

DOE/IG-0561

AUDIT
REPORT



U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

ENVIRONMENTAL MANAGEMENT
PERFORMANCE MEASURES

JUNE 2002



U. S. DEPARTMENT OF ENERGY
Washington, DC 20585

June 27, 2002

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Environmental Management Performance Measures"

BACKGROUND

As reported in its recent *Performance and Accountability Report*, the task of cleaning up contaminated sites and disposing of radioactive waste is one the greatest challenges facing the Department of Energy. The Department's effort, which is estimated to cost over \$230 billion and last for decades, includes remediation and disposal of large quantities of radioactive waste at 40 separate primary sites, and over 4,800 release sites.

The Department has committed to completing the cleanup faster and less expensively, and to reducing the risk to public health, its workers, and to the environment. The Office of Environmental Management established corporate performance measures and project-specific budget milestones as the primary mechanisms to measure overall program performance and gauge its success in cleaning up the environment. Given your concerns, those of the Department's senior managers, and the Congress regarding the environmental management program's cost and schedule, we initiated this audit to determine whether the existing measures reflect overall program performance.

RESULTS OF AUDIT

The audit disclosed that even though the environmental remediation program experienced substantial cost growth and schedule slippages, the Department consistently reported that the program was successful in meeting corporate goals. In addition, the performance measures covered only a limited number of cleanup projects. We found that Environmental Management focused on measuring discrete accomplishments rather than overall program results. As a consequence, the Department did not maximize its use of a valuable management tool that could have helped to identify and remedy cost and schedule problems. Without improvements to existing performance measurement mechanisms, the Department may be hindered in its efforts to satisfy the President's Fiscal Year 2002 Management Agenda initiative that directs all agencies to focus on performance rather than process and to fully associate program cost to program performance.

We recognize that establishing reliable measures of progress is a challenging and difficult undertaking and that the current suite of corporate performance measures does reflect work completed on major components of site cleanup. However, improvements are needed. The report includes recommended actions to achieve this objective.

MANAGEMENT REACTION

Management agreed with the conclusions reached and the appropriateness of the recommendations. Planned corrective actions were responsive to our recommendations. Management's comments have been included in the entirety at Appendix 4.

Attachment

cc: Chief of Staff

Under Secretary for Energy, Science and Environment

Assistant Secretary for Environmental Management

ENVIRONMENTAL MANAGEMENT PERFORMANCE MEASURES

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Overview

INTRODUCTION AND OBJECTIVE

Fifty years of nuclear weapons production and nuclear energy research during the Cold War produced large volumes of nuclear materials, spent nuclear fuel, and radioactive and hazardous waste resulting in contaminated facilities, soil, and groundwater. The primary goal of the Department of Energy's Office of Environmental Management (Environmental Management) is to clean up this legacy of the Cold War. The Assistant Secretary for Environmental Management recently announced that one of her top priorities was reducing the time and cost of cleanup, as well as expecting the program to deliver real risk reduction through its cleanup efforts.

To measure overall program performance of the clean up program, Environmental Management established corporate performance measures and project-specific budget milestones. The corporate performance measures included quantifiable annual goals for major mission areas such as waste management, materials stabilization, and release site cleanups (see Appendix 1 for a list and brief explanation of each). The project-specific budget milestones were designed to articulate planned objectives for work not directly linked to the corporate performance measures. For Fiscal Year (FY) 2001, Environmental Management established over 300 of these milestones.

Over the last four years both the Office of Inspector General (OIG) and the General Accounting Office (GAO) have issued several reports that identify cost increases or schedule slippages at Environmental Management sites. For example, in May 2001 we reported that the Miamisburg Environmental Management Project would close four years behind schedule and more than \$500 million over budget. The GAO has also designated Environmental Management project management as a major management challenge, citing project cost and schedule overruns as one of the causes (see Appendix 3 for additional examples of OIG and GAO reports identifying problems with site cleanup).

Taken together, corporate performance measures and milestones are Environmental Management's tools to measure its success in aggressively cleaning up the legacy of the Cold War. Given the concerns and priorities of management regarding cost, schedule, and

risk reduction, the objective of our audit was to determine whether Environmental Management's performance measures reflect overall program performance.

CONCLUSIONS AND OBSERVATIONS

Environmental Management's performance measure results did not completely reflect overall program performance. Although numerous performance measures exist at the corporate and project level, these measures did not capture overall program results and did not cover large parts of the cleanup program. Even though the program experienced substantial cost growth and schedule slippages, the Department consistently reported that its environmental cleanup program was generally successful in meeting corporate goals. This problem occurred because management chose to focus on measuring discrete accomplishments rather than overall program results. As a consequence, the Department was deprived of a valuable tool that could have helped it identify problems with cost growth and schedule slippages. For example, measurement in this area could have helped focus management's attention on recent estimated cost increases of \$39 billion and schedule slippages that averaged almost 6 years per site. Lack of overall performance data may also inhibit the Department's ongoing efforts to satisfy the President's FY 2002 Management Agenda initiatives that focus on performance, not process.

Management should consider the issues discussed in this report when preparing its year-end assurance memorandum on internal controls.

(Signed)
Office of Inspector General

Environmental Management Performance Measures

Performance Measures and Overall Program Performance

Although Environmental Management had developed a number of corporate and project-specific performance measures, these measures did not capture overall program results. Specifically, the measures did not cover the majority of cleanup projects or budgets, capture overall program performance, or address risk reduction attributes.

Performance Measure Coverage

Environmental Management's performance measures covered only a fraction of its cleanup projects and overall budget. For example, Environmental Management's FY 2001 budget request provided data on a total of 298 funded projects totaling \$6.3 billion. However, only 76 of those projects (26 percent) were covered by corporate performance measures representing only \$2 billion (32 percent) of the budget request. Project-specific milestones also had similarly limited project coverage. Key milestones reported in the budget covered only 102, or 34 percent, of the 298 funded projects. These 102 projects represented only about \$2.8 billion or 44 percent of Environmental Management's budget request.

To further illustrate the lack of coverage, the Department's inventory of high-level radioactive waste has a high profile, both internal and external to the Department, as there are significant risks associated with this waste type. Despite the high profile of this program, Environmental Management established only one corporate performance measure pertaining to it, the production of canisters of vitrified high-level waste. This activity represented only \$176 million (18 percent) of the \$970 million budget for high-level waste activities in the Fiscal Year 2001 budget. While this measure captured performance of a discrete process at the Savannah River Site, it provided no information on progress of the high-level waste programs at Hanford or Idaho. For example, Environmental Management has consistently met or exceeded its canister production performance measure since 1998, while other major parts of the high-level waste program face a \$4 billion increase in cost and 10-year delay in schedule.

Measuring Overall Program Performance

In addition, Environmental Management's reported performance results indicated that it was generally successful in meeting its program goals despite slippages in its overall cleanup schedule and significant cost growth. The Environmental Management program reported that it met or nearly met 82 percent of its annual corporate performance measures since 1998. In addition, Departmental records disclosed that the

program met over 70 percent of its budget milestones in FY 2000 and 2001 (detailed measure and milestone results are included in Appendix 2). In contrast to these favorable performance results, over the last several years estimated cleanup costs have increased and cleanup schedules have slipped. For example, the estimated¹ cost to cleanup former nuclear weapons sites has grown from \$145 billion in FY 1998 to \$184 billion in FY 2001, an increase of \$39 billion, or 27 percent. In addition, our analysis of planned site completion dates indicates that closure schedules for Environmental Management's cleanup sites have slipped. At the 40 cleanup sites still open at the end of FY 2001, the average time to complete cleanup work changed from 11 years in 1998 to 17 years in 2001. These slippages have resulted in an increased duration of 6 years, or 55 percent, with schedule slippages occurring at 32 of the 40 remaining cleanup sites.

Measuring and Reporting Risk Reduction

Also, while Environmental Management has recently focused on delivering risk reduction as a priority, it does not currently measure or report on risk reduction. To its credit, Environmental Management outlined a change in approach to cleanup and closure that focuses on reducing risk to public health, workers, and the environment in its February 2002 top-to-bottom review. Currently, however, none of the corporate measures related to cleanup explicitly measure risk reduction. For example, measures on waste disposal provide details on how much waste of various types was disposed but do not provide information on the impact on risks to the workers, the public, and the environment. In addition, Environmental Management does not have a standardized risk measurement system across sites or a system that can identify changes in relevant risks on an interim or periodic basis. Supplementing existing corporate measures with risk reduction information is essential to demonstrate whether clean up actions are successfully reducing risk to the public and the environment.

Measures Should Represent Overall Program Performance

Office of Management and Budget (OMB) and Departmental guidance require that performance measures provide an effective means to summarize overall program performance. OMB Circular No. A-11 requires the Department to prepare an Annual Performance Plan that presents a comprehensive picture of performance across the Department. The circular and the Department's own performance

¹ The estimated cleanup costs are based largely on lifecycle cost estimates that reflect a strategy for accelerating Environmental Management's efforts to clean up most of the Department's sites by 2006, with the remaining sites to be cleaned up by 2070.

measure guidance indicate that accomplishing the goals in the Annual Performance Plan should show progress towards meeting the Department's long-term goals and objectives. The Government Performance and Results Act of 1993 (Results Act) was enacted with the intent of improving Federal program performance and improving congressional decision-making by providing information on the effectiveness of Federal programs. Among other things, the Results Act required Federal agencies to develop performance measures to support the achievement of agency missions, and to report on the success in achieving program results.

No Focus on Overall Program Results

Performance measure results did not completely reflect overall program performance because management chose to focus its measures on discrete accomplishments rather than overall program results. Achieving the corporate performance measures reflected progress against particular metrics in the form of annual accomplishments, but did not reflect overall progress towards site cleanup or provide cost or schedule information. In essence, the measures reflected what discrete tasks were accomplished but did not address overall progress to mission completion. Environmental Management's policy guidance stated that corporate performance measures are used to justify and defend Environmental Management's budget to OMB, Congress, and stakeholders, and that measures should reflect accomplishments. Our discussions with Environmental Management officials indicated that the corporate performance measures were selected because they were clear, quantifiable indicators of performance. They further explained that these measures were easy to roll up and present from a programmatic standpoint and were not intended to represent the full resources used by Environmental Management in meeting its cleanup mission.

Measures Could Provide Valuable Tool to Measure Program Performance

The lack of focus of the measures on overall program results deprived the Department of a valuable tool for monitoring the progress of its cleanup program. Periodic reporting of information on overall cost and schedule performance could have focused management's attention on trends in cost growth of \$39 billion and schedule slippages of almost 6 years per site in the cleanup program. Once implemented, the Department may also be able to use such performance data to determine whether the initiatives outlined in the President's Management Agenda to focus management on performance, not process, are successful. Overall results may also help the Environmental Management program identify reasons for negative trends or variances in cost and schedule.

RECOMMENDATIONS

We recommend that the Assistant Secretary for Environmental Management focus the corporate measures on overall program performance. Specifically, we recommend that the Assistant Secretary develop performance measure mechanisms that:

1. Supplement existing corporate performance measures and provide information on overall cost and schedule performance; and,
2. Capture changes in risk across Environmental Management's site cleanup activities. As the cleanup program moves into an accelerated, risk-based cleanup strategy, such a mechanism should highlight whether the program's efforts were successful in reducing or eliminating risks to public health, workers, and the environment.

Appendix 1

FISCAL YEAR 2001 CORPORATE PERFORMANCE MEASURES

1. **Complete remediation at three geographic sites** – a geographic site is an area of land or a series of buildings where Environmental Management has or is conducting cleanup work.
2. **Complete 196 release site cleanups** – release site cleanups are conducted at inactive waste sites or facilities where releases or spills have occurred and contamination has been released into the environment.
3. **Complete 45 facility decommissionings** – decommissioning involves the decontamination and dismantlement and removal of nuclear facilities that are no longer active and pose a risk to public health and the environment.
4. **Deactivate 20 facilities** – activities associated with minimizing the risks, hazards, and associated costs at facilities to make them available for re-use or eventual decontamination and decommissioning.
5. **Produce 225 canisters of high-level waste** – high-level waste is highly radioactive waste material resulting from the reprocessing of spent nuclear fuel. The long-term objective for high-level waste management is disposal in a geologic repository. High-level waste is made disposal-ready through treatment to produce canisters of vitrified waste.
6. **Ship 2,425 cubic meters of transuranic waste to WIPP for disposal** – transuranic waste is, with certain exceptions, radioactive waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years. The long-term objective is to dispose of all defense related transuranic waste at the Waste Isolation Pilot Plant in New Mexico.
7. **Dispose of approximately 8,271 cubic meters of mixed low-level waste** – mixed low-level waste (MLLW) consists of both hazardous and radioactive components and is not high-level waste or transuranic waste. The long-term goal for MLLW disposal is to develop the capacity needed to dispose of the existing inventory as well as any newly generated waste.
8. **Treat approximately 4,814 cubic meters of mixed low-level waste** – the long-term goal for mixed low-level waste is to develop the necessary treatment of the existing inventory as well as any newly generated waste.
9. **Dispose of approximately 47,908 cubic meters of low-level waste** – low-level waste (LLW) is radioactive waste that is not high-level radioactive waste, transuranic waste, spent nuclear fuel, byproduct material, or naturally occurring radioactive material. The near- and long-term goals are to continue to dispose of LLW at a pace to eliminate currently stored LLW and match generation of new waste.

Appendix 1 (continued)

10. **Stabilize 510 containers of plutonium metals/oxides** – these materials must be stabilized to reduce the level of potential risk such as exposure to radiation, contamination of people and the environment, and critical events. Stabilization means that something (i.e., processing from a liquid to a solid form, repackaging, etc.) must be done to the nuclear material so that they pose significantly less risk to workers, the public, and/or the environment.
11. **Stabilize 29,456 kilograms bulk of plutonium residues**—see Number 10.
12. **Move to dry storage 195 metric tons of heavy metal of spent nuclear fuel** – similar to nuclear materials, spent nuclear fuel must also be stabilized to reduce the level of potential risk such as exposure to radiation, contamination of people and the environment, and critical events.
13. **Accomplish 200 innovative technology deployments** – deployment is the use of a technology system toward accomplishment of one or more site-specific Department Environmental Management program cleanup objectives as applied to the actual waste requiring management at the site. The intent is to encourage sites to deploy innovative technologies to solve cleanup problems and reduce cost.

Appendix 2

ENVIRONMENTAL MANAGEMENT PERFORMANCE INDICATORS

The tables below show detailed results of Environmental Management's performance indicators including the results of the corporate measures and project-specific budget milestones.

Table 1. Success in Meeting Corporate Performance Measures

Measure Status	1998	1999	2000	2001	Total
Total Number of Measures	14	15	14	13	56
Below Expectation	4	2	3	1	10
Met or Nearly Met	10	13	11	12	46
Percent Met or Nearly Met	71%	87%	79%	92%	82%

Source: Accountability Report for Fiscal Years 1998 through 2001.

Table 2. Success in Meeting Project-Specific Budget Milestones

Milestone Status	2000	2001	Total
Total Number of Milestones	303	421	724
Milestones Not Met	80	110	190
Milestones Met	223	311	534
Percent of Milestones Met	74%	74%	74%

Source: OIG generated from Integrated Planning and Budget System data.

RELATED REPORTS

OFFICE OF INSPECTOR GENERAL REPORTS

- *Remediation and Closure of the Ashtabula Environmental Management Project* (DOE/IG-0541, January 2002). As of October 2001, about 8 years after the remediation contract was awarded, only about 50 percent of the site's contaminated acreage and about 20 percent of the potentially contaminated soil had been remediated. Despite the planned 2003 completion date, the Ashtabula Environmental Management Project clean-up effort might not be completed until 2012, resulting in a likely increase in project costs of over \$60 million.
- *Remediation and Closure of the Miamisburg Environmental Management Project* (DOE/IG-0501, May 2001). BWXTO will not meet the cost and schedule provisions of its contract with the Government to complete remediation and exit the site no later than September 30, 2005, at an estimated cost of \$427 million. The estimated cost to complete the closure of the Miamisburg Environmental Management Project has grown to over \$1 billion, including \$148 million in infrastructure costs to keep the site open through 2009.
- *The Decontamination and Decommissioning Contract at the East Tennessee Technology Park* (DOE/IG-0481, September 2000). BNFL, Inc. is not on track to complete the decontamination and decommissioning of buildings K-29, K-31, and K-33 within the current contract price or on schedule. As of March 2000, 61 percent of the costs associated with the current value of the contract had been incurred, but only 14 percent of the project had been completed. It was estimated that the project will cost \$94 million more than the current contract amount of \$250 million and that completion is at least two years behind schedule.

GENERAL ACCOUNTING OFFICE REPORTS

- *Nuclear Waste: Agreement Among Agencies Responsible for the West Valley Site Is Critically Needed* (GAO-01-314, May 2001). While the Department has almost completed solidifying the high-level wastes at West Valley, major additional cleanup work remains that makes it unlikely to meet its estimated 2005 closing date. For example, additional cleanup steps that must be taken include decontamination and decommissioning structures, remediating soil and groundwater, and removing nuclear wastes stored and buried on site. These and other steps could take up to four decades with cleanup costs totaling about \$4.5 billion.

Appendix 3 (continued)

- *Nuclear Cleanup: Progress Made at Rocky Flats, but Closure by 2006 Is Unlikely, and Costs May Increase* (GAO-01-284, February 2001). Kaiser-Hill and DOE are unlikely to meet the December 2006 target closure date. Kaiser-Hill has made significant progress toward cleaning up the site, but the majority of the work—and the most complicated—remains to be done. As of December 2000, Kaiser-Hill estimated that it had only about a 15-percent probability of completing the project by 2006.
- *Nuclear Waste: Department of Energy's Hanford Tank Waste Project – Schedule, Cost, and Management Issues* (GAO/RCED-99-13, October 1998). The project, as currently envisioned, is substantially different from DOE's 1996 initial privatization strategy. Although the project award was made on the basis of a fixed-priced contract, further competition between contractors and short-term demonstration facilities have been eliminated in favor of more permanent facilities that could operate for 30 years or more and, therefore, would be available to treat additional tank waste. The revised approach extends the completion date for processing the first portion of the waste from 2007 to 2017, and total costs rise from \$4.3 billion to \$8.9 billion.

Appendix 4

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United States Government

Department of Energy

memorandum

DATE: June 4, 2002

REPLY TO
ATTN OF: Dennis Hosaflook (EM-13, 6-7685)

SUBJECT: Draft Report on "Environmental Management Performance Measures"

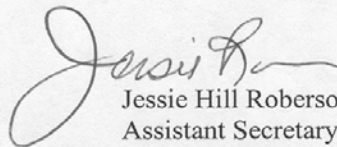
TO: Deputy Assistant Inspector for Audit Services

We have reviewed your draft report entitled *Environmental Management Performance Measures*. We agree with the conclusions reached and the appropriateness of the recommendations.

As a result of the February 2002 Top-to-Bottom review, my office has developed an aggressive plan of action to change how the Office of Environmental Management (EM) approaches its cleanup mission. The EM program is now focusing on one primary result-reducing risk to public health, workers, and the environment on an accelerated basis. New cleanup approaches must achieve greater risk reduction faster, accelerate site closure, and reduce life-cycle costs.

EM is currently evaluating, on a site-by-site basis, its performance metrics and milestones to align with EM's new approach of accelerated cleanup and risk reduction. Our goal in developing new performance measures will be to provide measures that clearly capture, at any point in time, the overall progress towards completion of the end-point objective of site cleanup. Your report will be another factor utilized to support EM's new approach. By developing performance measures to objectively and accurately measure overall program performance, EM will be in a position to meaningfully monitor and report overall progress towards reducing risk and accelerating cleanup while reducing life-cycle costs.

Attached is our corrective actions to be taken based on your recommendations. If you have any questions, please contact Mr. Eugene Schmitt, Acting Deputy Assistant Secretary, for Policy, Planning and Budget, at (202) 586-8754.



Jessie Hill Roberson
Assistant Secretary for
Environmental Management

Attachment

Corrective Actions Planned Based on OIG Report
Environmental Management Performance Measures

1. EM is currently defining risk reduction cleanup strategies at each of its sites. A Letter of Intent, signed by the Department and regulators, documents the agreed to cleanup strategy. From each Letter of Intent signed, a Performance Management Plan (PMP) will be developed.
2. Each site, in developing a PMP, will include key performance measures (metrics and milestones) which will be used to measure overall performance at the site in accelerating risk reduction and cleanup. From the PMP, an integrated resource-loaded project baseline will be developed that the site will manage. These baselines will enable the site to track cost and schedule progress along with providing EM the ability to track risk reduction progress.
3. A PMP will be developed for all sites by the end of 1st quarter FY 2003.
4. Earned Value/Cost and schedule will be available once resource loaded baselines are in place at each site. The target date, for all sites, is the end of FY 2003.
5. Once baselines are in place, EM will be able to track against its key performance measures to measure overall program performance.

Appendix 5

SCOPE

The audit was performed between January and April 2002, at Department Headquarters in Washington, DC and Germantown, MD. We evaluated whether Environmental Management's performance measures reflected the actual progress made in achieving site cleanup. Our work did not include a determination of whether the established performance measures met all the requirements of the Results Act (i.e., were objective, quantifiable, etc.) or whether the reported results were actually achieved.

METHODOLOGY

To accomplish our objective, we:

- Reviewed the Results Act, OMB Circulars, and Departmental guidance pertaining to performance measures.
- Reviewed Environmental Management's budget requests, the Department's Annual Performance Plans and Accountability Reports for Fiscal Years 1998-2001.
- Reviewed relevant reports issued by the Office of Inspector General and the General Accounting Office.
- Held discussions with officials and staff in the Office of Environmental Management.

The audit was conducted in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. To accomplish the audit objective we performed a limited reliability assessment of computer-processed data. Our assessment revealed reliability problems with certain performance related data. Because of these issues, we performed alternative procedures to verify that the data was reliable, including a review of publicly reported corroborating information. When these data are viewed in context with other available evidence, we believe the opinions, conclusions, and recommendations in this report are valid.

Management waived the exit conference.

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2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?
3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?
4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

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