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REVIEW OF THE DEPARTMENT OF ENERGY'S DEPLOYMENT OF DOE-FUNDED ENVIRONMENTAL CLEANUP TECHNOLOGIES

HEARING

BEFORE THE

SUBCOMMITTEE ON
OVERSIGHT AND INVESTIGATIONS

OF THE

COMMITTEE ON COMMERCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

MAY 26, 1999

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REVIEW OF THE DEPARTMENT OF ENERGY'S DEPLOYMENT OF DOE-FUNDED ENVIRONMENTAL CLEANUP TECHNOLOGIES

WEDNESDAY, MAY 26, 1999

HOUSE OF REPRESENTATIVES,
COMMITTEE ON COMMERCE,
SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:33 a.m., in room 2322, Rayburn House Office Building, Hon. Fred Upton (chairman) presiding.

Members present: Representatives Upton, Barton, Burr, Bilbray, Blunt, Bryant, Klink, Stupak, McCarthy, and DeGette.

Staff present: Dwight Cates, majority professional staff; Penn Crawford, legislative clerk, and Edith Holleman, minority counsel.

Mr. UPTON. Good morning, everyone.

Today, the subcommittee will continue its review of the Department of Energy's efforts to deploy new environmental technologies by the Department's Office of Science and Technology, OST. These technologies are important, because DOE currently estimates that it will cost $200 billion—"b" as in big—to pay for environmental cleanup responsibilities at its several nuclear waste sites. Indeed, we have already committed $51 billion to the cleanup effort since 1990, and DOE expects that we will spend an additional $147 billion during the next 70 years.

In order to reduce these enormous costs and speed the cleanup of these dangerous wastes, Congress has invested $2.7 billion in OST for the development of cheaper, faster, and safer environmental technologies. However, so far, our expected return on this investment has been very disappointing. In November 1996, Chairman Bliley began a programmatic review of this important issue by asking the Department three simple questions: What technologies have been funded by OST? Which of these have been deployed at DOE waste sites? And what cost savings have occurred as a result of those deployments? Remarkably, DOE was unable to readily provide this information, because these basic, programmatic performance measures were simply not tracked.

Chairman Barton's May 1997 oversight hearing revealed severe mismanagement within OST, a lack of integration between OST and the cleanup offices within DOE's Office of Environmental Management, a disappointing deployment rate, and many questionable funding decisions, including OST's $33 million investment in molten metal technologies. Although there has been some progress in

the past 2 years, according to GAO, many of DOE's management problems have not been resolved. But, today, I would like to focus on solving the deployment problem.

After several years of what seems to be an endless characterization and study, DOE is now moving into the actual cleanup phase. The Office of Environmental Restoration and the Office of Waste Management are stabilizing and treating waste sites, decommissioning nuclear facilities, and moving radioactive wastes to the recently opened WIPP facility. By the end of this year, cleanup at 4,490 sites, or 46 percent, of the Department's 9,700 release sites will be completed. The Department is also accelerating and disposal of the transuranic, low-level, and mixed radioactive wastes. Additionally, this year, 120,000 cubic meters of radioactive wastes will be treated and disposed. Much of this work is necessary to meet the Department's plan to complete cleanup at many DOE sites by the year 2006. However, a large part of the Department's cleanup job will remain after 2006. Many cleanup projects, such as Hanford radioactive tank waste will take many decades and several billion dollars to solve.

Unfortunately, amidst all of this cleanup progress, relatively few OST-funded environmental technologies are finding widespread application in the DOE cleanup market. DOE can verify that only 160 of its technologies have been deployed. Most of these technologies have been deployed only once and a total of less than 300 deployment instances have occurred. Notably, the Department's single most successful year occurred in 1998; the year after our May, 1997 hearing with approximately 104 deployments. However, DOE expects that only 60 innovative environmental technologies will be deployed in fiscal years 1999 and 2000. Why would DOE set such low expectations going forward? At this deployment rate, hundreds of deployment opportunities will be missed annually as the Department accelerates cleanup activities but ignores the use of promising environmental technologies.

In addition to the total number of deployments, total cost saving is also an important measure of success. At the subcommittee's May, 1997 hearing, DOE identified $20 billion in potential life-cycle cost savings that can be achieved with the application of OST technologies. However, after $51 billion in taxpayer funds spent on environmental cleanup to date, including $2.7 billion spent on technology development, DOE can account only for $700 million in projected cost savings. DOE will never achieve $20 billion in cost savings unless the Department and its site management contractors commit to deploying these cost saving environmental technologies at a much faster rate.

DOE's site management contractors play a very important role in the technology deployment process, and new technology will not be used unless the site contractor and its subcontractors agree to use it. We should not expect the DOE marketplace to embrace OST-funded technologies unless they offer a real improvement over baseline technologies. However, in many cases, the contractors seem to be reluctant customers even when the technology is proven and available. Today, we will hear about the experiences of several small businesses that have developed promising technologies with

OST funds but are unable to penetrate the bureaucracy at DOE waste sites.

This committee's work on this issue over the past several years has revealed that there is a substantial graveyard of OST-funded projects that did not have technical merit, did not have an identified end user once it was completed, or simply should never have been funded. However, OST does offer several proven and promising technologies. Although countless deployment opportunities have already missed, there is a great deal of cleanup work yet to be started or completed. If DOE and its contractors are willing, there is ample opportunity to find widespread use for several OST-funded technologies which could save us billions.

Today, we will hear from GAO, DOE, the Department's site management contractors, and a few environmental technology vendors on how we will achieve this important goal.

And I would yield to the ranking member of this subcommittee, Mr. Klink.

Mr. KLINK. Thank you, Chairman Upton.

In May 1997, as the chairman said, the subcommittee held its first hearing on the Department of Energy's Office of Science and Technology. This office has long been a subject of criticism by the General Accounting Office and by others. Questions have been raised repeatedly about whether enough of the technologies funded by this $2 billion program have actually been used at DOE cleanup sites, and those questions will be raised again here today.

The minority prepared the first request for the GAO for a comprehensive request of OST prior to that hearing. It was signed by both the committee and subcommittee chairmen and ranking members. The report was completed in September 1998, and GAO's testimony today is a follow-up to that report.

The investigation of the inefficient of taxpayer funds at DOE should be a bipartisan effort. Now, I have to say that, unfortunately, the preparation for this hearing was not. Minority staff was excluded from meetings and communications with technology vendors and site contractors. Written information requested from the contractors by the majority was not shared. One contractor even requested that minority counsel attend the meeting but was told that was not allowed. Until recently, we were not aware of the GAO's continuing work to update our joint request. Such actions make it very difficult for the minority to be a full and active participant in this subcommittee's, and, Mr. Chairman, I will note, for the record, we have had two other hearings in the past week, and in those two hearings, the preparation was completely bipartisan; we have worked together. So, it appears, some days we are in, and some days we are out.

In any event, I do look forward to hearing from the witnesses before us, and we hope that we can move forward working together, because this is something that is very important, and the minority would like to work with the majority on this issue.

And if there is no objection, I would like to put into the record two reports directly relevant to today's hearing. The authors of those reports are not here today. One is a May 19 audit report from the Department's Inspector General on technology deployment. The other is a communication from the Environmental Management

Advisory Board concerning one of DOE's technology initiatives. The EMAB provided essential testimony at our 1997 hearing, and I have got the two reports here, Mr. Chairman.

Mr. UPTON. Without objection, the material is entered into the record.

[The information referred to follows:]

Environmental Management Advisory Board
United States Department of Energy
1000 Independence Avenue, S.W., Room 5B-171
Washington, DC 20585

May 4, 1999

Mr. James M. Owendoff
Acting Assistant Secretary for
Environmental Management
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. Owendoff,

This letter transmits to you the resolution on the Work Package Ranking System, approved by the Environmental Management Advisory Board at its April 22, 1999 meeting.

If you have any questions or comments, please contact me through the Executive Director of the Environmental Management Advisory Board.

David L. Bodde

Dr. David Bodde
Chair

Attachment

Environmental Management Advisory Board
RESOLUTION
THE WORK PACKAGE RANKING SYSTEM
April 22, 1999

Whereas, the Environmental Management Advisory Board Technology Development and Transfer Committee (TD&T) has stressed the need for transparent decision-making processes in DOE-EM on technology funding priorities and for changes in how priorities are set by the Office of Science and Technology (OST);

Whereas, previously, DOE-EM decisions on technology development were not always based on objective criteria, user involvement, or competitive processes which contributed to unusable results, fragmented development, and heavy criticism;

Whereas, a team of the TD&T Committee has examined the Work Package Ranking System (WPRS) developed by OST;

Whereas, the TD&T Committee has reviewed the work of the team and agrees that the WPRS is an effective, defensible, and democratic system that should be continued.

Now, therefore, be it resolved that the Environmental Management Advisory Board recommends to the Assistant Secretary for Environmental Management that:

- DOE-EM should improve the WPRS as planned and implement it as the basis for technology development decisions for FY 2001 and beyond;
- DOE-EM should take pride in the WPRS and support, explain, and articulate its benefits;
- DOE-EM should ensure that criteria (and other) changes over time do not move the WPRS from an objective analysis to a subjective one; and
- if analysis indicates that urgent needs are not being met by current funding assignments, then the Assistant Secretary should ask for additional support, as required.

REVIEW OF OFFICE OF SCIENCE AND TECHNOLOGY WORK PACKAGE RANKING SYSTEM

TECHNOLOGY DEVELOPMENT AND TRANSFER COMMITTEE REPORT

Prepared for
Environmental Management Advisory Board
U.S. Department of Energy
April 22, 1999

Presented by
Dr. Edgar Berkey, Chairman

BACKGROUND

- EMAB (TD&T Committee) has stressed the need for transparent decision-making processes in DOE-EM on technology funding priorities
- Previously, decisions on technology development were not always based on objective criteria, user involvement, or competitive processes
- This contributed to unusable results, fragmented development, and heavy criticism
- TD&T Committee has pressed for changes in how priorities are set by the Office of Science and Technology

BACKGROUND (cont.)

- In 1998, the Office of Science and Technology (EM-50) introduced the Work Package Ranking System (WPRS) to prioritize funding for FY00
- WPRS yields an Integrated Priority List (IPL) of work packages to be funded
- EM-50 requested that EMAB TD&T Committee review WPRS
  - Evaluate and comment on approach
  - Make any suggestions

REVIEW PROCESS

- TD&T Committee conducted a 1-day review in February, 1999
- Meeting conducted with:
  - Gerald Boyd, Acting Deputy Assistant Secretary for Office of Science and Technology
  - Jef Walker, Director, Office of Technology Systems
  - Greg Parnell, Virginia Commonwealth University
- Information reviewed:
  - WPRS methodology
  - Portfolio analysis results for FY00
  - Future plans

WHAT IS WORK PACKAGE RANKING SYSTEM (WPRS)?

- WPRS employs Multi-Objective Decision Analysis (MODAL) methodology
  - Prioritizes across all Focus Areas
  - Ranks work packages (problems, not specific technologies)
    - » Work package is a portfolio of technologies needed to address a specific problem
  - Relies on end-user requirements and data
    - » Connected to EM cleanup plan
  - Uses objective criteria
    - » Supporting *Paths to Closure* requirements
    - » Meeting end-user needs, reducing technical risk and cost
    - » Accelerating deployment of technologies.

OBSERVATIONS / FINDINGS

- WPRS is a major step forward!
  - Objective approach based on user involvement
  - Results are credible and defensible
  - Transparent process; minimizes subjectivity
  - Technology funding clearly linked to program priorities
  - Provides management tool for portfolio analysis
  - Should be self-regulating and encourage beneficial behavior changes in the system
  - Should improve ability to communicate with Congress
- FY00 work package rankings make sense
  - Internal effort to train and coordinate with Focus Areas was worthwhile

FINDINGS (cont.)

- Improvements still needed
  - Criteria should be allowed to evolve as needs change
    - » For example, emphasize multi-site deployments
  - Adjustments to priority ranking need to be documented
  - Value of WPRS needs to be documented
  - Need to address how contingencies should be handled
  - Need to link applied research and development to basic research activities
- WPRS must be explained in simple terms
  - Addressing user requirements
  - Focusing on most pressing needs
  - Incorporating stakeholder concerns

RECOMMENDATIONS

- The Work Package Ranking System is solid -- DOE-EM should improve it and implement it for FY 2001 and beyond
  - This is a system to be proud of -- support it, explain it, articulate its benefits
- Ensure that criteria (and other) changes do not move WPRS from an objective analysis to a subjective one
- If urgent needs are not being met by current funding assignments, ...dare to ask for additional support -- but only if the analysis warrants it

Department of Energy
Washington, DC 20585
May 19, 1999

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "The U.S. Department of Energy's Large-Scale Demonstration and Deployment Projects"

BACKGROUND

The Department of Energy has about 7,000 surplus buildings that will eventually require deactivation and decommissioning (D&D). The estimated cost of D&D for the Department's surplus facilities is over $11 billion with an additional $20 billion to stabilize, deactivate and decommission facilities which are currently active. The Office of Environmental Management is responsible for assuring that adequate technologies are available to address these D&D needs. Through the development and widespread deployment of new technologies, the Department has established a goal of reducing D&D costs by approximately $1 billion by 2006.

Environmental Management uses Large-Scale Demonstration and Deployment Projects to identify and promote deployment of improved technologies throughout the Department. These projects are intended to provide an opportunity to compare the cost and performance of new or improved technologies against established technologies. To date, the projects have demonstrated many technologies which offer cost and performance improvements over established technologies. Environmental Management uses a concept of Integrating Contractor Teams to manage each project. The objective of our audit was to determine if opportunities exist to increase D&D technology deployments within the Department and to reduce the cost of managing technology demonstration projects.

RESULTS OF AUDIT

The Department was not successful in deploying newly demonstrated technologies throughout its facilities. In Fiscal Year 1998, only 10 of 46 deployments were to Departmental sites that did not participate in the original demonstration. While several factors may have affected the rate of deployment of the new technologies, we noted that deployments to other Departmental sites did not occur because technology end-users from these sites were not usually members of the team managing the demonstrations.

We also found that the Department did not control management costs of the demonstrations. The cost of the Integrating Contractor Teams, which manage, administer and provide technical support for the demonstrations, represent a large percentage of the total funds available to demonstrate technologies. In one project, for example, these costs represented 74 percent of the $5.5 million in total costs. Additional administrative costs also were incurred because of repetitive procurements for contractor services. Environmental Management had not identified

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or collected specific cost information that would allow consistent analysis and control of these costs.

MANAGEMENT REACTION

The Acting Assistant Secretary for Science and Technology, Office of Environmental Management expressed general agreement with the findings and recommendations in a draft of this report. Environmental Management agreed to expand Integrated Contractor Team membership to include Federal and end-user contractor personnel. Management has begun corrective actions to expedite publication of demonstration results and establish project cost collection and reporting requirements. Management has also agreed to pursue centralized procurement for contractor teams.

cc: Deputy Secretary
Under Secretary

DOE/OIG-0444

AUDIT REPORT

THE U.S. DEPARTMENT OF ENERGY'S LARGE-SCALE DEMONSTRATION AND DEPLOYMENT PROJECTS

MAY 1999

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

The U.S. Department Of Energy's Large-Scale Demonstration And Deployment Projects

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Overview

INTRODUCTION AND OBJECTIVE

The Department of Energy's Office of Environmental Management (EM) is responsible for deactivating and decommissioning (D&D) about 7,000 surplus buildings. Approximately 13,000 of the Department's currently active buildings may also require D&D activity. The estimated cost to D&D surplus facilities is over $11 billion, and an additional $20 billion will be needed to stabilize and D&D currently active facilities.

EM's Office of Science and Technology, Deactivation and Decommissioning Focus Area, is responsible for assuring that adequate technologies are available to address these D&D needs. For purposes of clarity, we are using the term "Focus Area" throughout this report to refer to this EM component responsible for acquiring and deploying new technologies for D&D work. The goal of the Focus Area is to deploy better technologies to reduce the Department's cost of D&D activities by $5 billion over the life of the environmental cleanup of the current surplus buildings. About $1 billion of these savings are expected to be realized by 2006. The Focus Area uses Large-Scale Demonstration and Deployment Projects (Large-Scale Projects) as the cornerstone for achieving this goal by identifying and promoting deployment of new and improved technologies to reduce the cost of the cleanup. The Large-Scale Projects are intended to provide an opportunity to compare the cost and performance of new and improved technologies against baseline, or established, technologies.

The projects began in July 1995 when the Federal Energy Technology Center, which leads the Focus Area, requested proposals from field sites for demonstrations. Proposed projects were evaluated by the following criteria: significance of the proposed demonstrations (especially for cost reductions in future projects), readiness of the proposed technology to be demonstrated, commitment of the site to the demonstration, and project management. The sites selected for demonstration had to have facilities that had an ongoing D&D project so that new technologies could be compared side-by-side with a baseline technology for cost and performance. In October 1995, the Focus Area selected three sites to host demonstration projects: Plant 1 at the Fernald Environmental Management Project in Ohio, the CP-5 Reactor at Argonne National Laboratory in Illinois, and the C-Reactor at the Hanford Site in Washington.

The Focus Area uses a concept of Integrating Contractor Teams to manage the Large-Scale Projects. For the most part, these teams are composed of commercial D&D technology companies which are responsible for screening and selecting technologies and the day-to-day management of the demonstrations. The cost and performance data that results from each demonstration is published in Innovative Technology Summary Reports as a way of encouraging other sites to adopt the new technologies.

As of January 1999, the Focus Area had completed three demonstration projects and was in the process of implementing four new projects. The Focus Area had expended approximately $16.5 million on the three completed Large-Scale Projects and expected to spend another $12 million on four new projects. According to Focus Area management, the three completed Large-Scale Projects had resulted in 46 technology deployments in Fiscal Year 1998.

The objective of our audit was to determine if opportunities existed to increase D&D technology deployments within the Department and to reduce the cost of managing technology demonstration projects.

CONCLUSIONS AND OBSERVATIONS

Although the Department had demonstrated many technologies it believed to be promising, it was not successful in deploying these technologies throughout its facilities. The majority of technology deployments in Fiscal Year 1998 were either to non-Departmental sites or to sites where the technology was originally demonstrated. Only 10 of the 46 technology deployments in Fiscal Year 1998 were to Departmental sites that did not originally demonstrate the technology. Field site personnel and D&D site contractors indicated that new technology deployments depend mostly upon first hand knowledge of the technology. However, the project Integrating Contracting Team members, with one exception, did not include D&D project managers from other Departmental sites. As a consequence, the benefits of new or improved technologies were not readily transferred to these sites.

In addition, the Department did not control management costs of the demonstrations. The cost of the Integrating Contractor Teams, which manage, administer and provide technical support for the demonstrations, represents a large percentage of the total funds available to demonstrate technologies. In one project, these costs

represented 74 percent of the $5.5 million in total costs. The Focus Area did not identify or collect specific cost information that would allow consistent analysis and control of these costs. Additional administrative costs were incurred by the Focus Area because of repetitive procurements for contractor services.

The Focus Area may not achieve its goal of $1 billion in cost savings by 2006 unless it ensures that Department site managers and contractors, who could benefit from demonstrated technologies, are part of the teams managing the Large-Scale Projects. In addition, the administrative and management costs of the Integrating Contractor Team appeared to represent an unreasonably large proportion of project costs. The Focus Area needs to implement better mechanisms to identify and control these costs.

In accordance with its 1997 Strategic Plan, the Department is to develop and deploy innovative environmental cleanup technologies that reduce costs, resolve currently intractable problems, and/or are more protective of workers and the environment. Because the Large-Scale Projects are the cornerstone of the Department's efforts to demonstrate and deploy new D&D technologies that reduce the cost of the cleanup, it is necessary that the Department make changes to enhance the program in order to meet Strategic Plan objectives.

The Office of Inspector General had previously performed reviews of the Department's efforts to manage and integrate technology research and development projects. In a report on *Management of Research and Development Integration* (DOE/IG-0417), we concluded that the Department did not have a system in place to ensure projects were jointly planned, budgeted, and managed. Detailed discussions of this and other related audit reports are included in Appendix 3.

The issues discussed in this report should be considered by management when preparing the yearend assurance memorandum on internal controls.

Office of Inspector General

Office of Inspector General

Opportunities For Technology Deployments

Technology Deployment Strategy

Demonstrated technologies were not widely deployed across the Department. The majority of technology deployments in Fiscal Year 1998 that resulted from the three completed projects were either to non-Departmental sites or to sites where the technology was originally demonstrated. Only 10 of the 46 technology deployments were to Departmental sites that did not originally demonstrate the technology. Nine of the deployments were to non-Departmental sites. The remaining 27 deployments were at the sites that originally demonstrated the technology.

There are a large number of current and planned D&D projects within the Department which are dependent on the technologies being demonstrated in the Large-Scale Projects. For example, facilities at seven separate field sites were identified as potential markets for a certain successfully demonstrated technology. However, none of these sites participated on the project's Integrating Contractor Team and only one had adopted the technology.

The National Research Council had similar findings in its review of Focus Area activities prior to Fiscal Year 1998. The Council found that Large-Scale Projects were not achieving the goal of widespread deployment of new technologies and the Focus Area had no systematic plan that would encourage the deployment of these technologies.

Deployment Objective

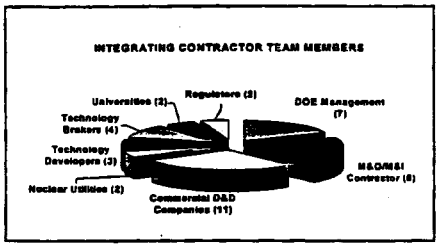
Large-Scale Projects are the tools used by the Department to achieve user acceptance of new D&D technologies. According to its Fiscal Year 1999 Multi-Year Program Plan, widespread deployment across the Department complex of improved and innovative technologies is the ultimate measure of success for the Focus Area.

Additionally, the Focus Area issued its *Large-Scale Demonstration Program Implementation Guide* in October 1997. This guide established a program goal to include multiple commercial D&D companies on the Integrating Contractor Team, defined the roles and responsibilities of the Integrating Contractor Team members, and established a method to communicate demonstration results. Specifically, the Focus Area relied on Integrating Contractor Team members and the Innovative Technology Summary Reports to disseminate information about the results of Large-Scale Projects.

Improving Deployment

Technology deployment was hindered because Departmental guidance did not require Integrating Contractor Teams to include a broad base of Department technology end-users and the timely publication of the Innovative Technology Summary Reports. Generally, Integrating Contractor Teams did not include D&D project managers from Department sites, other than the demonstration site, who could benefit from the demonstrated technologies. Rather, the Integrating Contractor Teams were composed of demonstration site contractors, commercial D&D firms, and others who did not have cleanup responsibilities at other Department locations. This composition occurred because the Focus Area determined that commercial D&D firms would use their first-hand knowledge from the demonstrations to compete for other Departmental site D&D work.

For the seven Large-Scale Projects, the Integrating Contractor Team membership consisted of 39 organizations. As illustrated in the following chart, 7 Department managers and 8 participants from major Department contractors participated on the teams. Except for one of those individuals, however, none of the Integrating Contractor Team members represented a Department site that could benefit from the demonstrated technologies other than the demonstration site.



Department field personnel and D&D contractors indicated that their adoption of new technologies depended mostly on first hand knowledge of the technology. They further indicated that the best means of obtaining that experience was through participation on the Integrating Contractor Team. For example, one project manager recommended that Integrating Contractor Team membership be changed (not necessarily expanded) to include more technology end-users. He advised that end-users should include companies, organizations, and individuals involved directly in the field work with D&D activities. The project manager stated this way technology end-

users are more likely to recognize a technology "winner" and be in a position to quickly deploy the technology. In addition, he believed it was important that information on the results of a technology demonstration be disseminated as soon as possible.

In its 1998 report, the National Research Council reached similar conclusions. The Council found that the Focus Area needed to improve its approach to introducing and gaining acceptance of demonstrated technologies. It concluded that new technologies must be "pulled" by the Department site cleanup project managers with the problem. They cannot be "pushed" by the technology suppliers.

The Focus Area was also not able to ensure timely communication of technology demonstration results to end-users across the Department. The Focus Area's primary communication tool was the Innovative Technology Summary Reports. The Summary Reports contained comprehensive cost and performance data from the side-by-side demonstrations of individual technologies. However, there were delays in publishing these reports. In fact, during Fiscal Year 1998, only 12 of 46 Summary Reports submitted to Headquarters were published by the Office of Science and Technology.

Focus Area management agreed to explore adding Departmental site contractors to the Integrating Contractor Teams. Management believed participation of other site contractors as team members must be balanced with commercial D&D firms to keep team size to a manageable level of four to six organizations.

Realization Of Project Goals

Unless the Focus Area ensures deployment of new and improved technologies, the Large-Scale Projects are unlikely to be effective tools in reducing D&D costs. The Focus Area is responsible for assuring that adequate technologies are available to address the Department's need for improved methods to reduce the cost of the cold war legacy of environmental contamination. Its specific goal is to deploy these better technologies to reduce projected D&D costs by $1 billion by 2006. This goal can only be realized if technology end-users adopt new and improved technologies demonstrated through the Large-Scale Projects.

RECOMMENDATIONS

We recommended that the Acting Assistant Secretary for Environmental Management improve program implementation guidance for the Large-Scale Demonstration and Deployment Projects by:

1. Stipulating that Department D&D managers and contractors from sites that have been identified as potential candidates for using demonstrated technologies be included in the Integrating Contractor Team functions related to selecting, screening, evaluating, and demonstrating technologies, and

2. Requiring the timely publication of the Innovative Technology Summary Reports.

MANAGEMENT REACTION

Environmental Management's Office for Science and Technology reviewed our report and generally agreed with this finding and recommendations. In its response, management stated that the Department concurs with the first recommendation and agrees to expand the membership of the Integrated Contractor Team to include Federal and end user contractor employees to assist technology transfers to other sites with similar D&D problems. Management's response also stated that we reported only 10 of 46 deployments in Fiscal Year 1998 were to sites beyond the demonstration site. They pointed out that 50 percent of the deployments occurred at the demonstration site and 50 percent occurred at non-demonstration sites.

Management agreed with the second recommendation and stated that they have "already taken corrective action to ensure that future ITSRs (Summary Reports) will be available for review within three months following completion of the technology demonstration and available for publication within four months following demonstration." This action is documented in the *Fiscal Year 1999 Program Execution Guidance* from the Focus Area to each Integrated Contractor Team.

AUDITOR COMMENTS

Management's comments regarding the percentage of deployments during Fiscal Year 1998, however, did not fully address the performance of the program. Management included non-Departmental sites such as public utilities in its assessment of non-demonstration site deployments. While the adoption of Department-generated new technologies by the private sector is a positive and

encouraging step, the primary measure of success of the program is the level of deployment of improved and innovative technologies at Departmental sites. Thus, we concluded that the inclusion of data on non-Departmental deployments tends to skew a realistic view of the performance of the program.

Management's comments are otherwise responsive. The proposed actions, if properly implemented, will improve the deployment of new and improved D&D technologies to other Departmental sites with similar problems and provide for timely publication of the Summary Reports.

Opportunities For Project Management Cost Reductions

Project Cost Controls

The Focus Area did not control the costs of the Integrating Contractor Teams that manage, administer, and provide technical support to the demonstrations. Specifically, the drivers of management, administration, and technical support costs of the Integrating Contractor Teams had not been identified even though such costs represented a large percentage of the total cost of demonstrations. On one $5.5 million project, for example, only about 10 percent ($520,000) of total costs represented payments to the technology subcontractor responsible for the demonstration. Seventy-four percent ($4 million) was spent for individual team member costs but the factors that drive overhead costs such as management, administration and support costs of the Integrating Contractor Team could not be separately identified by project management. The remaining $1 million was spent by project management on infrastructure items such as building upgrades.

Costs of the demonstrations were also increased because project management allowed repetitive procurements for similar contractor services on the Integrating Contractor Teams. Each operations and field office that participated in the Large-Scale Projects acquired services from commercial D&D companies. Often, these companies participated in one or more of the seven demonstration projects. Separate procurements were used each time a company participated in a demonstration project even though the services provided by the company were essentially the same. For the seven projects that have been completed or are ongoing, six contractors participated as team members more than once. In total, 17 separate procurements were used to acquire services from the six contractors.

Performance Measures

The Large-Scale Project Implementation Guide established performance measures for conducting each project. General areas covered by the measures included the percentage of project funding provided to technology vendors and funding percentages for project management activities. These measures were intended to influence the Integrating Contractor Team to focus resources on technology demonstrations and not project management. The guide also states that a substantial portion of the project funding be used for actual technology demonstrations and costs for project overhead functions such as planning, monitoring, and data collection and analysis need to be kept to a minimum to maximize the number and scope of technology demonstrations.

Project Cost Controls Needed

While the guidance stipulated that project managers minimize project overhead costs, it did not establish specific targets. Further, the guide did not contain any requirements regarding the identification and collection of cost elements for project management, administration, and support costs of the Integrating Contractor Teams. Also, the guidance did not address the issue of repetitive contractor procurements.

Focus Area management agreed that more detailed cost collection would enable them to be more aware of expenditures on specific Large-Scale Project activities and make any necessary adjustments. In December 1998, a request was issued to managers of ongoing projects for additional Integrating Contractor Team cost information and the Focus Area intends to request more detailed cost information to be reported beginning in February 1999. They also agreed that using repetitive contractors on the Integrating Contractor Team provides needed continuity between projects and will pursue centralizing team procurements.

Project Costs Reductions

The importance of cost information is recognized by government standards that require Federal managers to accumulate, analyze, and report project cost information. Without implementation of cost determination practices that assist project managers to evaluate where cost controls improvements are needed, demonstrations of potentially successful technologies may be severely limited. Focus Area management cannot be assured that projects are being managed in a cost-effective manner unless actions are taken to identify and control management, administrative, and support costs of the Integrating Contractor Teams.

RECOMMENDATIONS

We recommend that the Acting Assistant Secretary for Environmental Management improve program implementation guidance for the Large-Scale Demonstration and Deployment Projects by:

1. Requiring that managerial cost information is consistently collected and analyzed for current and future projects to ensure that management, administrative, and support costs do not represent an undue proportion of available funds; and

2. Directing the D&D Focus Area Manager to centralize procurement for contractor services on the Large-Scale Demonstration and Deployment Project Integrating Contractor.

MANAGEMENT REACTION

Management agreed with the first recommendation and has taken corrective action. In February 1999, the Focus Area issued guidance to the four current project Integrated Contractor Teams specifying that cost information must be collected and reported quarterly. Costs will be reported for project management, technology search and screening, technology demonstration, technology vendors, communications, and miscellaneous costs. The *Large-Scale Project Implementation Guide* will be revised to reflect this cost reporting change.

For the second recommendation, management agreed to pursue the possibility of centralized contracting for Integrated Contractor Teams through the Department's Federal Energy Technology Center. The Focus Area will consider executing a solicitation to assemble a team of qualified companies to serve on future Large-Scale Project teams. Management stated that the cost and efficiency of a centralized procurement approach will be compared with that of individual procurements. Since the Large-Scale Projects are carefully integrated into an ongoing site D&D project, care will be taken in considering a central approach to ensure that the site D&D project is not adversely affected.

AUDITOR COMMENTS

Management's comments are generally responsive to the recommendations. The new cost identification, collection, and reporting requirements should assist project managers to evaluate and implement cost control improvements and minimize project overhead costs. Management's consideration of centralized contracting for team members should give significant weight to potential administrative cost savings from such contracting. Although we agree that a site D&D project should not be adversely affected by this contracting method, repetitive procurements for the same contractors for similar services is not cost effective. To the extent that specialized services are required by individual projects, Operations Office contractor selections for Integrated Contractor Team members could be used to meet these particular needs. Specific action is needed by the Focus Area to initiate efforts for revising project contracting methods and reducing the overall management and administrative costs of future Large-Scale Projects.

Appendix 1

SCOPE

The audit was performed at Department Headquarters in Washington, DC; Germantown, MD; Richland Operations Office, WA, Fernald and Mound Field Offices, OH; Los Alamos National Laboratory, NM, and the Federal Energy Technology Center at Morgantown, WV, from August 1998 to January 1999.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed the Office of Science and Technology's Deactivation and Decommissioning Focus Area program goals and objectives;
- Reviewed the October 1997 and September 1998 Large-Scale Demonstration and Deployment Project Implementation Guides;
- Held discussions with personnel from the Headquarters Office of Science and Technology, Deactivation and Decommissioning Focus Area Program Office, Departmental Large-Scale Project field site offices, Integrating Contractor Teams and technology demonstration technicians;
- Examined program office documentation including the 1998 and 1999 Multi-Year Program Plans, 1999 Annual Performance Plan, 1997 and 1998 Focus Area Annual Reports, and Lessons Learned Reports prepared to described the past and proposed efforts of the program;
- Evaluated the efforts of the Office of Technology Systems and the Deactivation and Decommissioning Program Office to develop, improve, and facilitate implementation of the Large-Scale Demonstration and Deployment Projects and ensure deployment of successful technologies within the Department's complex; and,
- Evaluated management and procurement methods used to establish Integrating Contractor Teams for both completed and new start Large-Scale Demonstration and Deployment Projects.

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. We did not conduct a reliability assessment of computer-based data because no such data was used during the audit.

Management waived an exit conference on this audit effort.

OTHER MATTERS

The management practices used by EM's Focus Area in one of the completed Large-Scale Projects potentially could have limited the dissemination of technology information. Specifically, a Strategic Alliance composed of technology and utility companies to function as the Integrating Contractor Team for the project was formed for the demonstrations at the Argonne National Laboratory. This approach led to uncertainty regarding the proprietary rights to certain information generated by the Department funded project. The Alliance considered information it generated in screening and evaluating technologies to be proprietary information, making it unavailable to other Departmental sites. Resolution of this issue was especially important to the Focus Area because widespread dissemination of technology information is critical to the project's deployment and cost containment goals. According to the Focus Area management, proprietary information issue has been resolved at the specific project and they are evaluating alternative management structures for new projects which will prevent a recurrence of the problem.

Additionally, the Focus Area allowed the Strategic Alliance to acquire and pay for insurance with Federal financial assistance funds. Such costs are not normally paid for by financial assistance agreements, and increased the administrative cost of the project by $209,000.

Appendix 3

PAST AUDITS RELATING TO RESEARCH AND DEVELOPMENT PROGRAMS AND TECHNOLOGY DEPLOYMENTS

- *The U.S. Department of Energy's Management of Research and Development Integration*, IG Report DOE/IG-0417, dated March 1998. Concerns about the fragmentation of the Department's Research and Development (R&D) programs have been a long standing issue. Past studies and reviews have found that the Department needs greater integration of its R&D programs to more effectively achieve the vital mission in energy R&D. This audit determined that R&D program offices were managed independently and there was little effort to coordinate the planning and budgeting of research across program lines in order to integrate research activities. This problem occurred because the Department had not clearly established organizational responsibility or authority for integrating research across programs. The lack of a system for integration prevents the establishment of a baseline for performance measures. The Department agreed with the audit finding and stated that individual programs at the Department need to do a better job of integrating their research programs.

- *The U.S. Department of Energy's Participation in the Partnership for a New Generation of Vehicles Program*, IG Report DOE/IG-0422, dated July 1998. The Partnership for a New Generation of Vehicles (PNGV) was a partnership of seven Government agencies and three major car manufacturers. The Government funding was to be applied primarily to developing technologies that involve high risk with the Department providing most of the federal funding to the program. The audit determined it was unlikely that some research projects pursued by the Department would be developed in time to meet the PNGV timeframe of 2004. To bring the Department's promising but long-term research into alignment with PNGV goals, it was recommended that the Department modify its Strategic Plan to explicitly address the PNGV program. The Annual Performance Report should also address the barriers to meeting the 2004 timeframe.

- *Energy Management: Technology Development Program Taking Action to Address Problems*, GAO Report RCED-96-184, dated July 9, 1996. Since 1989, the Office of Environmental Management has spent $34 billion on cleanups, but schedules have slipped and progress has been slow. According to Office estimates, innovative cleanup technologies could reduce total cleanup costs by as much as $80 billion. The Office began a major reorganization in 1995 to improve the coordination and management of the technology development program by creating five "Focus Areas." Yet concerns persisted that management weaknesses were undermining progress in environmental cleanup. This report discusses whether the Office was managing its technology development program to prevent (1) unnecessary duplication and overlap and (2) an unwarranted concentration of projects at some field offices.

- *Nuclear Waste: Further Actions Needed to Increase the Use of Innovative Cleanup Technologies,* GAO Report RCED-98-249, dated September 25, 1998. The Department is developing technologies that could reduce cleanup costs, speed cleanups, provide methods for cleanups for which no cost-effective technologies now exist, and reduce risks for cleanup workers and the public. However, earlier reports by GAO and others have cited obstacles to selecting and using innovative technologies at Department sites. Because of concerns about the benefits returned from the $2.5 billion invested in Department's Office of Science and Technology since 1989, this report reviews the Department's efforts to deploy innovative technologies for each of the five Focus Areas, including the D&D Focus Area. GAO discusses (1) the extent to which innovative technologies developed by the Office of Science and Technology have been used at Department sites and how this rate of deployment compares with the rates of other government organizations that develop innovative technologies; (2) the Department's progress in overcoming obstacles o deploying innovative technologies at its cleanup sites; and (3) Departmental efforts to increase the deployment of innovative technologies.

IG Report No. DOE/OIG-0444

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Mr. UPTON. At this point, I will recognize Mr. Bryant.

Mr. BRYANT. Thank you, Mr. Chairman, and I want to thank you for convening this hearing and look forward to the testimony from what appears to be an outstanding group of witnesses on the panel. I want to specially recognize our first panelist today, my colleague, Mr. Hastings, from the fourth district of Washington, and I know his interest in this is very strong. He has long been an advocate for his district and for his State on these kinds of issues, and I certainly would welcome him and the other members of the panel and would yield back.

Mr. UPTON. Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman. I am delighted to come to an O&I hearing. I am chairing a hearing on electricity restructuring at 10, so I am going to have to leave, but I did want to come and give an opening statement on this important hearing.

Mr. UPTON. If you can just put the mike closer.

Mr. BARTON. Oh—on this hearing, which is a continuation of a series of hearings that we did in the last Congress.

Over the past 10 years, we have invested nearly $3 billion in the Department of Energy's Office of Science and Technology. Congress appropriated those funds with the expectation that OST would develop environmental technologies for use at DOE waste sites to reduce the substantial costs associated with cleaning up the Nation's nuclear wastes. We estimate those costs now approach $200 billion.

Last Congress, when we began our review of OST, things looked pretty bad. We held a hearing in May 1997 which identified gross mismanagement within OST, a very poor development deployment records of the technologies that OST has funded. We determined that DOE's dismal deployment rate was due to poor internal management and sufficient integration between OST funding activities and DOE's cleanup efforts in the field. At that hearing, the former Assistant Secretary for Environmental Management, a gentleman named Al Alm, told the subcommittee that the record of deployment was bad because "there was not really strong pressures to do more with less, and without the pressure to cut costs, you don't have any incentives to pursue innovative technologies."

I am glad that you are holding this hearing today, Mr. Chairman, because we have had at least 1½ years to try to make some improvements. After the hearing back in 1997, then Assistant Secretary Alm did undertake several initiatives to improve the management at OST and increase the rate of technology deployment. As a result of those initiatives, the management, I am told, at OST has improved, and there has been an increase in the deployment rate of OST-funded technology. But I am also told at the staff level that we are nowhere near where we could be and should be. Of the 160 OST-funded technologies that have been deployed at DOE waste sites, almost 100 of them have only been deployed one time. A one-time use of the technology that costs millions of dollars in development will not maintain the commercial viability of the small businesses that OST has funded to develop these new technologies.

Apparently, there continues to be a breakdown in integration between OST efforts and the cleanup work at DOE waste sites. In the testimony today, the GAO will report that OST continues to fund

the development and demonstration of technologies without involving or obtaining a commitment from the end user. I don't think this is good policy. Each year, DOE completes hundreds of waste cleanup actions; that is a good thing. In many instances, the remediation project manager in the field is unaware of the available innovative technologies that could reduce the cost, could speed up the cleanup time over the baseline technologies that are being deployed.

Today, we will also hear from DOE's site management contractors. The questions that I would ask if I could stay at the hearing are, are they doing all they can to promote and deploy the best technologies offered by OST? Do they think that the Department of Energy offers the right incentives to encourage the contractors to use these new technologies?

The Department of Energy waste remediation market represents the world's biggest single source of revenues for large remediation companies yet this market seems impenetrable to small companies. I hope that our hearing today will shed some insight on ways that small companies can use these innovative technologies and can compete.

Thank you, Mr. Chairman.

Mr. UPTON. Thank you. Mr. Burr.

Mr. BURR. Thank you, Mr. Chairman.

I would like to take this opportunity to welcome Mr. Barton back.

It has been somewhat lonely without him being here. I want to take the opportunity to——

Mr. BARTON. I am sure Mr. Klink shares that.

Mr. BURR. I noticed Mr. Klink grinned when we said that.

I want to take the opportunity to follow up on what Joe did, and that was 2 years ago in April when we held a hearing on OST, and I want to go a little bit further and read the three points that Mr. Alm pointed to at that time for their failure, he thought. He said, one, a conservative regulatory environment limits the demand for innovative technologies. Two, the Department's management and operating contracting structure discourages use of innovation. Three, it lacks a real budget pressure and the past has not required less costly solutions.

Well, we are here 2 years later to look at the progress that has been made in the Office of Science and Technology. At that time, we were very early into a 10-year plan that projected, I think, somewhere between $12 billion and $27 billion worth of savings through the good work of OST. At that time, 2 years ago, there were many fingers pointed at site managers; that site managers were, in fact, the ones that didn't promote the technological use by contractors, and, as Mr. Barton pointed out, that in most cases we had a good one-time usage by contractors of technology developed through OST but never a continuation or an integration into the cleanup process of any of the technologies from OST.

I hope, today, that the DOE will be candid with us in their testimony and in their answers as it relates to how well we have integrated technology into the work of all contractors, not just some; how successful we are at fulfilling the 10-year plan of savings of taxpayer money, because, ultimately, in that hearing, the one thing

that I think was passionate from all Members of Congress was if it didn't change, there was no way we could continue to support this area. I can assure you that Mr. Barton's pledge then to supply real budget pressure can be follow up by this hearing with an elimination through the budget process if, in fact, we haven't made progress in the right direction.

I thank the Chair for the opportunity to have this hearing, look forward to the witnesses, and I welcome our colleague, Doc Hastings.

Mr. UPTON. Thank you. I would note that all members of the subcommittee will have a chance by unanimous consent to put in a statement into the record as part of the opening statement, and we welcome our colleague, Doc Hastings, for his special perspective on this issue from the State of Washington.

[Additional statements submitted for the record follow:]

PREPARED STATEMENT OF HON. TOM BLILEY, CHAIRMAN, COMMITTEE ON COMMERCE

Today the Subcommittee continues its review of the Department of Energy's efforts to deploy environmental technologies developed by the Office of Science and Technology, or OST. Ten years ago, Congress directed the Secretary of Energy to develop a program to fund the development of technologies useful for the environmental cleanup of DOE's nuclear waste complex. In response, DOE created OST with the mission to develop technologies that would help DOE save money, reduce environmental risks, and speed up the restoration process. In November of 1996, I initiated a review of OST to determine how it had spent more than 2 BILLION dollars of taxpayer funds. This review revealed some real mismanagement. At this Subcommittee's May 1997 hearing, OST was unable to provide a sound report on what technologies it had funded, whether these technologies had actually been used, or even if there were any savings.

Today, I am happy to report that in two years since the Subcommittee's first hearing, progress has been made at OST to rectify many of these management problems. Unfortunately, as OST cleaned up its books, the books revealed a substantial catalog of poor funding decisions and millions of dollars wasted on technologies that never would have passed a credible peer review process. However, there are a few diamonds in the rough. OST has funded several promising technologies, and a few of these technologies have found widespread use at the Savannah River site and the Oak Ridge site. But these few success stories are the exception, not the norm.

In testimony, the Department presents tables and statistics that show an increasing deployment rate of OST-funded technologies over the past three years. I urge this Subcommittee to look behind these numbers. In fact, of the 160 OST-funded technologies that have been deployed, approximately 100 of these have been used only one time. Commercial viability of a small business trying to sell a new technology cannot be established or maintained with a one-time use of that technology. In far too many instances, the Department has left these promising small businesses stranded after spending millions to help them get started.

DOE headquarter offices, DOE field site offices, site management contractors, state and federal regulators, and numerous stakeholders are not putting their shoulder to the same wheel. In many cases the DOE has failed to bring these various parties together in this effort. The Department must demonstrate greater leadership, otherwise the widespread deployment and commercialization of these new technologies will never occur.

Also, in some cases the Department's site management contractors seem to be reluctant to use these new technologies. Let me be clear, I do not expect site management contractors to use a new technology simply because it has received government funds. But if a technology has been proven to work, there should be no excuse for its lack of widespread use at all sites where that technology is applicable.

At our May 1997 hearing, the Department identified 20 BILLION dollars in potential life cycle cost savings as a result of the use of OST-funded technologies. At the current rate of deployment, these savings will not be realized. DOE must achieve quick acceptance and application of these new technologies over the next few years as DOE accelerates the completion of much of its cleanup work by the year 2006. Today I want to hear from the DOE, the small businesses who own these

new technologies, and the Department's site management contractors on how we will achieve the substantial cost savings the DOE has promised.

PREPARED STATEMENT OF HON. GENE GREEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Chairman, I would like to start by thanking you for holding this important hearing. For too many years, our government manufactured nuclear weapons at sites around the country with little or no concern for the environmental impact of those actions. I hope that these hearings help to speed us along the track to cleaning up some of these sites.

Today, this committee is set to examine the role of the Office of Science and Technology in this cleanup process. Now, while I was not a member of this subcommittee at the time, I understand that at a previous hearing, in May 1997, DOE came here and told us that it while they estimate the cost of these cleanups at $200 billion, that they felt they could save some $20 billion of that through the development of new cleanup technologies.

After 10 years of development and $2.7 billion, though, how much has been saved? How far along in the cleanup process have we come?

Currently, cleanup at 4,123 of 9,700 sites, 43% of the total, has been completed, while the savings so far are estimated at $750 million. According to the EPA, the cleanup decisions for the remaining 5,577 sites will be made by the year 2000. It seems that we have a long way to go in a very short period of time if we are to realize an additional $19 billion in savings.

Questions have also been raised about the lack of a connection between the development of technologies and the identification of an end-user for those technologies. While a recent GAO report has indicated that OST has improved in this area, it has been inconsistent.

OST should make sure that the technologies that they choose to fund are useful and that the end-users are involved so that we are not spending money on something that will not used.

Mr. Chairman, these are just a few of the issues that we should raise in this hearing today. I look forward to hearing the testimony of the witnesses and I hope that we can continue to work towards cleaning up our legacy of hazardous and radioactive materials.

Mr. UPTON. Mr. Hastings, under the rules of our subcommittee, we would like to limit your remarks to 5 minutes, and I have got this fancy-shmancy egg timer to let us know when 5 minutes is up.

STATEMENT OF HON. DOC HASTINGS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. HASTINGS. Thank you, Mr. Chairman. I appreciate you inviting me to testify before your subcommittee, and I want to say that I appreciate the courtesy this subcommittee has given me in the past under your tenure and under Mr. Barton's tenure, because the issues surrounding this are very important to me in my congressional district.

As you are aware, the Hanford Nuclear Reservation is located within my congressional district in central Washington. With a majority of the Nation's volume of nuclear wastes located at Hanford, the work of the DOE to clean up the legacy of the World War II and the cold war is very important to the health and safety of the surrounding communities in my district.

In addition, as taxpayers, my constituents and I are equally concerned about the efficiency of this program, and I would like to say that in the future that the wastes are "contained" at Hanford, and they were "previously" at Hanford. That is the goal when we talk about cleanup.

Since I came to Congress in 1995, the budget for DOE's cleanup work has been under enormous pressure to reduce costs and to get

results. I am proud to say that at Hanford the workers have taken this message to heart, and we really have seen real progress made at the site. It goes without saying that the development of new technologies has made much of this advancement possible. A great example—this is only one example—is the reactor cocooning called interim safe storage. You will hear more about this from Bechtel-Hanford, because they were the contractor in charge of finishing the C Reactor at Hanford. In my view, this project has been a resounding success for two primary reasons. First, the decision was made that Hanford was going to be an industrial area and not a children's playground, and, therefore, the standards didn't need to be cleaned up to the standards of a playground. If you have ever been to Hanford, you immediately know that this decision was really just plain common sense. This decision meant that we could focus on stabilizing the existing facilities, including the nine reactors, and then to work to minimize the surveillance and maintenance costs for the foreseeable future. In other words, we could cocoon the reactors for interim storage so we could better focus our limited resources on other pressing needs.

Second, the deployment of several new technologies insured that the project came in on schedule and on budget. The cocooning of the C Reactor was really a test of how efficiently such a project could be accomplished, and that is good news considering that we have seven more reactors scheduled to be cocooned in the next few years.

We demonstrated the use of 20 different technologies and deployed 13 of those on the C Reactor. In the long run, this will result in a savings to taxpayers when we do all the cocooning around $23 million. Now, that this technology is proven, it can be transferred to other sites around the complex and the world.

While I believe that the work on the C Reactor represents how things ought to be done with DOE working with contractors and vendors to keep costs down and projects on schedule, I realize that this is not always the case. You will hear from many people today with a variety of perspectives on how the DOE can improve its deployment rate and development schedules or how companies can better use the technology that has already been developed with the help of taxpayer funds.

I am sure you will hear a number of good ideas that we should consider. However, I would like to offer one thought, and this is probably more important than anything else as you listen to this testimony. We must structure our cleanup effort to ensure that profit-oriented businesses perform as efficiently and as effectively as possible. Mr. Chairman, I know this sounds easy; it sounds like common sense, but it is very difficult to actually achieve. Let us look forward to ways to enhance the cleanup effort without micromanaging companies that we are relying on to achieve the results. Let us look for ways to be a better partner instead of a big brother for our major contractors. Let us look for ways to encourage small businesses to add efficiency and innovation to the process instead of looking for ways to force them into an established process. If we are to be successful, we will save money——

At that, I just want to say, Mr. Chairman, the last is to thank you very much for allowing me to testify in front of you. I think

there are innovations out there that can be used. I think what you need to do as you proceed with this process is to allow the free market and the innovations to be done with little Government oversight.

And, with that, I would be more than happy to respond to any questions you may have.

[The prepared statement of Hon. Doc Hastings follows:]

PREPARED STATEMENT OF HON. DOC HASTINGS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. Chairman: Thank you for inviting me to testify before your subcommittee today. As you and I have previously discussed, issues surrounding the cleanup work of the Department of Energy are particularly important to me and my Congressional District.

As you are aware, the Hanford Nuclear Reservation is located within my Congressional District in Central Washington state. With a majority of the nation's volume of nuclear waste located at Hanford, the work by the DOE to cleanup the legacy of World War II and the Cold War is very important to the health and safety of the surrounding communities. In addition, as taxpayers, my constituents and I are equally concerned about the efficiency of this program.

Since I came to Congress in 1995, the budget for DOE's cleanup work has been under enormous pressure to reduce costs and get results. I am proud to say that at Hanford, the workers have taken this message to heart and we have seen real progress made at the site. And it goes without saying that the development of new technologies has made much of this advancement possible. A great example of this is the reactor cocooning project, also called Interim Safe Storage.

As you will hear more about later, Bechtel-Hanford Inc. finished cocooning the C Reactor at Hanford this past year. In my view, this project has been a resounding success for two primary reasons. First, the decision was made that Hanford was not going to be a children's playground anytime soon, and therefore didn't need to be cleaned to those standards. If you've ever been to Hanford, you'd immediately know that this decision was really just common sense. This decision meant that we could focus on stabilizing the existing facilities, including the nine reactors, and then work to minimize the surveillance and maintenance costs for the foreseeable future. In other words, we could "cocoon" the reactors for interim storage so that we could better focus our limited resources on other pressing needs.

Second, the deployment of several new technologies ensured that the project came in on schedule and on budget. The cocooning of the C Reactor was really a test of how efficiently such a project could be accomplished, and that's good news considering we have seven more reactors scheduled to be cocooned in the next few years. Demonstrating the use of 20 different technologies, with full deployment of 13, the successful completion of the C Reactor project will enable the remaining reactors to be cocooned more efficiently and more effectively, saving the taxpayers an estimated $23 million. And now that this technology is proven, it can be transferred to other sites around the complex and around the world.

While I believe that the work on the C Reactor represents how things ought to be done, with DOE working *with* contractors and vendors to keep costs down and projects on schedule, I realize this is not always the case. You will hear from many people today with a variety of perspectives on how the DOE can improve its deployment rate and development schedules, or how companies can better use the technology that has already been developed with the help of taxpayer funds. I'm sure you'll hear good ideas that we should consider during this funding cycle for the Department's cleanup effort. However, I would offer one thought as you listen to the testimony to follow: *we must structure our cleanup effort to ensure profit-oriented businesses perform as efficiently and effectively as possible.*

Mr. Chairman, this sounds easy, almost like common-sense. But it is very difficult to actually achieve. Let's look for ways to enhance the cleanup effort without micromanaging the companies we are relying upon to achieve the results. Let's look for ways to be a better partner, instead of a bigger brother, for our major contractors. And let's look for ways to encourage small businesses to add efficiency and innovation to the process, instead of looking for ways to force them into an established process. If we are successful, we will have saved money for years to come, sped up our cleanup work, and protected the health and safety of our communities.

Thank you again for inviting me to be here today. I look forward to working with this committee to make the changes that will ensure the best use of our limited cleanup and research dollars.

Mr. UPTON. Thank you, Mr. Hastings, and we have spent a lot of time talking specifically about this project.

I guess I just have one basic question. My sense is that the community is fairly pleased with the work that has been done, at least, recently there, and I don't suspect that there is any real problems that have been—that have arisen since the work has continued. Is my perception correct?

Mr. HASTINGS. I think your assessment is correct, and I think there is a couple of reasons for that. No. 1, we changed from the old M&O contract, that I loosely call Cost Plus, to M&I, which is based on performance. That change came roughly 4 years ago, 4 years ago this summer, and I think that that has been a reason why there has been some efficiencies, because those efficiencies are based on performance, and you are rewarded for performance. So, I think that is one of the major changes why we have had some success out at Hanford.

Mr. UPTON. What is the timetable for the cleanup? How many years remain?

Mr. HASTINGS. Well, there are two huge projects going on. The "K Basin" projects, and I will just briefly say that we are moving the "K Basins" from right on the Columbia River, essentially, to dry storage, and that problem was created because of a change in the rules, if you will. "K Basins" was supposed to have been a storage for a very short period of time; in fact, it lasted for some 25 years. Now, one of the basins has had some unanticipated leakage that we didn't anticipate before. So, those costs need to be—and I am sure somebody will talk about what those costs are.

The other is the 177 underground tanks, and then we don't know, we haven't characterized everything in all of the tanks. That is a separate project that is moving, and there are some structural changes out at Hanford that I think were very important structural changes that will enhance the success of this project. But I can't say when the end is, because in both of those cases, they are unanticipated problems, and you are dealing, in both cases, with highly contagious—not contagious, but hazardous materials, including radioactive material. But I think that we have some structure now in place to see that this can be done in a very quick manner, but, obviously, it is going to take oversight on all of us.

Mr. UPTON. Thank you. Mr. Klink?

Mr. KLINK. I have no questions, but I commend the gentleman for his knowledge and his dedication to solving this problem. It is obvious that you have put a great deal of time in on this issue and that you bring a great amount of expertise to this issue, and I thank you for giving us your time.

Mr. HASTINGS. Thank you.

Mr. UPTON. Mr. Bryant?

Mr. BRYANT. I have no questions.

Mr. UPTON. Ms. McCarthy?

Ms. MCCARTHY. Mr. Chairman, I don't have any questions, but I thank the member for presenting this information to us; it is very important. Thank you.

Mr. HASTINGS. Thank you very much.

Mr. UPTON. Okay. Thank you very much, Doc.

Mr. HASTINGS. Thank you.

Mr. UPTON. The second panel includes Ms. Gary Jones, Associate Director of the Energy, Resources, and Sciences Issues at GAO as well as the Honorable Ernest Moniz, Under Secretary, Department of Energy, who will be accompanied by Mr. James Owendoff, Acting Assistant Secretary for Environmental Management and Mr. Gerald Boyd, Acting Deputy Assistant Secretary for the Office of Science and Technology.

As I think all of you know, we have a standing rule in this subcommittee that all of our witnesses, outside of the members, testify under oath. Do you have any objection to that? Seeing none, we also allow you to have counsel if you wish to have that under the House rules. Do you wish to have that?

If not, if you would rise, raise your right hand.

[Witnesses sworn.]

Mr. UPTON. Thank you very much. You are now under oath, and we will start with Ms. Jones. Your whole testimony will be included as part of the record, and we would like you to limit your remarks, if you can, to 5 minutes.

TESTIMONY OF GARY L. JONES, ASSOCIATE DIRECTOR, ENERGY, RESOURCES, AND SCIENCES ISSUES, GENERAL ACCOUNTING OFFICE; AND ERNEST J. MONIZ, UNDER SECRETARY; ACCOMPANIED BY GERALD BOYD, ACTING DEPUTY ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY; AND JIM OWENDOFF, ACTING ASSISTANT SECRETARY OF ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY

Ms. JONES. Thank you, Mr. Chairman.

I am pleased to be here today to follow up on our September 1998 report to this committee. That report made several recommendations to address DOE management problems that were obstacles to deployment of innovative cleanup technologies. Addressing these problems would help ensure that we get the biggest payoff for the Federal Government's investment in these technologies.

Our report noted that one key obstacle has been the lack of coordination between the technology developers and DOE's Office of Science and Technology and the technology users responsible for cleaning up the DOE sites. As a result, there have been no identified customers for some of the technologies that OST has sponsored. For example, 30 percent of the 171 technologies that OST has completed have not been used by DOE cleanup sites. Of the technologies used, about one-half have been used only once.

OST has taken several actions to improve coordination. For example, OST used a new ranking system that set funding priorities according to users' needs for the fiscal year 2000 budget request. However, OST is still not using the decisionmaking system it developed, called the Gate System, as we recommended. The gates are decision points preceding each stage of development and include criteria, such as defining users' performance requirements and, before investing in demonstration, obtaining user commitment to deploy the technology. The gates dictate user involvement and estab-

lish several go/no-go decision points during a project's development. Our report pointed out that one reason the Gate System had not been extensively used was that it would lead to the termination of some projects, an outcome that was resisted by OST's focus areas as well as the National Laboratories.

DOE told us that they did not implement our recommendation on the Gate System, because they need to determine how best to implement the system and who to involve in the Gate System reviews. However, OST is using elements of this system in annual project reviews. Although these reviews have benefits, they are being implemented inconsistently, and it is unclear whether they will ensure user commitment before substantial investment is made.

Our 1998 report also noted that some OST developed technologies were too generic to be readily implemented at sites and that responsibility for funding technology modifications to meet site-specific needs was unclear. For example, Hanford was interested in using an OST technology to help detect leaks in their high level radioactive waste tanks. However, Hanford officials said that the technology needed substantial fine-tuning for it to work on the tanks, and no funding was available.

DOE says their Accelerated Site Technology Deployment Program is addressing this concern. This program provides funding to DOE sites for their first use of an innovative technology. However, the program funds only a limited number of projects, and the funding does not necessarily have to be used for modifications. While this program has facilitated some deployments, more proactively marketing technologies that OST has already completed could provide a greater return on past investments in technology development. This is particularly important given that about two-thirds of the completed technologies have never been used or were used only once.

Our report also noted that the technical expertise of OST's focus areas varied, and site officials were sometimes reluctant to consult with them. As a result, sites were not consistently getting technical assistance to identify alternative solutions to cleanup problems. OST is currently establishing a lead national laboratory for each of its focus areas to increase their level of expertise. Since OST is still defining the role of the labs, it is too early to assess the impact of this change on improving expertise.

There is also a question of the lab's ability and willingness to support technologies developed by others, because each lead lab is involved in developing technologies. Further, without requiring that an OST representative participate in technology selection, as we recommended, it is unclear whether improving focus area expertise alone will result in more consultations with sites.

Data on deployments was another issue we covered in our 1998 report. We found that OST's data were of poor quality. For deployments claimed from the start of the program through January 1998, 38 percent should not have been counted. OST has since conducted a study that verified deployments reported for fiscal years 1997 and 1998 and taken several steps to improve the quality of data input, such as issuing a definition of deployment. However, the data continues to have a high degree of errors, with only about

half being correct before data verification. OST plans to hire consultants to help identify the causes of poor data quality and recommend improvements. If OST implements a systematic approach for ensuring data accuracy, the quality of deployment data needed to manage the program may improve.

Thank you, Mr. Chairman.

[The prepared statement of Gary L. Jones follows:]

PREPARED STATEMENT OF MS. GARY L. JONES, ASSOCIATE DIRECTOR, ENERGY, RESOURCES, AND SCIENCE ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE

Mr. Chairman and Members of the Subcommittee: I am pleased to be here today to discuss the Department of Energy's (DOE) progress in using the innovative technologies it has developed for cleaning up the hazardous and radioactive contaminants at its sites. These sites present environmental and human health concerns as a result of 50 years of nuclear weapons research, testing, and production activities. Since 1990, DOE has received about $2.7 billion for developing innovative cleanup technologies and has initiated over 800 projects. According to DOE's data, 179 of the technologies have been deployed at DOE's sites, 100 of which have been used only once.[1] Our September 1998 report to this Committee made several recommendations to address DOE management problems that presented obstacles to selecting and using innovative technologies.[2] The potential benefits of innovative technologies to reduce costs or speed cleanups cannot be realized unless these obstacles are overcome.

Our testimony is primarily based on our 1998 report and on DOE's actions in response to our recommendations. For this hearing, you asked us to follow up on DOE's responses to our 1998findings and recommendations on (1) coordination between technology developers and users, (2) modifying completed technologies to meet site-specific needs, (3) technical assistance to sites concerning innovative technologies, and (4) the quality of data on deployment. In addition, you asked us to determine what information is maintained and made available to sites on the vendor companies for the cleanup technologies that DOE has developed. In summary, we found the following:

As we reported in 1998, a key obstacle to deploying innovative technologies has been the lack of coordination between the technology developers in DOE's Office of Science and Technology (OST) and the end users of technologies at DOE's cleanup sites. As a result, some technologies have not met users' requirements. Since our report, OST has begun several actions to improve coordination between technology developers and users, such as setting its priorities according to the users' stated technology needs. However, OST is still not using the decision-making system it developed that requires user involvement during development and user commitment before investing in demonstrating a technology. Rather, OST is using elements of this system in its annual project reviews. Although these reviews have benefits, they are being implemented inconsistently and they may not provide enough management attention to developer and user cooperation as a technology progresses though development phases. More assurance may be needed that users will ultimately deploy the technologies being pursued and that a specific "go/no-go" decision is made before substantial investments are made.

Our 1998 report noted that some OST-developed technologies were too generic to be readily implemented at sites and that responsibilities and funding sources for modifying technologies to meet site-specific needs were unclear. DOE cites its Accelerated Site Technology Deployment program as addressing these concerns. This program provides funding to DOE sites for their first use of an innovative technology developed by OST or other organizations. However, the program funds only a limited number of projects and funding does not necessarily have to be used for modifications. More could be done to proactively promote OST's technologies by identifying potential applications and alternative DOE funding for modifications, if needed.

We found that the technical expertise of OST's focus areas varied and that site officials were sometimes reluctant to consult with them.[3] As a result, cleanup sites were not consistently getting technical assistance to identify alternative solutions to

[1] Figures are from DOE's data as of May 1999, some of which has not been verified.

[2] *Nuclear Waste: Further Actions Needed to Increase the Use of Innovative Cleanup Technologies* (GAO/RCED-98-249, Sept. 25, 1998).

[3] OST has five focus areas that manage technology development projects for the major cleanup problems that DOE faces, such as radioactive tank waste remediation.

cleanup problems. OST is currently establishing lead national laboratories for each of its focus areas to increase its level of expertise. Since OST is still defining the role of the lead laboratories, it is too early to assess the impact of this change on improving expertise. Furthermore, without requiring that an OST representative participate in technology selection, as we recommended, it is unclear whether improving focus areas' expertise alone will result in more consultations with sites.

In our 1998 report, we found that OST's data on the deployment of its technologies were of poor quality. Specifically, we found that, in deployment instances claimed from the start of the program through January 1998, 38 percent should not have been counted as deployments. The most common type of error we found was counting technology demonstrations that did not result in cleanup progress as deployments. OST has since conducted a study that verified the deployments reported for fiscal years 1997 and 1998 and has taken several steps to improve the quality of data input such as issuing a definition of deployment. However, the data being entered into OST's database continue to have a high degree of errors with only about half of the deployments being correct as listed in the database. OST plans to hire consultants to help identify the causes of poor data quality and recommend improved approaches. If, as a result of its study, OST develops and systematically implements an approach for ensuring the accuracy of its data, the quality of deployment data needed to manage the program may improve.

Finally, OST's database, which is available to end users at sites, generally contains information to allow sites to identify and contact vendors. However, these data can become out of date because companies move, merge, sell their patents, or make other changes. OST plans to improve the information on vendors in its database by, for example, linking information in the database with credit for deployment.

Background

The Office of Science and Technology, which is within DOE's Office of Environmental Management (EM), develops new technologies that could accelerate cleanup, reduce costs, reduce risks to cleanup workers, or enable cleanup activities for which no cost-effective technologies exist. For fiscal years 1990 through 1999, the Congress provided a total of approximately $2.7 billion for the development of innovative cleanup technologies, and OST has initiated over 800 development projects.

OST is currently organized into five focus areas for specific remediation activities: mixed waste characterization, treatment, and disposal; radioactive tank waste remediation; subsurface contaminants; deactivation and decommissioning; and nuclear materials. The focus areas were established in 1994 to concentrate OST's resources on each of the major cleanup problems that DOE faces. A field office that is responsible for the day-to-day management of technology development projects leads each focus area. For example, the Savannah River Operations Office manages the subsurface contaminants focus area, and the Richland Operations Office manages the radioactive tank waste remediation focus area. The focus areas use DOE's national laboratories, private companies under contract to OST, and universities to conduct technology research and development projects.

Although OST is responsible for technology development, DOE's waste sites are responsible for selecting the technologies they will use, with the review and approval of the U.S. Environmental Protection Agency and state agencies that regulate DOE's cleanups and with input from the public involved with the site.[4] Each DOE field office has established site technology coordination groups to identify sites' technology needs, provide OST and its focus areas with information, and communicate information about OST's technology development projects to the cleanup sites.

Actions Needed to Increase Coordination Between Technology Developers and End Users

In our 1998 report, we found that OST was not sufficiently involving end users during the development of new technologies. As a result, no customers have been identified for some of the technologies that OST has sponsored. Of the 171 technologies that OST had completed as of March 1999, 59 technologies, costing about $76 million to develop, have not been used by DOE cleanup sites.[5] Although OST developed a decision-making system in 1997 that would provide for users' involvement in projects during the development process, the agency was not consistently using this system, known as the gates system. The gates system identifies seven

[4] Remediation activities at DOE's facilities are governed by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, and the Resource Conservation and Recovery Act of 1976, as amended. These acts lay out the requirements for identifying waste sites, studying the extent of their contamination and identifying possible remedies, and involving the public in making decisions about the sites.

[5] Figures are from OST data as of March 1999.

stages of the technology development process: basic research, applied research, exploratory development, advanced development, engineering development, demonstration, and implementation. The gates are decision points preceding each stage. The gates system includes requirements such as identifying specific user needs, defining users' performance requirements, and before investing in a demonstration, obtaining users' commitments to deploy the technology if it meets the performance requirements. OST designed the gates system to provide its focus areas with a process and criteria for making "go/no-go" decisions at various points during a project's development. One reason why the gates system has not been extensively used was that it would lead to the termination of some technology projects, an outcome resisted by the focus areas and national laboratories. We recommended that OST rigorously and consistently use its gates system as a decision-making tool for managing its projects and as a vehicle for increasing cooperation between developers and users.

OST did not implement our recommendation. The Acting Deputy Assistant Secretary for OST told us that the office needed to determine how best to implement the gates system and whom to involve in the gates system reviews. However, OST has incorporated elements of the gates system in its existing project reviews. Specifically, in March 1999, the Acting Deputy Assistant Secretary issued a memorandum directing the focus areas to use the major criteria from the gates system in annual assessments of their projects, known as midyear reviews. The midyear reviews address the progress of each project, the importance and feasibility of the technologies under development, the development stage of the project, and whether it has met the requirements in the gates system for that stage of development. The memo states that end users should be involved in the reviews and that focus areas should address the question, Has an end user made a commitment to implement the technology? The requirements in the gates system, however, are more specific. For instance, end users' performance requirements must be incorporated before the project enters the advanced development stage. The Acting Deputy Assistant Secretary told us that he considers the midyear review guidance to be a first step in fully implementing the gates system.

We have some initial concerns about what has been implemented to date. We reviewed criteria that four of the focus areas had developed for their midyear review panels to use.[6] Only one of the focus areas—deactivation and decommissioning—linked the review criteria to the development stage of the project, as the gates system does. This focus area provided reviewers with different sets of questions for projects in basic science research, applied development, demonstration, and deployment stages. We also note that, unlike the other three focus areas, the radioactive tank waste remediation focus area did not review all of its projects, but only those that were about to be demonstrated or deployed, or that had concerns identified at previous reviews.

While using some of the gates system criteria in the midyear reviews may be beneficial, we do not believe that the midyear reviews provide enough management attention to help ensure developer and user interaction and cooperation as a technology progresses though development phases. A fully implemented gates system could provide more assurance that the technologies being pursued are needed and will ultimately be deployed by users and that a specific "go/no-go" decision is made before substantial investments are made.

DOE has taken some other actions to better integrate the needs and technical requirements of end users into its technology development projects. For example, EM has set up user steering committees to advise each of OST's focus areas, which carry out the development and demonstration of technologies. The user steering committees help focus areas develop their program plans. In addition, beginning with its fiscal year 2000 budget submission, OST used a new priority-ranking system for its program that analyzed sites' data on their specific cleanup projects and needs. The new priority-ranking system used information that sites generated for DOE's *AcceleratingCleanup: Paths to Closure* strategy[7] rather than information generated by OST personnel. Priorities for OST's fiscal year 2000 funding decisions were based on factors such as the number and costs of DOE's cleanup projects that could benefit from the proposed technology development work, the degree to which the proposed

[6] Three focus areas have held their reviews, but as of May 10, 1999, review reports were not yet available. A fourth focus area plans to hold its midyear review during the last week of May 1999, while the fifth focus area does not plan a midyear review this year.

[7] *Accelerating Cleanup: Paths to Closure* is an annual report on EM's strategy and progress in cleaning up the remaining 53 contaminated sites. Its development requires sites to identify the scope of work, timeframes, and costs for each of the more than 350 projects at the cleanup sites.

work addresses the technology needs of the sites, and whether sites plan to deploy the resulting technologies. OST plans to continue using this user-based priority system. According to OST officials, the system encourages the focus areas to work more closely with end users at sites to identify work that will meet their needs. These initiatives move the program in the right direction. However, these initiatives, like the midyear reviews, also do not substitute for the full implementation of the gates system. Continued attention by OST management and focus areas will be needed to fully implement these initiatives and make developer-user cooperation a routine part of doing business.

Identification of Responsibilities for Modifying Technologies Is Needed

During our 1998 review, DOE field staff and contractor personnel responsible for cleanup told us that, in many cases, OST had developed generic solutions that either do not meet specific site needs or must be modified before they could be used. Site officials told us that it was unclear who was responsible for paying for the modifications to those technologies that could prove useful. For example, Hanford officials were interested in using OST's Electrical Resistance Tomography to help detect leaks in their high-level radioactive waste tanks. However, a Hanford official said that the technology needed substantial fine-tuning to make it work on the Hanford tanks and that no funding was available at the time. In some cases, technology vendors have been willing to fund the necessary modifications, but for some needs unique to a DOE site, the market may be too small to elicit such an investment from vendors. We recommended that OST identify the technologies that could be cost-effectively used to meet sites' needs and that EM identify funds for modification if needed.

DOE has not addressed this recommendation. In its written response to our report, DOE cited OST's Accelerated Site Technology Deployment (ASTD) program as addressing sites' concerns about using new technologies. ASTD provides DOE sites with funding for their first use of an innovative technology developed by OST or other organizations. The program is intended to increase the use of technologies that could speed cleanup or reduce costs. OST competitively evaluates sites' proposals for ASTD projects to select projects to fund. Of the 46 ASTD projects that OST has funded to date, 36 are using technologies developed by OST.[8] The sites receiving ASTD funds must also provide funding for implementing the technologies, and ASTD funds are not targeted to specific purposes within the project, such as paying for modifications to technologies.

While ASTD may have facilitated some deployments, OST could be more proactive in identifying potential uses for its technologies and providing sites with assistance in such cases. This is particularly important, given that, of the 171 technologies that OST had completed by March 1999, 59 technologies—or more than 30 percent—have never been used by the sites. Of the 112 completed technologies used by the sites, about half have been used only once. Such proactive assistance might involve providing information on OST's technologies and technical advice or working with the sites to arrange and share the costs of technology modifications, if needed and cost-effective. These actions could identify additional cost-effective uses for technologies that OST has already completed and provide a greater return on past investments in the development of technology.

Some Actions Have Been Taken to Provide Sites With Technical Assistance, But Requirement Is Still Lacking

In our 1998 review, we found that OST was not fulfilling its role of providing users with the technical advice and assistance that they need to identify solutions to cleanup problems and to help implement those solutions. Focus areas' abilities to provide technical assistance varied, and some site officials told us that they were reluctant to consult with the focus areas because they were not convinced of the focus areas' technical expertise. We recommended that OST increase the expertise available for providing technical assistance on innovative technologies. We also recommended that EM require that an expert from OST participate in technology selection processes for site cleanup projects.

DOE has taken some actions to implement our recommendation for increasing technical expertise. Specifically, OST recently selected a lead national laboratory for each of its focus areas. The purpose of establishing the lead laboratories is to im-

[8] In fiscal year 1998, OST provided $27 million in funding for the 14 ASTD projects selected from its first call for proposals. In fiscal year 1999, OST is providing $16.8 million for 32 additional ASTD projects selected from its second call for proposals, as well as $14.7 million for nine of the first projects that continue into a second year. Another eight ASTD projects selected from the second call for proposals are expected to begin in fiscal year 2000.

prove the technical expertise available to the focus areas for assessing their technology development projects, identifying promising basic research for further development, and providing sites with technical assistance. With the exception of the radioactive tank waste focus area, which has worked with a national laboratory for several years, OST is currently in the process of defining the roles and responsibilities for their lead laboratories.

It is too soon to tell whether establishing lead laboratories will result in sites requesting technical assistance from OST more frequently. We note that multiple objectives exist for the lead laboratories and it is unclear whether technical assistance will receive adequate attention. In addition, since each lead laboratory is involved in developing some OST technologies, there is some question regarding their ability and willingness to support and assist technologies developed by other laboratories or organizations.

EM has not implemented our recommendation that experts from OST be required to participate in sites' technology selection processes. OST's focus areas have provided technical assistance for some technology decisions at DOE's sites but have not been routinely involved in all such decisions. For example, the subsurface contaminants focus area participates with the Office of Environmental Restoration in providing some DOE sites with consultations on groundwater and soil cleanups, and the deactivation and decommissioning focus area is participating in several value engineering studies with sites. According to an OST official, the radioactive tank waste focus area, assisted by the Pacific Northwest National Laboratory, has given beneficial technical assistance and advice to several key decisions for privatization projects at Hanford and Oak Ridge. In privatization projects, DOE uses fixed-price contracts, and vendors are responsible for identifying the technologies that they plan to use. Technical assistance can help sites develop performance specifications for the contracts, according to the Acting Deputy Assistant Secretary for OST.

The Acting Assistant Secretary for EM told us that he believes a policy on requiring OST's involvement in technical decisions for sites would not be as useful as other efforts, such as the ASTD program and integration teams that are studying waste problems common to several sites and trying to develop integrated responses to the problems. We believe that while technical assistance to sites may be increased by these activities and by additional expertise in the focus areas, technical assistance is not consistently being used to ensure that sites' decisions are based on well-informed consideration of the full range of available technology alternatives. During our 1998 review, we found that sites infrequently sought technical assistance from OST and its focus areas. In addition, ASTD and the integration teams have dealt only with a relatively small number of innovative technologies. As a result, DOE needs to do more to ensure that OST's technical assistance role is reinforced and made more routine.

Process Is Needed to Ensure the Quality of Deployment Data

Our 1998 report found that OST's deployment data were of poor quality. Specifically, we found that, for deployment instances claimed from the start of the program through January 1998, 38 percent should not have been counted as deployments. The most common type of error we found was counting technology demonstrations that did not result in cleanup progress as deployments. OST's focus areas are responsible for obtaining information about the use of OST-developed technologies at field sites and for inputting the data into a central database. While our review was under way, OST began to verify its deployment data for fiscal year 1997. We recommended that OST verify the accuracy of future deployment data and label the earlier data that had not been verified as an estimate.

Since our review, OST has completed a verification effort for deployments that occurred in fiscal years 1997 and 1998, and DOE's February 1999 report on the deployment of innovative technology indicated that data from earlier years had not been verified. OST verified its data through a Technology Achievements Study, which used structured interviews with DOE field sites and technology vendors to identify and obtain information about the deployments at cleanup sites. OST corrected the errors found by the Technology Achievements Study prior to publishing the deployment report.

OST's verification of fiscal year 1998 data found that only about half of the deployments were correct as listed in the database. Specifically, 18 percent of the deployments claimed should not have been counted as deployments (compared with the 38 percent that we found), and 43 deployments had been omitted from the database. Other errors included deployments that were recorded in the wrong year or that required major changes to the information provided.

Several actions were taken during 1998 to improve the quality of the data. In August 1998, OST issued a definition of deployment for its focus areas to use in gather-

ing and inputting deployment data. The definition emphasizes that a deployment occurs only if the use of the technology furthers site cleanup goals. OST also has site officials check deployment information that focus areas have entered into OST's database. This step occurs prior to verification through the Technology Achievements Study. In addition, beginning in 1998, focus areas have been required to fill out deployment fact sheets about each claimed deployment. This requirement may help focus areas to improve their knowledge about deployments and avoid such errors as the reporting of deployments in the wrong year or wrong location because the fact sheets require specific information about the site and project where the technology was used and the identification of end users.

OST officials told us that they plan to continue the Technology Achievements Study in fiscal year 1999 but have not decided if this approach will be followed in the future. OST is hiring consultants to conduct a one-time independent check of deployment data for fiscal year 1998, study reasons for the poor quality of the data, and provide advice on ways of improving data quality. If, as a result of this study, OST develops and systematically implements an approach for ensuring the accuracy of its data, the quality of deployment data may improve.

Vendor Information Is Generally Available for OST-Developed Technologies

Private vendor companies generally provide the innovative technologies that are selected for use at DOE sites. Therefore, it is important that DOE's field and contractor personnel have access to information about the vendors for OST-developed technologies. OST's database, accessible to DOE site personnel and the public, includes information on vendors. We reviewed vendor information in the database for the 171 technologies that OST had completed as of March 1999. Thirty-three of the completed technologies were not commercially available, leaving 138 technologies that should have information for contacting vendors. For 122 of the 138 completed, commercially-available technologies (88 percent), OST's database included the basic information that site personnel would need to contact a vendor namely, the company's name, a contact name, and a phone number.[9] According to OST officials, if the necessary information is not in the database, site personnel can contact staff in OST's focus areas to obtain vendor information. We called focus area staff about 3 of the 16 completed technologies that lacked information for contacting vendors in the database. The focus area staff provided three vendor contacts for two of these technologies and told us that the third technology is not currently commercially available. We then attempted to contact the three vendors with the information that the focus areas provided for the other two technologies. For one of the vendor contacts, the area code provided by the focus area was out-of-date. However, we were able to contact the three companies and confirmed that they are current vendors of the technologies.

OST officials told us that they plan to improve the vendor information in the database. First, OST plans to change its database so that the field for vendor information must be completed by focus area staff when they are preparing deployment fact sheets. If the vendor information is not complete, the focus area will not receive credit for the deployment. Second, the Technology Achievements Study obtains vendor information during its surveys that OST plans to put into its database. According to OST officials, vendor information changes frequently because companies may sell their patents, go out of business, relocate, or change the trade name of the technology. The manager of the Technology Achievements Study estimates that each year, 10 to 20 percent of the vendors may have some type of information change including new addresses or area codes and new contact points due to staff turnover or company mergers. If OST implements these two planned actions, it will have greater confidence that its information on vendors is complete and current.

Mr. Chairman, this concludes my statement, and I would be pleased to respond to any questions the Subcommittee may have.

Mr. UPTON. I think you are the first witness this year that hasn't used the full 5 minutes.

Ms. JONES. Do I get an award?

Mr. UPTON. You do.

This egg timer can be it.

Mr. Moniz.

[9] Some of the listings lacked other information, such as the company's street address or fax number.

TESTIMONY OF ERNEST J. MONIZ

Mr. MONIZ. Thank you, Mr. Chairman. Do I get the remaining time?

Mr. UPTON. It is now gone.

Ms. JONES. I yield.

Mr. MONIZ. Thank you, Mr. Chairman and other members of the subcommittee.

Mr. UPTON. We will give you an extra 30 seconds. Go ahead.

Mr. MONIZ. I am here to today to update you on the progress the Department has made in managing the Science and Technology Program in EM since the hearing on this topic before you 2 years ago. That hearing, we certainly acknowledge, galvanized the Department into action to solve the technology development and deployment problems that you pointed out.

Today, I am pleased to report to you we feel real results, both on the on-the-ground results and new ways of doing business, and real challenges that still lie ahead. We do feel we are on the way toward a system that responds to our site cleanup responsibilities, while, hopefully, getting the best use of the American taxpayers' dollars.

The environmental safety and health problems in the weapons complex, as you know, are often larger and more intractable than those in most conventional commercial cleanup programs. In many cases, no effective technologies have existed, and our goal is to develop and deploy those technologies that can help us achieve cleanup faster, cheaper, better, and safer.

We are investing only about 4 percent of the EM Program's annual budget in the Science and Technology Program, about half of the R&D investment made by large companies that depend upon innovative technologies for success. The potential payoff is substantial. Based on evaluations including independent evaluations by the Corps of Engineers and the EMAB, we expect that our science and technology investments will produce $10 million to $20 million in life-cycle savings for the program.

To achieve these results, we have done the following: first, we have shifted our science and technology investments in this 2-year period from developing technology that can be used to technology that will be used. Site cleanup project managers, as opposed to headquarters, are driving the investment decisionmaking to address on-the-ground needs. The technology needs have been mapped from major projects to identify the technology chokepoints and ensure that what is being developed will address the need.

I would just add that I have been with the Department now for 1½ years, very heavily involved in portfolio development and road mapping and technology across the board. Frankly, no group has been more aggressive in pursuing those approaches to planning than the Office of Science and Technology in the EM.

Second, we have significantly strengthened our peer merit review of technology development. We are using peer review both at the outset of a project as well as to help us make go/no go decisions at key points in an ongoing project. The National Academy of Sciences favorably reviewed the system.

Third, in fiscal year 2000, we are putting into place a significantly improved set of performance measures to help drive the pro-

gram to success, including tracking number of technologies deployed. We need good data to back up these performance measures, and we are working to improve this. We are using the results of the independent review of the fiscal year 1998 deployment data to develop and implement a system to validate the fiscal year 1999 deployments as they occur. And to improve cost savings data, we will begin using a standard calculation methodology in fiscal year 2000.

We also continue to work on increasing deployment levels. Today's hearing also raises questions about whether we are managing our contractors in a way that maximizes new technology benefits. Key to this are the incentives we provide to our contractors to use new technologies. However, current contract incentives, to complete as much work as quickly as possible or within a fixed price, may occasionally conflict with trying to accomplish that goal. Therefore, I have initiated an assessment of existing contract incentives in our M&O and M&I contracts to develop the contract incentive options for enhancing and better aligning toward the use of new technologies. I expect an initial report in September.

Technologies need to be available commercially to enable deployment at multiple sites—another issue you have raised. That is why we are focusing on developing the industry partnerships needed to increase multi-site deployments. To date, over 120 companies have told us that technologies we help them develop are now commercially available. This is significant progress, but we still need to do more with the vendors to ensure even greater use.

Regulatory and stakeholder acceptance of new technologies is also paramount to deployment. We have been working with the States and the EPA to gain an acceptance of new technologies and reduce regulatory barriers to deployment. But more needs to be done, and we are going to expand our work, through the EPA and the States, through the Federal Remediation Roundtable to improve permitting processes for new technologies.

While more needs to be done, we are achieving on-the-ground results. Over 50 percent of the OST developed technologies have been deployed in the past 2 years. In fiscal year 1998, alone, we had 108 first-time deployments of new technologies at DOE sites, a sharp increase from previous years—That is indicated on that slide over there.

Some of these first-time deployments came from the 13 new projects under the Technology Deployment Initiative. Ultimately, these projects, using a much better system than was being used 2 years ago, are now expected, to result in over 70 deployments and $700 million in projected life-cycle cost savings.

Mr. UPTON. Go ahead.

Mr. MONIZ. If I may just take another minute or 2, I appreciate it. I will shorten the rest.

I do want to emphasize that technology development and deployment are more complex than merely decreeing that "thou shalt use new technologies" and counting deployments. The goal, after all, again, is not simply more technology deployment but making cleanup faster, cheaper, safer, and better. As Albert Einstein said—now I am a physicist—"Not everything that can be counted counts, and not everything that counts can be counted."

Our technology investments are diverse. They may be very complex, such as the project that Congressman Hastings referred to at Hanford—actually, a different one than he referred to—an enhanced sludge washing approach being developed for $10 million has now reduced the projected life-cycle baseline cost by $6 billion, which would be, obviously, roughly equal to the entire lifetime investment in OST technologies.

On the other hand, the technology may be simple and cheap, such as this device, the band ball, developed by Savannah River Technology Center. This technology in its simplest terms is a low-resistance check valve with a ping pong ball inside. What it does is greatly improves the removal of subsurface contaminants. It basically works on the differential in barometric pressure from day to day. This is now doing a job for less than half the cost of conventional approaches, and it is being used by more 15 Government, commercial, and international organizations, and as best we know this ping pong ball was not manufactured in China.

But no matter whether it is cheap or expensive, technology is helping us to do the job better. We are addressing some previously intractable problems, such as the highly radioactive waste in the gunite tanks at Oak Ridge—and, again, we have a slide to indicate that. Technology is helping us do the job cheaper. For example, the Department made the cleanup at Oak Ridge $40 million cheaper with the out-of-tank evaporator. Technology is helping us work faster. Livermore developed the technology, and we are now ready for widespread use inside and the outside the complex that removes subsurface contaminants, orders of magnitude more quickly than conventional pump and treat. Technology is helping us work more safely. For example, the oxy-gasoline torch eliminates fire hazards for our workers.

So, we are looking to continuously improve how we do business, as if we make progress, we still have more to implement, as you well know, in the next 2 years—we do ask for your support to continue our progress in this vital program. And the last plea I would make is that in evaluating any RD&D portfolio, that you assess the overall portfolio and not focus just on individual projects.

Thank you, Mr. Chairman.

[The prepared statement of Ernest J. Moniz follows:]

PREPARED STATEMENT OF HON. ERNEST MONIZ, UNDER SECRETARY OF ENERGY, DEPARTMENT OF ENERGY

Mr. Chairman and other Members of the Subcommittee: I am pleased to be here to discuss with you the improvements we have made over the past two years in the Environmental Management (EM) Office of Science and Technology (OST) program's development and effective deployment of innovative technologies to support the cleanup of the Department's nuclear weapons complex.

INTRODUCTION

The Office of Environmental Management's (EM) mission is to clean up the environmental legacy of U.S. nuclear weapons production and nuclear research. EM's goal is to complete as much of the cleanup as possible by the year 2006. But considerable cleanup will remain after 2006 focused on the most complicated and difficult problems. The EM cleanup effort is expensive, technologically complex, closely regulated, and relatively unique in the world. Achieving the goal of accelerated cleanup requires targeted investments in science and technology to respond to hundreds of needs identified by cleanup project managers at the affected sites.

EM's science and technology investments (a total of $243M in fiscal year 1999) have the potential to provide more effective, less expensive, more timely, and safer environmental remedies, including technologies where no effective remedies currently exist. These investments can also provide the data or alternative approaches to reduce the risk that cleanup will be delayed or will exceed current cost estimates. Science and technology efforts within EM span the full spectrum from basic research to direct deployment assistance for cleanup projects and lead to fully integrated, technically defensible solutions for cleanup and long-term environmental stewardship at DOE sites. In order to maximize the value to the cleanup effort, EM's investments in science and technology must be effectively implemented across the DOE complex.

Approximately two years ago, your subcommittee held a hearing on the effectiveness of the OST program. At that time there was limited evidence that OST developed technologies were being deployed across the EM complex. During that hearing, your subcommittee also identified a number of concerns with the OST program: little or no involvement of the actual cleanup project managers with the selection, development, and implementation of new technologies; lack of a clear priority setting process for technology selection; lack of robust peer and merit review of science and technology investments; lack of effective measures to assess overall program performance; and lack of evidence that significant numbers of new technologies were being deployed in support of the Department's cleanup mission. We are here today to report that the Department took these criticisms very seriously, and as a result, EM has made a number of significant improvements in the management and integration of the OST program.

Over the last two years, OST and EM have substantially improved their technical and strategic planning processes. First, we developed policy and implemented new processes such as needs validation to assure that science and technology investments are driven by cleanup project managers. Second, we developed and are using a transparent, quantitative prioritization system for determining our science and technology investments; this system is wholly based on cleanup project data. Third, we instituted uniform and systematic peer and merit review systems; both are in place and working. Fourth, we established meaningful and challenging performance measures to assure that programmatic success can be demonstrated to regulators, state partners, and other stakeholders.

The net result of these changes has been a significant improvement in the way OST is managing our science and technology investments, which is evidenced in part by increasing deployment rates for innovative technologies across the DOE complex. With over 75 percent of the EM cleanup still ahead of us (in terms of estimated cost), the increasing deployment of innovative technologies should provide considerable opportunities for significant cost savings (i.e., billions of dollars) and schedule acceleration over baseline estimates. We are achieving results from our science and technology investments.

Achieving Results

In the past, the OST program has been criticized for the relative lack of deployments of new technologies across the DOE complex. I am pleased to report that we have turned the corner and are beginning to see the results of the investments we have made in science and technology. As with any science and technology initiative, substantial results cannot be expected overnight. We know that it takes at least several years to develop technology, gather needed supporting cost and performance data to demonstrate its utility and cost effectiveness under actual field conditions, and to make it ready for actual implementation. To accelerate the use of new technology in the EM cleanup effort, EM management of science and technology investments has evolved from a focus primarily on technology development prior to fiscal year 1996 to the more recent thrust toward deployment. The success of that strategy is now apparent.

OST-developed technologies, implemented by commercial vendors, are being used to clean up DOE sites across the country. From fiscal year 1991 through fiscal year 1998, almost 300 deployments of OST technologies took place at 30 DOE sites. While many of EM's cleanup issues are unique to DOE, there are some common problems shared with other federal agencies and organizations. To date, 32 deployments of OST-developed technologies have occurred at 28 non-DOE sites across the country and abroad. These sites include numerous military installations, Superfund sites, nuclear reactors, and various industrial sites.

For fiscal year 1998, EM committed to 49 first-time deployments of innovative technologies at DOE sites. This goal has been far exceeded and OST has played a major role in that success. DOE's Field Offices have reported 122 first-time deployments of innovative technologies in fiscal year 1998: 53 of non-OST technologies and

69 of OST-developed technologies. OST has conducted an intensive review of claims regarding its 69 technologies. To date, OST has verified that 55 of these first-time deployments utilized OST funded technologies at DOE sites. These 55 deployments, taken together with the 53 non-OST technology deployments, makes a total of at least 108 first-time DOE site deployments in fiscal year 1998. Considering only OST-developed technologies, in addition to the 55 first-time DOE site deployments, OST has also verified 49 subsequent technology deployments at DOE sites and 9 non-DOE site deployments, for a total of 113 deployments of OST sponsored technologies in fiscal year 1998. These 49 subsequent technology deployments reflect multiple usage of 18 OST sponsored technologies. Attachment 1 provides a list of OST developed technologies that contributed to meeting performance measures in fiscal year 1998.

More OST supported technologies are being deployed each year, and an increasing number of technologies are being deployed multiple times. Figure 1 below illustrates the increasing deployment trend for OST technologies. From fiscal year 1991 through fiscal year 1998, over 40 percent of OST's deployed technologies have been used more than once. Of the technologies with multiple deployments, 52 percent have been deployed 3 or more times. This increase in deployment of innovative technologies is contributing to schedule acceleration at many sites.

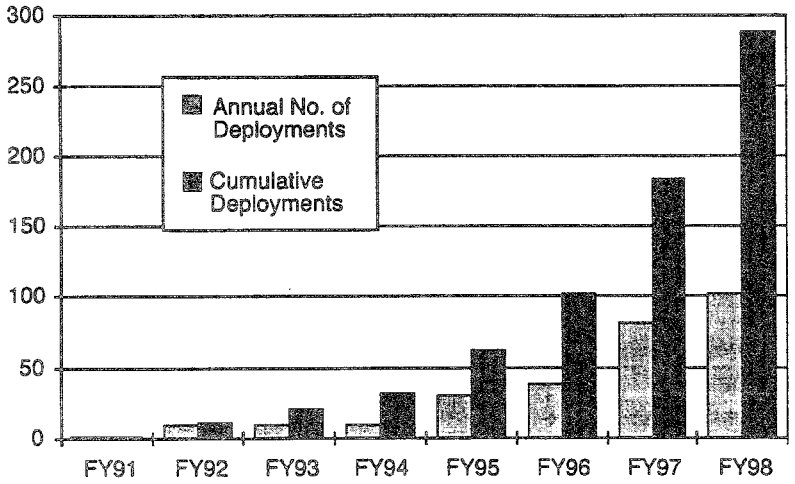


Figure 1. Cumulative Totals of OST Technology Deployments by Fiscal Year

In fiscal year 1998, OST initiated the Technology Deployment Initiative (TDI), now known as the Accelerated Site Technology Deployment (ASTD) initiative, to provide a means and incentive to promote the deployment of innovative technologies at multiple DOE sites. During fiscal year 1998, 14 projects, encompassing some 36 technologies, were started. By the end of fiscal year 1998, 13 deployments at 9 DOE sites occurred under 5 of these projects, with as many as 70 deployments projected over the next several years. Although the number of deployments for fiscal year 1998 was originally identified as 11 during testimony before the House Science Committee in March 1999, a final data review increased this by 2 deployments, to a total of 13. One particularly notable success under this program is the Segmented Gate System (SGS). The SGS, which reduces the volume of radioactively contaminated soils that requires disposal, was deployed at four DOE sites in one year under ASTD. For the original fourteen projects, over 60 private entities are providing products and services, of which approximately two-thirds are small businesses.

In fiscal year 1999, a total of 40 projects have been selected for initiation under the second round of the ASTD program. Technologies stemming from these projects are scheduled to be deployed at fifteen DOE sites, within one to two years of project start-up. Of particular note, the Hydrous Pyrolysis/Dynamic Underground Stripping (HP/DUS) technology will be used to clean up dense non-aqueous phase liquids (DNAPLs) in the subsurface at DOE's Portsmouth, Ohio facility, the Savannah

River Site, and Lawrence Livermore National Laboratory in place of pump and treat technology.

In 1998, the General Accounting Office (GAO) reviewed EM's efforts to deploy innovative technologies. GAO found that OST's overall deployment rate is comparable to deployment rates at both the Environmental Protection Agency's Superfund Innovative Technology Evaluation Program and the Department of Defense's Environmental Security Technology Certification Program.

Although the results of our science and technology investments are beginning to payoff, there remain areas in which improvements are still needed. For example, the Office of the Inspector General (OIG) has recently released an audit report critical of several aspects of OST's efforts to deploy decontamination and decommissioning technologies. We have reviewed this report. We have determined what corrective action is needed to address the report's major findings and are beginning to implement those actions.

Strategic Planning

To ensure that we are working to achieve common science and technology goals, we developed the EM Strategic Plan for Science and Technology and the EM Research and Development Program Plan. These documents articulate a set of common goals and objectives, shared by the EM complex, for the science and technology programs within EM. They describe the relationship between the Department's missions, EM's specific missions, the programs established to accomplish these missions, the technical opportunities and barriers within these programs, and the science and technology investments needed to directly support EM's missions. But setting policy and having a plan are not sufficient; we must also be able to successfully execute our program as well. The OST Management Plan is one primary document that we use to help execute the program. And one major requirement pervasive in all of these plans is that EM's science and technology investments must be driven by cleanup project managers, i.e., site managers responsible for on and under the ground cleanup, in order to have the maximum impact. At this point I want to elaborate on our major policy and programmatic changes.

Cleanup Project Managers Drive Science and Technology Investments

The first key policy decision we made was that cleanup project managers must drive science and technology investments for the OST program to be successful. Identification of cleanup project manager needs is the first step in the development of solutions to EM cleanup problems. Input from cleanup project managers is essential to accurately define and validate the needs to be addressed by EM's science and technology investments. Science and technology program needs are currently derived from needs developed by cleanup project managers and documented in "need statements," disposition map technology risk levels, critical pathway technology risk levels, and information contained in EM Project Baseline Summaries (PBS), i.e., relatively high-level project descriptions. Preliminary information for fiscal year 2000, for example, indicates that one-third of EM's cleanup projects and about 15 percent of the waste streams have technology needs associated with them. The majority, but not all, of these needs are currently being addressed by the OST program. The information also indicates the size (cost and extent) and complexity of the technical needs facing EM's science and technology program. They also identify the individual cleanup project manager, the schedule within which the solution must be available, and the impacts if these needs are not met.

Based on the cleanup project managers' input, OST's technical Focus Areas—essentially, teams of Federal and contractor experts that concentrate on a major area of technical need, e.g. high-level waste tanks or deactivation and decommissioning of facilities—begin an iterative process to develop fully integrated, multi-year technical responses to the site needs. The Focus Areas work closely with cleanup project managers to identify and document the specific science and technology requirements a solution must meet. The Focus Areas establish problem area roadmaps, also known as multi-year program plans, to document the life-cycle planning for the solutions they are providing. In addition, the Focus Areas ensure that their technical responses are fully and completely integrated into the cleanup project manager's activities.

This process of integrated, joint planning is intended to ensure that budgets are adequate to support the technology development efforts; delivery schedules align with technology insertion points; and the cleanup programs have the financial and technical resources to support deployment of the new technology. Finally, ongoing science and technology projects are evaluated at key decision points to determine if an effort should be continued or if an alternate strategy should be adopted. Clean-

up project managers are fully involved in these evaluations to ensure continued commitment to successful implementation of the solution.

Transparent, Quantitative Prioritization System for Proiect Selection

The second key policy decision we made was to use a transparent and quantitative system for establishing OST's workscope priorities based on data provided by our Field Offices. The complexity and duration of the EM cleanup effort requires OST to carefully prioritize and sequence science and technology projects. Our science and technology activities are now planned and managed in an interactive, coordinated and participatory relationship with EM's cleanup project managers and stakeholders. OST's prioritization process is iterative and integrative, beginning at the site problem level. EM's science and technology activities are pursued if and only if they:

- meet the highest priority cleanup project needs;
- reduce the cost of EM's costliest cleanup projects;
- reduce technology risk; and/or
- accelerate and increase technology deployment by bridging the gap between development and use.

Prioritization is first performed by the cleanup project managers, in the sense that only those OST technical responses that are endorsed by a cleanup project manager will be considered for integration and prioritization into each Focus Area's portfolio. Prioritization of technical activities is performed by each Focus Area, and then reviewed, revised if necessary, and approved by the Focus Area's User Steering Group, an oversight group charged with providing managerial oversight of the Focus Area's investment portfolio. Following this, the technical responses are compiled into work packages, which represent a set of related technical responses to site problems. A national, OST level prioritization process is then applied using a multi-attribute analysis, that includes the following factors: cost savings, technology deployment, site needs, and technical risk. The results of this process are then reviewed by the Department's Field Office Managers and EM's Deputy Assistant Secretaries to determine the final integrated priority list. This entire process has recently been reviewed and endorsed earlier this year by the Environmental Management Advisory Board (EMAB), an independent advisory group to EM. The EMAB concluded that OST's prioritization system was a transparent, robust quantitative prioritization system that is rooted in technology needs data supplied by project cleanup managers. We are committed to using this prioritization system to determine our portfolio of science and technology investments.

Peer and Merit Review Systems

The third key policy decision was to implement robust peer and merit review systems. Continuous internal and external review by peers and sponsors is generally recognized in the science and technology community as a necessary element of sound program evaluation and decision making. OST has put in place the review mechanisms and groups needed to assure the technical or scientific merit and programmatic relevance (potential to meet a cleanup project manager's needs) of its activities. Scientific merit review is performed by independent peer reviewers from universities and national laboratories, selected by the Department's Office of Science on the basis of their professional qualifications and expertise. OST's Environmental Management Science Program has been recognized for the quality of its scientific peer review through receipt of a Vice-Presidential Hammer Award.

Technical merit reviews of specific technologies are conducted for OST by the American Society of Mechanical Engineers (ASME). ASME review panels provide independent, external evaluation of the technical merits of a technology. Through fiscal year 1998, ASME has conducted over 58 technology merit reviews for OST, with another 40 reviews planned to be completed by the end of fiscal year 1999. Programmatic relevance reviews are conducted by each Focus Area to evaluate research projects for programmatic relevance and technical, schedule, and cost performance. Programmatic relevance review panels include OST program managers, cleanup project managers, subject matter experts, stakeholder representatives, and technology developers, as appropriate. Finally, ad hoc reviews are conducted of the OST Program by the National Research Council/National Academy of Sciences (NRC/NAS) and the EMAB. These ad hoc reviews generally address broad program issues and help guide OST and EM in addressing problems of greatest significance to the Department.

Performance Measures

The fourth key policy decision was to use an effective set of performance measures at the corporate EM level to guide and evaluate our science and technology invest-

ments. Performance measures and the appropriate associated metrics are critical to the evaluation and ultimate success of any program. They can effectively drive the direction of any program and ultimately help it succeed. EM's performance measures associated with science and technology investments have evolved with the EM program and improvements in our understanding of how to most effectively use performance measures to achieve program goals.

Two years ago, at the time of our first hearing, EM was not measuring numbers of technology deployments or associated cost savings. That hearing catalyzed a number of changes to our performance measurement system. Over the past two years, we have developed a set of four corporate science and technology measures that are sound, balanced, complement each other, and are reported by our customers at our Field Offices through the *Paths to Closure,* EM's corporate strategy document. The first of these measures—the number and impact of technology deployments—was initiated in fiscal year 1998. Starting in fiscal year 2000, the following three measures will also be used:

- number of high priority site needs being addressed by science and technology activities
- reduction in programmatic risk resulting from science and technology activities
- life cycle cost savings resulting from science and technology activities.

These four measures are designed to assess both how well we are managing our investments in, and how effective we are in using the results from, our science and technology activities. These measures will enable us to:

- measure the impact of our science and technology investments in terms of deployment by tracking both the number of technology deployments and, more importantly, a quantitative or qualitative discussion of the value of the deployment in helping to meet site and state regulator objectives;
- use site needs to better target science and technology investments; to evaluate and track high priority site needs being addressed; and the science and technology solution to those needs that meet site schedule requirements;
- make the reduction of programmatic risk a priority for science and technology investments by tracking the reduction in programmatic risk (technological risk in particular) associated with the site critical closure paths and the management of contaminated media, waste streams, and materials; and
- improve our focus on the highest cost projects, set metrics and document the resulting life-cycle cost savings from EM's science and technology investments as part of our Project Baseline Summary life-cycle cost variance analysis.

These four measures are a balanced and logical approach to determining science and technology based contributions to accelerated cleanup goals. These four performance measures are so integral to the way we are managing our science and technology investments that I want to discuss each of them in more detail.

Measure the effectiveness of our science and technology investments

EM started to track both the deployment of new technologies and the value of those deployments in 1997. EM established technology deployment as a corporate performance measure in 1998, asked the sites to review and comment on the data, and is currently improving the process for collecting, analyzing, and validating this data. EM is also working on better ways to capture the value and/or impact of deployments through qualitative descriptions rather than relying on simply the number of deployments. The number of deployments is a simple output measure. It implies that all deployments are of equal value and that the value is something worth measuring. In fact, deployments vary greatly in terms of impact on EM cleanup. For example, the Large Scale Demonstration Project at the Hanford 105-C-Reactor involved the demonstration of 20 innovative technologies, of which 15 were ultimately deployed, to provide for the safe storage of the C Reactor's core for up to 75 years until complete decontamination and decommissioning can be performed. While this project nets a count of 15 technology deployments (including a laser tracking and data system, the STREAM data management and integration system, and anti-contamination clothing for workers with a personal heat stress monitoring system to prevent overheating), the real impact of this project will stem from the benefits that can be applied to another 12 full-scale production reactors throughout the Department's nuclear weapons complex. As a second example, the deployment of the Out of Tank Evaporator, Light Duty Utility Arm, Fluidic Pulse Jet Mixer, Confined Sluicing End Effector, and Crossflow Filtration technologies at Oak Ridge net a simple count of 5 technology deployments, while masking the important baseline enabling and schedule accelerating effects of these tank waste cleanup technologies at Oak Ridge and potentially at Hanford and Savannah River.

Use site needs to target science and technology investments

In fiscal year 1999, the site science and technology needs are built directly into the cleanup projects. For the first time, we will have comprehensively integrated the cleanup projects and site needs and acquired direct user approval of OST's work packages at the project level. That is, we will have a solid understanding of the relationship between the approximately 400 cleanup projects, the 500 site needs, and the 40 Focus Area work packages or investments. This relationship serves as the baseline from which to measure progress. Focus Area efforts to meet or address EM's highest priority needs will be evaluated starting in 1999. Progress toward elimination of those needs will be measured starting in 2000. This data is reported by the cleanup project managers through the Project Baseline Summary structure established in the *Paths to Closure,* EM's corporate strategy document.

Make the reduction of programmatic risk a priority for science and technology investments

EM conducted an initial baseline of programmatic risk in 1998. This was done through two methods: the pathways and events associated with the site critical closure paths and the contaminated media, waste streams, and materials identified in the disposition maps. In 1999, we are baselining how EM's investments in science and technology correlate to those risk levels. In a manner similar to the site needs, as described above, we are mapping specific Focus Area work packages or investments, to specific critical pathways and events and particular streams on the disposition maps. The relationship between those elements and the risks associated with the elements provide us with our starting point or baseline from which to measure the effectiveness of the science and technology investments. That is, we must measure whether our investments are reducing programmatic risk and whether the programmatic risk is being reduced in those areas that are most important to the cleanup effort. This measure is also extremely effective in helping OST to target the investments; we now know the critical path and how we relate to it and by waste stream which problems we are trying to solve. In 2000, we will be able to start to measure changes in the risk levels, for pathways, events, and disposition maps that are due to science and technology investments.

Improve our focus on the highest cost projects and document resulting cost savings

In 1998 EM's cleanup projects were baselined and accelerated cleanup goals were established. However, systematic tracking of science and technology based cost savings relies on EM's ability to document detailed, project-level progress towards accelerated cleanup goals. The 1999 *Paths to Closure* guidance starts to do exactly that. This year through a Project Baseline Summary Cost Variance Analysis Report we are requesting each of the projects to identify changes in projected life cycle cost. This analysis looks at the life-cycle cost from the previous year and provides an explanation of whether the life-cycle cost for the project has gone up or down and why. One of the reasons for the decrease in life-cycle cost is the application of science and technology to change or improve the technical approach to the cleanup activity. Using this data, we will be able to set metrics for cost savings targets starting in 2000. This data will be reported annually through the Project Baseline Summary structure.

The four complementary performance measures that we are implementing are user-owned and determined, are outcome-oriented, can be tracked over time, and relate directly to cleanup. Ensuring that the measures are user-owned was a key element in their development and will be key in their implementation and reporting. To meet this key element, we needed a set of corporate measures, not OST measures, which were reported by the Field Offices, through the project structure EM is currently using to manage and plan cleanup activities. The performance measures are outcome oriented and relate directly to the cleanup. That is, they report the solution to needs, the reduction in risk, and the achievement of cost savings that EM needs to meet site closure goals. These measures will be tracked on an annual basis using site information.

Although we believe we have the right performance measures in terms of driving the program to achieve certain goals, we have had difficulty in establishing the right metrics. When implementing a new set of measures the availability of solid baseline data is critical to setting realistic but challenging metrics. The corporate measures we are implementing are based on data that was first available, in any form, in January 1998. The data will be available in a more useable form late in fiscal year 1999. Metrics development is a challenging task as is evident from our early efforts to pick a corporate level metric for deployment. We are considering the following factors in the development of metrics:

- numerical goals versus percentage goals to drive and evaluate performance;

- use of complete data sets or subsets of the data, e.g., technological risk of all the waste streams or just the high risk waste streams;
- annual goals versus life-cycle goals, e.g., should we analyze historical cost savings only or life-cycle cost savings; and,
- data collection methods available through *Paths to Closure.*

We believe these corporate measures are sound in terms of focusing the program and as tools for improved management. However, to allow proper analysis, that is, to successfully acquire the data for the measures and to evaluate performance, the metrics must be correctly crafted. This is a challenging task that we are still working on and each of these factors must be taken into consideration as we develop the specific metrics.

Other Concerns

During the last hearing before this committee, OST was criticized for the quality of its deployment and cost savings data. As a result, verifying technology deployments has been a key issue for us and we have been actively working to improve the quality of our deployment data. In fiscal year 1998, OST constructed Deployment Fact Sheets for every technology deployment that occurred from fiscal year 1995 through fiscal year 1998. These sheets were designed to both verify technology deployments and to disseminate information about the deployments (they are available on the internet at http://ost.em.doe.gov/tms). Our highest priority has been placed on validating those deployments that occurred in fiscal year 1998.

We have conducted a validation effort, known as the Technology Achievement Study (TAS), on the fiscal year 1998 Deployment Fact Sheets. The TAS is conducted by an independent contractor under the direction of an OST Federal employee, who is not aligned organizationally with any of OST's technical Focus Areas. This assures that the TAS will remain free of conflict of interest. The TAS works directly with technology vendors and their DOE and non-DOE customers to verify the technology deployments reported on the Deployment Fact Sheets. Any discrepancies that are revealed by TAS are then resolved with the Focus Areas and the Field Offices, and any necessary changes are then made to the final Deployment Fact Sheets. As a result of the application of the TAS to the fiscal year 1998 deployment data, we have a high degree of confidence (>90%) in the quality of that data.

For the fiscal year 1998 deployments, we are also performing a one-time additional level of validation and verification. We have requested the Center for Acquisition and Business Excellence at the Federal Energy Technology Center to commission an independent audit of the fiscal year 1998 Deployment Fact Sheets. The draft results of this audit are anticipated by June 15, 1999.

OST continues to seek ways to improve the quality of deployment data and to verify the accuracy and completeness of current and future deployment information. Frankly, this is a difficult and expensive task, but one to which we are committed. During its 1998 review of the OST program, GAO contacted ten research and development organizations; not one of these organizations routinely tracked deployments. OST recognizes the importance of this data as an effective, albeit limited, performance measure and will continue to track deployments.

Cost Savings

Since we testified in May 1997, EM has taken a number of steps to improve the collection of cost savings data. In 1998, EM developed and distributed a standardized cost savings methodology for use in calculating technology-based cost savings. In 1999, as part of EM's planning efforts, we established a data collection system for obtaining life-cycle cost savings data from the Field Offices on a project-by-project basis. Using this improved system will enable EM to identify, by project, where technology is being used to reduce the life-cycle cost of the cleanup, as well as where it isn't but needs to be. The standardized methodology and the data collection system support the implementation of technology-based cost savings as a corporate performance measure in fiscal year 2000.

Over the last two years EM has taken several steps to increase the amount of cost savings that result from our investments in science and technology. We have taken aggressive measures to accelerate the widespread use of new technologies. We are moving towards full integration of our efforts with the cleanup projects, and we are using the Field reported, and estimated, potential cost savings to prioritize work. Having said that, there are many factors that affect the actual cost savings that will result from these investments. These factors, including changes in regulatory requirements, the schedules and validity of existing baselines, and innovative approaches to contracting, make it difficult to either calculate or separate out what part of the cost savings was due specifically to a change in technology.

As noted in the *Paths to Closure* strategy document, remaining life-cycle cost of the EM cleanup is approximately $147 billion. While we are continuing to review our life-cycle cost estimates, we know that a major portion (>60%) of those costs will occur after 2006. In the intervening two years since our last hearing before this committee, we can confidently report to you an additional $300 million in projected life-cycle cost savings resulting from the deployment of some of our innovative technologies. Note that this figure represents the estimated savings from the use of twelve technologies and is not intended to reflect an exhaustive cost savings estimate of all our deployments since 1997. This figure of $300 million in projected life-cycle cost savings was developed by OST's Focus Areas working in conjunction with field office personnel; site concurrence has already been obtained for the majority of the estimated savings. Further, this figure of $300 million is in addition to the $400 million in cost savings that resulted from the deployment of OST developed technologies from the inception of the program through fiscal year 1996, as previously reported to this subcommittee. Although this latter figure is difficult to validate precisely, it suggests that the rate of cost savings is increasing as new technologies achieve widespread deployment.

We continue to believe that science and technology investments are needed and estimate that the life-cycle cost savings at the end of the cleanup will be in the range of $10-20 billion. This range is based on projected life-cycle cost savings from innovative technologies identified in the fiscal year 1998 *Paths to Closure* strategy document and includes both technologies already incorporated into site baselines and technologies identified as potential substitutes for current baselines. These cost savings estimates were obtained from information provided by each field office for sites under its jurisdiction. It should also be noted that this range of $10-20 billion is in accord with other assessments of the potential life-cycle cost savings resulting from the use of innovative technologies; for example, EMAB estimated a potential life-cycle cost savings of approximately $10 billion; a study by the Los Alamos National Laboratory identified a potential life-cycle cost savings of $10-17 billion from the application of OST-developed technologies; in another assessment, OST estimated $24-34 billion; and the Army Corps of Engineers, in a review of the OST assessment, estimated a potential life-cycle cost savings of approximately $20 billion. In addition, the standardized cost savings methodology and the collection of cost savings data on a project by project basis will enable us to improve our understanding of the impact of these investments and help us to manage them better as well.

Moving Forward

This subcommittee's hearing two years ago catalyzed the Department to improve the management of the OST program. We have made substantial progress in this area and are beginning to see the results. But much remains to be done. We have started, for example, to make better use of the Department's laboratories in this arena. A "lead laboratory"—a collection of subject matter experts coordinated by a specific national laboratory—is now providing direct deployment assistance as a part of OST's Focus Area support to site cleanup managers. The goal of this is to enhance the technical and scientific knowledge of each Focus Area such that they become true "Centers of Expertise." These centers will provide valuable insight from basic research through deployment assistance. This process must be institutionalized within each of OST's Focus Areas.

In addition, we must also realize that the value of any science and technology program rests not merely with the hardware that it produces, but also with the value of the knowledge that it imparts. That is, science and technology investments do not always result in pieces of hardware that can be counted. Often the scientific data or the demonstration results allow the project manager to make a better and more informed decision. For example, the cleanup action level for mercury in the East Fork Poplar Creek in Tennessee was initially established at 5 parts per million (ppm). Research studies sponsored by OST, the Environmental Protection Agency (EPA), and the Electric Power Research Institute demonstrated that the risk from mercury contamination was low. As a direct result of this research finding, the cleanup action level for mercury was raised to 400 ppm. This increase was agreed to by the DOE, EPA, the State of Tennessee, and interested stakeholders. The net result of this change to the cleanup action level was a cost savings of at least $150 million and significantly reduced (75%) the amount of floodplain ecosystem destruction. A second example concerns the reduction of high-level waste glass volume at the Defense Waste Processing Facility (DWPF) at Savannah River. OST is currently funding research work that is directed towards understanding the fundamental properties of waste loading of high level waste glass. The aim of this research work is to enable an increase in waste loading of high level waste glass. For each 1 percent increase in waste loading that can be achieved, a total estimated cost savings

of $250 million, due to schedule acceleration, can be realized over the life cycle of DWPF operations. The value and use of such scientific knowledge must come to be institutionalized.

Further, we must be vigilant in addressing the recommendations for improvement of the OST program provided by independent, external organizations. The recent OIG audit report, which was critical of OST's efforts to deploy decontamination and decommissioning (D&D) technologies through large-scale demonstration projects, is a good example. That audit report documented four recommendations to improve deployment of D&D technologies: 1) require multi-site Federal and contractor representation on large-scale demonstration project teams; 2) require timely publication of the results of the large-scale demonstration project; 3) require that project management cost information be consistently collected and analyzed; and 4) centralize procurement for all contractor services on large-scale demonstration projects. We agree with these recommendations and the D&D Focus Area has provided formal guidance to the field sites to implement these recommendations.

Larger structural issues must also continue to be addressed and continuous program improvement achieved through, for example: rigorous application of our new performance measures; re-examination of our incentivization provisions for our site contractors with an eye toward stimulating further technological innovation; and further streamlining and improving the permitting processes for new technology. In an effort to deal with these larger structural issues, I believe that the following actions are necessary to continue and accelerate our improved performance:

- Our four new corporate performance measures—increase in the number and value of technology deployments; number of high priority needs met; reduction of technological risk levels; and achievement of life cycle cost savings—must be rigorously applied to continue to drive our science and technology investments in the right direction. Although we believe these are the right performance measures, we want the subcommittee's input, as well as GAO's, relative to the viability of these measures, and the actual metrics that are assigned to them, as effective tools for managing our science and technology investments. With your help, we will drive the OST program in the right direction through the application of the right performance metrics.
- The Department has already begun an integrated review of what is required to get to the next level of efficiency in the deployment of appropriate technologies at our sites. At the core, this entails having sufficient operational and cost data to allow for the development of performance incentives that will encourage and reward successful integration and deployment of appropriate technologies. Joint development of the metrics accompanying our new performance measures is intended to generate this data. This is a complex problem requiring the input of many programs, agencies and stakeholders. Thus, special care must be taken to identify and allocate the risks and rewards appropriately between the vendors and the Department. Better incentive alignment is required. This applies to both the vendor and contractor community as well as our people, the project and site managers involved. This effort will be a joint undertaking by EM, Procurement and the Contract Reform/Privatization Office, and we expect an initial report by September 1999.
- An expansion of our current work with the Environmental Protection Agency through the Federal Remediation Technology Roundtable (FRTR), State regulatory groups, and other stakeholder groups. The FRTR is an interagency forum devoted to exploring policy and other issues related to environmental technologies and cleanup. Activities with the FRTR will be expanded to include consideration of improved permitting processes for innovative technologies. Ongoing efforts within the Interstate Technology Regulatory Cooperation (ITRC) program related to this issue will be continued and expanded, as will similar efforts with other groups.

Conclusion

In closing, we have turned the corner in our efforts to make the deployment of new technologies widespread through the DOE complex, but now we must institutionalize our gains and redouble our efforts; the deployment of new technologies must become routine and unfettered by other than non-technical issues. We will be continuing our efforts to expand the use of innovative environmental technologies in EM projects to reduce costs, reduce technical and safety risks, and accelerate the schedule of EM's cleanup program. We will continue to work with this subcommittee and advise you periodically of our efforts.

Attachment 1: OST-Developed Technologies Meeting Performance Measures in FY98

Technology	ID[a]	Codes[b]				
2-D Linear Motion System	1476					
Acid Digestion Alternative Oxidation Technology—SRS Demonstration	2167		R			
AEA Fluidic Pulse Jet Mixer	1511			V		
AEA Fluidic Samplers	2007			V		
Airborne Laser Induced Fluorescence Imaging	78	D				
Alternative Landfill Cover	10	D				
Bamberger Ultrasonic Sensor	214	D				
Barometric Pumping/Baro Ball	2331			V		
Biodegradation of Concrete	1421	D				
Borehole Miner	1499			V		S
CDI Remote Characterization System	2178	D		V		
Centrifugal Shot Blast System	1851	D		V		S
Characterization /Monitoring of Dense Nonaqueous Phase Liquids (DNAPLs)	1254	D				
Cogema 3-D Gamma Imaging	2302			V		
Colloidal Borescope	465					S
Compact Subsurface Investigation System	2153	D		V		
Concrete Dust Suppression System	2154	D	R	V		
Concrete Grinder	2102	D	R	V		
Concrete Shaver	1950	D		V		
Concrete Spaller	2152	D	R	V		
Corrosion Probe	1985					S
Decommissioning In Situ Plutonium Inventory Monitor (DISPIM)	2241			V		
Decontamination and Conversion of Nickel Radioactive Scrap Metal	234	D				
Deep Soil Mixing	54			V		
Development of Penetration Enhancement for the Cone Penetrometer Using Sonic Drilling Technology	1686	D				
Direct Chemical Oxidation	109		R			
Direct Measurement of Strontium-90 in Subsurface Soils	70		R	V		
Direct Sampling Ion Trap Mass Spectrometer System (DSITMS)	69					
DNAPL Bioremediation—RTDF	1737			V		N
Environmental Measurement While Drilling	8	D				
Fenton's Reagent	2161		R			
Field Raman Spectrograph	873	D				
Frozen Soil Barrier	51		R			S
GAAT Tank Isolation	2093	D		V		
Gamma Cam™ Radiation Imaging System	1840			V		N
Gamma Ray Imaging System	1793					
Graphite Electrode DC Arc Furnace	1652			V		
Gunite Retrieval System						
Light Duty Utility Arm	85					
LDUA – Decontamination System	835					
LDUA – Supervisory Data Acquisition and Supervisory Control System	810					
LDUA Stereo Viewing System	890					
Confined Sluicing End Effector	812			V		

Technology	ID[a]	Codes[b]				
Hand Held Shear	2304			V		
Heat Stress Monitoring System	1953		R			
High Speed Clamshell Pipe Cutter	1807	D	R	V		
(HTI) Vadose Zone Characterization System	2118	D				
Hydrophobic Lance	2360			V		
In Situ Object Counting System	2098		R	V		
In Situ Permeability Measurements with Direct Push Techniques	307	D		V		S
In Situ Permeable Flow Sensor	99		R			N
In Situ Redox Manipulation	15		R			
In Well Vapor Stripping	6			V		
Indoor Radiation Mapping Using Laser Assisted Ranging and Data System	1946		R	V		S
Intelligent Mobile Sensor System (IMSS) for Autonomous Monitoring and Inspection (AMI)	264	D				
Internal Reflection Sensor for the Cone Penetrometer	1723	D				
Laser Ablation/Mass Spectroscopy (LA/MS)	127		R			
Liquid-Nitrogen Cooled Diamond-Wire Concrete Cutting	2107	D	R			
Long-Term, Post-Closure Radiation Monitor	288	D				
Metal Emissions Monitor for DOE Mixed Waste Thermal Treatment	18	D				
Monitor for Demonstrating the Effectiveness of Barrier Installation and Long-term Performance using Electrical Resistance Tomography	2120	D				
Neural Network Raman Cone Penetrometer Signal Extraction and Enhancement	242	D				
Nondestructive Waste Assay Using Combined Thermal Epithermal Neutron Interrogation	1568		R			
Nondestructive Waste Assay Using Gamma-Ray Active and Passive Computed Tomography	2123		R			
Oceaneering Space Systems Tank Sampling and Inspection Tool	2359			V		
On-Line, Real-Time Alpha Radiation Measuring Instrument	312	D				
OSS Salt Sampler	2308			V		
Oxy-Gasoline Torch	1847			V	S	N
Passive Reactive Barrier	46		R	V		
Personal Ice Cooling System (PICS)	1898		R	V		
Pipe Explorer™ System	74					N
Plasma Hearth Process	26		N			
Pneumatic Fracturing/Hydraulic Fracturing	1916 1917		R			
Portable Hi-Purity Germanium Detectors for Delineating Contamination in Soils	2157			V		
Portable X-Ray, K-Edge Heavy Metal Detector	134	D				
Pulsed Air	1510			V		

[a] The ID column shows the OST reference numbers used in the Technology Management System (TMS) at http://ost.em.doe.gov/tms.

[b] D = demonstrated, R = ready for implementation, V = verified first-time deployment, S = subsequent deployment, N = deployed at non-DOE site

Technology	ID[a]	Codes[a]				
Radiation Tracking System (RTRAX) for Delineating Contamination in Soils	2361				V	
Raman Probe	1544				V	
Rapid Sampling Using 3M Membrane Technology	1514	D				
Reactor Surface Contamination Stabilization	1839	D	R		V	
Real Time Plutonium Monitoring	2004	D				
Remote Control Concrete Demolition System	2100				V	
Remote Operated Vehicle, Dry Ice Pellet Decontamination System	91	D				
Remote Underwater Characterization System (RUCS)	2151	D			V	
Remotely Operated Scabbling	2099					
Removal of Contaminants from Equipment and Debris, and Waste Minimization Using TECHXTRACT	1450	D				
RESRAD-Build	2103		R		V	
Road Transportable Analytical Laboratory (RTAL)	292		R			
ROTO PEEN Scaler and VAC PAC System	1943					S
RSS Software for Soil Excavation Control for Delineating Contamination in Soils	2362				V	
Salt and Ash Stabilization—Stabilize Ash Using Clemson's Sintering Process	2037		R			
Salt and Ash Stabilization—Stabilize High Salt Content Waste Using Sol Gel Process	2036		R			
Salt and Ash Stabilization—Stabilize High Salt Content Waste Using Polysiloxane Process	2045		R			
Seam-Sealed Sack Suit	1954		R			
Segmented Gate System	2158				V	
Self Contained Pipe Cutting Shear	1948		R			
Shallow Fluted Auger	2230				V	
Six-Phase Soil Heating	5					N
Soft-Sided Waste Containers	2240	D			V	
Solution Mining	157	D				
Steam Vacuum Cleaning	1780					S
Surface Acoustic Wave/Gas Chromatography System for Trace Vapor Analysis	282		R			
Surface Contamination Monitor and Survey Information Management System (SCM/SIMS)	1942				V	N
System for Tracking Remediation, Exposure, Activities and Materials (STREAM)	1947					N
Tank Waste Conveyance System	2116					
Thermal Oxidation of Organics Using Catalytic Chemical Oxidation	2040				V	
Three-Dimensional, Integrated Characterization and Archiving System (3D-ICAS)	97	D				
Tomographic Site Characterization Using CPT, ERT and GPR	284	D				
Track Mounted Shear/Crusher	2303				V	
Transportable Vitrification System	222					

Technology	ID[a]	Codes[a]				
TRUEX/SREX	347		R			
VecLoader HEPA Vacuum Insulation Removal	1784					
Waste Inspection Tomography (WIT)	259				V	
Wireless Remote Monitoring System	2104	D	R		V	S
Zero Tension Lysimeters	715		R			

First-Time Deployments of Non-OST-Developed Technologies at EM Sites

3-D Digital Camera Photogrammetry
3M Fire Dam Spray Coating
Annulus Inspection Ultrasonic Crawler Robot
Bagless Transfer
Boxed Waste Assay System
Catalytic Reduction Daholgenation
CO_2 Decon System for DWPF
Coaxial Flexible Above Ground Transfer Line for Tank
Cost-Effective Sampling (at two sites)
Decontamination and Dismantlement Bulk Concrete Waste Disposal
Double Diaphragm Heel Retrieval Pumps for Tank 17
Drum Delidder/Relidder Assembly
Electronic Signature System
Encapsulation Technologies "Capture Coating" Sugar Fog with Tracer
Excel Modular Scaffolding at TRA
Gamma Spectroscopy Logging System
GIS Real Time Access
Glovebox Nondestructive Packet Assay Monitor (PAMS) System
Glove X-Ray System for Nondestructive Examination of Packets
Hanford Tank Waste Remediation Operations Simulator
High Temperature Pour Spout Camera for DWPF
High Vacuum Extraction
Improved Pour Spout Insert for DWPF Melter
In Situ Beta Detector
In Situ Sampler
In-Cell Waste Grinding
Initiated Aliquot Side-by-Side Sampling for DWPF
Innovative Evaporators
IRIS Inductively Coupled Plasma Instrument
Laboratory Specialty Resins
Micro Chemical Chromium Monitor
Mobile Evaporator
Mobile Lab for Rad Analysis
Multiple Stage in Well Aerator
Passive Aerosol Generator and Capture Coating
Pipe Component Packaging Process
Plutonium Casting Chamber
Portable Digital Radiography
Pulsed Air Mixer
Purge Water Management System, Burial Ground
Pyrochemical Salt Oxidation Process
Q-Squared for TRU Waste Assay
Reducing Grout in Tank 17
Remote Ultrasonic Tank Inspection (RUTI) System
Soluble Bags
Sonatol System for Cleaning of CIF Prefilters and Tools
SS&C Dissolving Process
Surface Coating Thickness Measurements on Irradiated Fuel
Water Brush and Monitors for Tank 17
Water Mouse for Final Heel Retrieval in Tank 17
Water Polisher for Analytical Cells
Water Vapor Nitrogen

Mr. UPTON. Well, thank you. I appreciate that.

I heard Ms. Jones, in her testimony, she said that two-thirds of the technologies have never been used or only once.

Mr. MONIZ. Only once.

Mr. UPTON. I am glad to hear that the ping pong ball approach has been used 15 different times, I guess, in addition to Savannah River, but I note in the review of decontamination and decommissioning technology development programs at the Department of Energy reviewed by the National Research Council on page 2, it says, "The committee found that the DDFA generally has failed to meet its objective to promote DOE's sitewide deployment of new technologies. The LSDP, the main deployment approach used by the DDFA, lacked planning and did not meet its schedules or goals during the committee's review." How does what GAO said and from this publication which was put out, I think, in December 1998, how does that comport with where we are in terms of spreading those technologies around that you have developed.

I note just one other little comment: when Mr. Hastings was here and he was very glad about the approaches that were used, particularly the cocoon effort. There has been some concern that, perhaps, it is only being used there and no place else.

Mr. MONIZ. It still needs to be spread to the other reactors. That is absolutely correct in that case.

With regard to the NRC recommendations, Mr. Chairman, first of all, we certainly have accepted and agreed and are in the process of implementing most of the recommendations. For example, one of the very important recommendations was improving overall strategic planning. In fact, we have developed a strategic plan for science and technology and an EM R&D program plan that, in fact, maps investments in science and technology, including those of D&D where we do have a problem, to site program manager needs.

The NRC recommended that top management at OST needed to be involved in evaluation and prioritization of technology needs, and that is happening with a multi-attribute decision analysis scoring methodology using the Paths to Closure data. They talked about linking all actions and funding to the prioritized needs, and we need to respond to that in future solicitations.

Mr. UPTON. Do you see us moving toward using some of these technologies that have been developed more and more at these sites?

Mr. MONIZ. Yes. We believe we are making substantial progress. For example, in 1998 there were 55 OST-funded technologies that were first-time deployments, and there were another 49 that were subsequent deployments. So, that curve going up and obviously we hope to be able to maintain that trend, but since the hearing, there has been a noticeable uptick in those first-time deployments and multiple deployments.

Mr. UPTON. Well, I have another chart. I note that that rise in your statement that you would like to continue that trend the last couple years. I want to share this chart with you here. As we understand it, the Department actually plans to decrease the rate of technology deployments from 104, which were done in 1998, to only 60 deployments in 1999 and again in 2000.

Mr. MONIZ. Mr. Chairman, I believe the situation is that those were the benchmarks——

Mr. UPTON. These came out of the DOE budget, as I understand it.

Mr. MONIZ. Yes, and set as the benchmarks going forward. The comparable benchmark in fiscal year 1998, was 49, and we have significantly exceeded the 1998 benchmark. We hope to exceed those benchmarks comparably.

Mr. UPTON. So, you are hoping that those last 2 years will continue to be on the incline?

Mr. MONIZ. Exactly. Again, the baseline for 1998 was 49, and we have substantially exceeded our baseline there.

Mr. OWENDOFF. Dr. Moniz, if I can——

Mr. MONIZ. Please.

Mr. OWENDOFF. [continuing] just also on the——

Mr. UPTON. Use the microphone, just a little closer.

Mr. OWENDOFF. Okay. As far, Mr. Chairman, as you have mentioned specifically about Hanford and the reactors, in fact, a team has already gone from Hanford to Brookhaven for the graphite reactor at Brookhaven, and is now working with the Brookhaven folks on how to implement those. The reactor at Brookhaven was the next one, so we are pulling that team across.

Mr. UPTON. Thank you. Mr. Klink.

Mr. KLINK. Mr. Chairman, I didn't want to interrupt you during your line of questioning, but the report that you cited in your questioning——

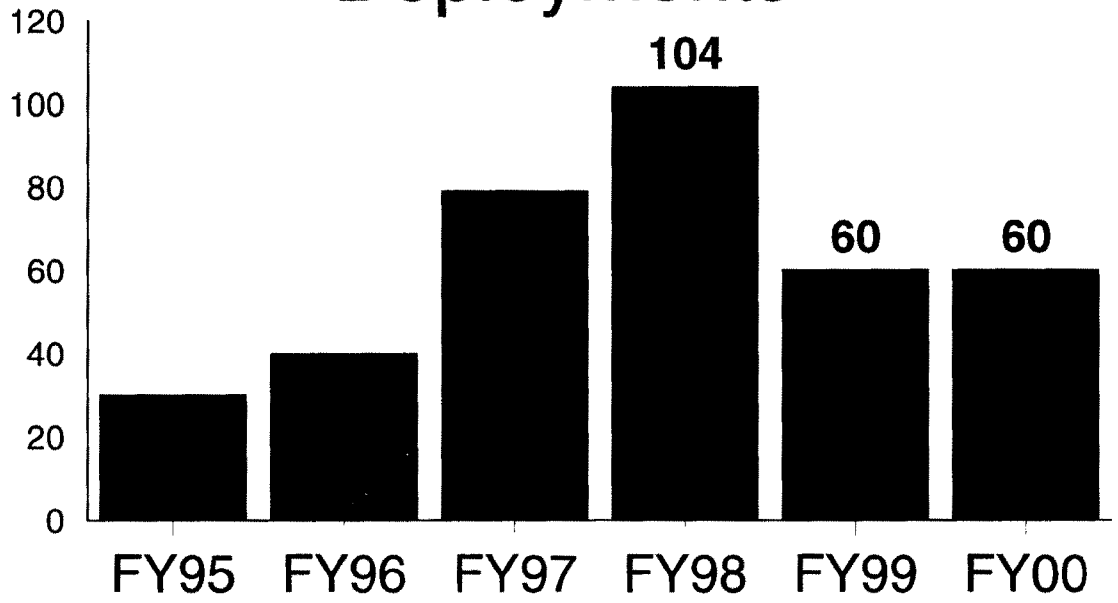
Mr. UPTON. We will share that with you.

Mr. KLINK. Is that going to be submitted for the record?

Mr. UPTON. Yes, put that in the record, without objection.

[The information referred to follows:]

Annual Number of Technology Deployments



Mr. KLINK. Thank you.

Mr. UPTON. We can give you a copy of it now, actually.

Mr. KLINK. That would be great.

Mr. Moniz, it has been 2 years since OST established the Gate System to evaluate the technology projects that it was funding. The idea, as I understood it, was that each project was going to be rigorously evaluated, not only for its technical progress but for its relationship to end users and to their needs. No end user, no project.

The Gate System has not been implemented, and you are here today to tell us about new systems and new committees that are going to solve these problems. It seems to me that the DOE continue to avoid the problem by constantly changing the review process. To be honest with you, I don't know how anyone gets anything done. I would like you to explain to us why you gave up on the Gate System before it was implemented?

Mr. MONIZ. Mr. Klink, my understanding, first of all—and I will defer to my colleagues in a minute, if I may—we really have not abandoned the Gate System established in 1997, which had seven stages of development and six gates for go/no go decisions. The criteria are still being used by the focus areas, the teams that address each of the major problem areas, to move a technology from one phase to another. Typically, EM uses independent panels arranged by ASME, the American Society of Mechanical Engineers, to provide technical merit review at key decision points. However, there currently are over 250 technologies in various stages of development, and, frankly, conducting peer reviews at each of the six gates for every project——

Mr. KLINK. I have only got 5 minutes, Mr. Moniz, and I don't think you are being responsive to the questions I ask you. Everybody told us that this Gate System was the greatest thing going, and now it seems to me that we are in some kind of either a modification of the Gate System or it has been scrapped altogether. And you are saying now it has not?

Mr. MONIZ. I think the core of the Gate System is being employed. May I defer to Mr. Boyd?

Mr. KLINK. Yes, that would be fine.

Mr. BOYD. Yes, we have not abandoned the Gate System at all. We used to the do the gate review process on a centralized basis, which was fairly expensive, and it was cumbersome. What we have done now is to ask each of our five technology focus teams to implement the gate review process as it was designed. We have given them direction in writing and guidance on how to do that. They have completed an analysis of all the technologies that are in their portfolios, within each one of those five focus teams and identified at which gate all those technologies currently sit and are identifying those that need a gate review. You don't necessarily need to do a review at every gate; you need to do a review at a gate where there is going to be a major investment. So, we have not abandoned that at all. We believe it is a very effective process, and we are continuing to use it but in a different way.

Mr. KLINK. Again, I don't think you have answered the question.

Ms. Jones, what do you think about this modification of the Gate Program? Where are they headed with this?

Ms. JONES. Our understanding, Mr. Klink, is that they are basically using what they call mid-year reviews, which is an annual project review, and if you look at the documentation that has been provided to the focus areas, it basically says the mid-year review—and I am quoting from the document—"will address the abbreviated gate deliverables in certain areas." Our review of this mid-year review process is that the Gate System was very definitive in terms of there were specific questions focused on each and every gate; there were specific deliverables for each and every gate. This annual review addresses these things in a very general way, but there is a set of very general gate questions that are being used. So, we don't see the Gate System being used as it was designed.

Mr. KLINK. Mr. Boyd, I would like you to respond to that. That was my understanding also, that this Gate System was very definitive, and it does not appear to me, the testimony that we are hearing here today, that DOE is using the Gate System as it was defined. It looks like you have gone off into some variation that is real nebulous, and we don't understand what your are doing.

Mr. BOYD. Well, we certainly did not intend for it to be nebulous. We went through a significant budget reduction since we used the centralized approach and used a lot of money doing that review. What we are attempting to do now is do the same Gate Review in a more efficient way. We have published guidance for that to be followed in the same structured fashion that it was on a centralized basis but have each one of the focus teams do that on a decentralized basis as they do their annual mid-year reviews.

Mr. KLINK. Ms. Jones, is it fair to blame budget cuts for the fact that they have moved away from this very definitive Gate System?

Ms. JONES. In my mind, we would have to have a better understanding about why they moved away from it other than budget problems. The other thing that I would want to point out is that in our preparation for this hearing in looking at their system of mid-year reviews, the reports are not out from them yet, but what we found was that they were being applied inconsistently across the focus areas. For example, one focus area was not doing annual reviews on all their projects; others were doing reviews on all their projects. One focus area was using questions more like the Gate System; other focus areas were using very general questions. So, even in terms of their annual reviews, it is not being done consistently across the focus areas.

Mr. KLINK. Thank you.

Mr. MONIZ. May I just comment, Congressman Klink? If you would permit, I would like to suggest——

Mr. KLINK. I don't control the clock.

Mr. UPTON. Go ahead.

Mr. MONIZ. I think it is a very important question and I propose that we, GAO, committee staff get together, examine in detail what we are doing. If we are not meeting the essential goals of the Gate System, then we will come back to you and talk about the situation.

Mr. KLINK. That would help us a great deal, and we certainly do want GAO involved.

Ms. JONES. We would be happy to.

Mr. UPTON. Thank you. Mr. Burr.

Mr. BURR. Thank you, Mr. Chairman.

Mr. Boyd, how many cleanup sites have you visited?

Mr. BOYD. Practically all of them. I have not been to Fernald; and I have never been to the Mound facility, but I have been everywhere else.

Mr. BURR. How about you, Mr. Owendoff?

Mr. OWENDOFF. I have been to all except Livermore.

Mr. BURR. So, both of you are fairly familiar with the cleanup sites, feel fairly comfortable?

Let me ask you—I am going to go back and ask some questions that are a direct result of testimony 2 years ago. Mr. Moniz, what is our total cleanup cost of DOE sites? What is the current DOE estimates?

Mr. MONIZ. The current baseline going forward from today is approximately $150 billion in current year dollars; roughly, $250 billion plus in——

Mr. BURR. So, it hasn't done anything but go up since 2 years ago. Two years ago, it was $227 billion to $229 billion, and I take for granted that was in forward dollars.

Mr. MONIZ. There has been something like a 10 percent increase in the projected lifetime cost.

Mr. BURR. And what would you say has contributed to the 10 percent increase in your projections now?

Mr. MONIZ. There are a variety of issues. In some cases, for example, Congressman Hastings mentioned the "K Basins". There have been unforeseen technical problems, which have increased some major project costs. Other cases, there have been schedule delays not associated with technology. Sometimes there are other drivers, externalities, involving regulatory issues, for example, which have changed schedules. May I suggest that also Jim may want to——

Mr. BURR. Let me suggest to you that as it relates to the regulatory hurdles, that this committee volunteered 2 years ago to address any of the regulatory hurdles that DOE thought caused the taxpayers an increase in their funding. To my knowledge, there were no requests from the Department of Energy. Mr. Owendoff?

Mr. OWENDOFF. That is correct, Congressman Burr. But on the question on the increases, as you can appreciate, as we move with the Paths to Closure, certainly in the near term between now and 2006, and then from 2006 to 2070, which is a long ways out, we are gaining better definition of those costs.

Mr. BURR. The real answer is we don't know the degree of contamination; therefore, we can't project today the total needs of cleanup, isn't it?

Mr. OWENDOFF. Some of that is fair, certainly, considering the kinds of material that we are looking at, it is not normal petroleum products contamination and normal chemicals. So, this stuff is very difficult.

Mr. MONIZ. Congressman Burr, I agree.

Mr. BURR. Well, let me ask you: wasn't that why OST was one of its primary functions was to try to get ahead of the curve; to try to create technologies that could meet these unexpected things? Do you agree?

Mr. OWENDOFF. Correct, I agree.

Mr. BURR. Do you think we have done it?

Mr. OWENDOFF. I think that we have demonstrated. Yes, is the answer, and I think that we are continuing. If you look at some of the technologies that we have in the gunite tanks at Oak Ridge to solve the problem down there on removing the waste that was in a very concentrated area next to a cafeteria where, over the years, we had kicked the can on how to solve that problem. We did the same thing on high level waste at Hanford on how to solve that. So, yes, Congressman Burr, I believe we are.

Mr. BURR. I realize that you are Acting Director, but at DOE that is a career, in some cases.

Do you believe that the technologies—and I have never disputed that the OST has financed some innovative technologies. The disconnect has always been contractors that were using it. Whether we created stuff that contractors couldn't use, wouldn't use, there wasn't the correct incentive to use—I think Mr. Alm was very specific in his three things, one of which we still use today, which is regulatory burdens, and I would implore you to please get with us on that. Let me ask you: Do you feel that the $12 billion to $27 billion in savings—now that we have 8 years left on the 10-year plan—is that still a realistic savings for the American taxpayer or has it been adjusted, as well?

Mr. OWENDOFF. I can give example after example of savings through new technology. What we are doing is we are making it so that we don't foreclose the technology that is going to be utilized for a particular activity. We say that with this cleanup problem, we have multiple technologies—some of them are innovative, some of them are baseline—that meet the regulatory requirements. What we try not to do is to lock in the technology, but rather let the marketplace work through competitive bidding. And what we are doing there, also, is ahead of time giving an added confidence to the regulators that these technologies will work. So, we are trying to remove that concern and that uncertainty from the equation before we bid those projects.

Mr. BURR. Your predecessor, Mr. Alm, said 2 years ago that one of his areas that he planned to find savings was to reduce all support costs in the field offices from an average of 45 percent to 35 percent. Has that been done?

Mr. OWENDOFF. The most recent report that we prepared indicated that, no, we have not been able to make significant reductions in those support costs, and that is an area where we are incentivizing contractors to get those support costs down. But by the same token, we are also looking at what that means? You need contracting support, public affairs and you need RAD—radiation protection—specialists. So, we are trying to understand what are the indirects, and, frankly, how many does it take? We have had some good inroads at some places on reducing those, but we are trying to understand, also, the definition.

Mr. BURR. I realize that my time has run out, but I look forward to another round.

Mr. UPTON. I have got—thank you, Mr. Burr—I have got one, really, last question to ask, as well.

Ms. Jones, you stated that DOE's Office of Environmental Management could do more to promote OST-funded technologies by

identifying potential deployment opportunities. Specifically, I am interested to know what should EM be doing, and, in commenting, I would like Mr. Moniz to comment particularly as it relates, perhaps, to—I know the Savannah River, I think, used some 40 different OST-funded technologies yet Rocky Flats and Hanford has used about 10, and I wondered why there is more success at—what would explain that disparity, and, maybe, Ms. Jones, I will let you go first.

Ms. JONES. Mr. Upton, what we were talking about in terms of increasing deployments was for OST to be more proactive in working with the user community on technologies that have already been developed. Early on, in the OST development of some of these technologies, they weren't working with the sites. A number of technologies were developed without user input, and they are not going to be able to used by the sites unless they are modified. So, what we are looking for is really a proactive marketing of these technologies; find out who might be able to use them, and then work with the sites to identify the funding for those needing modifications. Right now, it is unclear whether it is OST's responsibility or the site responsibility.

Mr. UPTON. Mr. Moniz?

Mr. MONIZ. With respect to your question of the various sites, I think one of the lessons here is that we have something to learn by studying the different kinds of contract incentives that we have at the different sites, which I think is partly responsible for the disparity you mention. I would mention another example at Hanford, and this refers also to Congressman Burr's question in terms of the lifetime savings costs and for Savannah River—where some very big savings are looming out there. I mentioned sludge washing, which has resulted in a $6 billion baseline change in the TRUEX project at Hanford, but, similarly, some of the technology development going on right now in vitrification has an enormous, enormous potential impact that we just have to push, technically, and push it out if it works. If we can increase the loading of the glass, in terms of waste, a 1 percent increase from a 25 percent base is worth $250 billion.

Mr. BURR. Would the chairman yield for a second?

Mr. UPTON. I would be glad to yield.

Mr. BURR. Could you just define "pushing it out" for us? I mean, this committee is having a difficult time determining exactly what Ms. Jones said. Is the responsibility Mr. Boyd's at OST? Is it Mr. Owendoff? Is it the Department of Energy? Is it the contractors? Who is responsible to push it out?

Mr. MONIZ. In my view, clearly, the principle line responsibility resides clearly with Mr. Owendoff. And that has, in fact, been amplified in the realignment initiative the Secretary announced in April in which, the field offices now, very explicitly, come under the lead PSO's responsibility.

Mr. BURR. Before you jump in a hole, do I take from that answer that it is the site managers who have a responsibility to place this technology at these sites to encourage contractors?

Mr. MONIZ. In my view, it is the head of EM who has the principle point of responsibility. However, that only works in the context of a system. The core of that system, in my view, is the strate-

gic planning that we are doing, the disposition maps, the maps that identify technology chokepoints where big leverage is possible, not only in cost but also in things like in-State cleanup quality. And we have to—Jim and Gerald have to monitor those and work with the field managers who, in turn, must work with the contractors.

In addition, the second thing is, we need to work carefully to do a better job of aligning incentives and that is part of the initiative report I mentioned earlier we will get in September. I mean, we are not there yet; that is a fact.

Mr. BURR. With the chairman's indulgence, do I take the meat of his answer, as it relates to your responsibility, a reliance on the site managers to place this technology?

Mr. OWENDOFF. Congressman Burr, I don't shuck responsibility. It is my responsibility, to work with the site managers to ensure that we have the appropriate contract incentives. At the beginning of each year, I work with the site managers on what are the appropriate incentives.

I will use two quick examples. At Savannah River, they do have incentives for implementing innovative technologies. That is an approach they have sorted out in their whole incentive program, and they feel that piece of it is important.

At Rocky Flats, the incentive is to put in stretch and super-stretch goals, not necessarily technology specific, but in order to drag scope, to accelerate it. Clearly, things have to be done, and, in that case, what is being done is, in order for the contractor to earn fee, they have to go out and pull in innovative technologies. Standard technologies will not work. But what we are not trying to do is to tell them which ones are where.

I don't have the answer of what works, as you can appreciate. Some incentives will, but if I would say, "I want just a lot of money put on incentives for technologies," then the question is, "Okay, are they cost effective?" What we really want is cleanup; and we want accelerated cleanup; we want safe cleanup; and we want the in-State to achieve. So, it is the balance.

Mr. BURR. Do you understand our frustration with the lack of it and then the inability to place some of the technology? As a matter of fact, I guess these are your projections for 1999 and 2000—is that reflective of the change that we have made as to who we get technology in the field to have a 44-unit drop—I guess those are specific technologies—or is that a reflection of the lack of the pool of technology that we have at OST?

Mr. OWENDOFF. I think what that reflects is where the field managers are wanting to say, "This is what we know we can deliver," and what it doesn't reflect is what they believe the potential is for delivery. If you look at the 1998 chart, we had an expectation of 49, and then we accomplished 108.

Mr. BURR. If you look at this chart, it would suggest that the best thing we could do for placing technology is to have an annual O&I hearing, because the bleep up certainly reflects a response, I think, to congressional pressure, and I imagine if we had one 2 years from now, we would see another bleep up in the 2000, 2001——

Mr. MONIZ. Sir, the hearing 2 years ago was absolutely a critical event in terms of galvanizing the processes that we have been

working on it for the last 2 years. They are not fully mature, but I think you are already seeing the results of them.

Mr. BURR. I appreciate that and realize that the chairman has been awfully kind to me.

Mr. UPTON. My time has expired.

Mr. BURR. As the Department comes back and continues to raise that cleanup cost—I mean, we do have a fiduciary responsibility. At some point, the money runs out. The American people look at us, and then they look at you, and say, "To what degree has the cleanup taken place?" I agree with you, at some point it becomes outcome; it is no longer process. We are here talking about process today, and I hope that the premise that you use in developing that process is, in fact, outcome, which is not something that even charts yet.

Mr. OWENDOFF. Congressman Burr, look at the sites that we are getting cleaned up, such as the Weldon Spring site in Charles County in Missouri, and what the projection was and now how we have accelerated that; at Fernald in Ohio, at Mound in Ohio and, certainly, at Rocky Flats. I am directly accountable for making those happen and accelerating those, and I think that you can see compared to those projections 2 years ago in cost and in time, they have been significantly reduced.

Mr. BURR. But with a 10 percent increase, that means that others have exploded based upon our projected costs, and with 5 sites comprising 80 percent of the total numbers—and I believe I am correct there—5 sites comprising 80 percent of the projected cleanup, one would suggest very strongly that our concentration should be very heavy on those 5 sites as the best way to control our costs.

I appreciate the chairman's leniency.

Mr. UPTON. The time has long expired. Mr. Stupak.

Mr. STUPAK. Thank you, Mr. Chairman.

Ms. Jones, you didn't join in that last set of questions from Mr. Burr, but let me ask you this question: the responsibility for implementation of these deployments and cleanups, is it a clearly defined line of authority as to who has the responsibility?

Ms. JONES. Dr. Moniz has set up the line of responsibilities through EM, OST, the technology developers, as well as the users. I think there has not necessarily been ownership in pushing out those technologies and ensuring that they are deployed.

Mr. STUPAK. Okay. And who is responsibility is it to decide on the technology then?

Ms. JONES. It is the user responsibility to decide on the technology; the one that will be cleaning up.

Mr. STUPAK. Okay. Is that the contractor?

Ms. JONES. Usually, it is the contractor decision, yes.

Mr. STUPAK. And what oversight, then, do you have over that contractor to make sure they are doing it on the timeline and doing what they project are going to do or what they bargained to do, if you will?

Ms. JONES. That is actually DOE's responsibility, the site manager's responsibility, but is also dependent on the contract. If a particular cleanup is being done under a fixed price contract, for example, really, the Department has no say in the technology; it is going

to be totally the decision of the contractor, because they are taking all of the risks.

Mr. STUPAK. But it is the Department's responsibility to ride herdsman on the line.

Ms. JONES. Absolutely; yes, sir.

Mr. STUPAK. Mr. Moniz, you state in your testimony that the Environmental Management Advisory Board concluded that OST's prioritization system was a "transparent, robust, quantitative prioritization system that is rooted in technology-needs data supplied by project cleanup managers." Actually, the EMAB, after a 1-day review, said the following, "It was an effective, defensible, and democratic system" that should be continued. EMAB also stated that its value would need to be documented and warned DOE against sliding again into subjective decisionmaking. It would have been helpful to have EMAB here again. They had particularly valuable testimony in our 1997 hearing. My question, Mr. Moniz, there is no way EMAB could bless your system when it hasn't even been implemented, correct?

Mr. MONIZ. I spoke with Mr. Berkey about 2 weeks ago, and, correct, the system is not fully implemented. But we have implemented a very large number of the tools that we are talking about.

Mr. STUPAK. How much has been implemented?

Mr. MONIZ. Well, I can't make a quantitative statement, but, certainly, the strategic planning part, for example, the road maps, which are very important, have been implemented. The Technology Deployment Initiative, which is focusing on getting the better data, better analysis, is being implemented. The focus area groups are there that work with the site managers. I will let, also, Jim and Gerald add to that—but I think the areas where we need to get more done, certainly, are going through the performance measures to more specific metric development and looking at the contract incentive alignment. Those are two very important parts that we still need to fully implement.

Do you want to add something to that, Gerald?

Mr. BOYD. The prioritization system that you addressed is a five-factor system, and we did use it to put our fiscal year 2000 budget together. It was the first time it had ever been used, and we have used it again inside of the Department to do the 2001 budget formulation. So, we have used it, and the review was to look at how well it worked for putting the fiscal year 2000 budget together. The advisory board said it was their view that it was a defensible system. I think their comment was "Unless you continue to use something like that, you will fall back into a subjective process."

Mr. STUPAK. Yes, but didn't they say you have to use it, implement it on your cleanups?

Mr. BOYD. This particular attribute analysis, these five factors, are based upon deciding which technology projects you work on. It is not designed to prioritize cleanup sites, but it is designed to get the needs of cleanup sites into the technology prioritization system. So, it is only aimed at the Science and Technology Program.

Mr. STUPAK. But is that actually going to be carried out?

Mr. BOYD. Yes, sir. Our budget on the hill for 2000, which is being marked up right now——

Mr. STUPAK. But it hasn't really been carried out yet? It hasn't been fully run through the system yet?

Mr. BOYD. We built the budget for 2000 with it. We will implement that starting in October of this year, and we do plan to carry it out as we ask Congress for the funding.

Mr. STUPAK. We just want to make sure we don't go back to the subjective decisionmaking that has been evident in the past.

Mr. BOYD. Right. We have no intentions of doing that.

Mr. STUPAK. Thank you, Mr. Chairman.

Mr. UPTON. Thank you. Mr. Burr?

Mr. BURR. Mr. Boyd, are you familiar with Bio-Imaging Resources, Inc.?

Mr. BOYD. Yes, sir; I am.

Mr. BURR. A CAT scan technology to see inside of a drum of unknown substance? We have spent $14 million over the last 10 years to develop a waste inspection tomography process here. Why has that not been used?

Mr. BOYD. Well, it has been used, but on a very limited basis. Dr. Moniz asked me questions about this particular issue earlier today, and we are doing a review to try to determine why that particular technology is not being used at DOE's sites versus other competitive technologies of the same type. The response we get from the site——

Mr. BURR. Of the same type, you are talking about a standard x-ray versus a imaging Cat——

Mr. BOYD. Within the category of neutron-induced types of assay systems, there are several different ones that are available. They operate a little differently, and we have quizzed several sites where this has been an issue, and the response was that there was an open competition for this technology and that the ones that won, won on a fair and open basis. That is what we are looking into right now to see if we can really determine that that is the case but that is the response that we got when we queried the sites where this particular company and their technology were not successful at getting DOE work versus other companies.

Mr. BURR. Is there a reason to believe that with this technology we were able to process more drums without opening them or to process more drums more efficiently and faster; consequently, we saved more time and money on the site?

Mr. BOYD. There is no question that this technology allows you to assay drums without opening them, and it certainly saves you a lot of time. It certainly reduces risk to the workers who are doing the work. There is no question about that. There are other technologies that are comparable, though, that are being used instead of this one in at least a couple of cases where——

Mr. BURR. Comparable from a standpoint of?

Mr. BOYD. Non-intrusive; you don't have to open the drums.

Mr. BURR. How about comparable from the standpoint of the speed with which contractors go through it?

Mr. BOYD. Mr. Burr, I don't really know. That is something we have to look at. I am not certain if the contractors that won the bids can do the work as fast as BIR or not. I would have to look at that.

Mr. BURR. Isn't that an important part of the bid process? Understand, I am not a scientist; I am not even a lawyer, so that really puts my credentials down as it relates to a Member of Congress, but one can look at the way that we pay for cleanup, which in most cases is cost based plus. Therefore, the longer you are there, the more revenues you have. In fact, this is one particular area where when you perform your job you become unemployed on that site, right? There is not a tremendous incentive to find a faster way to do it, and there may be incentives for employees to find safer ways to do it, and what we are trying to determine is—we talked about the correct incentives; I think Mr. Moniz mentioned that—was there an incentive on this technology that we spent $14 million to help develop?

Mr. OWENDOFF. Congressman Burr, the direction that I give to the site managers is the criteria should be laid out, certainly when they have a competitive bid; worker protection; what is the economics of the throughput? how much can you process through, and what are the dollars? I don't know the history of this particular action, and I need to get back to you, but in a competitive sense, we try to ensure that we don't skew the evaluation so that it is only on one factor. For instance, how big the machine is shouldn't be a factor. So, I need, in this case, to look back and find out specifically. I trust that the site managers, in working with the contractors, did set it up appropriately, and we just need to evaluate it and get back to you on why they did not succeed.

[The information referred to follows:]

The WIT system, developed by Bio-Imaging Research, Inc. (BIR, Inc), uses high-energy computed tomography, emission tomography and emission spectroscopy for non-destructive assay of waste drums. Environmental Management's Office of Science and Technology (OST) has provided $9.8 million for the development of this technology, including successful testing on both surrogate and real waste, primarily to enable DOE sites to meet the characterization requirement for shipment of waste to the Waste Isolation Pilot Plant (WIPP).

The WIT system is now commercially available. BIR Inc. has recently formed a new division, the Waste Inspection Technology Company (WITCO) specifically to provide WIT services to DOE customers and is actively pursuing jobs. WITCO partnered with a team of mobile characterization service providers to supply DOE sites with all the required technologies to certify transuranic (TRU) waste for WIPP disposal, including WIT. The mobile vendors are certified by Carlsbad Area Office (CAO) to perform waste characterization of TRU wastes.

Because the market for WIT is characterization of waste for shipment to WIPP, the facility's delayed opening and limits on waste acceptance pending NM's issuance of a RCRA permit have also lessened the urgency for the technology. The other major marketing factor for WIT is competition from other technologies currently available at DOE sites and other companies.

In 1998, two contractor teams were awarded identical phased Task Order contracts for characterization services: TRUtech and Mobile Characterization Services (MCS). WITCO was part of the TRUtech team. In November 1998, both teams completed their commitments under the Base Period (Task Order No. 1) of the contract by providing characterization of 187 drums. The teams were evaluated against the Statement of Work requirements for acceptability and adequacy of submitted documentation. The TRUtech team, as a whole, scored six unacceptable performance ratings on the primary process sub-criteria versus the MCS team which, as a whole, scored only one unacceptable performance rating. The evaluation indicated that MCS was superior to the TRUtech in most areas. Deficiencies identified during the DOE/CAO audit indicated that TRUtech would not be able to demonstrate performance within a reasonable period to meet obligations for program requirements and other contract commitments. Therefore all of the additional characterization services (Task Order No.2) were awarded to MCS.

Mr. BURR. I look forward to that.

Mr. UPTON. Mr. Klink.

Mr. KLINK. Thank you. Ms. Jones, I just wanted to pick on one answer that you gave a few moments ago. You talked about the choices of technology really belongs to the contractor when they have a fixed price contract. Yet we had a hearing about a year ago involving Pit-9 and Idaho—I don't want to revisit that whole issue, because we don't have the parties here—but, clearly, there was a huge disagreement between the Department of Energy and between the private contractor as to whether or not—who was at fault for the fact that all this money had been paid out and that literally nothing, not one scrap of material, had been cleaned up. Where do we stand there? I mean, whose responsibility—and I hope that we are still working to resolve that, and, again, I don't want to revisit that whole issue—but, clearly, there are times when the contractor comes back and says, "Yes, we do have a clear-cut, fixed price contract," but they are blaming DOE when they may have been the ones that chose the technology. What are the lines of delineation there?

Ms. JONES. One comment I would make is that it is also DOE's responsibility to ensure that the technology that the contractor is putting forward as being ready is, in fact, ready to go and can work on the waste. I think what they found subsequently is that the technology that was proposed was really not robust enough to handle the waste in the Pit-9. So, there is responsibility on both sides, even with a fixed price contract.

Mr. KLINK. After reading through both the 1998 GAO report, your testimony and that of other witnesses, it appears there is a critical issue I think we need to address today. And it seems to be the failure of the Department to work with end users in the clean-up process so that the technologies developed can be used.

Ms. JONES. That is correct.

Mr. KLINK. Is that how you see it? Do you agree with that?

Ms. JONES. That is what we said in our 1998 report; that is correct.

Mr. KLINK. When I read your testimony today, your report and your testimony about the involvement or the lack of involvement of the end users in the technology development and the deployment process and then I read Mr. Moniz' testimony and hear what he has to say today, they don't seem to be coming to the same conclusion or, in fact, even talking about the same program. You seem to be saying the end users still are not part of the process; that, in fact, the technologies are still being developed with no end user in sight, and Mr. Moniz is saying, in short, that everything seems to be good; we are making great progress, and the world looks fine. Can you explain to me your perception as to why the message that I am getting from you is different from the message I am getting from Mr. Moniz?

Ms. JONES. Mr. Klink, I think that DOE has made some strides in terms of getting the end users more involved; in particular, in the planning process, in the upfront budgeting process that Dr. Moniz was talking about earlier. They have gotten the end users involved in this kind of transparent prioritization system, and they have been working on that; also, in terms of their program plans.

I think where they still need to some more work is in terms of trying to proactively market technologies that have already been developed and also in terms of using the Gate System to ensure that, as the technology is being developed, that the different requirements in terms of user commitment—particularly at the demonstration phase where they are asking the user to put up some money to help fund the demonstration—is actually happening. So, that when you get to the end, you will have somebody that can deploy that technology if it meets their performance specs.

Mr. KLINK. Are you satisfied that it appears that DOE is, in fact, going to be using that Gate System?

Ms. JONES. No, sir.

Mr. KLINK. So, where are we going?

Ms. JONES. Again, we still recommend that they continue to use the Gate System, because I think that is the most definitive way of ensuring that the user is involved and that the correct go/no go decisions are made at the appropriate stages.

Mr. KLINK. Dr. Moniz, response?

Mr. MONIZ. I fundamentally agree with what Ms. Jones has said. We have been making progress, as I said earlier. For example, establishing the focus area user steering committees for planning, budgeting, and tying technologies to the site needs. I agree that we need to do more in terms of the communication aspect in terms of making sure everyone knows what technologies are there, and, as I described earlier, we feel that we are implementing core elements of the Gate System. But as I committed earlier and, I will repeat: we will get together with GAO and with committee staff to evaluate exactly what we are doing, rack it up against the formal Gate System, and come back to you with either we are implementing it effectively, or if we are not, we will change it.

Mr. KLINK. Ms. Jones, Dr. Moniz testimony stated that the Department had a new process called a Needs Validation to assure that science and technology are driven by cleanup project managers. Let me ask your opinion on that. How does the Needs Validation work and how does this relate to the Gate System?

Ms. JONES. There are so many different processes, Mr. Klink. To be quite honest with you, I am not quite sure which piece the needs assessment is. Maybe if Dr. Moniz could talk about that, I would be able to comment on it.

Mr. BOYD. As part of the 10-year planning process, the Paths to Closure document that we referred to earlier, there is a new electronic data base that has been put in place by the Department to make sure that we can determine what the baselines are at the project level and build the budget each year and the program each year on the basis of that project. What we have been able to do in the Office of Science and Technology is to feed into that system science and technology needs that have been identified by the sites along with recommended solutions. The project manager, then, while in that data base building or formulating the program for the next year, is able to look at what our recommendations are and validate whether or not they believe that technological solution is the right solution and select from a whole array of things that could be solutions what they would like for us to implement. So,

that is one way that we are trying to get very closely connected with them.

The Gate System clearly needs to be revisited and to bring them in to the review of the technologies after the projects have been started so that we can continue to validate that that technology is still a good technology, it is meeting the mark, and that it is something that they still want to use.

Mr. KLINK. Ms. Jones, If I could just—I think you put your finger on it, with your response to my last question to you, the exact problem we have here, and from my perspective, as a layman, hearing Mr. Boyd's answer just now, it seems very clear to me, unless I am missing something, that DOE is putting too much effort in changing all of these systems rather than solving problems. Go with whatever your system is. If it is the Gate System, go with it, and then let us solve the problems of all this cleanup or let us solve the problem of having an end user for all this technology that is going to solve our problems. Instead, we seem to have a variation of all these different processes in place. I would just ask, with the chairman's blessing, Ms. Jones, to comment on what Mr. Boyd just said.

Ms. JONES. We have just one other comment on the system that Mr. Boyd was talking about. The kind of exchange being done in terms of using these computer systems is one way in terms of linking the user and the technology developer, but we think even more importantly the focus area experts need to go out and talk and with the project managers. That is not happening in all of the focus areas. There is only so much that you can do looking at data on a computer. We understand that, for example, the tanks focus area does a very, very good job in that area and the subsurface contaminants focus area is doing a much better job, but the other focus areas need to get out and talk and make these contacts so that it is just not all done through this computer analysis.

Mr. UPTON. Thank you. Mr. Bilbray.

Mr. BILBRAY. Thank you. Mr. Chairman, I am sorry, I want to shift the focus from the micro to the macro, and, Ms. Jones, bigger than the specific implementation technologies or whatever, I would like to ask a question about—and I leave this open to the rest of panel—the determination of the technologies that will be directed toward the contracts, the assumptions that we make. And a good example—let me just throw it out—is the assumption that incineration was going to be totally abandoned in the mid-eighties, late eighties, and that incineration, the entire concept of the emissions problems, the dioxins problems, and everything else focused toward the Federal Government looking at non-incineration options. The transformation issue, that somehow there was major environmental reasons to avoid transformation using incineration and go to other technologies, was based on certain assumptions by—dioxin was one of them—and the issue that there were cleaner, better ways of handling the situation.

What I am wondering about, as somebody with a background in air pollution, is that I think the dioxin issue was totally reversed, if not backed off by 10 points, and the issue of the non-point source emissions caused by transporting the use of diesel engines and everything else has gone up by megatimes than what we thought. My

question is does anybody in the GAO or in the Department of Energy go back and check the assumptions of what technology should be followed or are we just, sort of, once we set the course, we move forward?

And in layman's terms, the fact is there were assumptions in the eighties about transformation and incineration that were dead wrong. If you could consider the fact that rather than incinerate it onsite and maybe reducing dioxins, which are one-tenth the emissions we thought, we are now trucking waste all over hell and creation emitting diesel fumes which are probably 100 times more toxic than we thought. Has anybody gone back to basic assumptions and said, "We need to review these periodically; see if present good science supports our assumptions and our contracts" before we get to the fact of lighting the contract?

Ms. JONES. Mr. Bilbray, I am going to defer to Dr. Moniz for that.

Mr. OWENDOFF. Congressman Bilbray, I think what you have hit on is that we talk about end users as if it is some name and there are no faces that go with it. The role and responsibility, certainly, for environmental management overall rests with me. The site managers' responsibility is two-fold: one, what kind of cleanup problem sets do I have? And what is my current technology or technical approach to that? And what are some opportunities that if I had some innovations could I improve that? So, the good news is that the site managers own the problem set, and they also sit with their other managers in deciding how the money should be spent.

Now, a good example on what you brought up is at the TRU Waste Treatment Facility at Idaho, Idaho National Engineering and Environmental Lab. What we put out was a competitive contract, and we said there is a level of expectation that you are not going to pollute the air or you are not going to pollute the ground or water or whatever. But, assuming that, here is what we want the material to look like when you are finished treating that TRU waste. We are not going to decide whether or not it should be vitrification, put into glass, some of it incinerated, or microencapsulate some of it. In fact, what the contractors come back with is a suite of those technologies and to say "This is how I plan to use them, and this is, when I look at the waste, how I plan to use those."

What we have seen is, as far as incineration as a general concept, that when we are looking at the actual cleanup approach, we don't foreclose on any particular technology. Because, in essence, we say, "Okay, what is available today," and we try very hard not to prejudice ourselves with something where there is an old wives tale that says, "Oh, you should not use this or that."

Mr. BILBRAY. Mr. Chairman, I ask for unanimous consent for 1 more minute.

Mr. UPTON. I am sorry?

Mr. BILBRAY. I ask for unanimous consent for 1 more minute to follow up.

Mr. UPTON. Go ahead.

Mr. BILBRAY. And I appreciate that. My biggest concern is where we saw situations like working on the air base in Los Angeles that we couldn't allow them to burn or to even bury their trash in the L.A. air base to be able to fulfill the standards, but if we went to

transport, we found that the no project option ended up in real world emissions as more than any onsite technology. The trouble is, I am wondering, is anybody looking at the big picture of not just how do you handle the waste here, but if you don't handle it this way, what is the related emissions, the non-point source emissions, and is anybody looking at the big picture world, the real world impact of these technologies?

Mr. OWENDOFF. In fact, Congressman, we are. That is, in fact, what the life-cycle approach is, because what folks say is, "Wait a minute, just because you are transferring from here to here, you are not giving a life-cycle cost if you, one, get it over there, and then what happens when it is in another location?" So, indeed, we are looking at those.

Mr. BILBRAY. And I appreciate that, because I see the stationary source being disproportionately having to carry the weight and the transport problem, basically, not being integrated into our decision-making, and we have identified that is our big problem right now. Thank you very much.

Mr. MONIZ. If I may, I just have one comment; I will make it very brief. Your macro question is very interesting and an even more macro response is that the issue of aligning policies with environmental policies, with regulatory policies, with tax policies is something that goes across the entire Government and is certainly a major challenge to bring this together. We are trying to do that in the Department through our portfolio development, and, at some time, I would be happy to discuss this with you or other members any time.

Mr. UPTON. Thank you. Ms. DeGette.

Ms. DEGETTE. Thank you, Mr. Chairman.

Ms. Jones, can you please describe what the Technology Acceleration Committee was?

Ms. JONES. The Technology Acceleration Committee, if I remember correctly, was the head of Environmental Management along with the deputy assistant secretaries and site managers that worked to together on technology development issues.

Ms. DEGETTE. Does that still meet, and, if you know—I have heard it doesn't—and if it doesn't, why not?

Ms. JONES. My understanding is that was a committee that was formed under Mr. Alm, and since his departure from the Department, that committee no longer exists.

Ms. DEGETTE. In your analysis, don't you find that to be a way of both delaying and reducing headquarters' attention to the technology deployment issues?

Ms. JONES. We felt that that committee, if it had gone forward the way it was projected to go forward and the way it had been set up, could have helped with bringing some of the more policy-focused issues to the attention of headquarters management, yes.

Ms. DEGETTE. Was it successful in doing that in just the small time it——

Ms. JONES. There wasn't a lot of time to make that determination.

Ms. DEGETTE. I see, okay. I am wondering if some of the rest of you can comment on your perspective on that committee, perhaps?

Mr. MONIZ. Jim, you would be the best one.

Mr. OWENDOFF. Sure. That committee, consisted of, as was mentioned, myself, the DASs, and the site managers. We get together multiple times throughout the year and talk about a lot of things with that corporate group. Certainly, one of the things that we do talk about is the Science and Technology budget; what is appropriate and where are we spending the money. One of the things that I especially am pushing the site managers on regarding the accelerated deployment technologies is how do we get more technologies in place? And, in fact, that is why we have the commitments between them and myself on how many technologies they are you going to deploy? We are trying to not have a committee here, a committee here. My corporate folks, field managers, and I talk about a lot of issues, one of which is accelerating deployments. And we are talking about what type of incentives do they put in their contracts to accelerate it? Because we don't have a formal name for it anymore, maybe that is a shortcoming. I just try to get the work done and not put a label to it.

Ms. DEGETTE. Well, I assume you have some other committees in DOE.

Mr. OWENDOFF. Not within Environmental Management.

Ms. DEGETTE. You don't have any committees?

Mr. OWENDOFF. Not with the field managers. I mean, within the Department of Energy, yes, and Gerald has some within Science and Technology where he is working with focus areas, but we are talking about my senior managers, who are the site managers, my deputy assistant secretaries, and myself. Every time we get together now, we do not have to have a separate name for that meeting.

Ms. DEGETTE. Well, but the Technology Acceleration Committee kind of worked across disciplines, which is why it was effective, and what you are saying is—well, it could have been effective—what you are saying is, you are just doing that without any formal name.

Mr. OWENDOFF. It is those people—the site managers; they represent across.

Ms. DEGETTE. Well, but just what you are saying is, you are doing that without any——

Mr. OWENDOFF. Yes.

Ms. DEGETTE. Okay. Ms. Jones, you wanted to comment on that?

Ms. JONES. Yes. In preparing for this hearing, we asked the Department what had happened to that committee and if anything had replaced it, and what we were told was basically they had formed integration committees. There is an executive—I don't remember all the titles—but there is one executive committee that is Mr. Owendoff and, I believe, five site managers, but it does not include the head of OST; it does not include the other deputy secretaries, and there is another committee below that but, again, focusing on integration that are the deputy assistant secretaries and some contractor folks and other people from the site.

Deployment is one issue that these integration committees focus on, but in our review of the minutes of their meetings, we didn't see a lot of discussion of deployment issues. It seemed to be focusing on other kinds of issues.

Ms. DEGETTE. Thank you.

Mr. UPTON. Mr. Burr?

Mr. BURR. Mr. Chairman, I would only take this opportunity to make a recommendation to the Chair as well as to the minority that, with the help of the Department of Energy, that we either have a hearing or an opportunity to formally meet with at least the five site managers who head up those sites that comprise 80 percent of our cleanup funds, and I hope that the Chair would pursue that as actively as he could.

Mr. UPTON. I think that is a very good idea, and I would be glad to pursue it, and we will make sure that it gets on the schedule.

Mr. MONIZ. We could be so responsive since they are actually here today.

Mr. UPTON. Are they all here today?

Mr. MONIZ. I believe they are all here.

Mr. OWENDOFF. I have been meeting with them yesterday and on the 2001 budget.

Mr. BURR. They are not physically in the room then?

Mr. OWENDOFF. No.

Mr. UPTON. Well, I think we will look forward—maybe we will work a date to make them all part of this.

Mr. BURR. I would also make a recommendation, Mr. Chairman, that with, again, the help of the Department of Energy, that we try to review the contracts on those five sites so that we know, really, the interconnection of the contracts the use of technology and the progress on cleanup.

Mr. MONIZ. Congressman, we would be happy to bring up, particularly, Walter Howes, who heads the Contract Reform Privatization Office, and he can describe his ideas and our efforts in terms of alignment in contracts.

Mr. BURR. Very good; thank you.

Mr. UPTON. Panel, I want to thank you. I was not on this subcommittee 2 years ago when your predecessors were here. I look forward to continuing this oversight, and you are now formally excused. Thank you.

Panel three includes Mr. John Schofield, president and CEO of Thermatrix, Inc.; Mr. Dick Bernardi, general manager of Bio-Imaging Research; Dr. Payasada Kotrappa, president of Rad Elec, Inc., and Mr. Terry Rogers, president of Delphi Research, Inc., New Mexico.

Thank you for your patience. As you heard me explain to our first panel, we have a long history of taking your testimony under oath. Do you have any objection to that? House rules also allow you to have a counsel in place if you would like. Is there some need for that?

If not, if you would rise, and raise your right hand.

[Witnesses sworn.]

Thank you. You are now under oath, and as was indicated, your entire statement will be made part of the record. If you would like to summarize it or keep your comments to 5 minutes or less, it would be appreciated. And, Mr. Rogers, we will start with you. Thank you.

TESTIMONY OF TERRY W. ROGERS, PRESIDENT, DELPHI RESEARCH, INCORPORATED; PAYASADA KOTRAPPA, PRESIDENT, RAD ELEC, INCORPORATED; RICHARD T. BERNARDI, GENERAL MANAGER, BIO-IMAGING, INCORPORATED; AND JOHN T. SCHOFIELD, PRESIDENT AND CEO OF THERMATRIX, INCORPORATED

Mr. ROGERS. Very good. Mr. Chairman, committee members, Delphi Research has been involved in development and demonstration of its alternative waste treatment technology, DETOX, in the U.S. Department of Energy's Office of Science and Technology sponsored programs since 1991.

Mr. UPTON. If you could just move the mike a little closer, that would be——

Mr. ROGERS. Sure.

Mr. UPTON. Thank you.

Mr. ROGERS. Some $12 million in total investment has been expended on Delphi's process by three different DOE facilities. During the course of our $10 million development program with DOE FETC, we have prepared 13 proposals and have been the subject of 14 reviews and evaluations. Yet we have not completed demonstration objectives which are a prerequisite to deployment.

Demonstrating waste treatment technologies on a DOE operations site poses formidable obstacles and complexities for the technology developer that requires intercession by DOE EM-50 sponsor and the DOE EM management. Without advocacy and support by these organizations, the developer is left to deal with regulators, subcontractors, M&O contractors, and DOE field offices on their own, making progress on actual demonstration work incredibly difficult, if not impossible.

Our experiences at the Savannah River site have identified three contributing factors to delays and cost growth. First, is the poor demonstrationsite support that is provided by EM-50; second, is critical decisionmaking process by DOE, which was slow and costly, and, third, the strategic project decisions were predicated on inconsistent marketing information.

Based upon our experience in the EM-50 Program, we present the following five recommendations for the subcommittee's consideration on how EM-50 programs might be improved. First, the DOE office administering the project should be an advocate for the technology, not a bystander or an adversary. Advocacy can be obtained by, first, taking a proactive, solution-oriented role in helping the technology developer resolve issues and obstacles encountered in the process of demonstration, and, second, being directly involved in the negotiations with potential DOE users, not only as stakeholders in the demonstration but as long-term customers.

The second recommendation is that M&O organizations who sign on as partners or stakeholders in a demonstration project should be held accountable by DOE EM to uphold their agreements with the technology developers who are attempting to demonstrate or deploy new technologies at DOE installations. Relegation of the technology developer to subcontractor status by an M&O contractor does not constitute a partnership or stakeholder relationship.

The third recommendation is that market data on DOE waste types is the basis for technology development needs; therefore, the

data must be reliable. DOE should utilize the expertise of its resources from all the major sites, thus assuring that decisions on funding and surviving projects will be in the best interest of the complex rather than meeting the needs of a particular site's agenda.

The fourth recommendation is that no demonstration of a technology should be permitted to proceed at a DOE site which does not have a vested interest in its success. That is to say that economic development and commercial application are not adequate incentives to ensure the demonstration partner will assist in meeting demonstration goals.

And the last recommendation is that M&O contractors who are involved in the development of competing technologies and who declare or practice that they have no intent to deploy outside technologies should not be considered as demonstration partners by EM-50.

Neither large allocation of Government funds nor the best laid plan for demonstration and deployment can be successful when there is no single advocate within the EM management to champion a project through the labyrinth of DOE directives and organizations. Under the present project management structure and using the existing programmatic requirements, the DETOX demonstration could be funded for twice the amount of money, and I believe that the problems and issues would rise to the level of funding so as to prevent success. Only when the EM-50 Demonstration and Deployment Program incorporates a responsive and well defined decisionmaking and site selection process and an advocacy program offering guidance, assistance, and support for technology developers, will the development and commercialization of good, innovative technologies be maximized.

Thank you.

[The prepared statement of Terry W. Rogers follows:]

PREPARED STATEMENT OF TERRY W. ROGERS, DELPHI RESEARCH, INC.

Dear Mr. Chairman and Committee Members, Delphi Research, Inc. has been involved in the development and demonstration of a waste treatment technology in the U.S. Department of Energy's Office of Science and Technology sponsored programs since 1991. Some $12 million total investment has been expended on Delphi's DETOXSM technology by three different DOE facilities. During the course of our $10 Million development program with DOE-FETC, we have prepared thirteen (13) proposals, and have been the subject of fourteen (14) Reviews and Evaluations.

Demonstrating waste treatment technologies on a DOE operations site poses formidable obstacles and complexities to the technology developer that requires intercession by the DOE-EM50 sponsor and DOE-EM management. Without advocacy and support by these organizations, the developer is left to deal with regulators, subcontractors, M&O contractors, and DOE field offices on their own, making progress on actual demonstration work incredibly difficult, if not impossible.

Our experiences at the Savannah River Site have identified three contributing factors to delays and cost growth (1.) Poor demonstration site support was provided by EM-50, (2.) Critical decision making process by DOE was slow and costly, and (3.) Strategic project decisions were predicated on inconsistent marketing information.

Based upon our experience in the EM-50 program, we present the following recommendations for the Subcommittee's consideration on how EM-50 programs might be improved:

1. The DOE office administering the project should be an advocate for the technology, not a by-stander or an adversary. Advocacy can be attained by
   a) taking a proactive, solution-oriented role in helping the technology developer resolve issues and obstacles encountered in the process of demonstration, and

b) being directly involved in the negotiations with potential DOE users not only as stakeholders in the demonstration, but as long-term customers.

2. M&O organizations who sign on as partners or stakeholders in a demonstration project should be held accountable by DOE-EM to uphold their agreements with the technology developers who are attempting to demonstrate or deploy new technologies at DOE installations. Relegation of the technology developer to subcontractor status by an M&O contractor does *not* constitute a "partnership" or "stakeholder" relationship.
3. Market data on DOE waste types is the basis for technology development needs. Therefore, the data must be reliable. DOE should utilize the expertise of it's resources from all of the major sites; thus, assuring that decisions on funding and surviving projects will be in the best interest of the complex, rather than meeting the needs of a particular site's agenda.
4. No demonstration of a technology should be permitted to proceed at a DOE site which does not have a vested interest in its success, i.e., economic development and commercial application are not adequate incentives to ensure that a demonstration partner will assist in meeting demonstration goals.
5. M&O contractors, who are involved in the development of competing technologies and who have declared, or practice that they have no intent to deploy "outside" technologies, should not be considered as demonstration partners by EM-50.

Neither large allocations of government funds, nor the best laid plan for demonstration and deployment can be successful when there is no single advocate within EM management to champion a project through the labyrinth of DOE directives and organizations. Under the present project management structure, and using the existing programmatic requirements, the DETOX℠ demonstration could be funded for twice the amount of money, and I believe that the problems and issues would rise to the level of funding, so as to prevent success. Only when the EM-50 demonstration and deployment program incorporates a responsive and well-defined decision-making and site selection process, and an advocacy program offering guidance, assistance and support for technology developers, will the development and commercialization of good, innovative technologies be maximized.

Mr. UPTON. Thank you. Dr. Kotrappa. Am I pronouncing your name correctly?

TESTIMONY OF PAYASADA KOTRAPPA

Mr. KOTRAPPA. Correct. Mr. Chairman, thank you for this opportunity to testify today on the subject matter of great interest. We hope that this testimony will be useful as an example of the long and difficult path to get to any commercial business from the Department of Energy, however promising the technology may be.

We are a small business with a unique radiation emission technology called Electrodyne Chambers, and these have been successfully used for measuring radon; in fact, nearly 20 percent of the market share we have for radon. And how we got into the Department of Energy business was interesting. We were in the process of diversifying in order to go ahead and see other applications, and that is where, in 1994 or 1995, Oak Ridge National Laboratory identified the potential application of Rad Elec technology for use in measuring the low levels of uranium, plutonium, and alpha-emitting contamination in surfaces and in soil, and the technology was projected to provide better, cheaper, and faster method with a large commercial potential applicable to more waste sites. Nearly 80 to 90 percent of all the sites have this problem of uranium and plutonium. Our technology is not cleanup; it is a characterization technology, which is important, as characterization has to be done first during the processing, decontamination and also after cleanup.

This cooperative development agreement was signed between Oak Ridge National Lab and Rad Elec, and then it was—turned out to be a very successful product and with the testing and demonstration, and the ready was product in 1996. And the technology

was jointly—and then, later on, that was the time when we found the separate division and started allocating some of our money to see how we can commercialize this product and how we spread the good news about this technology. And that is where we are now successful in putting this technology in the Marsin document and GETE/Dawnbreaker Program help does a lot in making a business plan and really projecting what is the market share and all that.

In November 1997, we made a presentation to a small number of staff at Rocky Flats which we think is the highest potential for application for technology. There are hundreds of buildings which can make use of this technology adequately. And then after a full presentation, and, in fact, the staff members got so excited and they say they can immediately start using this technology throughout all buildings and equipment; immediate application is there. And we followed up within a month. We sent the whole set of instrumentation for them to proceed and start using it and see if any problems are there. And, then, from that time on, which now is about 16 or 18 months now, we heard very little except when anybody would inquire about it, we hear that, "Oh, everything is okay." And though the tests have been done and has been demonstrated by a competent lab, by Oak Ridge National Lab, still it was on at about 18 months, I don't know how long we can survive.

And, then, we furthered—we did not keep quite—the further commercialization process, we went ahead, and then did our own limited demonstration project at Oak Ridge National Lab in the high visibility area in K-25, and that report has come, and there are two original publications have come and one in a health physics journal and the other in DOE policy institute journal. So, we have done everything that we can to give wide publicity and recognition; everything we have done, and still we are waiting and waiting.

I can summarize, possibly, three reasons why we had to wait this long, and one is of course not developed in-house is one of the catch words, and then one technology developed and protected by one side is simply—does not pass on the other side; that is because of mistrust or I don't know what it is. And the second reason is the soft attitude why to try anything new, and I am doing my job with the existing technology and why take risk attitude. And this is the reason why these new technologies are really falling behind. And any new technology, there is some risk involved, and unless somebody takes a risk, there is no benefit. Everybody knows, unless you take a risk, there is no benefit. It always easy to play safe and forget and carry on with whatever we are doing. So, that is what is going on. The third reason would be that the decisionmaking staff does not have the incentive nor the authority to implement large schedules of new technologies.

Those are just my observations. I hope these points that I made will be of some use. Thank you.

[The prepared statement of Payasada Kotrappa follows:]

PREPARED STATEMENT OF PAYASADA KOTRAPPA, PRESIDENT, RAD ELEC, INC.

Mr. Chairman, Members of the Committee and Staff, on behalf of myself and other members of the staff of Rad Elec Inc., I thank you for the opportunity to testify today on the subject of the transfer of DOE-funded environmental cleanup technologies to DOE sites. We hope that this testimony will be useful as an example

of the process that many small businesses have experienced in the long and difficult path from concept to deployment.

SUMMARY

Rad Elec, Inc. (REI) is a small business, that manufacturers a unique class radiation measuring instruments called E-PERM®s (Electret-Passive Environmental Radiation Monitor). Rad Elec.'s first product was an E-PERM® radon monitor. This was commercialized successfully and now commands nearly 20 % market share in USA and is being used in 20 other countries. In 1994-1995, Oak Ridge National Laboratory identified the potential application of this technology for use in measuring low levels of uranium, plutonium and other alpha emitting contamination on surfaces and in soils. A CRADA (Co-operative Research and Development Agreement) between Oak Ridge National Laboratory and Rad Elec Inc., developed and perfected the technology. During 1997-1999, further commercialization and demonstration efforts were put into place, through a partial funding by DOE (GETE/Dawnbreaker program). These efforts have resulted into many recognitions and publications in DOE and Scientific Journals. Limited demonstrations and application researches were carried out at Oak Ridge and at Rocky Flats. In spite of publications in DOE methods compendium and other publications, demonstrations and application researches, the use of this technology in DOE sites is painfully slow, putting Rad Elec into economic stress. There are hundreds of buildings at Rocky Flats and several large buildings at Oak Ridge and elsewhere, where this technology can be used beneficially. It should be recognized that new technologies provide an improved alternative to the base line technologies. These involve taking some well-informed risk that will eventually save money to DOE. There is no reason why such attitude should not be used by decision making staff at DOE, as done with private agencies. This will help innovators and for many DOE developed technologies to emerge as successful, eventually saving money to DOE.

RAD ELEC INC. COMPANY PROFILE

Rad Elec, Inc. (REI) is a small business. It has less than 10 employees and annual sales close to $1M. It is the sole manufacturer of a unique class radiation measuring instruments called E-PERM®s (Electret-Passive Environmental Radiation Monitor). Our first product was an E-PERM® radon monitor. The annual performance of these electret radon monitors in the EPA's Radon Proficiency Measurement Program over the last six years has shown that they consistently out-performed any other radon-monitoring devices, either passive or electronic. The technology is established the name as one of the most rugged and accurate radon detectors. These are being used in 35 States in USA and in 20 other countries. Twenty percent of all radon measurement done in USA uses Rad Elec Radon Monitors.

DIVERSIFICATION OF TECHNOLGY TO MEET DOE NEEDS

1994-1995

In 1994-1995, Oak Ridge National Laboratory identified the potential application of this technology for use in measuring low levels of uranium, plutonium and other alpha emitting contamination on surfaces and in soils. A CRADA (Co-operative Research and Development Agreement) between Oak Ridge National Laboratory and Rad Elec Inc., was approved and the work was carried out for a period of two years. DOE (Office of Science and Technology, OST) funded this research to a tune of about 1M and Rad Elec contributed similar funding mainly in kind by providing technology, consulting and instrumentation. This resulted into several publications including two major "DOE Methods Compendium Documents". These documents provide scientific basis, the protocols for routine use in D and D Characterization of DOE sites.

1997-1998

In 1997 three different paths were pursued in an effort enter the D and D market. First, EIC technology was included in the Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM) which was published in 1997. The MARSSIM not only provided the basis for the use of EIC by other U.S. Agencies including DOE but also provided the statistical basis for large-scale site surveys. During the year REI also participated in the DOE-funded Dawnbreaker/GETE program. This effort produced a comprehensive business plan for commercializing the technology and produced a business plan that had not previously existed. At its conclusion, REI had an opportunity to make a carefully prepared presentation of our company and its products to a number of key participants in the D & D community. The exposure was important and the follow up was intensive but our progress was slow. Finally,

in November REI was asked to make a detailed presentation on EIC technology to a small group of staff members at Rocky Flats. The presentation was well received and in December a full set of EIC instruments and monitors was loaned to Rocky Flats for test and evaluation.

DEMONSTRATION AT OAK RIDGE (1998-1999) AND APPLICATION RESEARCH AT ROCKY FLATS

REI began working closely with the OST-funded GETE program to develop a full-scale EIC deployment plan. During the year GETE staff in Oak Ridge, Rocky Flats and at the Savannah River Site also worked with REI staff as well as site management and staff to consider the deployment of alpha surface monitors. The preliminary results of the Rocky Flats laboratory tests of the alpha surface monitors were reported in the Denver meeting of Spectrum 98. The paper by Wilkes, et al entitled "Measurement on Low Level Plutonium Sources using Rad Elec Electret Ion Chambers" concluded that "... The performance demonstrated with this work indicates the system should receive serious consideration for approval as a tool to confirm that unrestricted use property release levels are met." At that time the Rocky Flats Instrument Review Committee requested that additional EIC tests should be made and, as of the present time, approval of EICs for use at the site is still pending.

With the active participation of Mr. S.A. Meacham, Strategic Analytical Management Services. LLC, the first large scale field demonstration of the E-PERM(alpha monitoring system was completed with REI funding in Building 1401, East Tennessee Technology Park in November of 1998. A copy of the Executive Summary of the report describing this field test has been included in the material accompanying this testimony. The summary includes the statement that "... Large area surveys can be conducted with an initial capital cost of less that $14,000. Based on the use of 175 monitoring points, the demonstrated costs is less than $2.00 per measurement (consumables and labor) and can be conveniently performed overnight without impacting daily operations."

RECOGNITION OF THE TECHNOLGY (1998-1999) (ENCLOSURES)

The technology attracted the attention of DOE funded Waste Policy Institute and a feature article entitled "Rad Elec prepares to enter the DOE market place" was published in their official journal "Initiatives", a copy of this is enclosed.

Recently (May 1999), the technology attracted attention of the editors of Health Physics Journal, a premier radiation Journal devoted to radiation protection and published an article in their "Technology Monitor" column. Article concluded, "Contrary to its inherent simplicity, the EIC system should receive due consideration for alpha contamination surveys". Reprint of this article is enclosed.

Rad Elec's commercial brochure and a list of all the relevant publications on the technology are also enclosed.

COMMENTS, CONCLUSIONS AND RECOMMENDATIONS

1. In spite of the development and demonstration that the technology can perform the tasks (characterization surveys) better, cheaper and faster, it takes a painfully long period for taking a decision to use the technology at DOE sites. There are hundreds of buildings at Rocky Flats and several large buildings at Oak Ridge and elsewhere, where this technology can be used beneficially. Small businesses like Rad Elec that depend upon the sales to DOE market undergo economic stress during waiting period and may go out of business. In our efforts from 1995-1999, Rad Elec has only very minor sales to DOE less than $ 20,000 in 1998-1999 for small projects) and Rad Elec has yet to receive major sales. It is more than a year since we provided the instrumentation for test application and we do not understand why it should take this long for a proved technology to test use and recognize this as one of the method for their characterization projects. The reeducation of staff personnel, the local community as well as state and regulatory officials may be difficult. These issues and others clearly play an important part. If there is more that REI can do we will do it. However, it would seem that the critical information is available and that the deployment decision now rests with the M & I contractors and DOE site managers.

2. Such problems are faced by most DOE funded technologies.

3. It should be recognized that new technologies provide an improved alternative to the base line technologies. These involve taking some well-informed risk with the hope that there will be considerable saving on the long run. Innovative attitude involving the use of new innovation that has brought America to the forefront in the world. There is no reason why such attitude should not be used by decision making

staff at DOE. This will help innovators and for many DOE developed technologies to emerge as useful technologies saving money to DOE.

Mr. UPTON. Thank you very much. Mr. Bernardi.

TESTIMONY OF RICHARD T. BERNARDI

Mr. BERNARDI. Good morning, Mr. Chairman and subcommittee.

For the past 10 years, I have been the DOE program manager at Bio-Imaging Research, a small Illinois business located near Chicago. BIR has developed new technologies for inspection of nuclear waste drums using high energy x-ray and gamma-ray computed tomography, CT. CT produces three-dimensional views of what is inside a drum similar to medical CAT scanning. We built these technologies into a mobile trailer called Waste Inspection Tomography, or WIT for short.

The DOE investment in WIT, shared with BIR, has been about $15 million over 10 years. BIR and DOE's goal is to provide a CT service to DOE sites for the regulated inspection of nuclear waste drums. These drums are mostly destined for the Waste Isolation Pilot Plant, WIPP, in Carlsbad, New Mexico.

X-ray CT identifies drum content, such as clothing, items buried in cement, and prohibitive items, such as free liquids. Gamma-ray assay CT identifies what radioactive elements are in the drum and determines the amount of radioactivity. CT is not invasive, meaning the drums don't have to be opened. Opening a drum costs more and is risky due to needed radiation protection. WIPP can CT x-ray and assay all drums, including those that cannot be inspected by older technologies currently deployed by larger DOE sites. We see through an assay that denser waste materials, like sludge and cement, which make up over half the waste drum inventory destined for WIPP.

Between 1996 and 1998, WIT was successfully field tested at three DOE sites, including Livermore, Rocky Flats, and Idaho and participated in three DOE-sponsored blind test programs. WIT was the only system to pass on every drum tested. The test results and verification statement from DOE as well as Federal and State environmental regulators can be found on our BIR Website at www.bio-imaging.com. Last year, WIT successfully completed three quality assurance audits and inspected 187 drums at the Nevada test site; that is our one deployment.

The technology is ready and deployable today. Yet, today, WIT is not deployed at a DOE site. Why? I offer six reasons and solutions. First, WIPP has not yet fully opened. When it does, DOE site budgets will need to support drum inspections. Second, major DOE sites are currently deploying 30-year old x-ray and gamma-ray assay technologies that only work well on lightweight waste drums. Working side by side, WIT major sites can accurately meet State mandates to inspect all wastes—lightweight and dense—in a timely manner. Third, regulation language must support both the already deployable technologies and new technologies, like WIT. Fourth, though DOE has identified a 159,000 drum market from small DOE sites for WIT, this market does not yet exist. We need quantity contracts now to foster private capital investment to reduce inspection costs. Fifth, competition between industry cost-shared projects and similar 100 percent DOE-funded projects

should be minimized. And, finally, DOE should do more to carry through the path from development to deployment and cover the costs of small companies as it does with the M&Os.

All of these reasons for delayed WIT deployment have now placed a financial burden on BIR to maintain a deployment ready WIT capability that cannot be sustained by a small business, like BIR, without compensation from DOE or its M&O contractors.

In closing, the computed tomography revolutionized medical imaging in the 1970's by minimizing surgical intervention, resulting in improved health care. Computed tomography can, today, provide DOE with accurate nuclear waste drum examinations while minimizing costly drum openings for improved environmental cleanup. Please help to immediately deploy WIT within the DOE complex.

Thank you for the opportunity to speak to you this morning.

[The prepared statement of Richard T. Bernardi follows:]

PREPARED STATEMENT OF RICHARD T. BERNARDI, GENERAL MANAGER, WASTE INSPECTION TECHNOLOGY COMPANY

Introduction

My name is Dick Bernardi from Bio-Imaging Research (or BIR for short). I'm General Manager for BIR's Waste Inspection Technology Division. I've been with BIR since its founding 19 years ago. It's a small private business located 30 miles northwest of Chicago. BIR has been a DOE contractor since 1990 and I've been the DOE Program Manager since that time. I'd like to begin by thanking the House Subcommittee for the opportunity to present this testimony today. I am here to discuss BIR's continuing difficulties in deploying and commercializing services for the inspection of DOE nuclear waste drums.

Why New Technology is Needed

The technology and equipment that BIR provides to the U.S. DOE can uniquely contribute to a timely national environmental problem: the disposal of nuclear waste drums from our nation's nuclear weapons factories. There are over 600,000 waste drums (that are 55-gallon drum equivalent) at nearly 22 DOE sites across the U.S. that require characterization before they can be disposed of at the DOE Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. As you may already know, the WIPP site has just opened within the past month and has accepted about 100 of our nation's nuclear waste drums from DOE sites near Los Alamos and in Idaho. Originally, WIPP was scheduled to open in 1988. It has taken more than 10 years to achieve the first disposal of nuclear waste drums at WIPP. This is the big reason why deployment of our technology has been delayed.

The U.S. regulations for nuclear waste drum transportation, treatment, and disposal, require inspection. We must identify materials such as clothing, cement, items buried in cement, and prohibited items like free liquids. This takes nondestructive x-ray examination. In addition, nondestructive gamma-ray assay is required to identify the type and determine the amount of radioactivity in the drum. Nondestructive means examination without opening the drum, where the opening of a radioactive waste drum is more expensive and risky because of the needed radiation protection. BIR is the only company that examines nuclear waste drums using x-ray computed tomography, (or CT) which provides three-dimensional imaging inside a drum, just like medical "CAT" scanning. These CT drum inspection methods are located on BIR's mobile trailer called Waste Inspection Tomography (or WIT). WIT can cost-effectively inspect these drums with better operating performance than any other drum inspection method in use today. BIR's extension of medical CT technology to the inspection of waste drums was sponsored by the DOE.

CT revolutionized medical diagnostic imaging in the 1970s and '80s through cost-effective minimization of exploratory surgeries. Today, CT can provide DOE with safe and accurate nuclear waste drum inspection through cost-effective minimization of invasive and potentially hazardous "glove box" inspections of nuclear waste drums. However, WIT is currently not deployed and not being used by DOE. That is the situation I would like to rectify with the help of this House Subcommittee.

Since 1990, BIR has contributed over $2.5M of its own resources into the development of WIT, and DOE has supplied the remainder. BIR's investments included providing our detectors, software, and 2 MV (two million volt) x-ray CT technology, as

well as cost-sharing the DOE contracts. This represents a major investment from a company whose annual revenue has averaged $6.5M over the past eight years.

How the New Technology was Developed

BIR's first contract with the DOE for WIT came from a Small Business Innovative Research (SBIR) grant back in 1990. We showed how to apply 2MV x-ray detectors and CT software that BIR developed previously, to solve the problem of inspecting drums of radioactive waste. Since then, about $8M in DOE funding has come directly to BIR for the development of WIT, mostly from DOE research and development contracts through competitive DOE solicitations from the EM-50 Industries Program Office in Morgantown, West Virginia at the Federal Energy Technology Center (FETC). About $4.5M of DOE funding has been provided to LLNL (Lawrence Livermore National Laboratory) since 1993, mostly from the EM-50 Mixed Waste Focus Area for gamma-ray assay technology development. This LLNL CT gamma assay technology has been successfully transferred to BIR for use on WIT through BIR funds in a Work-for-Others agreement between LLNL and BIR, which has been an excellent example of successful national laboratory collaboration with and technology transfer to a small business.

This 10-year, $15M investment from BIR and DOE has given rise to the mobile WIT technologies that have demonstrated unique and superior cost-effective solutions to our nation's nuclear waste drum inspection problems without the need for new, costlier, *fixed* DOE facilities for drum characterization. Based on three years of field experience at four DOE sites, WIT has demonstrated that it can noninvasively see through all DOE nuclear waste drums, more accurately identify their content, and measure their radioactivity better that any system currently in use at any DOE site. All of this is done without requiring riskier and more expensive invasive inspection of nuclear waste drums. There is substantial third party testing data demonstrating WIT performance, and there is a verification statement from Federal and State environmental regulators supporting these WIT performance claims.

WIT and Only WIT Passes Every Test

I'd now like to briefly summarize the WIT experience with DOE and identify what I perceive are the numerous impediments to commercial WIT deployment within the DOE complex, based on our experiences.

Since 1990, BIR has responded to numerous DOE need statements found in various DOE solicitations requiring the development of new, improved, and innovative nuclear waste drum inspection technologies. Between 1990 and 1993, with the DOE SBIR, BIR experimentally demonstrated the feasibility of using 2 MV high-energy x-ray CT to inspect nuclear waste drums. Under DOE contract, with the industry programs office (from FETC) between 1993 and 1995, BIR designed and built the WIT trailer for CT x-ray and gamma-ray inspection of nuclear waste drums. In 1996 under the same contract, WIT was field-tested at DOE Livermore, Rocky Flats, and Idaho, and successfully completed its first commercial nuclear waste drum scanning contract at Babcock and Wilcox in Lynchburg, Virginia. In 1997, WIT was involved in three DOE-sponsored inter-comparison blind test programs called the CEP, RCI, and PDP tests. The WIT system is the *only* characterization system in the country to participate in and pass on *all* drums tested and scored in *all* three tests, based on DOE acceptance criteria. I will briefly explain these tests.

During the Capability Evaluation Program (CEP) sponsored by DOE and Lockheed-Martin Idaho, WIT passed on every drum tested on the first scanning attempt. Other systems tested through the CEP were asked to repeat testing two and three times in order to achieve passing scores on some (but not all) drums.

WIT is the only characterization technology to participate in the Rapid Commercialization Initiative (RCI), which resulted in a verification statement from Federal and State environmental regulators indicating that WIT complies with the DOE characterization requirements for all nuclear waste drums tested for x-ray and gamma assay inspections. This included drums filled with low-density materials like clothing, and higher density materials. During the RCI program, WIT's performance verification was overseen by three DOE offices with regulator interface from Headquarters, site interface from Idaho, and project management from FETC, as well as various Federal and State environmental regulators. The regulators included the U.S. EPA, the U.S. Army Corps of Engineers, the Southern States Energy Board, the Western Governors Association, and five states, which include California, South Carolina, Washington, Idaho, and Colorado.

In the latest Performance Demonstration Program (PDP), which was a national test sponsored by DOE Carlsbad in October 1998, the WIT system had the best assay scores (the most accurate) of 16 systems tested nationwide for drums with

sludge, which is one of the most difficult waste materials to inspect. Nine systems from DOE sites and other companies failed these tests. WIT identified 100% of the radioactivity in sludge, whereas the next closest system from a DOE site passed with only 80% identification. The closest commercial competitor to BIR only identified 40% of the radioactivity.

WIT results from the PDP, RCI, and CEP can be found on BIR's web site at www.bio-imaging.com.

In 1998, WIT participated in and successfully completed three quality assurance audits conducted by DOE Carlsbad at the Nevada Test Site. In parallel, WIT successfully completed its first DOE commercial contract for the characterization of 187 nuclear waste drums, also at the DOE Nevada Test Site as subcontractor to TRUtech, a Thermo-Electron company who was contracted with Bechtel-Nevada, the site M&O.

Why Isn't This Technology Deployed Yet?

Unfortunately, WIT is not now providing characterization services under a DOE contract. Yet the WIT technology is deployable today. Another WIT quality assurance audit is now required by the U.S. EPA at the Nevada Test Site in June, 1999 and is currently being planned by Bechtel-Nevada, TRUtech, and BIR with no future DOE Nevada characterization revenue in sight. Cooperation between DOE and EPA with combined audits would assure quality inspections while providing effective and timely quality audits at a reduced cost. Throughout 1998, the three DOE audits at the Nevada Test Site have cost BIR in excess of $560,000, with only $111,000 in cost-shared compensation received from DOE. BIR was willing to participate in these DOE audits with cost-sharing because Bechtel had a contract in place where up to 1,325 drums were to be characterized with mobile services such as WIT. However, Bechtel terminated our inspection services after 187 drums because of the continuing audit process and a redirection of budget. Nevertheless, DOE still required the three audits, which WIT successfully completed, and is now requiring us to participate in a new fourth EPA audit without any compensating contract for new characterization work at the Nevada Test Site. BIR believes that Bechtel, the Nevada site M&O, continues to be compensated by DOE for all its waste management activities, including the audits. We also believe that small contractors like BIR should be compensated for all their inspection-related activities, including the DOE and EPA audits, just as Bechtel is.

Why is WIT not now deployed at a DOE site or under contract with the DOE to provide inspection services for nuclear waste drums, especially with WIPP just opening? I believe the following six reasons are the root causes of this situation, which can lead to potential solutions:

1. The WIPP Delay—WIPP has been delayed in opening for 10 years and it will take another four to eight months to completely open after achieving final approval from the State of New Mexico for the RCRA Part B permit. As a result of these continued delays, various DOE sites and M&O contractors have not provided budgets or procurement activities of significant quantities related to commercial mobile drum inspection services. They have indicated they want to deploy mobile technologies, and we believe this will most likely only occur after WIPP *fully* opens, though we are ready to begin characterization work today.

2. Inertia Favors Outdated Technologies—Major DOE waste generator sites continue to use existing, in-place, 30-year-old drum inspection technologies for drum x-ray and gamma assay exams. The larger DOE sites have already invested in these existing facilities and staff, which use older x-ray and gamma assay instruments with limited capability for drum inspections. These older capabilities cannot see through or assay difficult and denser waste matrices like sludge and cement, which make up over half of the existing nuclear waste drum inventory destined for WIPP. But since these older technologies have demonstrated the ability to characterize lightweight matrices like clothing and other combustibles, which only make up less than half of the DOE waste materials, the solution is for us and them to work together. WIT's mobile trailers can work side-by-side with the M&Os from the major sites, thus supporting their existing infrastructure and jobs while nearly doubling the output, including the drums that the older technologies cannot see through or assay. Increasing output is needed at both DOE's Rocky Flats and Idaho to meet DOE mandated cleanup commitments to the states of Colorado, Idaho, and others.

3. Regulations Need Updating—Existing regulations can favor the older technologies and need to be modified. The first draft of the language in New Mexico's RCRA Part B Permit only supported the older x-ray technology and stated that dense drums that used the older x-ray technology would need to be opened for invasive inspections. It has taken BIR one year to modify the second RCRA permit draft application to include language that will now allow WIT. This new language

is expected to be approved by New Mexico this coming August to allow CT scanning technology to be used in addition to or alongside the older x-ray techniques. This will reduce the number of costlier and less safe invasive inspections by about half! As another example, the DOE auditors are continuously requesting to see the WIT calibration data for gamma assay. The older assay technologies do not measure absolute values of radioactivity, since they must be regularly calibrated against prior information about drum content (information that could be wrong!). But WIT gamma assay is an absolute measurement method and calibration is not required. So we have to continually teach DOE auditors and their regulators the advantages of our new innovative WIT technology.

4. We Need the Promised Quantity Order for Financial Feasibility—On Halloween 1996 at a public meeting in the Forrestal Building here in Washington, D.C., DOE Carlsbad and DOE Headquarters presented a plan for commercial mobile nuclear waste drum inspection. The market was identified as 159,000 drums from smaller DOE sites with the potential for an additional 319,000 more nuclear waste drums from the larger DOE sites. DOE also emphasized the need for new innovative characterization technologies throughout the 1990s through R&D and SBIR solicitations. In view of this and the imminent opening of WIPP in 1999, BIR continues to spend its own money to pursue this marketplace with WIT. That is why I am here today.

A single DOE task order for 187 drums is a far cry from a potential market of 478,000 drums presented in 1996. DOE and its M&Os must put forth a significant market share of drums to mobile inspection vendors, who must invest millions of dollars in capital equipment to provide state-of-the-art inspection services for the difficult waste materials. Significant task orders of five years and 25,000 drums will permit small business capitalization to get the job done, and more importantly, can cut the cost per drum almost in half. Achieving significant drum quantity task orders requires coordinated efforts between many DOE sites and their M&Os, which DOE Carlsbad and Headquarters has thus far not been able to materialize. Making available significant drum quantities for commercial mobile inspection vendors like BIR in a timely manner from M&Os of both large and small DOE sites is required to achieve successful lower cost commercialization of WIT inspection services and meet the nation's schedule for nuclear waste drum cleanup.

5. Competition Between Fully DOE-Funded and Industry Cost-Shared Projects Should be Minimized—There are two competitive groups within the DOE waste drum characterization business. First, BIR has few commercial service competitors, who use older technologies. But more significant, competition comes from the DOE sites themselves. It is difficult for BIR to directly compete in the waste drum characterization business in the DOE market when the major DOE site M&Os have already invested in technologies either developed by themselves or have deployed older technologies purchased from commercial competitors with 100% DOE funding. In addition,

I believe conflicts of interest and unfair competition exists when DOE sites share technology they have developed and transfer this technology that has been 100% developed or purchased with DOE funds. At the same time, a small business like BIR has been required to cost share the WIT technology development with DOE since 1993. These conflicts can lead the larger sites to ignore WIT's innovative technical and cost benefits. This is because of a prevailing preference at the large sites to use in-place personnel and existing instruments. The reason that only the small DOE sites (e.g., Nevada) have offered drums to commercial service vendors like BIR is that the small sites have little in-house inspection capability, unlike the larger sites. Again, the solution is to have WIT work side-by-side with these existing systems at the large DOE sites, as well as at small sites to inspect all of the waste drum materials, both lightweight and dense, in an accurate, safe, and timely manner.

6. Close Coordination is Nonexistent—Full DOE support for a planned transition (e.g., compensation for quality assurance audits) of innovative technologies from development to field deployment does not exist for projects like WIT. Delayed deployment, because of the above reasons, has now placed a financial burden on BIR that cannot be sustained by a small business for the maintenance of WIT and its staff in a deployment-ready condition. We should generate a general awareness within DOE and each M&O contractor that currently deployed drum inspection technologies have limitations and that WIT can provide cost-effective solutions today. How many field operations people know that the current drum inspection technologies fielded at DOE sites have problems characterizing the dense waste drums? Conversely, how many DOE sites know that WIT can solve these problems? Who within DOE and its M&Os is responsible to see that innovative technologies that work like WIT are properly applied to DOE problems? BIR has continuously marketed to DOE and its M&Os at each site to develop and educate waste management regarding WIT and its capabilities and benefits. DOE support is needed for the

transitioning of proven new innovative technologies like WIT that have achieved successful initial field deployments and have solved recognized DOE field problems, if sustainable commercialization and deployment in the DOE market is our final goal.

Conclusion

In closing, medical computed tomography has successfully improved medical care worldwide by improving the accuracy of diagnosis, minimizing surgical intervention, and by keeping the cost of medicine down through capital investment for improved health care. This same logic applies to the application of computed tomography to nuclear waste drum inspection where noninvasive CT inspection can greatly improve the accuracy of identifying and measuring drum content, can minimize costly drum opening intervention and hazardous radioactive waste exposures, and can lower the overall costs of environmental remediation. Thank you for the opportunity to present this testimony. I hope this House Subcommittee will support the immediate deployment of new innovative technologies like WIT to effectively cleanup our nation's nuclear waste drum inventory.

Mr. UPTON. Another gold star; more than a minute left.

Mr. BERNARDI. Well, I can talk some more.

Mr. UPTON. Yes. Mr. Schofield.

TESTIMONY OF JOHN T. SCHOFIELD

Mr. SCHOFIELD. My name is John Schofield. I am the chairman present and CEO of a company called Thermatrix, which I founded in 1992. Thermatrix was founded——

Mr. UPTON. If you could just pull that mike a little closer.

Mr. SCHOFIELD. Thermatrix was founded to commercial a technology which was developed at London's Livermore Lab and was abandoned in 1985 of having no commercial significance. Today, Thermatrix, we expect this year our sales will be about $60 million. We employ over 400 people, and 55 percent of our business is overseas.

In terms of the deployment of the technology with the DOE, we ran a test program at Savannah River with Westinghouse which came out with flying colors. We supplied three systems to INEL, and those systems are operating today. Thereafter, we were asked by the DOE to get involved with a company called ThermoChem, which had a steam reforming technology, to see if we could bring that technology in conjunction with our technology, and our technology, principally, is a unique technology. We are the only people in the world with this technology, and it is a flameless replacement for incineration. It is widely deployed throughout the world, and, particularly, it has been certified by the State of California, the State of Massachusetts, and has received the prestigious Dean Sensenbaugh Award from the Air Waste Management Association.

We formed a joint venture with ThermoChem, and with our engineering resources and with our own money, we spent a considerable amount building a pilot facility. We put in roughly $1 million on top of the $4 million that the DOE put in to build a pilot facility in Baltimore. The facility passed all the tests. Six surrogate wastes were tested on this. We passed all the criteria; we passed all the reliability tests, and we even issued a brochure showing the pictures of the facility. In April 1997, the Idaho National Engineering Laboratory Mixed Waste Focus Group evaluated 23 technologies and picked out this particular technology as being the most successful and the most likely to be deployed.

In May 1997, a proposal was submitted to deploy the technology at the Paul Smith Diffusion Plant at Piketon, Ohio. We held a lot of meetings there; we put the proposal together, and nothing ever happened. The reasons given were, one, there were no funds available to deploy the technology, and the question I would have is of all the technologies that are being deployed in the program, nobody ever talked how many of these technologies are actually invented by the contractors and within the DOE and how many are outside, because I know when we were told there were no funds available, 15 other technologies had just been selected that happened to have been developed by the contractors. And so they were able to deploy them internally.

Second, we were told that it was impossible to competitively bid for our technology, because we were the only people in the world with this technology, and so how can they deploy a unique technology on a sole source basis?

Mr. UPTON. I hope you had it patented.

Mr. SCHOFIELD. We have it well patented worldwide, and sole source selection does not seem to be a problem for the likes of Pfizer, Chevron, Warner-Lambert, Exxon, Mobil, PPG.

At the site itself, when we talked to the people there, it was very revealing. They said, "Why do we want to solve this problem? If we solve the problem, we don't have a job. It is far better that we keep looking and searching for other solutions and testing and looking around, because, on that basis, we have a job." We reward our people because they solve problems. It seems to me, the DOE rewards people for not solving problems, because, on that basis, they keep their job.

Going forward, because of the amount of money we spent on this, we now do no business with the DOE. It is our policy not to do business with the DOE, and I am sorry to report that.

Thank you.

[The prepared statement of John T. Schofield follows:]

PREPARED STATEMENT OF JOHN T. SCHOFIELD, CHAIRMAN, PRESIDENT AND CEO, THERMATRIX INC.

From 1980 to 1985 the DOE Laboratory at Lawrence Livermore invented a technology to improve the efficiency of energy conversion as part of the oil shale program. Approximately $25 million was spent during this period but in 1985 further work was suspended and the technology was abandoned as having no commercial application.

In 1985 researchers from Lawrence Livermore, in conjunction with others, formed a company, In-Process Technology, to further the technology development. $12.5 million of venture capital funds were spent in the period from 1985 through 1991 without any product being developed and in early 1992, a decision was made to close down the company and abandon the technology. I, John T. Schofield, was brought in by one of the venture investors to look at the technology. This investigation during the first three months of 1992 resulted in the establishment of Thermatrix Inc. in July 1992, to commercialize the technology as an environmental technology to treat noxious emissions from a wide range of process plants in the refining, chemical and pharmaceutical industries.

As the founder of Thermatrix Inc., I provided funds, recruited a team and by the end of 1992 had designed and received orders for the first two systems using the "Thermatrix technology." The technology was successfully deployed and commercialized during the period 1993 to 1996 by attracting approximately $22 million in venture capital funds. The technology was extremely successful and the product was sold not only to blue chip clients in the major process industries, but also three units were installed at INEL, and further installations took place at various USAF

bases, including Brooks, Patterson, McClelland and the Naval Air Station, North Island.

Thermatrix has become a leader in air pollution control and sales in 1999 are expected to exceed $50 million with over 50% being exported outside the United States.

In 1994, ThermoChem, a small technology developer, was awarded a contract to a value of approximately $4 million to build a steam reforming system to treat low level mixed waste. The contract was awarded by the US Department of Energy's Morgantown Energy Technology Center under contract number DE-AR21-95MC32091. By early 1996, problems began to appear in the design of the system concerning the treatment of off gas from the steam reforming system and Thermatrix, which was known to the DOE, was brought together with ThermoChem in an endeavor to solve this problem. We were encouraged to believe that a solution to this problem would provide a unique system, which could be extensively deployed by the Department of Energy in dealing with a wide range of mixed waste including radioactive PCBs.

Thermatrix, which went public in June 1996, contributed several hundred thousand dollars of its own funds to supplement the inadequate allocation of funds, under the original $4 million contract, set aside for dealing with the off gas, and engineered, in conjunction with ThermoChem, a highly reliable system combining the two technologies.

Thermatrix published the first details of this system in its Annual Report for 1996 on pages 12 and 13. The system was built and tested in accordance with a very exacting regime under the auspices of a joint venture between Thermatrix and ThermoChem. The system which is shown in the attached brochure and appeared in the 1997 Annual Report of Thermatrix on pages 10 and 11, successfully treated six surrogate wastes and passed reliability standards which had been set.

In April 1997 the Mixed Waste Focus Area of Lockheed Martin Idaho Technologies Company at INEL published a study entitled "Evaluation of Alternative Nonflame Technologies for Destruction of Hazardous Organic Wastes," reference number INEL/EXT-97-00123. This report evaluated 23 different technologies and ranked the steam reforming technology as number one based upon ratings of categories of performance, readiness for deployment, and environment, safety and health considerations. The steam reforming system was recommended as one of three technologies for continued development.

In May 1997, Formatrix, the joint venture of ThermoChem and Thermatrix, joined with the US Department of Energy Oak Ridge Operations to submit a proposal under the Technology Deployment Initiative for "Steam Reformation of TSCA and Low Level Mixed Waste at the Portsmouth Gaseous Diffusion Plant." Considerable time and expenditure was incurred in putting this proposal together, including meetings with responsible people at Piketon, Ohio, where detailed discussions were held concerning the deployment of the technology. The technology was never deployed and as a result in late 1997 the joint venture with ThermoChem was discontinued and Thermatrix wrote off its significant investment in this development.

Subsequent investigations revealed the following reasons for the lack of continuation:

- No funds available,
- Inability to contract sole source for a unique technology,
- Allocation of funds from reduced budgets were being directed internally to preserve jobs and were not available for the purchase of "outside" solutions.

The Thermatrix technology has been successfully deployed around the world on a commercial basis and has been awarded, world wide, the most prestigious awards granted to any air pollution control technology over the past decade. Thermatrix has expended a considerable sum of money in pursuing this development and has also offered proven commercial systems for destroying bottles of stored gases at numerous DOE facilities, and for replacing the PCB incinerator at Oak Ridge Tennessee with its technology which has been certified as being an alternative to incineration. Thermatrix has been encouraged in all these endeavors only to find that deployment does not occur for the above stated three reasons. It is now Thermatrix policy not to propose on any further consideration of the deployment of its technology with the Department of Energy.

Mr. UPTON. Well, I know we all appreciate your testimony this morning, and I will tell you, Mr. Schofield, as I listened to your testimony just now and as I look at this report that we will make sure is part of the record from the evaluation of alternative non-flame technologies for destruction of hazardous organic wastes in April

1997, and I see that your firm is No. 1 in terms of capability for the cleanup work, and yet you do no business at all, this is why I think we need additional hearings, particularly with the five field managers that we referenced a little bit earlier with Mr. Burr.

Mr. Bernardi, I had heard about your operation before you came, and looked at your testimony, and, again, as a—I didn't know much about this issue at all before I began to serve on this subcommittee in terms of the cleanup, and in my role, I have met with a number of folks. We heard from Mr. Hastings this morning. I remember sitting down with Mr. Hastings, my colleague, a month or so ago, 2 months ago, maybe, and I have never been to Hanford; really, never been to Washington State since I went to the World's Fair in 1964. But as he talked about the site and described it with all of these containers and did so again this morning, one of the concerns that he had or that the folks in the field have is that they have no idea what was in them, so they didn't know how to treat them; they didn't know how to get rid of it. They knew that they were leaking, but it seems as though in your description today that your technology that you developed is the perfect one to answer the questions, whether they be there or whether they be at a WIT site or anyplace else.

Mr. BERNARDI. For small packages, such as drums or small boxes, yes. For tanks that are very large, it is certainly difficult to build a CT scanner to a large tank. But, certainly, for the smaller packages——

Mr. UPTON. But is it possible to do that? Is it possible to build a CT scanner?

Mr. BERNARDI. Yes, it is, but that is not what we have been concentrating on, but it is possible.

Mr. UPTON. And do you have any Federal—I mean, we heard with Mr. Burr's questioning a little bit earlier this morning, I think they are going to go back and readdress and find out why—but do you have any Government contracts now in terms of the cleanup of this?

Mr. BERNARDI. We have a contract to move our technology back to the Nevada test site for an EPA audit; that is the only contract we have. We have a contract with EM-50, which is our R&D contract, which is closing out this last quarter of the year. Those are the two contracts in this area. We have other Government contracts in other areas but not cleanup.

Mr. UPTON. For the record, maybe I would like to know—particularly as we embark on a future hearing—maybe some of the contacts or miscontacts that your company has had and, perhaps, the reasons given in terms of why you were not awarded something, particularly as we look at the promise of this.

Mr. BERNARDI. Yes, I would be happy to provide further testimony, if you wish.

Mr. UPTON. You know, the Department, in its written testimony, indicated that they "we have taken aggressive measures to accelerate the widespread use of new technologies." It seems to me, as I listen to the comments with all of your firms, that that has really not been the case. Would anyone like to comment specifically on that?

Mr. SCHOFIELD. I think it depends where the technology was invented, and it seems to me that the object of the exercise is with the budget that the contractors have, they intend just to spend that budget internally rather than spending external dollars, and they will spend that money internally developing their own technologies even if they are not successful, because it preserves jobs, and the solution may be outside, but they will not spend those dollars outside.

Mr. UPTON. Well, Mr. Schofield, you indicated in your testimony that one of the reasons you thought that you were denied was because you were a sole source; there was no other firm that had the comparable technology to compete with you in terms of making of a bid.

Mr. SCHOFIELD. Correct.

Mr. UPTON. And, Mr. Bernardi, is there anyone else that has developed the technology that you have in terms of this CT scanner?

Mr. BERNARDI. No, there isn't. The problem, I think, lies with the definition of a competitive procurement. When you are comparing apples and oranges in a procurement, I don't view that as a competitive procurement. Our goal has been to develop leapfrog technology over what exists. We believe we have demonstrated that, but the procurements aren't designed to show the technical benefits of the technology, and that has been a continuing story in everything we have gotten involved in. The technologies that exist in the sites have a purpose, and they do well for what waste streams they can work on, but when you are competing with a technology that can work on other waste streams and the procurement doesn't define that, then it is a procurement that is waved toward the prior technology, and that is what we have faced.

Mr. UPTON. Thank you. Ms. DeGette.

Ms. DEGETTE. Thank you, Mr. Chairman.

The first thing I would like to ask is unanimous consent for members to submit questions to DOE maybe 7 days in response to this panel and I assume the testimony from the next panel. I was just commenting a minute ago how I would have liked to have heard some of the responses of the DOE folks to this disturbing testimony.

Mr. UPTON. Without objection.

Ms. DEGETTE. Thank you.

Mr. BURR. Would the gentlelady yield for 1 second?

Ms. DEGETTE. Sure.

Mr. BURR. Would anybody from the Department of Energy raise their hand that is here? Thank you for staying.

Ms. DEGETTE. Yes, thank you for staying.

My first question is if each of the four of you could estimate the potential sales you could have for your products to DOE sites and then the potential sale of your products outside of DOE. What I am trying to do is get a feel for the applicability for your products outside these specific DOE sites. Mr. Rogers, you want to——

Mr. ROGERS. Sure. I believe it was also mentioned here that we had gone through—a number of us, actually, have gone through what is known as the Dawnbreaker Program for development of our business planning, and my recollection out of that was that there was approximately $150 million to $200 million market avail-

able for application of our technology within DOE in the treatment of low level mixed wastes, and outside of that, the nuclear power industry probably represented the biggest component; it was about $100 million market. And them you branch out into hazardous and a number of other applications, but if you are going to talk about low level mixed waste applications, which our technology is focused on, that would be the comparison. They are pretty equal.

Ms. DEGETTE. Thank you. Dr. Kotrappa?

Mr. KOTRAPPA. Yes, we went through the GETE/Dawnbreaker program, and that really helped us to put our business plan in place, and we do, I think, projected sales to use our instrumentation for characterizing sites. As I pointed out, nearly 80 percent of all the sites have this problem of uranium and plutonium contamination; very large number of sites, and this technology can do characterizations much cheaper and better and faster. Based on that, we have projected in next 5 years we should have a business of $60 million to $70 million. Because of that projection, we have gratefully followed all of the commercialization steps that anybody can think of, and still we have waited.

Ms. DEGETTE. Mr. Bernardi?

Mr. BERNARDI. Yes. I have also participated in the Dawnbreaker Program a number of years ago. Our projections, depending on which scenario you use, is between $20 million to over $40 million a year. The lifetime of the program would coincide with the lifetime of WIPP's disposal program, which is about 35 years.

Mr. SCHOFIELD. We are a public company. We went public in 1996, so some of our information is public information. In 1998, our sales were up 94 percent over 1997. We expect our sales in 1999 to be around about $60 million, and we would expect in 3 to 5 years to be somewhere in the $300 million to $500 million range. In terms of deployment with the DOE, the facility that we designed for Portsmouth was a $24 million facility which would have cleaned up all the waste there in 3 years. I would expect, in terms of its type of deployment, possibly that DOE represents about $100 million over about a 5-year period.

Ms. DEGETTE. Thank you. For any of you, during the course of your product development, did you prepare a cost-benefit analysis either with or for the DOE to compare the cost of your product or proposed product against the baseline product or process? And, if so, what was the result of the analysis?

Mr. SCHOFIELD. I can answer that. Westinghouse produced an independent report on the work they did at Savannah River showing that this technology would product a cost benefit of not less than 25 percent compared to any of the technology now. McClellan Air Force Base did a similar evaluation and confirmed the Westinghouse numbers. And in deployment, the fact that we get these orders now from the big pharmaceutical companies, et cetera, and the fact that a lot of our business is in Europe is because energy costs in Europe are about three times what they are in the States. The savings in Europe are that much greater than they are in the States, and we get our business because we are cost effective and because we do what we say we are going to do.

Ms. DEGETTE. Would any of the rest of you like to answer that question?

Mr. BERNARDI. Yes, there are three ways you can look at from our technology. First of all, on our Website, there is a what is called a Rapid Commercialization Initiative Final Report, and in there is a study that was done by the Army Corps of Engineers doing cost analysis. And, basically, our technology is competitive in sufficient quantity of drums, not a 187-drum contract; you need tens of thousands of drums to make it competitive.

Ms. DEGETTE. Right.

Mr. BERNARDI. Also, it is certainly cheaper than building new facilities at each of these sites, because it is a mobil technology, and, third, compared to opening the drums, it could be cheaper by a factor of anywhere from four to eight times cheaper on a per drum basis compared to opening drums.

Mr. KOTRAPPA. Yes, we have done this analysis, so also, Oak Ridge National Lab for promoting the product also did this, and then we—as a large-scale application, our method is much cheaper and better and faster with the analysis that we have done and especially this program related to 100 buildings in Rocky Flats. Each of that has to be parted out as contaminated or not contaminated, and that was one of the—we supplied the information to their request for information on the new technology to do this job, and that is what we did, and we did everything, and that what it is. Thank you.

Mr. ROGERS. To answer your question, Congresswoman, Delphi participated in a DOE-sponsored program to evaluate technologies—non-incineration and non-thermal treatment technologies with the Department of Energy and had life-cycle cost analysis performed on that to compare with other alternatives. It was done early in the program, and since we are still involved in demonstrating our technology, we really haven't concluded those economic factors, if you will. One humorous anecdote was that in one of the review meetings that we had, there was a citing of a Government statistic, a DOE statistic, that our technology would achieve these cost savings of $200 million when applied to all the wastes in inventory that is applicable to our technology. And, so we cited that reference in a presentation we did, and we were challenged by the ASME review committee on where that number came from, and I said, "Well, the gentleman who generated that number is sitting right here in the back of the room. Would you care to tell them where that came from?" And his comment was, "That is a DOE-generated number and has no credibility whatsoever." So, I don't know where the answers are after that.

Ms. DEGETTE. Thank you, Mr. Chairman.

Mr. UPTON. Thank you. Mr. Burr.

Mr. BURR. Mr. Schofield, let me go to the statement you just made which was Westinghouse identified a significant savings—25 percent, is that what you said?

Mr. SCHOFIELD. Yes.

Mr. BURR. And that was specifically for what process or what process at what site?

Mr. SCHOFIELD. Westinghouse ran a test program at Savannah River using our technology on a remediation of chlorinated hydrocarbons.

Mr. BURR. Why are you not a subcontractor for them now, do you think?

Mr. SCHOFIELD. As a result of that test work and the report that came out, we did receive and order from INEL to install three units for the remediation of radioactive chlorinated hydrocarbons, and those three units are in operation today.

Mr. BURR. But no other sites?

Mr. SCHOFIELD. No other sites. No, we have no other DOE sites. We have installations at Air Force Base at North Island, Naval Air Force Base in North Island, Patterson, McClellan.

Mr. BURR. Is DOE aware of the savings that you brought to the Savannah River site for Westinghouse?

Mr. SCHOFIELD. Yes.

Mr. BURR. How many times have they contacted you in hopes that they could place your technology at another site?

Mr. SCHOFIELD. We participated and we spent about $1 million of our own money building a pilot facility to process radioactive wastes. The Portsmouth Diffusion Plant was the identified ultimate deployment. We built the pilot plant; we tested six surrogate wastes; we passed all the tests; we passed the reliability tests; everything was approved. We then went to Piketon; we drew up plans to build a facility at Piketon; we spent a considerable amount of money doing that, and we were told it will not be deployed, because the funds are not available, and the people at Piketon basically said, "We don't want to solve this problem, because then we don't have a job left if we solve the problem."

Mr. BURR. How much money would you have saved in Piketon, do you know?

Mr. SCHOFIELD. I don't know, because I don't know what the annual cost is to——

Mr. BURR. What about the deployment funds?

Mr. SCHOFIELD. The deployment funds were $22 million to build the facility.

Mr. BURR. Could you have saved $22 million?

Mr. SCHOFIELD. I would have thought we would have saved two or three times that.

Mr. BURR. Okay. Let me ask you, you are doing business at Savannah River for Westinghouse——

Mr. SCHOFIELD. Yes, we have an installation in your community in North Carolina also at Cheesebrough Ponds.

Mr. BURR. And we welcome you. Let me ask you: any application for your technology at Hanford?

Mr. SCHOFIELD. I have no idea. We have not pursued it, because we refuse to spend any more time or money on this——

Mr. BURR. Oak Ridge?

Mr. SCHOFIELD. Oak Ridge, certainly. We had a lot of meetings with Oak Ridge. We talked to Oak Ridge about a very simple system to——

Mr. BURR. When you say you talked to Oak Ridge, did you talk to the site manager at Oak Ridge? Did you talk to Bechtel, which is the contractor? Who in that chain?

Mr. SCHOFIELD. No, we were talking to people from Lockheed Martin, and there was a committee set up to look at our technology

specifically to destroy 22,000 gas cylinders that were stored at Oak Ridge.

Mr. BURR. And what type of help did you get from the Department of Energy relative to these conversations with Lockheed Martin?

Mr. SCHOFIELD. The conclusion at the end of the day was that they were not ready to get rid of those gas cylinders.

Mr. BURR. How much did DOE help you in your conversations with Lockheed Martin at that time?

Mr. SCHOFIELD. Not at all.

Mr. BURR. Mr. Bernardi, I asked some questions about your technology. They weren't too familiar with your technology. Should they be?

Mr. BERNARDI. Certainly in the field, they should be. I spent these past 10 years driving to most of the sites of flying to most of the sites.

Mr. BURR. You have got a mobil unit, almost like the mobil mammography van, or something like that. You can go onsite where there are no bricks and mortar costs; you drive in; you are able to scan these containers, which eliminates the opening.

Now, they led me to believe that there was a good process, and the technology that was comparable apparently won out. Is that how you see it as the manufacturer?

Mr. BERNARDI. The competing technologies, commercially, are the conventional technologies that have been around awhile, and the procurement was tied to these DOE audits, and the selection criteria was based on completing the DOE audits. The day we were told that our contract was terminated was the day we were ending our third audit, and we had successfully completed that audit, and the contract was terminated based on previous audit findings. Subsequently, we passed all the audits, but we are part of a team of companies, and these DOE audits are something that is an ongoing process, and it is ongoing for every site for all technologies, and we successfully completed the audit, and so we believe that we are just as legitimate a competitor in this arena as anyone else.

Mr. BURR. But I think their comment was you were given the opportunity to bid, and you lost the bid. Is that accurate?

Mr. BERNARDI. The contract was terminated; at least the work was terminated based on audit findings, because the audit process was continuing.

Mr. BURR. Somebody is currently inspecting those containers, right?

Mr. BERNARDI. Right.

Mr. BURR. Conventional x-ray——

Mr. BERNARDI. But, actually, the other people's contract was also terminated, so we were both—our contracts were ended both——

Mr. BURR. Are we not inspecting any of the barrels now?

Mr. BERNARDI. Not at that site, that is correct.

Mr. BURR. It just stopped.

Mr. BERNARDI. It just stopped, because we are continuing the DOE audit process.

Mr. BURR. And that site is which?

Mr. BERNARDI. That is the Nevada test site.

Mr. UPTON. Might I just ask, when was it that it stopped?

Mr. BERNARDI. We finished our work the fall of last year, and this third audit was the beginning of this year.

Mr. BURR. Do you feel like that DOE knew the contracts had been terminated?

Mr. BERNARDI. I am sure people in DOE knew that, yes.

Mr. BURR. Do you think that people at Bechtel, since they were the contractor, knew that contracts had been terminated?

Mr. BERNARDI. Yes, sir; they were involved in it.

Mr. BURR. Certainly, I think they are going to be here on the next panel. I will be sure to ask them.

Let me just ask as a last question to all of you: if you could pick one thing to identify for this subcommittee as the reason that new technology is not being integrated—I don't want you to limit it to your technology. Trust me, I don't think you would be here if you didn't think your technology was the best—but why new technology is not being incorporated in the cleanup process at sites around the country, if there was one reason, what would that be? And let me start with you, Mr. Schofield.

Mr. SCHOFIELD. In my view, the people at the sites don't want to solve the problem. They want to prolong the problem in order to save jobs.

Mr. BURR. Define people at the site for us. Contractors? Site managers?

Mr. SCHOFIELD. Contract personnel.

Mr. BURR. Mr. Bernardi?

Mr. BERNARDI. I have a number of reasons. I think I will mix two things, sir. One is, in my technology case, it is the combination of the opening of WIPP and the existence of older technology onsites; those two things have made it difficult for us.

Mr. BURR. Doctor?

Mr. KOTRAPPA. The delays are what really kill us, and they don't make any decisions for a long, long period, and we wait and wait and, you know, this new technology, we have put in so much money, and to small companies, that money is a lot of money, and delays is the way I would put it.

Mr. BURR. Delays caused by contractors or DOE?

Mr. KOTRAPPA. Unnecessary for that research where all of the research has been done, the product is ready. And to go on testing, testing, testing, I don't know why.

Mr. BURR. That sounds like it is generated out of OST. Okay.

Mr. Rogers?

Mr. ROGERS. If I had to distill everything down to one, I would still refer to the five recommendations that I gave you earlier, but probably the single most important of those would be the fact that there is no single advocate within DOE EM programs, and I am speaking as a demonstration technology developer; I haven't made it to deployment yet. But there is no single advocate to assist small business in overcoming the overwhelming communications required and inertia required to move a project forward.

Mr. BURR. With contractors? Site managers? DOE?

Mr. ROGERS. Wrap a bow around all of them. I mean, it is DOE; it is M&O contractors. As a matter of fact, it is not just DOE, it is DOE—you have your Contract Administration Office to deal with and reporting and all of the requirements that go along with that.

You have the site DOE office that you have to communicate with, and then you have the M&O contractors. You have your own team of subcontractors that, because a small business doesn't have all the expertise, we have to bring that on. So, it is an overwhelming management problem that is really laid in the lap of the technology developer to solve.

Mr. BURR. I thank all four of you for your willingness to come and for your candidness with your testimony.

I yield back.

Mr. UPTON. Thank you, panelists. We appreciate your testimony; it was very enlightening. You may look to see some questions coming, and we look forward to those additional responses, as well. You are excused. Thank you very much.

Our next panel includes Mr. Ron Peterson, group president of Flora Corporation; Mr. Robert Card, president of Kaiser-Hill; Mr. Lee McIntire, president of Bechtel National, and Mr. James Gallagher, president, Government Environmental Services of Westinghouse Electric.

Thank you all for being patient. As you heard from the beginning, this morning, we have had a long tradition of having our witnesses swear under oath or testify under oath and do any of you have objection to that? And we also usually allow for the availability of counsel. Do you any of you desire an additional person to be with you? Mr. Gallagher, Dr. Wood might accompany you on this?

Mr. GALLAGHER. Yes.

Mr. UPTON. Okay, good.

If you would all stand and raise your hand, that would be terrific.

[Witnesses sworn.]

Thank you very much. You are now under oath, and, Dr. Gallagher, we will start with you. Thank you.

TESTIMONY OF JAMES L. GALLAGHER, PRESIDENT, GOVERNMENT AND ENVIRONMENTAL SERVICES, WESTINGHOUSE ELECTRIC CORPORATION; ACCOMPANIED BY SUSAN WOOD, DIRECTOR, SAVANNAH RIVER TECHNOLOGY CENTER, VICE PRESIDENT, WESTINGHOUSE SAVANNAH RIVER COMPANY; LEE A. MCINTIRE, PRESIDENT, BECHTEL NATIONAL, INCORPORATED; ROBERT G. CARD, PRESIDENT, KAISER-HILL; AND RONALD G. PETERSON, GROUP PRESIDENT, FLUOR CORPORATION

Mr. GALLAGHER. Thank you, Mr. Chairman.

I am Jim Gallagher, president of the Westinghouse Government Services Group.

Mr. UPTON. If you could just put that mike just a little closer.

Mr. GALLAGHER. I am pleased to discuss with you a contractor's perspective on the environmental management technology. As president of the Government Services Group, I am responsible for the overall direction of our government operations and can provide you a general background on our management philosophy and systems at these facilities.

Accompanying me today is Dr. Susan Wood from our Savannah River Technology Center, our primary interface with DOE's Office

of Science and Technology. She is available to help me or you if you raise questions in need of more detail.

Simply put, technology deployment is important to us, because it allows us to meet our mission needs, our regulatory requirements as well as save money. Our experience shows that we can achieve significant reductions in life-cycle costs through technology, and we expand, scope, and deliver with the taxpayer dollar.

Further, we have cast a wide net in search of these technologies that meet our specific needs. While we have some development success on our own, we also look to other DOE sites, universities, commercial industry, DOE's Technology Development Program or any other source to supply technology to meet our mission. We have a process in place to make sure this happens, and we believe we can demonstrate that it is working.

The committee forwarded to us a list of 154 technologies. At our 3 locations, we have deployed 45 of them, and there are at least another 113 opportunities to deploy them at one or more of our sites. Because Savannah River is the home to most of our work in this area, I would like to focus specifically on technology development and deployment there, and I would like to express my appreciation, Mr. Chairman, to your recognition earlier of our success at Savannah River.

Of the 154 technologies you asked about, we have deployed 41 of them at Savannah River; 23, multiple times, ranging from 2 to 25 deployments each. We believe there are 54 more that may have application there. I would not that Savannah River has also deployed or developed technology not included on your list.

From fiscal year 1996 through fiscal year 1998, Savannah River received $45 million in EM-50 funding. In our Environmental Restoration Program, alone, the OST investment has yielded $62 million in savings. We believe innovative technologies from all sources will save more than $168 million in life-cycle costs beginning in fiscal year 1996 and beyond. That represents deployments in only one line program. We have others doing similar work.

Cost savings is not the only measure of success. We can point to cases in which technology deployment has increased our margin of safety or has enabled us to perform mission tasks that are critical to program success, such as safe shipment of transuranic waste. We feel the key factor that contributes to our technology deployment success is the fact that we involve our end users in line throughout—from working with our laboratory personnel to accurately define needs, to working with our regulators and other public stakeholders to incorporate their requirements. We also promote those needs widely in the commercial marketplace.

Let me cite two specific examples of successful technology deployment at Savannah River. There, we have closed two high level waste tanks. These are the first such closures in the Nation. As this process evolved, scientists developed a new type of non-bleeding grout. Without this technology, which was supported by EM-50, we could have not gotten regulatory certification to close those tanks. That tank closure saved us $150,000 per tank per year in surveillance and maintenance costs, and there are 49 additional tanks that must be closed at Savannah River.

Second, SEAMIST/FLUTe technology. This is the technology that was part of the committee's inquiry to us and has been deployed more than 10 times at Savannah River. And, additionally, we have not only deployed it at Savannah River, but we have also worked with NASA on a successful deployment at Cape Kennedy.

Finally, as these examples demonstrate, we believe we have a good record and are committed to working with DOE and with the committee to bring the best technology available to the DOE clean-up effort.

[The prepared statement of James L. Gallagher follows:]

PREPARED STATEMENT OF JAMES L. GALLAGHER, PRESIDENT, WESTINGHOUSE GOVERNMENT SERVICES GROUP

Good afternoon. I am James L. Gallagher, President of the Westinghouse Government Services Group, and I am pleased to discuss with you a contractor perspective on environmental management technology. Westinghouse operates the Savannah River Site, the Waste Isolation Pilot Plant and the West Valley Demonstration Project under contract to DOE, and we have a unique perspective as both developer and an end user of innovative technology.

Simply put, technology deployment is important to us because it allows us to meet our mission needs and our regulatory requirements, as well as save money. Our experience is showing us that we can achieve significant reduction in lifecycle costs through technology, and we can expand scope and deliver more for the taxpayer dollar.

Further, we have cast a wide net in search of those technologies that meet our specific needs. While we have had some development success on our own, we look to other DOE sites, universities, commercial industry, DOE's technology development program or any other source to supply technology to meet our mission. We have a process in place to see that this happens, and we believe we can demonstrate that our process is working.

The committee forwarded to us a list of 154 technologies that are of interest to you. At the three locations I referred to earlier, Savannah River, WIPP and West Valley, we have deployed a total of 45 of those technologies. We believe that there are at least another 113 opportunities to deploy these technologies at one or more of the three sites.

Because the Savannah River site is home to the majority of our work scope in this area, I would like to focus specifically on technology development and deployment at the Westinghouse Savannah River Company.

As I mentioned previously, the committee provided a list of 154 technologies that are among those funded through DOE's Office of Science and Technology process. The Westinghouse Savannah River Company (WSRC) has deployed 41 of those technologies (27 percent). WSRC has deployed 23 of these technologies multiple times, ranging from two to 25 deployments each. The successful deployments have included a range of applications—from the stabilization of fixed surface contamination to a process for expedited waste site characterization.

We believe there are an additional 51 technologies that may have applications at SRS; in some cases there are technologies that have two distinctly different potential applications. Others may be added to the list of potentially deployable technologies, while others still may have applications at other sites, but not at SRS. I would note that WSRC has also deployed or developed technology not included on the list the Committee is focusing on today.

From FY96 through FY98, WSRC received $45.0 million in EM-50 funding. We used that money to support university research on truly innovative technologies, development of technology in-house, and application of technologies developed by others. In our environmental restoration program alone, we believe these innovative technologies will save more than $168 million in lifecycle cost savings beginning in FY96 and beyond. That represents deployments in only one of several line programs within WSRC. We have other line programs doing similar work.

Furthermore, cost savings are not the only success measure. We can point to cases in which technology deployment has increased our margin of safety, or has enabled us to perform mission tasks that are critical to program success, such as the safe shipment of transuranic waste.

We feel there are at least four key factors that contribute to WSRC's technology deployment success:

Well defined needs—Our line programs and our laboratory personnel collaborate, and have continuously improved our ability to write accurate technical statements of technology needs. Those needs are advertised to potential vendors and other DOE sites via the Internet, and have been highlighted at Vendors' Forums that have been sponsored by WSRC and our DOE customer. At these forums, we have invited vendors in from all over the country to hear our needs.

End-user involvement—The end users of technology are involved from the beginning, from the needs identification process through technology deployment. This is not a new practice at SRS. Our Savannah River Technology Center (SRTC), the site's research and development arm, has always had a primary focus on applied research, and on solving the specific problems associated with working facilities.

Stakeholder and regulatory involvement—We keep our Citizens Advisory Board involved. At SRS, that board includes the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control. That regulatory involvement can not be overlooked; technology has to enhance our ability to meet regulatory milestones. We are fortunate to have leadership at both EPA and the state level that is interested in working with us on technology solutions.

Utilization of technical resources—The Savannah River Technology Center acts as a clearinghouse, and helps to ensure that the best resources from industry, universities and other national laboratories are utilized.

In practical application, our line organizations all have technology panels that integrate technology specialists with end users. These panels include DOE and contractor end users as well as technologists from SRTC. The panels function in two ways: (1) to prioritize program needs, and (2) to assess the maturity of commercially available technologies. When cost effective solutions do not exist, the technology panel members develop plans for the ultimate solution to the problem. In some cases the research is performed by SRTC; in other cases, DOE funding is used to seek solutions from elsewhere.

DOE encourages the promotion of technology deployment through a variety of incentives. These have included:

—Targeting performance based incentives that encourage Westinghouse and its partners to utilize new technologies;
—Award fee evaluation that explicitly includes our performance in technology management; and,
—Funding of large-scale demonstration projects that facilitate deployment of innovative or improved technologies, including items from industry and academia.

Let me cite several specific examples of successful technology deployment at SRS.

Tank Closure—At SRS, we have closed two high level waste tanks. This is groundbreaking work, the first two such closures in the nation.

As this process evolved, scientists at SRTC developed a new type of "smart" grout, a non-bleed grout technology. Without this technology, which was supported by EM-50 money, we could not have gotten regulatory certification that the tanks were closed. We estimate that tank closure saves us $150,000 per tank per year in surveillance and maintenance costs, and we have 49 additional tanks that we must ultimately close at SRS. There are many more tanks throughout the DOE complex.

SEAMIST/FLUTe—SEAMIST/FLUTe, a technology that was part of the committee's inquiry to us, has been deployed more than ten times at SRS. The company (Flexible Liner Underground Technologies, Ltd.) is a small business spinoff from a national laboratory, and the technology is an inexpensive, reliable technology for locating a particular type of contaminant (Dense Non-Aqueous Phase Liquids). We have not only deployed the technology at SRS, we have also worked in conjunction with NASA on a successful deployment at Cape Kennedy.

Drum Vent and Purge—NFT, a small Colorado company, developed a technology that removes hydrogen and volatile organic compound gases from transuranic waste drum headspace. The technology represents a significant safety enhancement, and allows us to meet the waste acceptance criteria for the Waste Isolation Pilot Plant. It is significant to note that this technology would likely not have been developed outside the DOE complex, because the DOE complex may represent its only unique application.

GeoSiphon—The GeoSiphon is a successful combination of research by SRTC combined with research performed by the University of Waterloo. GeoSiphon is a passive, in situ approach to remediation that collects contaminated groundwater into geosiphon cells, passes the water through a reactive matrix of iron filings, and discharges it to the Savannah River. The lifecycle cost savings for installing and maintaining the 12 cells is more than $19 million over conventional pump and treat units. GeoSiphon research and development was supported primarily by EM-40.

We believe the above are some of the examples that clearly demonstrate the benefits and the cost savings associated with innovative technology that we have deployed.

Our future success will depend on several factors. Many parties must continue to collaborate—end users, regulators, DOE and the research community. We must continue to document the success, both in cost savings and results, of our various programs. And, we must have an ongoing technology development mechanism that addresses those needs that are completely unique to the end users in the DOE complex.

We believe we have a good record. We are committed to working with DOE and with you to bring the best technology available to the DOE cleanup effort, and to improve our performance into the 21st century.

Mr. UPTON. Thank you. Mr. McIntire.

TESTIMONY OF LEE A. MCINTIRE

Mr. MCINTIRE. Thank you. My name is Lee McIntire, and I am the president of Bechtel National, and we do the DOE work for Bechtel. And we are not big developers of technology, but we sure use a lot of them on all our projects in 88 countries around the world, so we are very comfortable working, screening, looking at all kinds of technologies.

I just had four components that we thought was important for the success of environmental cleanup technology deployment. One is, it has to be needs driven, and I would be glad to talk about this more. It has to be, I think, be driven by the people that had the problems in the field, and Mr. Owendoff mentioned that before. I believe that it is where it needs to come from. The new technology must improve on the project baseline too. I think that it is a metric I would like to discuss in a minute, and the continuity of funding is also important, and I think you have heard remnants of that throughout the testimonies today, whether it be by the small businesses or by DOE, it is a factor in all of this. And then there has to be a partnership; overused word, but between the technology programs, the national labs, industries, small and large, and the universities is really key.

The use of new technologies is improving project baselines in all of Bechtel's cleanup assignments for DOE. Since 1994, at the Hanford site, which is a pure cleanup for us, we have screened 450 technologies that have been identified by the EM-50 and other sources. We deployed 25 of those technologies. And you might say, "Why didn't you use 450?" Well, we have screening, and that is what screening is all about, is to find ones that will solve our problems in the field. We incentivize to get these things done where we can say there are four important things. One is the safety of the people doing the work and health and safety also. We are also looking at cost savings; we are also looking at schedule savings, and we are looking at the quality of the work as our reputation depends on this holding up for decades after we do the work. So, we do screen through those technologies and find what we want. And we finally deployed 13 on the C Reactor that has probably been overmentioned today. The reason that is mentioned so much is because that is a project that is done, and that is very important.

I think a key that we all ought to remember is that the real, actual, physical cleanup of all these sites just started recently. For many years, as you know, you have seen a stack of paper on one side, the performance on the other side; that is all reversed now.

The percentage is different. So, the reason C Reactor is mentioned is because you can do all the metrics; you can study it; you can look at it; you can count it; you can measure it, and it is all done and successful, and that is why it is brought up. And it will say $23 million on the cleanup of the rest of the reactors along the river there, which is a really good idea. I also mention the original concept for the reactors was probably at a cost of over $1 billion. The original concept was to move all the reactors inland. So, it is not only technology but innovative ideas said let us get it down to what is in the low millions to do these.

I do offer three recommendations, however, that I think could maybe help. I would continue to focus on needs drive process, and I do believe EM-50 and the Department of Energy is doing that. There is a vehicle for doing that, and we are very much working on that. It has improved. There was a time when it wasn't as needs driven, but I believe, my opinion is it is improving.

Then, second, I would develop metrics that focus on the results and improvements of the project life-cycle baseline. I don't think you just want to use technology. What you want to do is have a life-cycle cost that is safe and on schedule, and so I think metrics ought to be—if I was this panel, I would push for that, and I would look at those metrics over a 2- or 3-, 4-year period and see how we are doing, how DOE is doing.

Third, I would continue to look at funding. It is a part of the whole success of this.

I think that is it. That is all I would like to say. Thank you.

[The prepared statement of Lee A. McIntire follows:]

PREPARED STATEMENT OF LEE A. MCINTIRE, PRESIDENT, BECHTEL NATIONAL, INC.

Mr. Chairman—Members of the Committee: I have been invited before you today to provide testimony on the deployment of environmental cleanup technologies at Department of Energy (DOE) sites where Bechtel has a contractual leadership responsibility for that mission.

As I am sure you are aware, Bechtel is a contractor to the DOE at many of its installations across the country, including prime contracts at the Hanford Site in Washington State, the Nevada Test Site, the Oak Ridge Operations Sites in Tennessee; and we are part of the Westinghouse team at the Savannah River Site in South Carolina. Significant portions of our assigned contract work scopes are directly tied to environmental cleanup missions, particularly at Hanford, Oak Ridge, and Savannah River. As such, we are actively involved with the DOE in determining technological needs for environmental cleanup, identifying and assessing potential technical solutions to environmental problems, and selecting and deploying those technologies and approaches that effectively answer the specific needs, prove to be most practicable, and are efficient in terms of cost and schedule performance.

Bechtel is a worldwide leader in managing complex projects and solving difficult technological challenges. To succeed in the extremely competitive business markets in which Bechtel is engaged, we must continuously develop, use, and improve upon "best commercial practices". We see technology as a pivotally essential area for the application of such practices. In fact, technology is an integral element of Bechtel's planning, project management, and work performance processes; it is not an accessory or afterthought. In a very purposeful and pragmatic sense, we seek to bring best technologies to the DOE's environmental cleanup programs.

I intend to keep my comments short. First I will describe four key components for a successful technology deployment program; then provide an overview of some of our current activities; and end with a few recommendations.

KEY COMPONENTS FOR A SUCCESSFUL PROGRAM

Technology activities must be driven by project technology needs.

Technology use must be driven by the needs of the field projects; this is essential to a successful technology program. Technology must solve a problem and result in

improved project performance. Simply deploying the latest concept or device is not sufficient and will not result in a successful program. The field project (or "problem holder") understands the objectives, requirements, and needs of the project, and is responsible for the resources to accomplish those objectives. Performance is then measured by how effectively those project objectives are accomplished.

If use of new technologies or innovative approaches best fit a project's needs, then they will be effectively used and deployed. To have a set of technologies to draw from, there must be an effort to forecast these needs, then apply resources—either public or private—to their development, such that they are available for the problem holder when needed. This clearly requires an integrated effort throughout the field of possible users.

Currently the field projects identify, document, and communicate their requirements by preparing technology needs statements which are then formalized through the Site Technology Coordination Groups (STCG), and distributed to the DOE Office of Science and Technology (EM-50), and to industry. The technology needs statements provide a clear understanding of what type of technology is needed—and when—and allows EM-50, National Laboratories, industry, and universities to work towards providing solutions.

Identified technologies are screened by the field projects to ensure that they are applicable to the priority needs as documented in the technology needs statements. Those technologies that are applicable are further evaluated with regard to technical adequacy, safety, cost, and schedule impacts. This disciplined process focuses the limited resources of the project.

New technology must improve on the baseline.

Good project organizations develop baselines to guide their efforts and to gauge their performance over time. A project baseline is an estimate of the cost and schedule to complete the defined scope of work using best commercial practices. Project teams look to improve the baseline through whatever means possible, including the use of new technology or innovative approaches. If the new technology or innovative approach cannot improve the cost, schedule, safety, or quality of the project, then it should not be used. Likewise, the benefits from new technologies must exceed the costs invested for full deployment.

New technologies require demonstration, testing, new procedures, and training before they can be fully implemented. It is our experience that the DOE EM-50 program is providing the vehicle for that effort. Without some means of demonstrating the anticipated effectiveness of new technology—meaning, providing some form of verification of the value of the technology—it becomes difficult, if not impossible to encourage its deployment and use. This is particularly so when those that are being encouraged to use the technology are being rewarded for successful performance.

Continuity of funding is needed that is consistent with project schedules.

Funding to support deployment of new technology must be provided consistent with the identified needs of the projects it supports. Delayed or inconsistent funding will hamper the time needed to develop, demonstrate, and deploy new technologies, and may result in failure to achieve anticipated cost savings forecast by technology roadmaps. Funding delays may even result in increased project costs.

I understand the difficulty in doing this, as budgets are developed well in advance of when funding is provided to the field, but having the technology available for use at the right time is critical if we are to not only meet project schedules, but realize possible savings that would result from their use. Perhaps "stability" in funding for technology development is at least achievable; then allowing the planning that is necessary to help assure the right alignment between development and deployment.

Partnership between DOE technology programs, National Laboratories, industry, and universities is key.

To achieve maximum success in the technology arena, multiple sources of technology—that have progressed through a development phase and some level of demonstration or validation—are required. This is where the DOE Science and Technology (EM-50) program provides value. By further partnering with the National Laboratories, universities, and other industry sources, the potential sources of available technologies expand.

As I mentioned earlier, new technologies often require some time before they are fully mature and ready for deployment. Where industry owns or develops those technologies, DOE can access them through their procurement process. Where such technologies do not exist or have limited application (not commercially viable) the DOE Science and Technology program, in cooperation with the National Laboratories and others, can provide needed support to technology development and demonstration.

This partnership is successfully working at Hanford and Oak Ridge, where DOE and Bechtel partner with Pacific Northwest National Laboratory (PNNL) and Oak Ridge National Laboratory (ORNL) to help identify, evaluate, and develop technologies. Other DOE sites use similar approaches.

OVERVIEW--PROGRESS IS BEING MADE; BASELINES ARE BEING IMPROVED

Now let me back that up with some examples:

Hanford Technology Deployments.

Over the past several years at Hanford, the Bechtel team has screened over 450 technologies identified from EM-50 and others for applicability to its environmental restoration (ER) scope.

Since 1994, the Hanford ER program has deployed 25 new technologies. In addition to vendors responding directly to the published technology needs statements, the Bechtel team proactively searches for potential technology solutions through continuing interaction with the DOE's technology focus areas, industry contacts, and technology meetings. The C Reactor Interim Safe Storage (ISS) Project is a good example of how this process works. The project involved extensively reducing the "footprint" of an old deteriorating reactor complex and placing the reactor's core in a safe, inexpensive to maintain condition.

The C Reactor Project was jointly supported by EM-40 and -50 as one of DOE's first Large-Scale Demonstration and Deployment Projects. One reason for the success of technologies deployed on this project was that EM-50 technology support was integrated into the project planning at the project's inception. As a result of that approach, the C Reactor ISS field-demonstrated 20 innovative technologies, with 13 of those technologies being selected by the project for deployment. To be selected, the technology demonstration was required to confirm that deployment would provide improvements to the project baseline (cost, schedule, safety, and quality). Applying these improved technologies at the seven remaining Hanford reactors is projected to result in savings of at least $23 million.

The technologies deployed at the C Reactor ISS are also applicable to hundreds of other similar facilities throughout the DOE complex, at other government sites, and in commercial industry. Some of these technologies are being deployed at the Ukraine's Chernobyl reactor.

Another opportunity for technology deployment currently being pursued at Hanford is the Canyon Disposition Initiative (CDI) Project, which is evaluating alternatives for disposition of five massive chemical processing facilities. There is a potential cost savings of one billion dollars if these former processing plants can themselves be utilized as low level waste disposal facilities instead of subjecting them to costly structural decontamination, demolition, and disposal. Obtaining regulatory concurrence for alternate use of these highly contaminated facilities for waste disposal will require improved technology to support characterization, and to demonstrate long-term environmental acceptability. Bechtel's team is currently partnering with EM-30, -40, and -50, and with other Hanford contractors to provide technology support in the characterization of a test case canyon facility, Hanford's U Plant.

Oak Ridge Remediation Technology Results.

Deployment of innovative technologies to reduce cost and accelerate schedule is a key element of the Bechtel Jacobs Company, LLC, environmental management and integration (M&I) contract at the Oak Ridge Operations Sites.

The M&I approach was initiated in April 1998, so most of the Oak Ridge results are carryovers from the traditional management and operation contracting approach. Over the past eight years in Oak Ridge operations, over 80 innovative technologies have been deployed. Examples of these, jointly funded by EM-40 and -50, include Borehole Miner, Pulsair Mixer, and Modified Light Duty Utility Arm for tank remediation; and Soil Freezing Technology, and Passive Reactive Barriers for treatment and control of subsurface contaminants.

Cost savings gained from innovative technology deployment are evident in the underground tank remediation projects underway at Oak Ridge National Laboratory. A suite of technologies designed to assist with the cleanup of underground radioactive waste tanks have been developed and deployed by Bechtel Jacobs in support of these projects.

Confined sluicing is utilized as a technique to clean Gunite and Associated Tank (GAAT) internal walls, and to break up and retrieve hard sludge deposits without introducing excessive amounts of additional water. Robotic arms designed for large vertical tank configurations have been effectively deployed for in-tank operations, including handling and control of sluicing, sampling, and pipe cutting and plugging

tools. Remotely operated vehicles have proven invaluable in support of in-tank cleaning operations such as tool handoff to robotic arms, breaking up hard floor sludges, and physical movement of sludge piles for retrieval. Overall, the use of these technologies will accelerate the GAAT cleanup schedule by eight years and result in an estimated cost saving of $112 million.

Savannah River Site Successes.

As part of the Westinghouse Savannah River team, Bechtel also provides assistance with environmental activities at the site. Those have been (or, will be) covered in more detail by my fellow panelist from Westinghouse.

I would, however, like to mention in summary that over the past three years the SRS ER program has successfully achieved 38 innovative technology deployments, saving approximately $168 million in projected lifecycle costs. Examples of these innovative deployments, which were jointly funded by EM-40 and EM-50, include Barometric Pumping/Baroball, In-Well Vapor Stripping with Recirculation Wells, and In-Situ Chemical Oxidation using Fenton's Chemistry. These technologies are utilized for the cleanup of contaminated groundwater.

RECOMMENDATIONS

Progress has been made in the use of technology resulting in improved project baselines. To continue to improve the process I would offer the following recommendations:

First—Continue to work towards a needs-driven process and align technology funding with projects' technology needs.

It is necessary for technology funding to be closely aligned with the priority technology needs of the DOE environmental cleanup projects. In order to be successful in utilizing technology to accomplish improved cleanup results, support from EM-50 through its focus areas must be strongly tied to field projects and to solving the problems specifically identified by those projects. What is needed are pragmatic and timely scientific and technological solutions. We support the changes that are currently underway in the EM-50 program, which are intended to improve continuity of funding and place sharper focus on solving problem-holder needs.

Second—Develop metrics that focus on results and improvements to the project lifecycle baseline.

DOE's EM-50 and EM-40 Programs should develop an improved set of metrics to measure program success. These metrics should include cost savings, schedule acceleration, problem resolution, and risk reduction. Simply counting technology deployments does not provide an adequate picture of technology's impact on the process.

Third—Place appropriate responsibility and accountability in the Science and Technology program, and in the field with the project performers.

The DOE Science and Technology program must be oriented to provide solutions that meet science and technology needs identified by field projects; and these solutions must be capable of being deployed by the field project organizations. The program's success should be measured against its effectiveness in providing workable and cost-effective solutions in answer to the identified needs.

IN CONCLUSION

In my judgement, the process is improving. Is there more room for improvement? You bet—and we all have both the responsibility and accountability to do so. But now is not the time for a major upheaval in the process, or a significant cut in the funds that support this effort. I would recommend continuing to support the program, but also continuing to insist upon real progress and measurable results.

Mr. UPTON. Thank you very much. Mr. Card.

TESTIMONY OF ROBERT G. CARD

Mr. CARD. Mr. Chairman, members of the subcommittee, thank you for the opportunity to testify this morning.

My name is Bob Card, and I am the president and CEO of Kaiser-Hill Company. The company has been the management and integration contractor for DOE at their Denver area Rocky Flats site since 1995, and understanding the site mission at Rocky Flats is fundamental to discussion of technology deployment.

Rocky Flats is a closure project. Closing the site safely, cost effectively, and quickly is our only mission. Accomplishing this mission will, in turn, enable Congress and the DOE to reallocate nearly $700 million per year of budget resources to address long-term and technologically complex challenges, such as the Hanford tanks.

In moving toward our goal, last Friday, we released our detailed project baseline to accelerate closure to 2006. This baseline shaves over $30 billion and 50 years from DOE's 1995 estimates produced just prior to our contract signing. This aggressive short-term cleanup focus means that we are looking for technologies that will help us achieve our goal safer, better, cheaper, and faster than the way we currently do the work. They must also be implemented before the problem they were supposed to solve has already been taken care of, which is a very short time cycle at our site compared to typical deployment and development timeframes.

When technologies come across our desk that meet these objectives, Kaiser-Hill aggressively pursues them. However, technology is just one of the main tools we use to reach our goal of accelerating site closure. From a technology perspective, Rocky Flats is fortunate in that our closure challenges are management and systems integration rather than technology development. While the challenges we face are certainly daunting, we do not have the long-term technological problems that exist at some of the major DOE sites. We are not aware of any insurmountable technology hurdles to accomplish the site's cleanup.

That notwithstanding, the deployment of existing technologies developed for different applications, however, is important to closing Rocky Flats. We actively search out these deployment opportunities, and we use our Vendor Response Program to help screen and deploy these and unsolicited technologies. This program is designed to help overcome previous vendor relationship weaknesses. It helps technology vendors match their technologies to specific needs we have identified at Rocky Flats. As a result, the vendors save time and money by having more detailed information about what the site needs.

I want to say, the Office of Science and Technology is a valuable partner.

I am going to conclude my testimony there. Thank you.

[The prepared statement of Robert G. Card follows:]

PREPARED STATEMENT OF ROBERT G. CARD, PRESIDENT AND CEO, KAISER-HILL COMPANY, LLC

Mr. Chairman and Members of the Subcommittee, I want to thank you for the opportunity to testify this morning. My name is Bob Card, and I am the President and Chief Executive Officer of Kaiser-Hill Company, the management and integration (M&I) contractor at the Rocky Flats Environmental Technology Site (RFETS, or "the site") in Denver, Colorado. Kaiser-Hill was awarded the contract to manage the site on April 4, 1995, and operates under one of the first significant performance-based contracts offered by the Department of Energy (DOE).

I realize contract reform has been a major concern of the Commerce Committee over the past several Congresses, and I am pleased to say that the reforms envisioned by this Committee are being realized at Rocky Flats. While I would love to spend some time providing you an update on the progress Kaiser-Hill has been making at the site, I will confine my comments to the issues before the Subcommittee today.

OVERVIEW

Rocky Flats is located next to the foothills of Colorado's Front Range, about 15 miles from downtown Denver and within a major metropolitan area of nearly 2.5 million people. From 1952 to 1989, it was the primary manufacturing facility of plutonium "triggers" for our Nation's nuclear arsenal. Rocky Flats was also a major facility for the production of other nuclear weapons components.

In 1989, the site abruptly halted its production mission, and since 1992 its primary responsibility has been to clean up and close down. This mission has been complicated by the manner in which production operations were terminated. In 1989, DOE did not anticipate that the site would permanently cease operations. As a result, production processes were left in mid-stream—much like workers leaving for a lunch break, except in this case the lunch lasted about six years. Weapons components, scrap materials, waste, and hazardous chemicals were all left in production lines or areas and configurations not designed for long-term storage.

When Kaiser-Hill was awarded the M&I contract in 1995, the Department estimated the responsible cleanup and shutdown of Rocky Flats would require 65 years and over $37 billion. Since that time, Kaiser-Hill and DOE have compressed this schedule to a proposed 2010 closure at just over $7 billion—a savings of 50 years and nearly $30 billion for U.S. taxpayers. This accelerated work will provide the *same outcome*—the same ultimate level of protection for human health and the environment—with reduced risks for workers due to the shorter overall length of time involved in the cleanup effort.

Kaiser-Hill has accomplished this by two means: an aggressive acceleration and compression of the cleanup schedule, and a detailed management plan streamlining nearly every aspect of site operations. Since 1995, Kaiser-Hill has cut nearly $100 million—about ⅙ of the annual site budget—from overhead and support costs. Nearly 6,000 main contractor employees were at the site in 1995, and Kaiser-Hill has sliced this number in half. In the environmental remediation and waste management areas, Kaiser-Hill is saving an average of over $150 million each year, compared to DOE's original cost estimates, through efficiencies and innovation.

One of the more exciting events we've had at Kaiser-Hill is the release last week of the detailed project plan mapping out our strategy to close Rocky Flats by 2006—shaving an additional four years off the accelerated 2010 schedule. Using lessons learned over the past four years and a forward-looking management approach, we feel that the 2006 schedule, while very, very difficult, is an achievable and worthwhile target.

Accelerating the schedule requires Kaiser-Hill to do three things exceptionally well. First, and most importantly, we must conduct every single work activity safely. A strong safety margin is critical to achieving an accelerated closure. Second, we must execute our responsibilities with appropriate safeguards and security controls. Safeguards and security is a crucial issue given the significant quantities of special nuclear materials at the site. Third, Kaiser-Hill must continue to increase cost efficiencies at the site. Accelerating the closure depends on our ability to cuts costs, produce savings, and redeploy those savings into other closure activities.

We have been successful in each of these categories. In safety, we have seen a 30 percent across-the-board increase in key safety performance areas since taking over in 1995. This includes a 58 percent reduction in nuclear safety rule violations, and a 57 percent improvement in the lost workday case rate. The security and safeguards area has seen similar improvements. For the last two years, Rocky Flats has received DOE's highest rating for the overall status of its safeguards and security program. The site has been aggressive in securing both the advanced hardware and software needed by our forces to ensure a strong security posture. The results have been seen in the site's force-on-force exercises, in which elite military units attempt to infiltrate Rocky Flats and gain access to its special nuclear materials. In every case, the attack test results support the adequacy of the site's security response. In the cost efficiency area, we have also seen great success. In FY98, Kaiser-Hill was able to put $40 million into unfunded cleanup work by generating savings in other activities. In FY99, efficiency gains in other site operations will hopefully allow us to allocate a similar amount for additional unfunded cleanup work. The ability to realize these savings, and refocus them on cleanup activities, is a critical component of the 2006 closure strategy.

KAISER-HILL'S TECHNOLOGY APPROACH

This background is important to the discussion of how technology is used at Rocky Flats. The site has some fundamental differences separating it from most major sites in the DOE complex. First, Rocky Flats is focused on short-term closure. Second, while the challenges we face at Rocky Flats are unique and quite complicated,

we do not have technical and environmental problems as extensive as some other DOE sites—nothing as physically large as the Hanford tank system, for example, or the Oak Ridge groundwater remediation challenges. Third, we have not yet identified any insurmountable technological hurdles to accomplishing the cleanup of Rocky Flats. Most of the technology we need at the site we can either pull off-the-shelf, or we have been able to adapt to the site's needs through creative problem solving.

Rocky Flats is a construction site, not a laboratory. Our responsibility is to safely clean up and demolish about 700 structures and just over three million square feet of building space. While constantly seeking ways to operate more safely, accelerate schedule, and cut costs, we need tools that will work in a productive environment *today*. Kaiser-Hill is eager to incorporate new technologies at the site, but these must deliver immediate, cost-effective results. As a result, we take a very practical approach to technology deployment at Rocky Flats.

Some of the technologies being used at Rocky Flats are very cutting edge. One of the most significant examples is the Standard Waste Box (SWB) counter we will begin using next year. This device measures the total radioactivity inside SWB containers without having to open the box. These measurements are necessary to qualify the SWB for disposal at the Waste Isolation Pilot Plant (WIPP), and are an important component of safeguards and security in determining the total amount of radioactive materials in the container. However, a counter to accurately and quickly assay the radioactivity in the container has never before been deployed. The SWB counter incorporates several different technologies into one unit, and is a first-of-its-kind technology for the DOE complex. Kaiser-Hill identified the need, is getting the necessary technology on line, and, thus, has helped pioneer a solution for the rest of the complex. The site estimates that this single set of technologies will enable a fourfold improvement in safety and time for the takedown of contaminated equipment destined for WIPP and a sevenfold decrease in the amount of paperwork going to WIPP.

There are decidedly low-tech innovations at Rocky Flats as well. For example, one of the site's most recent technological innovations was redesigning "bag-out" bags to incorporate filters to release non-hazardous gas buildup and to change the bag and gaskets/seals materials used in bag construction. These bag-out bags are the inner layer of the radioactive contamination packaging system used for much of Rocky Flats' waste. These simple technology fixes allow four times greater quantities of combustible waste material to be packaged per bag, which reduces the number of shipments of this material to WIPP, and provides a better seal—a more secure environment—to contain the radioactivity than previous bag designs. The end result is that U.S. taxpayers will save more than $20 million over the life of the Rocky Flats Closure Project, and employees involved in the cleanup work will see a significantly greater safety margin in the packaging process.

Other technology deployments at Rocky Flats are outside the area of environmental technologies, but are equally important to achieving the mission of the site. Safeguards and security is a good example. The classified nature of the radioactive materials at Rocky Flats demands a strong commitment to proper security. A recent deployment at the site is the Ion Trap Mobility Spectrometer, which can quickly detect and identify explosives or chemical agents attempting to be smuggled onto the site. This technology provides a quicker, more accurate analysis of possible contraband than previous technologies and is one of the many ways in which we have upgraded security at the site.

Another important non-environmental deployment area is in information technologies. Kaiser-Hill uses a unique integration of commercially-available computerized planning, management, and database software, including the Basis-of-Estimate Software Tool (BEST) cost estimating system and the Primavera Project Planner (P3), which provide detailed and logic-driven management planning. These and other tools allow us to track activities at Rocky Flats for tangible progress, allowing Kaiser-Hill to "de-bottleneck" and integrate activities to ensure the maximum beneficial use of the site's resources. Proper activity planning is critical to success at Rocky Flats, and information technologies are a vital component of Kaiser-Hill's planning process.

TECHNOLOGY OBJECTIVES AT ROCKY FLATS

Technology objectives at the site are fairly simple: a new technology must provide results safer, better, cheaper, faster than the technology we are currently using. In order to achieve these objectives, Kaiser-Hill has established a straightforward method of assessing and deploying new technologies at Rocky Flats.

Integral to this is an understanding of how activities are conducted at Rocky Flats. Every individual project at the site supports the overall goal of closure. Technology is but one component of the project as a whole, and it is the coordination of all activities that moves Rocky Flats to closure. There is little room in the schedule for error.

The project approach at Rocky Flats puts a great deal of responsibility into the hands of line managers—the men and women actually performing the cleanup work. From line operations management, to subcontractors, to project managers, each person is responsible for meeting performance metrics: worker safety, budget, and schedule.

Under its contract with DOE—and embodying the contract reform principles sought by Congress and this Committee—all members of the Kaiser-Hill team are incentivised to increase safety, ensure proper security and safeguards, reduce costs, and accelerate the schedule. To the extent that new technologies can assist in accomplishing these objectives, they are aggressively pursued at the site. Technologies must be fully deployable before they are used, and must have a fairly high worth-to-risk ratio.

DEPLOYMENT PROCESS: TECHNICAL PLANNING AND INTEGRATION ACTIVITIES

Since line management has the primary responsibility to accomplish the work safely, on time, and on budget, they have the lead role in identifying roadblocks to progress in work activities, and assessing the role new technologies can play in successfully executing work. To assist in getting technology deployed where it belongs, Kaiser-Hill operates several proactive technical programs to identify and assess potential new technologies. These programs are used by Kaiser-Hill to support operations and to support technology vendors.

The Planning and Integration (P&I) organization works with operations at the management and project levels to develop the closure strategy for the site and to integrate individual project plans into an overall Closure Project Baseline. P&I also works with the line program and project managers to package and integrate technical innovation in their project activities. There are several elements to the P&I approach:

a) Technology "what if" scenarios are run to determine how life cycle costs, resource allocations, schedules, and other aspects of a technical innovation would affect the critical path, overall closure schedule, and program and project budgets. This activity determines where the most promising "breakthrough" opportunities are.
b) Programmatic Risk Assessments are conducted at the detailed project activity level to identify those activities with technical, scope, cost, and schedule uncertainty, and to isolate those activities that could become bottlenecks. Where an improved technology is needed or foreseen, P&I and line managers develop a path forward and engage potential vendors and service providers to prepare an appropriate procurement. Multiple options or paths forward are often pursued until the point at which an optimal technical approach is decided upon.
c) Project plans prepared by the line organizations are scrubbed by P&I for scope, Work Breakdown Structure (WBS) logic, schedule, cost, and technology. One of the most effective ways to integrate technology is to build it into projects at the beginning.
d) Candidate technologies are screened and evaluated using performance-based selection criteria: guarantees on commercial terms; reduction of cost, schedule, and/or risk; compliance with performance or regulatory milestones, and other requirements; creation of options; provision of versatility and practicality; and consistency with mandates for off-site treatment and easy shutdown/closeout, so that the means of achieving a clean end-state do not themselves pose hurdles to getting there.
e) Commercial candidates meeting the Site criteria need to be qualified, recast in the specific terms of the relevant project activity, adapted into the needed technical service, and approved and/or permitted on a time line that fits the project schedule.

There have doubtless been occasions on which vendors have felt that their technologies have not been given every due consideration for deployment at the site. To give vendors an opportunity to present and demonstrate their technologies at Rocky Flats, Kaiser-Hill has established a Vendor Response Program. This program assists technology vendors in focusing their offering on the specifics of a needed application at the site so that scheduling, costing, performance metrics, and commercial terms can be quickly addressed, and teaming with a service provider can be facilitated. With this focus, both the vendor and the site save time and money. A mismatch can

be quickly identified, and the site benefits from a higher capture rate with those technologies that truly meet the needs at Rocky Flats. Once a fit at the project level has been determined, the project manager and project engineers assist the vendor, as described above, to ensure success in terms of the required project performance measures. The P&I and Procurement departments serve as a coordinated entry point for technologies at RFETS.

The Kaiser-Hill team subcontractors executing projects are the actual technology end-users. In most cases, the subject matter experts reside in the line organizations and are frequently in direct contact with vendors in their respective fields of expertise for information relevant to a specific project activity. Those project managers, engineers, and workers who are most likely to realize gains are motivated by the performance terms of the contract to invest the resources required to integrate technology into their operations.

DEPLOYMENT PROCESS: TECHNOLOGY OPERATIONS

In addition to the individual project initiatives, there are several technology initiatives run by the line and operating organizations that are designed for the common benefit of all projects or a specific group of projects. There are a number of these initiatives functioning at any given time. They include:

a) The Decontamination and Decommissioning (D&D) Technology Steering Committee, which reviews needs and vendor offerings for D&D work, recommends applications, and qualifies vendors as needed;
b) The Non-Destructive Assay (NDA) Team, which reviews needs, vendors offerings, and supports development and qualification of technologies needed to characterize and certify wastes for shipment;
c) Value Engineering Teams, which evaluate technical options and benchmark technologies, performance capabilities, etc.;
d) Process Improvement Teams, which review and/or develop processes and procedures for work activities at the site (e.g., radiological survey and disposition of property, criticality reengineering);
e) Engineering Quality Assurance (QA), which reviews engineering designs for safety, compliance with various codes, cost effectiveness; and
f) The ALARA (As Low As Reasonably Achievable) Center, a clearinghouse for technical information and demonstrations of technologies having the potential to reduce worker radiation exposures.

Initiatives like these may be on-going, or in some cases ad hoc and terminated when their mission is completed, while new ones are started up to resolve an identified problem that is common to several projects. They are staffed by subject matter experts drawn from the projects themselves—again, using the expertise of those men and women actually doing the work at Rocky Flats.

To ensure that the site is being exposed to a full range of the technology options available in today's marketplace, the Kaiser-Hill team regularly participates in conferences to communicate needs and business opportunities to the technical community. Additionally, qualified vendor technology demonstrations occur regularly at Rocky Flats, sponsored by one or more interested project managers or subcontractors.

NEEDS AT ROCKY FLATS AND THE ROLE OF DOE-FUNDED TECHNOLOGIES

As the closure effort progresses, Kaiser-Hill continues to discover new opportunities for technology deployment. Again, these technology needs are driven by our primary deployment objectives: to accomplish the closure of Rocky Flats safer, better, cheaper, and faster. Some of the areas in which we are seeking additional improvements include:

a) in situ and stand-alone size reduction and contaminated equipment removal;
b) survey and measurement of contamination and special nuclear materials (SNM), both in situ and in containers;
c) characterization and decontamination of equipment and buildings;
d) detection and control of trace quantities of plutonium in soils and water; and
e) business processes, such as waste container management, content certification, and computerized documentation of materials to be shipped off-site.

The Department's Office of Science and Technology (OST) is the front-line organization providing technology support at DOE sites. OST addresses the technology needs of the complex over the long term. This reflects the lengthy schedules for cleanup at most sites. However, due to the accelerated closure schedule at Rocky Flats, technologies that may well fit the scope of work here cannot be used simply because they do not fit the project deadline. Other categories of technologies that have only a limited potential for use at the site are groundwater remediation tech-

nologies and waste treatment technologies. There are major groundwater contamination problems at some DOE sites, and many OST technologies are focused on this particularly vexing issue. Rocky Flats is fortunate not to have significant groundwater contamination problems. The site is using passive systems for remediation, and this OST-supported approach looks promising for other applications.

Regarding waste treatment technology, Rocky Flats is planning to ship a significant percentage of wastes to other DOE and commercial sites for treatment and disposal, and thus looks to those other sites for deployment. This obviates the need for certain technologies at Rocky Flats. The Savannah River Site, for example, plans to process plutonium metals and oxides and some of the plutonium residues in the Rocky Flats inventory. The Oak Ridge Reservation has already treated some of the site's hazardous wastes. Rather than spend time developing new technologies at Rocky Flats to treat each specific waste stream, we are depending on other sites to engage in this activity. Again, these other DOE sites do have a continuing mission in the complex, and the development of these treatment and processing technologies is an appropriate role for them. For these sites, the role of OST in supporting longer-term activities would appear to be a wise investment.

Another OST area paying off at Rocky Flats is the leveraging of funds from the Accelerated Site Technology Deployment (ASTD) and other Focus Area programs. These programs have prompted the use of certain technologies at the site that were on the edge of commercial availability. In Fiscal Year 1998, the site received $2.9 million from OST, and we expect that a total of about $3.65 million in OST funding will be allocated at Rocky Flats in Fiscal Year 1999. While the amounts are not large relative to the overall site budget, they have a significant impact "on the margin" in planning specific activities.

TECHNOLOGY DEPLOYMENT AT THE SITE

A sampling of some of the specific work activities at Rocky Flats is helpful in describing the range of technologies the site uses to accomplish these activities. Again, it is important to remember that at Rocky Flats, technology deployment is not an end in itself. Technology simply provides tools to get the job done. In most cases, the site identifies the need: for productivity increases, for additional worker protection, for solutions to technical problems, or for less costly methods of conducting procedures. Once that need has been analyzed, an appropriate technology solution is applied to the problem. In many cases, addressing a need in one area produces benefits in the others.

Size Reduction: Remote Operated Systems, High Efficiency Tools

Process equipment from weapons production includes gloveboxes, tanks, chemical reactors, furnaces, machine tools, and pipe, valve and duct work. These materials, contaminated both radiologically and chemically, are to be stripped out of all buildings by cutting and packaging for off-site disposal. Current technical approaches include metal saws, nibblers, chisels, etc.; workers in very cumbersome protective clothing; complex air/fume controls; alarm systems; and direct contact with sharp pieces of radioactive metal. This can be very dangerous work. Many innovations in workspace design, equipment handling, and cutting techniques have been made, yet accomplishing a safer and less-costly acceleration of site closure still requires order-of-magnitude technology improvements. The Kaiser-Hill team is now instituting remote operated robotic work stations; containment/ventilation/filter systems; and efficient hydraulic, torch, and possibly laser cutters. These technologies will enhance productivity by making the work much safer for the employees, and result in greater work efficiencies. OST has provided leveraging funds for the first stand-alone dual robotic platform (in Building 776), advanced hydraulic and torch cutters, a torch-head fume control system, and design of a high-throughput central station concept. These advances will have a dramatic impact on worker safety at Rocky Flats.

Characterization of Equipment and Buildings: Survey Instrumentation

Characterization consists of the instrumentation, mechanics, and data management systems for measuring, mapping, and documenting radiological and chemical contamination. All process equipment and building components must be characterized: first for work planning, then for monitoring work progress, and finally for work release and property release. The requirements differ for all three stages, and the definition of what constitutes adequate characterization is a regulatory issue. The Kaiser-Hill team is pursuing technical improvements on all these fronts. For example, systems engineering analyses showed that decontamination could be avoided and disposal simplified in many cases by segregating transuranic (TRU) wastes from other low-level waste materials. These case-method decision models portend

enormous cost savings throughout the DOE complex. The DISPIM (Decommissioning In Situ Plutonium Inventory Monitor TM) neutron-gamma system recently deployed in Building 771, with OST cost sharing, provides an image that displays the radioactive contamination inside gloveboxes and tanks. With this information, workers can plan the cutting so as to minimize exposure and maximize the packaging of TRU-level pieces of process equipment to be disposed at WIPP, while the low-level waste can then be packaged and disposed at a much reduced cost at other facilities. Also, the SCM/SIMS (Surface Contamination Monitor and Survey Information Management System) system is being used to characterize entire walls in Building 779 where equipment has been stripped out. This system scans the walls automatically and identifies "hot spots" for concrete removal work. The SCM/SIMS combines both conventional detectors and high sensitivity proportional counters; it was demonstrated at other sites with OST support before Kaiser-Hill acquired it through a commercial service provider.

Airborne Contamination Control: Fog n' Fix

Airborne radioactive contamination levels in some rooms are so high as to preclude human entry for more than a few minutes—even with the most protective supplied breathing air suits. These so-called "infinity rooms" required a work/support team of a dozen people for a single entry to drain process pipes or perform decontamination activities. The site has deployed a combination of a sugar/glycerin fog called Capture Coating TM, a fluorescent dye called Invisible Blue TM, and a polyurea coating called Insta-Cote TM to capture and contain airborne radioactivity. Insta-Cote TM is an OST supported technology. The radioactive particles are settled out on room surfaces by the aerosol, after which a spray-on flexible plasticized layer is applied to enable workers to walk and work in the room without resuspending the particles. Air contamination levels are reduced at least ten- to a hundred-fold, resulting in much safer and faster work at significantly reduced cost. Additionally, the size of the work/support crew is reduced to four people, allowing more efficient use of employee resources. The performance of the fog has prompted other applications at RFETS. Its dispersive characteristics are superior to most fixatives and its adherence to surfaces makes it a candidate for coating process equipment of all kinds prior to size reduction.

Multi-Purpose Containers: Pipe n' Go

Residues from weapons production processes contain plutonium and associated americium in amounts that require special handling, radiation shielding, and disposal at WIPP. In addition, the closure baseline specified stabilization treatment processes for over 50,000 kilograms of ash, salt, and combustible residues before they could be packaged and shipped. Setting out to design a radiation-protective package, the Kaiser-Hill team ended up developing a complete storage/shipping/disposal container system called the pipe overpack component. This pipe system is so robust with respect to safeguards and hazard conditions that it has since been certified by regulators for the shipping and disposal at WIPP of the majority of the site's residues without prior stabilization and with greater quantities of plutonium than previous drum packaging configurations. As a result, worker risks are dramatically reduced, costs associated with residue treatment are avoided, and the number of shipments to WIPP is reduced by at least a factor of four. This significantly extends the capacity of WIPP to accept TRU wastes from other sites. Further, all sites in the DOE complex can capitalize on the pipe component technology.

Groundwater Treatment: Passive Reactive Barriers

Conventional groundwater remediation techniques involve active processing by recovery, physical-chemical and/or biological treatment, and recharge or surface water discharge. Cleanup typically takes decades. Closure by 2006 requires that servicing requirements for systems be minimized, and a passive technology was needed that would meet the water quality cleanup requirements for the site. The geology at Rocky Flats is such that contaminated groundwater plumes seep to the surface at a finite number of locations, where they can be confined and funneled to discrete "reactors." These reactors are, in effect, sumps filled with appropriate reactive media designed to render the water safe for discharge. Discharge monitoring and occasional media change-out are the only long-term requirements. This technological approach has been promoted by OST and two deployments have been co-funded by the Office. One is treating a plume contaminated with plutonium and volatile organics. A second system, using an alternative medium, is now being installed to treat uranium and nitrates. Instead of pumping and processing tens of millions of gallons of water over the coming decades at the site's water treatment plant, the plant can be shut down and removed at great cost savings. The water will continue

to be collected by gravity and treated passively until its hazardous constituents are eliminated.

Shipping Certification: Non-Destructive Assay

Materials assay is a little recognized but critical component of the cleanup process, as accurately measuring the amounts of material being transferred or disposed is not only an environmental issue, but an important nuclear safeguards issue as well. All wastes must be characterized and the containers documented/certified for acceptance by the appropriate disposal site, such as WIPP or the Nevada Test Site. With regard to radiological content, the amount of each isotope must be assayed to specified accuracy. To minimize exposure, assay methods are employed that do not require the container to be opened and waste samples extracted for laboratory analysis. Quantities are determined by counting decay events and/or heat release through the container surface. Computational models of the physics are needed to correct the measurements for internal shielding or interference by the waste itself. Such methods, while safe, have not been able to meet site needs for the high throughput rates and large dimension containers needed to stay on track with an accelerated closure schedule. In Fiscal Year 1997, the Kaiser-Hill team pushed the technology envelope with a competitive procurement for a WIPP-certifiable drum counter on pay-for-performance terms. A commercial firm succeeded in meeting the specified throughput rate. The next quantum step was to count SWB loads for shipping. The SWB is ten times larger than a drum, which greatly reduces the worker risk, time, and cost of size reduction, yet magnifies the engineering challenges and cost of counting and certifying the Box's radioactivity content. With OST co-funding, the site is again pushing the technology envelope by developing a Box counter that exceeds current commercially offered specifications in sensitivity and throughput rates. This system will be completed in Fiscal Year 1999, certified in early Fiscal Year 2000, and commercially released for deployment complex-wide at that time. In addition to the advantages in terms of size reduction work, the Box counter will cut the high costs of WIPP certification for radioactive-contaminated equipment sevenfold.

CONCLUSION

Technology deployment has been, and will continue to be, an important component of enhancing worker safety and nuclear safeguards, increasing productivity, and realizing cost efficiencies at Rocky Flats. The site's partnership with OST has provided leverage to deploy some of the innovative solutions we need to accelerate the cleanup work at Rocky Flats. OST is one of the many ways in which we seek out and use technology at the site.

The pay-for-performance nature of the DOE/Kaiser-Hill contract at Rocky Flats provides the fundamental incentive for us to aggressively pursue technical innovation, and the DOE employees of the Rocky Flats Field Office have proven to be skillful in linking performance measures to those activities that will provide the greatest return on investment—those most likely to accelerate the closure date. Since the site closure takes a project approach, and performance measures are tied to the critical path and to safety, project managers are incentivized to employ innovative technology to complete their projects on schedule and on budget. There are further incentives in the contract to exceed these objectives—to come in ahead of schedule and under budget. From this standpoint, technology is not only a method to reaching a specific project ends, but it is also a means to accelerating closure.

The overall result of performance-based contracting at Rocky Flats is that the Kaiser-Hill team has reduced the estimated cost of cleaning up Rocky Flats from about $37 billion when the contract was initiated to about $7 billion under the current plan, without changing the end result. Technology has made and will continue to make an important contribution to safety and productivity at Rocky Flats. Since much of the technical work at RFETS is being done for the first time anywhere and under an accelerated schedule, the technology integration process is a necessarily dynamic and interactive activity. The results are helping steer the Rocky Flats site toward its closure with increased worker safety, enhanced performance, and significant taxpayer savings.

Mr. UPTON. Thank you very much. Mr. Peterson.

TESTIMONY OF RONALD G. PETERSON

Mr. PETERSON. Thank you, Mr. Chairman. Please note that we have submitted a report for the record, and I would like to give a short summary in my time allotted.

Mr. UPTON. That would be just fine.

Mr. PETERSON. I am Ron Peterson, and I head up the responsibility for the Government business at Fluor Corporation. So, the Fernald site in Ohio is a part of what I watch over as well as the Hanford site in the State of Washington. I think on those two sites, certainly, we do have a first-hand knowledge of the application of technology, and if I could, I would like to give a brief summary of those two.

At Fernald, we have been managing that site since 1992. So, over the past 7 years, we have deployed around $20 million in OST funds, and with those deployments, which have ended up in around 22 technologies being applied over this 7-year period, we have estimated the savings in the $100 million range. One could conclude, however—I would like to mention one of those. We do have a water injection system which has allowed us to accelerate the closure from 2019 to 2006. That 15 years has a documented savings of $3.1 billion, so one could push the fact, I would suppose, that $20 million has really been the linchpin of driving that closure. But, in any case, we have documented that single one in the $100 million range.

At Hanford, the spending on technology issues is somewhat higher. It is around $10 million. In the 2 years that we have been managing that site, we have deployed 11 demonstrations and 4 deployments, mainly in the tank waste area which we have talked a little bit—177 underground storage tanks in the decontamination, decommissioning area and then also, third, in the solid waste area.

I think the approach to innovation and technology at these sites in particular I think is very important in that more often than not, the things that we are asked to do are typically first of a kind. There are no known technologies. A company like ours and those of my colleagues deal in R&D kinds of things often and will apply commercial practices where applicable. Our problem at these sites, so often, it is one of a kind. And, so the choice that we have is either do it in an R&D setting or do it in what one might term a production setting, and we certainly think that the former is a smarter way to do it.

In terms of recommendations, I, too, would have three recommendations in the application of these funds in technology. No. 1 would be, let us really do it in a problem driven kind of way. Let us apply the dollars, technology, and brain power in an applied versus a pure research way, because we do have, certainly, a host of problems to deal with.

No. 2, in some fashion, let us ensure the surety in the schedule of funding. It is very, very difficult and frustrating to get 80 percent of distance down the road of development and deployment only to find out that the schedule gets slipped or funding gets cut.

No. 3, and, finally, I think that we need to put a lot more effort into a well thought out programmatic plan as we launch off on some of these things and less of a shotgun year-by-year approach to it.

That pretty concludes my summary of that. Thank you.

[The prepared statement of Ronald G. Peterson follows:]

PREPARED STATEMENT OF RONALD G. PETERSON, PRESIDENT, FLUOR GOVERNMENT SERVICES, FLUOR CORPORATION

Mr. Chairman and Members of the Committee, thank you for the opportunity to appear before you today to address the Committee's concerns regarding the Department of Energy's (DOE) deployment of environmental cleanup technologies. As the management contractor at two major Department of Energy clean-up sites, Fernald and Hanford, I have witnessed first hand the application of technology in the "clean-up" process.

As a company, Fluor Daniel has a long tradition of executing large complex projects for industry and government clients worldwide. We are the first Management and Integration (M&I) contractor for Project Hanford, as well as the first ERMC or Environmental Remediation Management Contractor at the Fernald site in Ohio. Both of these unique contracts are performance-based. They are designed to implement commercial practices and applications, and to show a new, improved and more disciplined way of doing business. Utilizing innovative technology, as well as new management practices, is a vital part of our plan to accomplish these missions.

In the past seven years as a major DOE contractor, our experience in utilizing and deploying technology, as well as our experience in working with DOE's Office of Science and Technology (OST) has generally been positive. Like any major undertaking there is always room for improvement—on our part, as well as on the part of others.

Overall, we believe it is fair to say that projects supported by the OST have had a very positive impact on costs and schedules at Fernald and Hanford. Additionally, the contracts under which we work have further encouraged us as contractors to seek new and improved technologies to accomplish our missions.

Prior to submitting our proposal for the contract at Fernald, we were aware of the potential significant role that innovative technology could play in ensuring that clean up could be performed in a safe and more efficient manner. Fluor Daniel brought a similar understanding to Project Hanford. Both Fluor Daniel Fernald (FDF) and Fluor Daniel Hanford (FDH) are dedicated to utilizing innovative technology to support the overall clean-up mission by working with project managers to identify and deploy new, technologies for safer, less costly, and faster remediations. Fluor Daniel's recognition of the importance of technology development and deployment has resulted in the establishment of a proactive approach which identifies opportunities for innovative technology consideration and receives some funding from OST.

Fluor Daniel Fernald manages its basic Technology Programs activities with funds from its prime contract with DOE. We regularly identify technology needs and seek solutions for them from DOE, other government agencies, universities, and the private sector, including approaches used by subcontractors. We believe that there are proven approaches for most stabilization and remediation requirements, however we are always investigating new technologies that can be implemented within the scheduled time frame to improve safety and efficiency at our sites.

Since assuming responsibility for the Fernald Environmental Management Project (FEMP) in December 1992, the site has received approximately $22 million from OST. It is estimated that 25% of these funds were passed through FEMP to national laboratories to support the FEMP-administered DOE programmatic led initiatives. The projects supported at FEMP have included; Integrated Demonstrations, Individual Technology Demonstrations, Large Scale Demonstration and Deployment Projects, and Accelerated Site Technology Deployment (ASTD).

As a result, Fluor Daniel Fernald has deployed 22 technologies, 19 of which are listed in the DOE Technology Management System. Some of these, such as the oxy-gasoline torch and personal ice-cooled suits, have also been deployed at other sites. We estimate that the potential savings from the technologies deployed to date exceed $100 million.

The Project Hanford Management Contract (PMHC) team under FDH leadership was designed to ensure that best-in-class contractors were aligned with the appropriate work scope. In part, this contracting approach was designed to ensure first hand knowledge of work practices and state of the art technologies to perform the work efficiently and cost effectively. The technology efforts under the PHMC are integrated under a Technology Management (TM) organization. This organization is aligned with the various project organizations and reports directly to the Executive Vice President and Chief Operating Officer. To ensure alignment with the OST, Fluor Daniel Hanford has co-staffed the TM organization with staff from the Pacific Northwest National Laboratory under a formal Memorandum of Understanding. Additionally, Numatec Hanford Company, a subsidiary of the French companies SGN

and Cogema, has been integrated into the project team to identify opportunities to deploy technologies with a proven history of successful application in the French nuclear industry.

At Fernald we have been involved in OST programs since 1992, and have witnessed a transition from an emphasis on demonstrations through the OST formation of Focus Areas, to the emphasis on deployment. With this transition, FDF witnessed and encouraged a change from a technology provider-driven program to a site needs-driven approach. We support DOE at the FEMP through the Site Technology Coordination Group that represents the end users, as well as stakeholders and regulators, in determining needs and seeking solutions. We believe that the switch to a needs-driven and deployment-emphasized approach is making OST more valuable to closure sites. At FEMP, more than half or 11 out of 19 deployments supported by OST occurred in 1997 and 1998. The OST system and FDF have improved with time.

Fluor Daniel Hanford, on the other hand, has only been involved with OST since 1997, but has established a technology program that is driven by the needs of the projects. The Project Hanford Management Contractors have in their first two years successfully demonstrated 21 technologies and deployed 29 others, with plans to complete 8 new technology demonstrations and deploy 14 more technologies in the current fiscal year. These successes can be attributed in part to the fact that the PHMC has been incentivized through Performance Agreements and/or Performance Expectations to demonstrate and deploy new technologies.

The impact on our projects has been substantial and our current focus is on project enhancements that will tie technology investments to risk. One example of high technical risk at Hanford is associated with the retrieval of high level waste from underground storage tanks. In partnership with the OST, under the Hanford Tanks Initiative (HTI) project, a number of promising retrieval technologies were evaluated. The HTI utilized a novel approach to simultaneously develop effective technology and qualify industrial suppliers to retrieve wastes from the Hanford tanks. Several commercial vendors competed in a two-phase (design/demonstration) procurement, which provided the capabilities and experience of the national laboratories at no cost to the project, and yet preserved the business secrecy and competitive position of the commercial enterprises. This unique arrangement effectively utilized the investments DOE had made over several years in basic technology, and qualified four vendors for waste retrieval.

HISTORICAL EVOLUTION AND INVOLVEMENT OF OST

Early technology efforts at the FEMP were centered on the Uranium Soils Integrated Demonstration (USID) which had been funded by OST under the predecessor contractor. The USID was a program to treat uranium-contaminated soil in a cradle-to-grave approach. This early work eventually led to the success under the ASTD program of real-time characterization, and treatment of uranium contaminated soil. A soil washing pilot plant was constructed in conjunction with the FEMP Operable Unit 5 (OU5) and testing was done to support the Remedial Investigation/Feasibility Study (RI/FS). Although the results did not indicate that soil washing would be effective in treatment of soil at the FEMP, the work was then used in the RI/FS as part of the justification for selection of the preferred alternative. The work funded in part by OST was valuable in determining a final remediation strategy. The equipment used in the soil washing treatability studies was then transferred to the DOE Ashtabula Environmental Management Project for utilization.

Beginning in 1995 FDF's technology efforts involving OST changed from a strategy of investigation and early stage technology development to a strategy focused on demonstration of mature technologies directly supportive of site closure, followed by implementation and deployment. In 1995 a demonstration and deployment proposal was made to OST to investigate the use of solution mining techniques to remediate an aquifer beneath the FEMP. A determination was made that a main component of solution mining was worth pursuing as a means of accelerating completion of the aquifer remedy. In 1995 and 1996 two tests of groundwater re-injection were conducted. The small-scale tests showed that aquifer geochemistry could be managed and re-injection had potential for accelerating completion of the aquifer remediation remedy at the FEMP. Modeling simulations were conducted, and it was determined that re-injection used in conjunction with an optimized groundwater extraction strategy could potentially shorten the aquifer remediation by 17 years. The optimized site groundwater remediation strategy has the potential to produce savings of $40-50 million.

This cost savings represents a return on investment of about 8:1. The Fernald site and OST jointly are funding a full-scale demonstration of remediation using ground-

water re-injection. The demonstration has been operating for six months and to date, the results look promising. The value to Fernald of this type of development work supported by OST was that the work could not be budgeted in a site undergoing remediation and striving to meet regulatory milestones. If OST had not been available as a means to jump-start promising ideas outside of the box, this work and the subsequent cost cutting may never have been achieved.

The re-injection project marked a change in the way OST was involved in the conduct of technology projects at the FEMP. The OST program administered funding and program management, but the direction of technical efforts were determined at the site by FDF and DOE management. OST management directly supported accelerated remediation and agreed to construct a full-scale demonstration system in the heart of the groundwater contamination plume, so that when re-injection is shown successful the equipment will then be used for the balance of the remediation.

The overall effect on the Fernald baseline from numerous improvements, including key enhancements from the groundwater injection enabling technology, in conjunction with other improvements, have led to compression of the Fernald baseline from the year 2019 to the year 2006, and a cumulative budget reduction of $3.1 billion.

We have also conducted a Large Scale Demonstration and Deployment Project in conjunction with the Decontamination and Decommissioning (D&D) of the FEMP Plant 1 Facility. The objective was to find promising technologies that were ready to be tried in the field and compare them under real field conditions to our project baseline D&D methods. A cost benefit analysis was done comparing each technology demonstrated to its corresponding baseline method, and the projects benefited.

The following technologies were identified as superior methods for D&D work: the oxy-gasoline torch for steel cutting; the Vecloader HEPA vac for insulation and other debris removal; centrifugal shot blasting for removal of contamination in concrete floors; and the Personal Ice Cooled System for personnel safety and improved efficiency for workers wearing anti-contamination clothing in high heat stress working conditions.

The Accelerated Site Technology Deployment program has also moved promising technology efforts to the field. Early work, as part of the USID, did comparisons of the results of measurements made with real-time uranium characterization instruments on contaminated soil. The knowledge gained in the 1997 tests resulted in real-time instruments being considered for soil characterization and was deployed in 1998 and 1999.

In 1997, FDF submitted a proposal to integrate real-time instruments with Global Positioning Systems (GPS) to produce area contamination survey maps in one half-hour. This allows field crews to work without a three to seven day delay waiting for sampling results. The ASTD program allowed us to tap into the resources of two national labs to focus on the problems of system and software integration. To date, the real-time methodologies are acceptable to regulating agencies for all measurements; except those for final certification for an area that has been remediated. The OST investment was $2.4 million, while the savings are estimated at $34 million.

Another example of an ASTD project for deployment is the Personal Ice Cooling System (PICS). The PICS is being used at several other DOE sites. The PICS circulates ice water through tubing in undergarment-like clothing using interchangeable bottles that can be replaced quickly. This improves worker productivity by allowing them to work safely for longer periods of time in high heat stress areas. Information and several PICS units were transferred from Fernald to end users at the Nevada Test Site and Hanford. As part of the ASTD project trial, sets of the PICS will be given to each site for their use in developing their own deployment strategy.

The oxy-gasoline torch is another example of a new tool that is being used as a result of the Large Scale Development and Deployment Project. The oxy-gasoline torch is used for steel cutting operations. Using gasoline for fuel at one-tenth the cost, the oxy-gasoline torch is particularly effective when utilized on thick steel and cuts twice as fast as the baseline method. These torches are currently being used at six DOE sites.

When Fluor Daniel was chosen as the M&I contractor for Hanford in 1997, the team had a commitment to successfully demonstrate and deploy new technologies. Since FY 1997, the OST program has provided PHMC with approximately $22 million to support over 15 technology and deployment projects. OST funding has enabled eleven technology demonstrations and four deployments.

The successful OST funded deployments include; Laser Ablation/Mass Spectrometer System, Macro-encapsulation of Mixed Waste Debris, Tank Corrosion Sensor Monitoring, and Inductively Coupled Plasma/Mass Spectrometer.

The Laser Ablation/Mass Spectrometer (LA/MS) was deployed at Hanford to analyze highly radioactive samples extracted from waste tanks. The LA/MS was used

to quickly analyze the mass distribution of metal components in a waste sample that has been split for detailed analysis. The data obtained from the LA/MS has proven successful in identifying partially blended samples that are not homogeneous and require further blending to ensure that the sample is representative of the larger primary sample. The use of the LA/MS has enabled us to develop a better understanding of tank waste characteristics, including chemical and radionuclide composition.

In 1997, the macro-encapsulation of mixed waste debris took place. Over 880 drums of hazardous mixed waste debris were size-reduced (achieving approximately a 75% volume reduction) and encapsulated in high-density polyethylene tubing for long term disposal in Hanford's low-level burial ground. This demonstration was very successful.

Two other significant initiatives have also taken place between 1997 and 1999. The first is the tank corrosion sensor deployment. Corrosion of the tank walls is a serious concern for the underground storage tanks at Hanford. These tanks store radioactive waste as a result of plutonium production for 50 years. Deployment of improved corrosion sensors resulted in a significant cost saving by minimizing chemical additions necessary to adjust the pH of the tank waste, therefore minimizing the volume of tank waste to be treated by privatization.

The last initiative represented is the Inductively Coupled Plasma/Mass Spectrometer (ICP/MS). The ICP/MS can simultaneously measure elemental (more than 70 elements) and isotopic information in a waste sample. The technology provides nearly complete chemical and isotopic information from a single analytical technique and offers analysis with lower detection limits for long lived isotopes.

As stated earlier, the PHMC is planning to complete eight technology demonstrations and deploy 14 technologies during FY 1999. For this effort, OST has provided Fluor Daniel Hanford and its subcontractors with about $4 million to support technology development and deployment in the areas of tank waste, deactivation and decommissioning and solid/mixed waste management.

In support of tank waste retrieval efforts the PHMC team plans to deploy three technologies this fiscal year. The Enraf Densitometer will be used to provide tank sludge layer interface location and sludge density information. Additionally a versatile variable speed new generation waste transfer pump will be deployed that fits most waste transfer pumping applications and a soil sampler will be used to gather samples from the contaminated vadose zone at SX farm.

In support of the Tank Waste Remediation System (TWRS) Operations the PHMC team plans to deploy 7 technologies in FY99. Three technologies provide tank and transfer line leak detection capabilities and the multifunction corrosion probe will provide data to enhance tank integrity and life extension data. New continuous air monitors will reduce cost while making the site safer for workers. The Saltwell Portable Exhauster is flammable gas qualified for tank pumping and the Slimhole Neutron/Gamma Probe will provide changes in moisture and identify the liquid surface beneath the growing crust in tank 101-SY.

The Plutonium Finishing Plant (PFP) Gloveport Monitor will be used to support Facility Stabilization at the PFP. This technology will permit plutonium-containing items in gloveboxes to be individually assayed without the time consuming seal-in seal-out process. This represents a significant cost and worker safety improvement.

There are also plans to deploy three technologies this year to support Spent Nuclear Fuels. The Fuel Retrieval System will remove and clean fuel elements from K Basins. Two technologies, the Integrated Water Treatment System and the enhanced Thermo-gravimetric Analysis Instrument will be used to remove particulate debris and for treating the sludge from K Basins.

INCENTIVES AND INITIATIVES

Both the Hanford and Fernald contracts, although different, require Fluor Daniel to undertake initiatives for the utilization of new technology. We have also established programs and organizations to encourage staff and other site contractors to utilize innovative technologies. Both FDF and FDH search widely for innovative solutions, including those from industry as well as from the DOE. We conduct demonstrations of technologies in actual project conditions, evaluate the results, and foster the deployment of successful technologies. For example:

—The Technology Programs Department at the Fernald site supports all the projects in determining technology requirements to expedite remediation in a safer and faster approach that also reduces costs.

—Fluor Daniel Fernald initiated efforts to include within the site Records of Decision a commitment to continue to seek innovative technologies throughout the closure effort.

—Establishment of a Technical University Program that involves personnel from local and minority universities in assisting in the identification, development, and demonstration of potential innovative solutions.
—FDF supports OST in its deployment efforts by providing cost-sharing for technology demonstrations and deployments and supporting participation with DOE Headquarters technology initiatives.
—Making lists of applicable new technologies available to potential subcontractors for their potential use.

DOE Hanford also has incentives to assist in promoting the deployment of new technologies. In addition to the ASTD program at Hanford, additional incentives include:

—Performance based contracting incentives implemented through Performance Agreements and Expectation Plans to encourage the application of alternative technologies that improve project baselines.
—Technology planning efforts including the identification of Technology Insertion Points (TIPs) and technology needs are incentivized. TIPs are the key technology decision points that represent an opportunity to insert technology to enhance the baselines. These key decision points are tracked and reported as DOE milestones.
—Incentives for the application of alternative technologies include technology demonstrations and deployments.

Fluor Daniel also is supportive of efforts underway to evaluate and encourage the participation of small businesses. Some examples are:

—Working with Petrogen, inc. for wide-spread deployment of the cost-cutting oxy-gasoline torch by working with the union training coordinators, vocational schools and from other DOE sites.
—Working with Concrete Cleaning Incorporated, the vendor of centrifugal shot blasting, from the demonstration phase (at a competitive evaluation of similar technologies conducted at Florida International University) through the deployment stage at Fernald.
—Employing Terra Kleen to work on a process to treat tri-mixed wastes. Although the process was not capable of treating all waste forms, the effort showed the support from OST on high risk projects.
—An ASTD project has been used to involve a small business subcontractor in the use of innovative dismantlement technologies for D&D at the FEMP site.
—Currently investigating technologies from two companies that could provide pretreatment to improve the operation of the Advanced Wastewater Treatment facility.

SUMMARY, RECOMMENDATIONS, AND CONCLUSIONS

Technology has played a key role in our success to date at Fernald and will play an ever increasing role at Hanford. Projects supported by OST have had a substantial impact on baseline costs and schedules. Our general observations, conclusions and recommendations include the following:

—The initial investment in demonstrations by OST is paying off. Technologies that were demonstrated in the mid-nineties are now starting to be used.
—While not every initiative has been successful, OST has provided support that has helped identify and deploy needed technologies.
—OST has provided the funding for deployment of high-risk approaches which could not have been supported from other funding sources.
—The ASTD program has been successful in deploying technologies, but it could be improved by making a portion of the funds available directly to the sites. This would permit a site to deploy technologies in a more timely fashion instead of relying on the periodic proposal requests and the uncertain timing of funds from OST.
—The OST programs should be even more "end-user" driven. The local DOE and site contractor personnel have a greater understanding of each site and its unique needs. Programs without clearly identified end-users should be minimized or eliminated.
—OST is currently reorganizing to better serve the sites. In these efforts, OST should solicit input from the sites.
—OST could better serve the needs of the site by developing a program that provides immediate service to the site focusing directly on the technical problem in the field.
—OST should continue to fund development of technologies that are necessary for problems that are unique to DOE, such as high level wastes and tanks.

—OST should use its funding to provide up-to-date information on commercial availability of potential technologies.
—OST should concentrate on deployments, especially at the closure sites. Funding support should be based on an anticipated return on investment.

In summary, while Fluor Daniel believes that there are proven approaches for remediation for most of the problems at the sites, we continue to investigate new technologies that can be implemented within the time frame of our projects to improve upon our projected baseline. In addition to working closely with the DOE, we broadly distribute the technology needs statements for all our projects and encourage innovative ways to engage industry in solving these important issues.

Mr. UPTON. Thank you very much.

Mr. Gallagher, I noted that the record shows that Westinghouse has deployed relatively more OST-funded technologies at Savannah River compared to other sites. Why do you think that is the case?

Mr. GALLAGHER. I think, in part, Mr. Chairman, it is because we have a science and technology center that is run by Dr. Wood—who I brought with me this morning, and I appreciate you allowing that to happen—and the fact that we have a focus there under her cognizance that has a cadre of scientists that are devoted to looking at the technology needs, interacting with the programs at the site in a very close linkage that makes that happen.

Mr. UPTON. And do the other project sites not have someone like Dr. Wood? We have been talking about cloning in a couple of the other panels that we have, but wouldn't that be part of a function of the other major contractors at all these sites?

Mr. GALLAGHER. Well, I think it depends on the particular sites. Other sites, those large sites like Hanford, has Bechtel Northwest as a scientific arm for that particular site, but other sites may not have a need like, for example, our West Valley site or WIPP site does not have that specific need.

Mr. UPTON. Mr. Peterson, how does Fluor do with regard to having OST technology?

Mr. PETERSON. Jim mentioned PNML, which is a division of Bechtel Laboratories, but we also have internal field corps at the Hanford site and Office of Technology, as well. We have a Dr. Anderson who has been running that. Probably, the majority, however, goes to Bechtel Labs as far as its development.

Mr. UPTON. Would you say that the Department of Energy has been a positive force in trying to influence OST technologies coming into play? Have they been a main player in terms of trying to influence or encourage that type of activity?

Mr. PETERSON. I think they have. The two areas that you have heard somewhat about in earlier panels was the "K Basin" issue where the characterization of the spent reactor fuel that is in there, and, second, the robotics method in which it has to be moved, is a very high priority of the DOE. And, so my opinion is that they have been very supportive. The second area that you have heard some about is the tank farm and the characterization and ultimately the movement of that to make preparations for the privatization piece which ultimately will vitrify that liquid, mainly waste.

Mr. UPTON. Mr. Card, I know that we are all pleased to know that 2006 is coming and it is close, and I guess the release that was made on Friday is certainly encouraging news. But as we sort of focus on OST technology, I know that Rocky Flats has less 10, I think, technologies that have been used there. What would be the reason for that, do you suppose?

Mr. CARD. Well, I think there is a couple. First of all——

Mr. UPTON. And are they a part of the new plan that you announced on Friday.

Mr. CARD. Well, the baseline does include whatever technologies we view are appropriate to meet that 2006 timeframe. I would cite a couple reasons. One is, I think, if you look at the original mission of OST, it was to work on the more intractable, long-range problems. Frankly, if you look at the list of OST technologies, hopefully, we are going to be done before many of them will be deployable, and, furthermore, Rocky Flats is gifted in a way in that all of our ground water, which comprises a large number of the OST suite, emerges as surface water onsite, which, by the way, one of the OST technologies we have applied is a passive treatment system for that ground water before it emerges. So, I just view Rocky Flats as, as I said, more of a management and systems integration problem than a problem you see at these other megasites, like Savannah River and Hanford and Oak Ridge where you have the very large problems that people haven't even figured out quite what to do yet.

Thank you.

Mr. UPTON. Thank you. Ms. DeGette.

Ms. DEGETTE. Thank you, Mr. Chairman.

Following up a little bit, we heard from the last panel and others that you don't want to use technologies developed by some of these small vendors and other folks. I am wondering if any of you who wish would like to comment on that?

Mr. GALLAGHER. I will comment first. Mr. Schofield mentioned the initial demonstration of his technology to a DOE site was done at the Savannah River, and we did a separate evaluation and determined it was cost effective. I can tell you that we have looked over the technologies that we have applied at Savannah River for all the programs, and over 65 percent of these technologies that have been applied at the Savannah River site are from commercially available technology and not self-developed or through the OST Program.

Ms. DEGETTE. If it was effective, then why didn't you use it?

Mr. GALLAGHER. You mean, additionally at Savannah River?

Ms. DEGETTE. Right.

Mr. GALLAGHER. Well, as Dr. Schofield mentioned, there was additional applications for his technology at Idaho and there limited applications at Savannah River. Dr. Wood might be able to comment more specifically on that.

Ms. WOODS. The technology was demonstrated as part of a integrated demonstration program at Savannah River which demonstrated a very wide suite of technologies that may be available across the DOE complex. One additional commercially available technology was selected from that suite for use at Savannah River. It was actually being implemented when the second technology was demonstrated.

Ms. DEGETTE. Okay. Would any of the rest of you like to comment on that?

Mr. MCINTIRE. If I could just comment on the issue of whether we like to develop our own technologies or use somebody else's. We don't develop our own technologies, so we have to rely on other technologies either from the labs or through bids. I want to men-

tion Oak Ridge M&I, too, is a—you know, the DOE keeps moving; they keep learning from the past, and we are going into a different stage, too, and we are not just maintaining like we used to do. We are now tearing down, cleaning up, so they are learning, and they are using different contracting vehicles. The Oak Ridge M&I is a job where we are doing none of the work ourselves. We are just managing it, and we are putting up 94 percent of the revenue all out in subcontracts. There are 150 RFPs out on the street over a 12-month period. Each one of them, they are asked to use technology. Most of the jobs are lump sum for a fixed price, so they have to use technology; they have to take risks. So, I don't think we have the metric shut to see how successful this is going to be, but it is—anyway, on the question, do we like to develop our own, and we don't want to any help? It is 180 degrees the other way.

Ms. DEGETTE. So, you disagree with that?

Mr. MCINTIRE.

Ms. DEGETTE. Okay.

Mr. CARD. First of all, Kaiser-Hill, we have consistently exceeded our small disadvantaged business goals, winning the Secretary's Award in 1997; being rated as highly successful by the SBA in 1998. I empathize, though, with the plight of the gentlemen who were up here earlier in that the process is long-term. Let me just take two specific examples for Rocky Flats. The gentleman from BIR, we were very interested in that technology, but, as I think he alluded to, WIPP waste acceptance criteria were a gold-plated, certified measurement system; that is very expensive to develop. Even if you have the technology to go through the paperwork, that is a very expensive process, and I think he mentioned that he was nearly there and his contracted was terminated at another site. I think for low capitalized businesses, it is a very tough thing.

The other example was the surface radiation measurement system. We continue to be very interested in that. However, our job at Rocky Flats is to eliminate the need for technologies by eliminating the work altogether, and we dramatically changed our approach and focused on more contaminated buildings after talking with that firm. We are still very interested when we get to the more lightly contaminated areas where that technology would have better application, but that is probably now, frankly, 12 plus months out, and the question is how can they maintain their business while we are waiting unless we are instructed to subsidize in the meantime which is not our current instructions.

Ms. DEGETTE. Okay. Did you have something, Mr. Peterson?

Mr. PETERSON. I would also disagree with the premise that says we like to develop in-house, on our own. First of all, we, like Bechtel, are not a science company, we are an engineering company. No. 2, 100 percent of the profit that we make is based upon meeting schedules and meeting cost numbers. If we don't do those, we make no corporation profit, and we will take whatever technology is available to help us do that.

Ms. DEGETTE. Okay. Let me quickly, with consent of the chairman, go back to a couple of specific questions relating to the last panel, and, Mr. Card, since you are my pal, I will pick on you, and, by the way, we were all happy to see your announcement last week, as well about 2006.

Mr. CARD. Timing of the change was a good one then.

Ms. DEGETTE. Yes, yes, at least for us.

In your written testimony, you said that you need additional technology improvements in surveying and measurement of the contamination out at Rocky Flats, and I am wondering if you heard Mr. Kotrappa testify about his technology to measure low levels of uranium, plutonium, and other alpha-emitting contaminations, which was field tested at Oak Ridge and was presented, as I understand, to Rocky Flats in November. I am wondering what your response to that is and why they still haven't heard back from you folks on their proposal?

Mr. CARD. Well, I am not sure they—we put out two bids—there are about three parts to my answer—we put out two bids for this technology, and it is my understanding that, for whatever reason, they did not submit a bid on the first one, which is mobil containers, and, as Congressman Burr noted, the successful bidder has a no bricks and mortar trailer with their name on it. The drugs go in one way and come out measured and nobody opens them. Even though it may be older, it meets the bid specs. There was another bid we put out for larger containers, waste crates, and it was my understanding their technology was attractive and certainly within the competitive range. The cost was significantly out of line, for whatever reason, on that technology. Our bigger problems, frankly, are in the residues, which are higher levels of contamination, and we have very complex matrices. But what I would like to do is go ahead and submit a one-page write-up to the committee on our analysis of BIR and where they have been through our process.

Ms. DEGETTE. Yes, because Mr. Kotrappa was focusing on the other vendor——

Mr. CARD. Canberra, BNFL, and Amtech are the primary international competitors, and all of them work at Rocky Flats.

Ms. DEGETTE. Rad Elec is the one that you are talking about. So, if you can get us a written answer, that would be helpful.

And then, I am wondering if, Mr. McIntire, you can comment on this technology, as well?

Mr. MCINTIRE. I was waiting for Congressman Burr to ask me about Bio-Imaging, but you want to ask about which technology?

Ms. DEGETTE. Well, I am sure Congressman Burr will have several fabulous questions.

Mr. MCINTIRE. Okay. Could you rephrase your questions, please?

Ms. DEGETTE. Yes, I would be happy to. The technology that Mr. Kotrappa was testifying about on the technology they have to measure the low levels of uranium, plutonium, and other alpha-emitting contaminations in soils and surfaces.

Mr. MCINTIRE. I can't comment at this time. I am sure I can get back to you on it. I have got some notes here, but it would take me 15 minutes to figure them out.

Ms. DEGETTE. To figure it out, okay. Thank you. Mr. Chairman, I will yield back.

Mr. UPTON. Thank you. Mr. Burr?

Mr. BURR. I will try not to disappoint my colleague's confidence in me.

Really, I am sort of lost as to where to start. Let me start here. To each of you, do you think we can achieve a $20 billion life-cycle cost savings with the use of OST technology? Mr. Gallagher?

Mr. GALLAGHER. I think that we can't do it with OST technologies alone. I think we, as I mentioned in my testimony, must look at universities, commercial vendors for innovative technologies. The process that we have, Congressman, is that for each of one our technology projects, we have a baseline which has a schedule and cost and a baseline technology. Then, when we come across an innovative technology that can reduce the cost and the schedule, then we evaluate that and, with Dr. Wood's organization at Savannah River, make that evaluation and decide then whether or not to proceed with the new innovative technology.

Mr. BURR. The answer is there is not enough confidence that OST technology can do it alone.

Mr. GALLAGHER. You have to use others.

Mr. BURR. Mr. McIntire?

Mr. MCINTIRE. I don't think I would say there is not enough confidence in the OST. I think the process in DOE is looking at all avenues. I will mention the M&I again; I think——

Mr. BURR. Do you believe they can get $20 billion of savings through this effort?

Mr. MCINTIRE. Not alone, but they are not trying to just do it alone. They are trying to open it up to other avenues, too, and we are looking at all avenues of technology. I think we need to look at everything.

Mr. BURR. Mr. Card?

Mr. CARD. Obviously, there is not $20 billion left at Rocky Flats, but a thing that we have been working with Mr. Boyd's office on, which is promising, is co-funding of technologies that we need now but we need some seed money to test out, and I think, certainly, for a site like Rocky Flats, that kind of approach would be more fruitful than long-lead technology development.

Mr. BURR. Mr. Peterson?

Mr. PETERSON. I believe that the implementation of innovation and technology will far exceed a $20 billion savings if you really look at a $200 billion to $250 billion cleanup problem. It is difficult for me, however, to say what OST's input and piece of that is, but it will take innovation, and, as we do that, there will be big savings as a result.

Mr. BURR. So, clearly, since the sites that you are in charge of make up 70 percent of the cleanup costs projected for DOE sites, the numbers that this committee could expect from your answers that this would be the last time we would ever hear DOE say that they projected an increase for the future cleanups. Am I correct? At least of the 70 percent that are represented here at the table? We will actually save money and start going the other way.

Mr. GALLAGHER. I believe there is a significant opportunity to save costs and schedule with innovative technologies. I think the thing that we have to concentrate on, Congressman, is the process in which we get those actual applications. And, as you heard from the previous panel, there can be a lot of barriers, procedurally and administratively, to get these technologies to the field.

Mr. BURR. I will make the same offer to the companies that we made to the Department of Energy. Any specific recommendations that you see from a regulatory side, from a process side that are recommendations you would like to make to this subcommittee for them to follow through in a partnership or whatever with the Department of Energy and with your companies, we would certainly entertain that exchange of good ideas, because our attempt is to clean up and to do it as cost effectively as we can.

Let me shift, if I can, because I have got limited time, and let me compliment all of you for your willingness to come, for your commitment to use new technologies, but let me also—several additional minutes, unanimous consent—let me also make one comment relative to some of the testimony you gave; that comment would be "Bull." The cleanup process is not working as smoothly as the testimonies you gave, and I think it is time that somebody come before this committee and tell us what the hell is wrong. Are we going to hit the 2006 figure in your site? If so, and you can't incorporate technology, then why the hell is OST sending you $3 million? If you don't need it, turn it back in. If you are going to take it, then know that there is some technology out there that you can incorporate in the process. You do as big of an injustice as OST does, to some degree, and DOE to these private entrepreneurs who are going out on a shoestring, creating technologies with good intentions. If the technology, Mr. Card, at BIR is as bright as what you said, my question would be why didn't you put up the capital?

Mr. CARD. There is a whole variety of contracting issues that we could get into if we were going to do that. You end up in a situation that has been before the committee before. Do we have one foot in too many buckets at the site? And, so we, actually, are anxious to put up some capital for Rocky Flats.

Mr. BURR. So, the answer is that contractually, as it is written, you can't do it?

Mr. CARD. It would be institutionally difficult.

Mr. BURR. Since we do have some DOE folks in the room, let me encourage them that we explore any waiver processes that could exist so that if we are deficient in our ability to help finance to the level needed for you to make a decision on new technologies, that we look at a waiver process for promising technologies that might have started at OST or started anywhere that you see as long as we can contractually use those technologies to save money and to clean up sites faster. There is one thing that I can assure you that I will attempt to do and that is to try to bring a higher degree of accountability to the cleanup process, and I think for those of you that know me, you know I am not going to go away or forget about it.

Let me ask you—I hate to pick on you, Mr. Card—how many technologies do you think have come across your desk, new technologies, relative to the Rocky Flats site?

Mr. CARD. Well, it would be dozens. I don't have an exact count, but it would be certainly in the many dozens.

Mr. BURR. And of that, we elected to use how many?

Mr. CARD. I don't have that count either, because most of the technologies we are employing are not technologies on the OST list. I did mention several in the testimony, and I would be glad to go

into detail on them, but, for example, for us, some of the more important technologies are not even necessarily hardware and process equipment like you would normally imagine barcoding drums, which we have a huge quantity of. Computer systems and other management process improvement systems are just as important to us in closing Rocky Flats.

Mr. BURR. How much in OST funds do you receive?

Mr. CARD. I would say, of the large sites, we must be the smallest recipient. It is in the few millions of dollars per year; certainly less than $10 million.

Mr. BURR. Mr. Peterson, how much for Fluor?

Mr. PETERSON. We receive around $3 million at the Fernald site per year and around $10 million per year at the Hanford site.

Mr. BURR. Mr. McIntire?

Mr. MCINTIRE. Remember that both the Hanford project that we are doing and Nevada, the dollar value is relatively small, and the OST percentage, I believe, is in the 4 percent area of the total cost of the cleanup. So, it is in that region.

Mr. BURR. Does that include Oak Ridge?

Mr. MCINTIRE. No. Oak Ridge is similar—a little lower percentage, a little more dollar volume. It is about $250 million of their total volume per year, and the percentage is more like 2.9, 3 percent. Those are rough figures, and I would be glad—I think we have already provided that information, by the way.

Mr. BURR. Mr. Gallagher?

Mr. GALLAGHER. Twenty million dollars.

Mr. BURR. Twenty million?

Mr. GALLAGHER. Yes.

Mr. BURR. Is there any correlation between how much money OST gives to you and how many technologies you ultimately end up accepting as usage?

Mr. GALLAGHER. I think there probably is a correlation.

Mr. BURR. Are there any additional comments any of you would like to make relative to this hearing and to this process?

Mr. MCINTIRE. Yes, I would like to say that I disagree with some things that have been said, and some things I agree with. The bull part I don't agree with, but the fact that the future of cleanup and reducing, dramatically, like my colleague said, probably more than $20 million is tied to technology and innovation and creativeness. Sometimes we are getting a little narrow on the technology part. It is also just creative thinking, and I believe some of the small businesses that have testified today, I think that is part of our future, and I do empathize with working with the system. I think we could do more, and I think we are doing more—all the companies are—but I think there is more to communicate with these folks, and we have to do more. I will commit our company to try even more than we have done before, because I empathize with their pain.

Mr. BURR. Let me be bold and share with you where the bull I thought came from; you deserve at least that. Three of you referred to funding. I guess there is some consistency in the people's willingness to come to Washington and say the problem is money. Clearly, it may be, but one of the responsibilities, I think, of companies is to, in fact, tell us what it will cost us to do "X." There is no way

that the long-term cleanup costs can rise every year if that honest exchange is, in fact, happening. It is important that we be good stewards of the taxpayer money. If that is an investment in OST because we feel that the good works of that area of the Department of Energy will ultimately save us money, that is what people have asked us to come here and do. If we are not incorporating those technologies, then they have asked us to ask the question, why? If you are not using them, yet the problem is funding, and we have addressed things that we thought were actually going to bring down the cost versus come and listen to the reasons that we need to put more money in, quite honestly, I don't think that is a fair exchange, and I think there is a degree of accountability that does not exist at DOE cleanup sites that we must and we will get a handle on. That may alter significantly who bids for them in the future. It may be that some of the entrepreneurs that we saw in here with technologies might end up actually having those technologies onsite, but I am confident that funding is not the primary reason that sites aren't getting clean. There is a process problem that allows us to concentrate 99 percent on process and funding and 1 percent on outcome. There is something wrong with that mix.

So, I apologize to all of you if you take offense at the fact that I said your testimony was bull, but if we can't get past that part of it and you to actually share with this committee what the problem is—if 2006 is not a date you can hit, then tell us why. If it is not a date you can hit, then tell us why. If we can't meet the schedule that DOE comes in here and says, "Here is what our contractors will do," this is your opportunity to tell us, "We can't do what they said, Congressman." But all of you have sat here and said "Everything is rosy; it is great. We are incorporating this. In the places where they are deficient with supplying us new technology, we are creating it; we are finding it; we are developing it." If everything was that good, we would have all the sites cleaned up in 2006, and that is not the case.

So, I would just implore with each one of you that you have as much of a responsibility to share with us accurate information and suggestions as to how we accomplish this or that word that each one of you has used, and that was "partnership," will, in fact, not work.

With that, I yield back, Mr. Chairman.

Mr. UPTON. Thank you. We appreciate your testimony this morning and this afternoon, and we look forward to seeing you again.

This subcommittee is now adjourned.

[Whereupon, at 12:46 p.m., the subcommittee was adjourned.]