues of programmatic effectiveness and efficiency, which include cost improvement. To understand and control costs, EM undertook the Benchmarking for Cost Improvement (Benchmarking) initiative.[1]

[a]Work supported by the U.S. Department of Energy, Assistant Secretary for Environmental Restoration and Office of Waste Management, under contract W-31-109-Eng-38.

The Benchmarking initiative used four principal methods to examine cleanup cost issues: (1) program classification, (2) nationwide cost improvement survey, (3) paired cost comparison, and (4) component benchmarking. Stakeholders, defined as parties interested in DOE decision making, contributed during both the design and execution phases. The Benchmarking initiative identified several programmatic areas in which DOE can improve costs. Stakeholders have been expressing the view that "we know what the problems are: what we need to do is act." However, significant actions affecting a complex, long-term, multibillion-dollar program must be based on empirical data. One benefit of the Benchmarking initiative was the opportunity to focus DOE's effort to reduce costs on the real problems most likely to optimize cost savings.

One component of the Benchmarking initiative was a nationwide survey to determine stakeholders' perceptions of the factors that affect the cost of environmental restoration (ER) and waste management (WM) activities. The goal of the nationwide survey was to identify the issues that most frequently contribute to the cost growth and/or cost overruns on DOE programs and to develop a framework in which those issues may effectively be addressed. Part one of the survey contained questions relating to the work experience and educational background of the respondents. Part two sought to identify those areas that the public felt frequently contributed to cost growth and/or cost overruns and to evaluate those same cost issues in terms of their potential for reducing cost growth and/or overruns. Part three consisted of two open-ended questions. The first asked respondents to identify the single most important action that DOE could implement to reduce cost growth and/or cost overruns. The second asked respondents to provide an example of a recently implemented action that resulted in cost savings. The answers to these questions were evaluated to help EM better understand the attitudes of stakeholders and to design future cost improvement initiatives directed toward reducing and/or controlling the cost of ER and WM activities.

METHODOLOGY AND STAKEHOLDER INVOLVEMENT

The initial survey instrument was designed by the Benchmarking project team and revised on the basis of comments received from stakeholders during and immediately following the Benchmarking Initiative Kickoff Meeting in June 1993. DOE defines stakeholders as parties interested in DOE decision making (e.g., affected individuals, organizations, state and federal agencies). The input provided by Indian Nations, professional organizations, state and federal agencies, regulators, DOE, and other individuals improved the design, focus, and execution of the nationwide survey.

The survey mailing list was compiled from several sources, including attendees at the Waste Management '93 Conference, participants from the Benchmarking Initiative Kickoff meeting, and distribution lists maintained by DOE organizations. The survey was mailed to 3,319 stakeholders throughout the United States in July 1993; in total, 2,114 stakeholders responded to the survey (64% response rate). These responses provided the most comprehensive information to date that identifies factors contributing to DOE costs and potential areas that DOE could pursue to reduce costs.

RESPONDENT DEMOGRAPHICS

DOE-related respondents (DOE Headquarters [HQ], Operation Office, and contractors) make up approximately 60% of the total respondents. Of the 60%, the largest single group (Operation Office Contractors) makes up approximately half of those respondents. The remaining 40% of respondents represents the U.S. Environmental Protection Agency (EPA), the U.S. Department of Defense, Tribal Governments, other federal agencies, state and local government agencies, the private sector (non-DOE affiliated), universities, environmental groups, citizen groups, and other individuals. People from a variety of organizational roles were surveyed. Approximately 39% of respondents identified themselves as project or program managers; engineers and scientists make up 29% of respondents. Approximately 81% of the respondents stated that their current work involves addressing costs associated with ER or WM activities. Nearly 37% indicated that ER was the primary focus of their work, 21% said WM was their primary focus, and 36% said both ER and WM were their primary focuses. The basic demographic information of the survey respondents is provided in Figure 1.

Place Figure 1 here

RESULTS

Close-Ended Question

Respondents were asked how frequently each of the 26 cost issues from four categories (COST ESTIMATING, PROGRAMMATIC, RESOURCES, and REGULATORY) contributed to cost growth and/or overruns in ER and WM activities within DOE. A five-point Likert scale was used and coded for analytical purposes. A blank line was provided in each category for respondents to include cost issues not identified by the survey. Respondents used this space to include additional cost issues as well as to suggest solutions to remedy the identified problem areas. The following cost issues that the respondents identified as most frequently contributing to cost growth and/or cost overruns are followed (in italics) by a recommended cost improvement initiative that was extrapolated from the respondents' comments to address each cost issue.

Scope: Changes in the scope of projects resulting from inadequate scope definition, bureaucratic re-interpretations of scope (e.g., new administrations), regulatory changes, and unexpected field conditions occur far too often and are very costly.

> *DOE should develop a means to address the scope of work by examining more specific, well-defined, and focused cost issues and then integrating the benefits from the specific issues into more stable scopes of work.*

Contracting: DOE's contracting practices are inefficient and lead to increased costs.

> *DOE should revise its contracting practices to clearly define the roles and responsibilities of DOE and its contractors. This would increase the quality of DOE's*

contract management and oversight and provide a means for ensuring contractor accountability.

Reviews: Delays in internal (e.g., National Environmental Policy Act [NEPA] approvals) and external reviews and regulatory response (e.g., EPA approvals) contribute to cost overruns.

DOE should clarify the roles and responsibilities and the divisions of authority between HQ and the Operations Offices.

DOE should increase communication and coordination within DOE and with other federal agencies to expedite regulatory response.

Schedules: Unrealistic schedules and continual management by crisis contribute to cost increases.

DOE HQ should work more closely with contractors and Operations Offices when developing schedules.

Funding: Funding delays cause inefficiencies in program implementation that result in increased costs.

Budgeting cycles should be restructured into multiyear funding packages to coincide with the long-term planning and nature of EM projects.

Open-Ended Questions

The final portion of the survey comprised two open-ended questions. The first question asked respondents to identify the single most important action that DOE could implement to reduce cost growth and/or overruns in ER and WM activities without jeopardizing health and safety. More than 1,700 respondents (80%) provided suggestions and/or comments. The second question asked respondents to provide an example of a recently implemented cost-saving action for an ER or WM program that could be replicated within DOE. Slightly less than half of the respondents provided a cost-saving example.

The analysis of responses to the question of what actions DOE could take to reduce cost growth and/or overruns yielded several underlying themes, which are discussed in the following sections. These themes are important because they identify areas in which changes would be most cost-effective. Each theme is defined by several specific cost improvement issues; then, examples of cost-saving solutions are provided from the stakeholders' responses. Respondents provided 1,003 examples of cost-saving solutions. Because of space constraints, only limited examples could be included. These cost-saving solutions highlight the issues that respondents identified as areas that could significantly reduce cost growth and/or cost overruns within DOE. A few of the cost improvement issues are not followed by a solution. This may indicate a regulatory or DOE constraint, or simply that no one has yet thought of a solution.

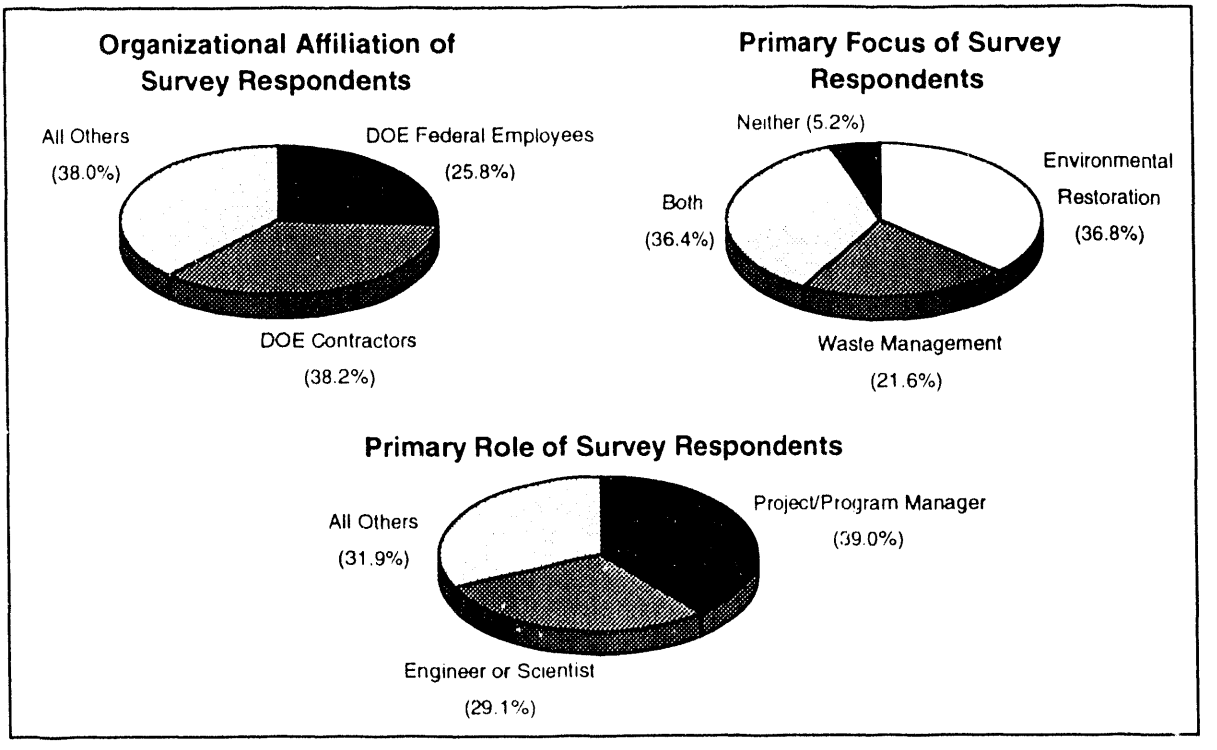

FIGURE 1. Demographic Characteristics of Survey Respondents

Scope

Scope was identified as the most frequent contributor to cost growth and/or overruns in both the close- and open-ended questions. However, scope cannot be addressed in the same manner as other cost issues. Cost estimates for any activity are based on some knowledge or estimate of the scope of work to be done; the time provided to accomplish this work; the availability and cost of personnel, equipment, and materials; and many other factors. In many instances, such as in constructing a building, these factors are well known because of design specifications, experience, building codes, and other reasonably well-established criteria. In ER and WM activities, however, these factors are often not well established.

Respondents indicated that more firmly established scopes of work are highly correlated with other cost issues identified in the survey. One such correlation is that between stable scopes of work and improved contracting practices. 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. Therefore, any initiatives directed toward changes in scope must also address these issues. Conversely, initiatives directed toward the more specific issues must also address the change-of-scope issue. Scopes of work can also be improved by clearly defining the scope and project goals, determining realistic schedules, and incorporating stakeholder involvement during decision making. Moreover, everyone should agree on the scope before the bidding process and then adhere to the agreed-upon scope.

Personnel

Respondents also indicated that cleanup costs could be reduced if DOE hired experienced, adequately trained, technically competent, decision-making managers, personnel, and contractors across the complex.

> "Assure that waste generators are trained to identify, document, and package waste to be shipped or stored. Our experience has been that cost is reduced through efficiency and not having to redo or uncover mistakes at a later date."

More specifically, respondents felt that DOE needs to hire personnel adequately suited for positions in the EM mission rather than force-fitting personnel from the nuclear mission days.

> "We hired a chemical engineer to head the Tank Waste Remediation Division instead of a nuclear navy guy."

DOE also needs to increase the number of full-time employees (FTEs) rather than relying on support service contractors and maintenance and operation (M&O) contractors.

> "At Pantex, FTE resources cost considerably less than subcontracted personnel. We were able to recently hire full-time employees to replace some of the subcontractors at

a significant savings. It is also expected that in the long-term, the full-time employees will be more effective and efficient than subcontractors."

Regulations, Requirements, and DOE Orders

Respondents thought that DOE needs to reduce overregulation (both overlapping and redundant) among state, federal, and DOE regulations, requirements, orders, and documentation (e.g., Resource Conservation and Recovery Act [RCRA]; Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]; NEPA).

> "The A/M area groundwater monitoring program was re-evaluated relative to RCRA regulation requirements and major reductions were identified. The state regulations were consulted and provided agreement to reductions in monitoring requirements. A Part-B (RCRA) modification was required resulting in $250K annual cost reductions."

DOE needs to evaluate existing and new orders, regulations, and requirements to ensure that they have added value (e.g., environmental assessments, categorical exclusions).

> "Common sense approach taken regarding implementation of new DOE orders (e.g., self-assessment, quality assurance). Every requirement is evaluated as to its impact on public health and safety. Our site management (PMC and DOE) review all site activities for the appropriate balance of safety and cost responsibility and active participation by all site employees is sought out to continually improve this process."

DOE should develop regulations that apply to the EM mission and not to the nuclear mission.

DOE Management Structure, Coordination, and Unified Mission

Respondents indicated that EM needs to clearly define its mission internally, in relationship to other departments of DOE, and in relationship to other federal agencies.

> "DOE/NV has assigned responsibility for waste management and certification (in relation to internal protocols for waste disposal at the NTS) to the Environmental Support Services Contractor performing the field investigations rather than the M&O contractor for site operations. This eliminates redundancy in both field personnel and sample collection/analysis, resulting in large dollar savings."

In terms of DOE management structure, respondents thought that DOE needs to reduce its top-heavy management and bureaucracy (e.g., oversight, micromanagement, constant reviews, empire building).

> "We have empowered our site managers to be fully responsible, authorized, and accountable to prevent bottlenecks, and get the job done."

Respondents clearly felt that improved cooperation, communication, and coordination between DOE-HQ, Operations Offices, and contractors is necessary.

> "DOE-Idaho Environmental Restoration Program is in the process of buying equipment that will act as a pool for ER and deconstruction and decommissioning programs. Also, the equipment to have available for this program avoids leasing or sale contract costs and avoids the liability of having to pay for leased or subcontracted equipment that becomes old and contaminated. It is estimated that this purchase will save the Idaho National Engineering Laboratory (INEL) ER program $10-12M during the life of the program."

Stakeholders stated a need for DOE to develop a sitewide unified management and reporting system.

> "Program management costs tracked in detail indicate 150-200% overrun due to changing DOE reporting and planning demands. Tracking may not save money but will assist in better cost planning."

Also, DOE needs to increase contractor oversight and make contractors accountable for their quality of work, budgets, and schedules.

> "INEL Part-9 Proof of Process contract approach places maximum responsibility on contractors, reducing potential for large overrun situations."

Coordinated Effort

Respondents felt that DOE needs to increase interactions with stakeholders and actively involve them in decision making.

> "At a mining heap leach facility in California, the company brought all selected contractors together with stakeholders (EPA, a water quality control board). Work plan and schedule was agreed on in a meeting by all parties. From thereon out, work proceeded according to established work plan and schedule."

Respondents indicated that DOE needs to determine its position on treatment, storage, and disposal (TSD) facilities and work with stakeholders in developing a nationally integrated TSD program.

Respondents also indicated that DOE and regulatory agencies need to develop and implement nationwide cleanup standards (i.e., "How clean is clean?").

Review Approval

Respondents indicated that DOE needs to reduce the review times of internal reviews (e.g., NEPA, DOE orders, CERCLA requirements).

"Performing the NEPA & CERCLA documentation review and approval cycle simultaneously with careful coordination between 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."

Also, respondents stated that the length of external reviews should be reduced.

"The development of a permitting plan at the infancy of a project significantly reduced costs associated with preparation/review/approval cycles. The permitting plan identified each applicable permit required, scheduled the development and review time frames, identified personnel to perform tasks and most importantly set up monthly interface/status meetings with the regulators to discuss preparation of permits. This effort streamlined the process, eliminated delays to schedule and allowed regulatory approval with minimal comments."

Funding

Stakeholders felt that DOE must ensure timely funding. More specifically, respondents indicated that DOE needs to institute multiyear funding cycles to coincide with the long-term nature of ER and WM projects, thereby increasing funding stability.

"Fund programs completely through the cleanup project. It is easier to stop funding ineffective programs than to get continuing funding. INEL has done this with some success."

Risk-Based and Cost-Based Decision Making

Stakeholders stated that DOE decision making should be risk-based, focusing on true health and safety and ecological risks rather than perceived risks.

"Renegotiating the Federal Facilities Compliance Act with EPA to defer removal of PCB contaminated ventilation ducts with the shutdown of K-25 gaseous diffusion plant saved more than $50M. The activity would not have increased protection of the environment and worker, but only meet a regulatory deadline."

Also, DOE should implement cost benefit/risk analysis and realize that some risks are necessary and get away from "zero-risk" culture.

"Ebasco recently conducted a simplified cost-benefit analysis of two remedial technologies for a Hanford application. The analysis clearly showed that one alternative produced a higher reduction in risk per dollar expended."

"Public review of RCRA driven corrective action to a burial ground at our site brought out the fact that the cost ($140M) to benefit (negligible) considerations should have

stopped any further action towards remediation. The site cost savings: approximately $80M."

Contracting

Respondents suggested that DOE use fixed-price contracts rather than award fee/cost plus contracts.

> "Fixed price contracting resulted in a 40% savings over M&O estimate."

> "INEL TAN (Test Area North) Groundwater Project Procuring design/build package on a fixed price/unit price basis, where contractor is compensated only for desired results. Here the contractor is at risk and is incentived to be results oriented, not process motivated."

Also, DOE must begin actively employing cost-effective contracting methods (e.g., incentives).

> "Establish a program that provides a contract mechanism to DOE contractors whereby a fraction (e.g., 25%) of true cost savings identified by the contractor is provided as an incentive fee."

Respondents also felt that contracts should be well-defined work packages.

> "Although not recent, the use of a turnkey contract approach for an incinerator at the ICPP (INEL) was very cost/schedule effective. What is required is full project definition and commitment by DOE prior to contract award."

CONCLUSIONS

The Benchmarking initiative is the most comprehensive and broad-based example of DOE's effort to seek stakeholder participation in its decision making. The stakeholders in this initiative identified the issues that most frequently contribute to cost growth and/or cost overruns in ER and WM activities. These issues include scope, contracting, reviews, schedules, funding, personnel, regulations/requirements/DOE orders, DOE management structure/mission, coordination, and risk- and cost-based decision making. Perhaps even more significantly, the stakeholders also provided examples of actions that they have taken to control costs and that could possibly be implemented throughout the DOE complex. The results of this Benchmarking initiative should focus DOE's efforts to reduce costs on those issues most likely to optimize cost savings.

Moreover, this survey served as a groundbreaking first step in building relationships, establishing ties, and tapping into the expertise of more than 2,000 DOE stakeholders nationwide. Those relationships should not be forgotten at the conclusion of this study. DOE can work with its stakeholders to further define initiatives and strategies to reduce EM

costs. This survey provided a means of collecting the opinions, perceptions, and ideas of DOE stakeholders regarding cost-related concerns. Throughout DOE there has been a nebulous idea as to where the problems reside; however, the Benchmarking initiative has provided empirical data to support and/or refute existing notions. In effect, the Benchmarking initiative should assist EM in controlling programmatic costs and more effectively spending taxpayers' dollars by implementing the recommendations from the Benchmarking stakeholders and continuing to build on those relationships.

REFERENCE

1. U.S. DEPARTMENT OF ENERGY, "Benchmarking for Cost Improvement," DOE/EM-0106P, U.S. Department of Energy (September 1993).

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