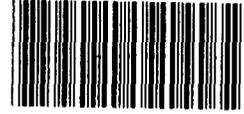


**GAO**

**Testimony**

Before the Department of Energy Defense  
Nuclear Facilities Panel  
Committee on Armed Services  
House of Representatives



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**NUCLEAR WEAPONS  
COMPLEX**

**Improving DOE's  
Management of the  
Environmental Cleanup**

Statement of Victor S. Rezendes, Director, Energy Issues,  
Resources, Community, and Economic Development Division



Mr. Chairman and Members of the Panel:

We are pleased to participate in these hearings on the Department of Energy's (DOE) cleanup of the nation's nuclear weapons complex. As our work over the last several years has shown, DOE faces a monumental task in addressing the legacy of environmental problems created by nearly a half century of nuclear weapons production. (See appendix I for a list of relevant reports and testimonies.) Although DOE has begun to make some progress, major obstacles remain and estimated clean-up costs continue to rise. For fiscal year 1993 alone, DOE is requesting \$5.3 billion-- a 24-percent increase in its clean-up budget over just last year. Over the last several years, the total estimated cost of the cleanup has risen from initial estimates in the billions of dollars to about \$100 billion just 4 years ago to currently as much as \$160 billion. Without technological breakthroughs, DOE officials believe that clean-up costs could continue to increase significantly.

Over the last several years, we have reviewed many of DOE's key clean-up projects. Our work has shown that while DOE has made some initial progress in cleaning up the complex, its efforts have been hampered by technological, compliance, and management problems. In light of the enormous cost of the cleanup and the problems DOE has already experienced, effective and efficient management of the cleanup takes on paramount importance. Recognizing this, this Panel, as part of the Committee on Armed Services, asked us to review DOE's clean-up program and to evaluate the adequacy of the program's management controls. In particular, you asked us to examine DOE's management systems for prioritizing its clean-up work and tracking work in progress. Consequently, we are here today to discuss our work on the overall management systems DOE will need to oversee this expensive and difficult effort.

In summary, our ongoing and completed work shows that DOE has put considerable effort into developing management systems to set priorities, estimate project costs, and track clean-up progress. However, work on these systems is not complete, and further effort will be needed to provide management systems that can assure the Congress and the public that clean-up funds are being used efficiently. Before discussing DOE's efforts on these management systems, I would like to highlight our work on the progress DOE has made in cleaning up the complex.

TECHNOLOGICAL, COMPLIANCE, AND  
MANAGEMENT PROBLEMS HAVE HAMPERED  
CLEAN-UP PROGRESS

DOE has begun to report its initial accomplishments in cleaning up the nuclear weapons complex. For example, in its August 1991 5-year plan, DOE pointed out that it had (1) continued

to sign compliance agreements with the states and the Environmental Protection Agency (EPA), (2) completed construction and begun testing of the Defense Waste Processing Facility at Savannah River, and (3) demonstrated several new clean-up technologies.

Reporting such accomplishments is key to providing the Congress and the public with information on the return they are receiving on their annual multi-billion-dollar investment. However, as our work over the last year has shown, many of DOE's most important clean-up projects continue to be hampered by technological, compliance, and management problems, leading to missed clean-up milestones and escalating budgets.

For example, cleaning up the high-level radioactive waste in the single-shell and double-shell tanks at DOE's Hanford facility is one of the biggest challenges in the weapons complex. Progress has been slow, and costs continue to rise. Concerning the single-shell tanks, we concluded in April 1991 that DOE was unlikely to complete its efforts to characterize the waste in these tanks by its compliance agreement milestones. Technical problems--such as how to sample hardened waste and how to avoid explosions in tanks containing hydrogen gas and other potentially explosive materials, such as ferrocyanide--blocked this effort, which must be completed before the wastes can be removed and treated.

Regarding the double-shell tanks, in June 1991, we reported that DOE's planned approach to pretreat this waste by modifying a 46-year-old facility known as B Plant would not work because (1) the plant could not meet current environmental standards and (2) the process being considered for treating the waste could eat through the piping in the facility, quickly rendering it useless. We recommended that DOE cancel further work on B Plant and shift its effort to developing an acceptable alternative. In December 1991, DOE decided not to proceed with B Plant but instead develop an alternative approach. This will cause DOE to delay milestones it had previously agreed to with the state and EPA and could lead to a potential \$2 billion increase in the cost of pretreating Hanford's waste.

Not only have we found problems with technology development and environmental compliance, we have also found that DOE has not managed existing proven technologies very well. For example, in October 1991, we reported that DOE was continuing to have problems with the "pondcrete" program at its Rocky Flats plant. DOE's effort to mix concrete with low-level radioactive waste was still unsuccessful and was characterized by escalating costs--rising from \$25 million to \$169 million--and missed milestones.

Our ongoing work continues our focus on many of the clean-up program's major challenges, including the current status of the Defense Waste Processing Facility at Savannah River, the future of

the vitrification program at the Hanford Site, and DOE's ability to monitor underground contaminants at Hanford.

KEY MANAGEMENT SYSTEMS  
ARE STILL BEING DEVELOPED

In light of the enormous cost of the cleanup and the problems DOE has already experienced, adequate management controls are essential. DOE is working to develop the management tools needed to oversee such a major effort. Key among the tools DOE needs are methods for setting priorities, estimating project costs, and tracking progress. While DOE has made progress in developing and refining these systems, additional effort will be needed.

Environmental Restoration  
Priority System's Future  
is Unclear

Faced with rising clean-up costs, this panel, as well as others, has called for a national clean-up prioritization system. In response, DOE has spent more than 2 years developing the Environmental Restoration Priority System. This system represents an improvement over DOE's prior methodology which, by its own admission, was not risk-based and too subjective. There has been considerable controversy about the system, and DOE is attempting to improve it. However, the extent of DOE's future use of it is unclear at this time.

DOE's stated purpose for the system is to (1) help decide which environmental restoration activities to include in DOE's initial budget request, (2) support the budget request during the federal budget process, and (3) after the Congress actually appropriates environmental restoration funds, serve as a tool to assist DOE management in allocating the funds among field offices, programs, and installations.<sup>1</sup>

The system does not establish priorities for specific clean-up activities or projects. Rather, it evaluates and compares alternative budget cases.<sup>2</sup> The system involves basically five steps--(1) identifying and ranking proposed clean-up activities at each facility; (2) defining alternative budget cases at each facility by combining various clean-up activities; (3) scoring the potential benefits of each facility budget case in eight areas, including individual and population health risk, environmental

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<sup>1</sup>The system does not cover DOE's waste management and technology development programs, which account for over 60 percent of DOE's clean-up budget.

<sup>2</sup>A budget case is the total collection of specific environmental restoration activities to be addressed in a given budget year.

risk, and socioeconomic impact; (4) combining the facility scores through a computer program at DOE headquarters to measure the utility or desirability of each budget case; and (5) choosing the budget case that produces the greatest total benefit for a specified total cost. These data are then used to develop the environmental restoration budget submission.

To date the system's use has been limited to assisting in allocating DOE's fiscal year 1992 budget. Use of the system has been put on hold for the fiscal year 1993 budget process and probably for fiscal year 1994 as well. This is because DOE proposed an environmental restoration budget based on the requirements contained in the compliance agreements it has signed with EPA and the states. Basing the proposed budget on the agreements, many of which contain milestones for DOE's efforts, obviates the need to set priorities through another approach, like the prioritization system.

Concerns about the prioritization system have been raised by a variety of groups. A Technical Review Group, comprised of highly qualified experts, reviewed the system for its methodological soundness. An External Review Group comprised of representatives of EPA, the states, Indian Tribes, and public interest groups reviewed the system from a variety of perspectives, including the system's consistency with existing compliance agreements. DOE's Advisory Committee on Nuclear Facility Safety also reviewed the system. The concerns expressed by these groups ranged from specific, mechanical aspects of the system's application to broader policy questions of how the system will interface with DOE's existing compliance agreements with EPA and the states.

A critical step in the system is the scoring of cases regarding their ability to reduce risk, such as individual and population health risk and environmental risk. However, because DOE is still in the very early stages of assessing the nature and extent of contamination at many of its sites nationwide, most of the data necessary to support the system does not exist.

The Advisory Committee on Nuclear Facility Safety, the Technical Review Group, and the External Review Group have all raised concerns about the lack of sufficient data to support the use of such a quantitatively oriented system. In particular, these groups have noted that without knowing the specific contaminants that must be cleaned up, the system is forced to rely to a large extent on imprecise data and "best professional judgment." DOE officials agree that they need to continue to develop additional scientific data on the nature and extent of contamination at their sites nationwide.

Without adequate oversight, the reliance on imprecise data could lead to the priority system not being consistently applied from site to site, or to manipulation by the individual sites. For

example, the prioritization system can be manipulated because it is weighted heavily in favor of clean-up activities that reduce individual and population health risk. By overemphasizing the amount of risk reduction to be gained relative to cost, one site could gain an advantage in competing for funds. As an example, the Los Alamos National Laboratory's scoring for fiscal year 1992 showed about \$68.1 million in benefits to be gained from about \$60.4 million in funding. However, Los Alamos officials told us that if they had made a few relatively minor changes, that same \$60.4 million could have been shown to produce about \$77.9 million in benefits, an increase of over 14 percent. DOE officials agree that to ensure accuracy and consistency in the scoring process, they need to increase oversight both at the sites and at headquarters.

Even though DOE intends to improve the prioritization system, its future use is in question. EPA and most of the states that are parties to the compliance agreements with DOE have opposed the system in principle because they believe that the agreements, and other regulatory provisions, should be used as the sole basis for priority setting and budget development. This is how the fiscal year 1993 budget was determined, and the situation likely will be the same for fiscal year 1994. However, as the scope of the cleanup expands, the possibility exists that DOE may not receive enough funds to achieve all clean-up agreement goals in the future, and that a risk-based prioritization system could be beneficial in making funding decisions. Currently, it is not clear what role the prioritization system will play.

#### DOE Has Taken Steps to Improve Project Cost Estimates

When we appeared before this panel last year, we pointed out that DOE's ability to properly estimate clean-up costs for individual projects had been criticized by a variety of organizations, including the state of Washington, EPA, and DOE's Inspector General. Since then, faced with rising clean-up budgets, concerns about DOE's cost estimating have continued, culminating in an extensive review of the cost estimates contained in the August 1991 version of DOE's "Environmental Restoration and Waste Management Five-Year Plan." The review was done by DOE's Office of Procurement, Assistance, and Program Management.

The Office of Procurement's study, carried out by the Independent Cost Estimating (ICE) group, involved independent contractor teams who developed their own estimates of project costs. Through meetings with field office staff responsible for the management of about 1,600 clean-up projects, ICE representatives defined the scope of each project and collected information on the labor, material, and services needed to meet project milestones during the 5-year period. After verifying the completeness of the information collected, ICE teams then used (1)

generally accepted indices of costs for certain activities such as well drilling, (2) recent DOE cost studies, and (3) Corps of Engineers statistics to estimate direct and indirect project costs.

The ICE results supported the continued increases in the overall cost of the cleanup contained in the 5-year plan, but also found very large variances in the cost estimates for individual activities. Specifically, the teams' estimates were within plus or minus 10 percent of the 5-year plan's estimates for only about 250 of the 1,600 projects. For the remaining projects, the ICE estimates ranged from almost 100 percent below to over 200 percent above the estimates in the 5-year plan. For the 350 projects where the ICE estimates varied widest from the DOE field estimates, the ICE teams reconciled the differences. Projects selected for cost reconciliation met one of the following criteria--fiscal year 1993 costs greater than \$2 million and variance outside the range of -50 percent to +100 percent; fiscal year 1993 variance greater than \$5 million; or five-year plan variance greater than \$20 million.

The ICE effort represents an important source of independent information that DOE could use to improve the reliability of its cost estimates for individual clean-up projects. Officials of DOE's Office of Environmental Restoration and Waste Management and Office of Procurement have told us that they intend to consider the ICE results as one of several factors they will review during their separate evaluations of the Department's upcoming fiscal year 1994 budget.

#### DOE is Developing a Progress Tracking System

In our testimony last year before this Panel, we noted that DOE was not routinely collecting consistent nationwide information on the status of its clean-up actions. In a May 1991 report on the 1992 Energy and Water Development Appropriations Bill, the House Committee on Appropriations directed DOE to provide information on planned versus actual costs and milestones achieved for each clean-up activity. In response, during the first quarter of fiscal year 1992, DOE implemented the Progress Tracking System.

The system will report on the technical, cost, and schedule progress for all of the major components of DOE's clean-up program including environmental restoration, waste management, corrective activities and technology development. While the system is being designed, in part, to enable DOE to respond to internal as well as external information requests, additional information and refinements will be needed before the system can deliver all the information needed to track DOE's progress.

The Progress Tracking System is designed to collect monthly data for each clean-up and technology development activity or project. The system will collect (1) information on actual versus

planned costs; (2) planned, actual and forecast dates for significant compliance and programmatic milestones; and (3) general narrative information on a project's progress. The narrative information will discuss problems encountered with cost, schedule and technical progress, corrective actions planned to address these problems, and notable achievements.

The Progress Tracking System represents a major step toward effectively tracking progress and expenditures for DOE's clean-up program. At the present time, however, DOE is still experiencing problems obtaining all of the information it needs for the system to operate as intended. For example, the Progress Tracking System is designed to use the same actual cost data contained in DOE's accounting system. However, actual cost data for some clean-up projects are not yet reflected in the accounting system. Similarly, while the Progress Tracking System is designed to track DOE's progress in meeting significant compliance milestones, it currently does not have complete information on all of these milestones. DOE has recently issued guidance and is working with its field offices to ensure that the system contains complete and accurate milestone information.

Even after DOE addresses these problems, there will still be some important information that the system cannot provide until additional modifications are made. For example, while the system is intended to provide information on milestone status, it does not, as currently implemented, provide information on the extent to which achieving individual milestones contributes to the completion of the entire project. Such information would allow DOE to report on what percentage of work on a total project had been completed. Also, currently the system provides only planned and actual cost and schedule information for one fiscal year at a time. Since many projects in the clean-up program span the course of several years, the system currently cannot show the full picture of how work on a project is progressing from the original project estimate to project completion. Unless the system can track actual performance against original estimates, its usefulness in measuring DOE's progress and performance will be limited.

DOE has acknowledged that the current system needs to be expanded and is planning to significantly increase the system's capability in its second phase. This expansion includes enhancing the system's capabilities for measuring program performance and for tracking project costs over the life of the project.

#### SUMMARY

In summary, Mr. Chairman, sound, credible management systems are a critical tool to support the clean-up effort. DOE faces a monumental problem as it attempts to address the environmental problems created by nearly a half century of nuclear weapons production. DOE and the Congress will need to make hard choices

between the weapons complex cleanup and other national needs. Management systems to set priorities, estimate project costs, and track progress will be critical to making these choices. DOE is making progress on these systems; however, further steps are necessary to (1) improve the prioritization system and determine how it will be used, (2) refine how DOE estimates costs, and (3) complete and expand the Progress Tracking System.

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Mr. Chairman, this concludes my prepared remarks. We will be happy to respond to any questions you may have.

RELATED GAO PRODUCTS

1. Nuclear Waste: DOE's Management of Single-Shell Tanks at Hanford, Washington (GAO/RCED-89-157, July 18, 1989).
2. DOE's Efforts to Correct Environmental Problems of the Nuclear Weapons Complex (GAO/T-RCED-90-47, Mar. 15, 1990).
3. Nuclear Health and Safety: Status of GAO's Environmental, Safety, and Health Recommendations to DOE (GAO/RCED-90-125, Apr. 20, 1990).
4. Nuclear Health and Safety: Long-Term Plans to Address Problems of the Weapons Complex Are Evolving (GAO/RCED-90-219, Sept. 28, 1990).
5. Nuclear Energy: Consequences of Explosion of Hanford's Single-Shell Tanks are Understated (GAO/RCED-91-34, Oct. 10, 1990).
6. Nuclear Safety and Health: Problems With Cleaning Up the Solar Ponds at Rocky Flats (GAO/RCED-91-31, Jan. 3, 1991).
7. Nuclear Health and Safety: Environmental Problems at DOE's Idaho National Engineering Laboratory (GAO/RCED-91-56, Feb. 12, 1991).
8. Managing the Environmental Cleanup of DOE's Nuclear Weapons Complex (GAO/T-RCED-91-27, Apr. 11, 1991).
9. Nuclear Waste: Problems and Delays With Characterizing Hanford's Single-Shell Tank Waste (GAO/RCED-91-118, Apr. 23, 1991).
10. Nuclear Waste: Pretreatment Modification at DOE Hanford's B Plant Should Be Stopped (GAO/RCED-91-165, June 4, 1991).
11. Nuclear Waste: Hanford Single-Shell Tanks Leaks Greater Than Estimated (GAO/RCED-91-177, Aug. 5, 1991).
12. Nuclear Health and Safety: Problems Continue for Rocky Flats Solar Pond Cleanup Program (GAO/RCED-92-18, Oct. 17, 1991).
13. Nuclear Weapons Complex: Major Safety, Environmental, and Reconfiguration Issues Facing DOE (GAO/T-RCED-92-31, Feb. 25, 1992).

14. Cleanup Technology: DOE's Management of Environmental Cleanup Technology (GAO/T-RCED-92-29, Feb. 26, 1992).

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