



U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

The Department's Pollution Prevention Program

DOE/IG-0680

March 2005



Department of Energy

Washington, DC 20585

March 17, 2005

MEMORANDUM FOR THE SECRETARY

FROM:

Greg Friedman
Gregory H. Friedman
Inspector General

SUBJECT:

INFORMATION: Audit Report on "The Department's Pollution Prevention Program"

BACKGROUND

The Department of Energy, like the other Executive Branch agencies, is responsible for structuring its operations so as to prevent or reduce the creation of waste, including sanitary, hazardous or radioactive waste. Obvious benefits of such efforts include savings in waste treatment, storage, and disposal costs; reduced environmental compliance costs; and, reduced health risks to workers and the public. Department regulations require Program Secretarial Officers and the Administrator, National Nuclear Security Administration to ensure that sites develop, implement, and budget for cost-effective pollution prevention programs. This effort is especially important in the Department of Energy which, as of September 30, 2004, had a \$179 billion unfunded environmental remediation liability for legacy activities.

During 2003, the Department generated nearly 1.2 million cubic meters of waste, including radioactive waste resulting from production and environmental restoration. We initiated this audit to determine whether the Department and its contractors were maintaining an effective pollution prevention program.

RESULTS OF AUDIT

We found that the Department did not have in place a comprehensive, consistent complex-wide program to identify, evaluate, and implement cost-effective proposals to minimize the generation of waste. For example:

- Two of the four sites included in our review did not systematically research new opportunities to prevent and recycle waste; and,
- Sites did not always implement pollution prevention strategies that they had already concluded were feasible and cost effective.



We found that the Department did not always support and fund pollution prevention programs, nor did it establish performance measures to monitor waste reduction activities. Based on our review of only four sites, we identified a total of over \$5.5 million of potential cost savings opportunities that the Department had not realized. In addition, at one site, annual average cost savings from pollution prevention activities since Fiscal Year 2002 actually decreased nearly \$40 million.

During the course of our audit, we found examples of notable successes associated with pollution prevention. For example, in 2004, two Departmental pollution prevention projects were recognized through the White House's *Closing the Circle Awards*. The Office of Environmental Management informed us that an innovative approach to reducing transuranic waste at Hanford was selected for a Department of Energy "Best in Class" Pollution Prevention Award in 2005.

While these successes are encouraging, we believe that additional senior management focus is needed if the Department is to maximize opportunities to reduce costs and minimize waste generation across the complex. In that connection, this report includes several recommendations designed to improve the effectiveness of the Department's pollution prevention program.

MANAGEMENT REACTION

Management generally concurred with the report's findings and recommendations and agreed to take corrective actions designed to ensure opportunity assessments are performed and implemented when appropriate, and to design and implement performance measures for pollution prevention. Management's comments are included in Appendix 4.

Attachment

cc: Under Secretary for Energy, Science and Environment
Assistant Secretary for Environment, Safety and Health, EH-1
Assistant Secretary for Environmental Management, EM-1
Director, Policy and Internal Controls Management, NA-66

REPORT ON THE DEPARTMENT'S POLLUTION PREVENTION PROGRAM

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POLLUTION PREVENTION

Pollution Prevention Activities

The Department of Energy (Department) has not maintained a completely effective pollution prevention program. In some cases, sites did not systematically research cost-effective opportunities to reduce waste generation or to increase recycling/reuse of materials. Additionally, sites did not always implement identified cost-effective measures to reduce pollution.

Opportunity Assessments

Although required by Department Order 450.1, *Environmental Protection Program*, two of the four sites visited during our review were not conducting operational assessments to identify opportunities to reduce waste generation or to increase recycling/reuse of materials. Current policy requires sites to continually conduct operational assessments to identify opportunities for source reduction, material segregation, recycle/reuse, and to implement those opportunities determined to be feasible and cost-effective. We noted, however, that at the Hanford Site, the Richland Operations Office (Richland) had not ensured that their major contractors reviewed and assessed their operations for opportunities to prevent pollution in Fiscal Years (FY) 2003 and 2004. We also noted that, although required by contract language, the Office of River Protection contractors had never performed such opportunity assessments. Prior to FY 2002, Richland contractors performed yearly assessments of their activities. One of the major Richland contractors had, however, recently completed a value engineering study to identify more efficient mixed low-level waste disposal methods, its first review of a waste stream since FY 2001.

Richland and the Office of River Protection's decreased emphasis on identifying new opportunities to prevent pollution may have contributed to a decrease in cost savings from pollution prevention activities at the Hanford Site. Specifically, these sites reported average annual cost savings/avoidance of over \$70 million from these activities in FYs 2000 and 2001. However, in FYs 2002 and 2003, the sites reported an average of \$32 million in cost savings/avoidance, or an average decrease of nearly \$40 million per year. Hanford Site officials indicated that the reduction of efforts and lack of support, as well as the fact that past efforts had already implemented the most

promising opportunities, were contributing to the decrease in annual cost savings/avoidance.

Project Implementation

Although the Los Alamos National Laboratory (Los Alamos) and the Sandia National Laboratories (Sandia) had successfully implemented certain pollution prevention proposals, they had not acted on a number of proposals that they determined to be feasible and cost-effective on a life-cycle basis. Based on a review of 20 judgmentally selected proposals, we found the sites had not implemented 9 proposals that represented potential life-cycle cost savings of over \$5.5 million. Additional information is presented in Appendix 2 regarding the proposals we reviewed. Some of the more significant proposals that the sites did not take advantage of include:

- Los Alamos had not implemented an opportunity, which had been proposed multiple times since FY 2001, to use lead-free bullets at its major outdoor firing range. While lead-free bullets cost more than lead alternatives, they are environmentally friendly and do not require a firing range remediation every 25 years. As a result, the purchase of such bullets could save Los Alamos \$97,100 each year, about \$2.4 million over the life-cycle of the project. According to Los Alamos officials, they had not implemented the proposal because of funding limitations and concerns about the availability of all necessary calibers of lead-free bullets. However, we noted that other Federal training facilities such as the Federal Law Enforcement Training Center are successfully using lead-free ammunition.
- During 2003, Los Alamos also identified but did not take advantage of an opportunity to potentially reduce water consumption and chemical usage through the testing and design of silica seed crystal filters at a cost of \$60,000. The filters would reduce the formation of silica scale in Los Alamos cooling towers enabling them to operate at higher levels of concentration. By increasing the level of concentration in the cooling towers, Los Alamos

estimated that the filters would save over \$501,000 per year in costs attributed to the use and disposal of nearly 41 million gallons of water and treatment chemicals required to control corrosion and silica scale formation. Los Alamos officials said that the project was one of several similar projects that had not been implemented due to insufficient funding.

- In April and May of 2003, Sandia identified but did not implement five feasible opportunities to minimize waste. These initiatives were estimated to generate life-cycle cost savings of about \$216,000 and required an initial capital investment of less than \$54,000. These opportunities to minimize waste included: (1) purchasing a wood chipper for mulching green waste for reuse on-site that would reduce life-cycle disposal costs by more than \$50,000 over a ten-year period; and (2) installing paint shop equipment to reduce the life-cycle costs of solvent disposal by approximately \$26,000. According to Sandia officials, these opportunities were not implemented due to limited funding or a lack of facility interest.

Managerial Focus

Pollution prevention managers at all of the sites we visited did not believe that they had adequate program support to maintain an effective pollution prevention program. Additionally, the Department did not hold managers accountable for identifying and implementing cost-effective opportunities.

Program Support

Program offices and the National Nuclear Security Administration (NNSA) had not fully supported pollution prevention activities since they were made responsible for directly funding the program in FY 2003. In August 2002, the Office of Environment, Safety and Health (Environment, Safety and Health) became responsible for policy development and individual program elements were required to fund pollution prevention activities. Prior to that date, the Office of Environmental Management (Environmental Management) had lead responsibility for pollution prevention and provided centralized funding to other programs to implement promising projects. After this

realignment, all the sites we visited told us that support, including funding, direction and/or perceived importance of the program was not adequate to continue activities at the most successful levels. For example, Hanford Site pollution prevention officials told us that since FY 2003, the site had cut its staff from approximately seven staff members to one member, and had limited efforts, for the most part, to monitoring ongoing recycling activities and reporting waste generation data. Other than at NNSA sites, we were unable to determine the level of funding provided for prevention activities because most program offices did not budget or track funding.

Problems with program direction and emphasis also existed in the organization formerly responsible for its overall administration and funding – Environmental Management. We noted Environmental Management did not assign responsibility for coordinating the program's pollution prevention activities across its sites and contractors until about two years after responsibility for the Department-wide program was transferred to Environment, Safety and Health. Recently, Environmental Management assigned responsibility for program coordination and emphasized to site managers' their responsibility to conduct pollution prevention activities consistent with Departmental requirements.

Although site pollution prevention managers told us that they did not have adequate funding for their activities, we noted that Los Alamos had implemented an innovative funding strategy to supplement their program by charging a fee to waste generators, based on the quantity and type of waste generated. Los Alamos invested the waste generator fee in prevention activities. In FY 2004, this generator fee provided approximately \$600,000 which funded eleven pollution prevention projects.

Accountability

The organizations included in our review had not established performance measures for their pollution prevention programs. Furthermore, three of the four sites included in our review did not have performance measures

for pollution prevention activities (Los Alamos was the only site with pollution prevention performance measures at the time of our review). As a result, managers had not been held accountable for implementing an effective program.

Opportunities for Savings

The Department is missing opportunities to reduce costs and minimize waste generation across the complex. Based on our review of selected proposals, we identified potential life-cycle cost savings of over \$5.5 million from 9 proposals that the sites determined to be feasible and cost-effective but were not implemented. Additionally, cost savings at one Environmental Management site have been reduced an average of nearly \$40 million dollars each year since FY 2002. Without renewed emphasis on the pollution prevention program, the Department may continue to miss opportunities to cost-effectively reduce waste streams.

RECOMMENDATIONS

We recommend that the Administrator, National Nuclear Security Administration and the Assistant Secretary for Environmental Management, in conjunction with the Assistant Secretary for Environment, Safety and Health:

1. Ensure that sites implement the pollution prevention provisions of DOE Order 450.1, by:
 - (a) Conducting operational assessments of site operations to identify opportunities for pollution prevention projects and implementing those deemed cost-effective using life-cycle assessment concepts and practices; and,
 - (b) Employing innovative strategies, such as waste generator's fees, to fund cost-effective pollution prevention programs.
2. Develop and implement performance measures for pollution prevention activities that reemphasize the program and hold managers accountable for implementation.

**MANAGEMENT
REACTION**

In separate responses from the responsible Departmental organizations, management generally concurred with the report's findings and recommendations. Management's comments are included in Appendix 4 and summarized below.

The National Nuclear Security Administration (NNSA) generally agreed with our report and recommendations. NNSA acknowledged that our conclusions were similar to those reached during its FY 2004 site reviews and agreed to include our findings in a memorandum it plans to send to their site managers. NNSA sites also commented that several of the examples used in the report have now been identified for future implementation.

The Office of Environmental Management (EM) agreed to implement the recommendations by providing additional guidance to their field managers on the need to conduct opportunity assessments, and developing and implementing performance measures for pollution prevention. EM stated that part of its mission is to find innovative solutions to clean up past contamination problems and, where possible, use waste minimizing approaches to cut the cleanup risk, schedule, and cost. In addition, they included an attachment from the Office of River Protection (ORP) emphasizing it has requirements in place directing its contractor to perform operational assessments.

The Office of Environment, Safety and Health (EH) agreed to work, in conjunction with NNSA and EM officials, to implement the report's recommendations. However, EH raised the concern that our draft report did not recognize the Department's numerous pollution prevention successes. EH also noted that its office is not in a position to ensure that actions are undertaken at Departmental sites or to hold site managers accountable. However, they agreed to support NNSA and EM by monitoring site performance in implementing the pollution prevention provisions of DOE Order 450.1 and providing information that will assist in carrying out the report's recommendations.

AUDITOR COMMENTS

Management's comments are generally responsive to our recommendations. Based on these comments, we have made several changes to the body of this report where necessary. With regard to ORP's comments related to operational assessments, we agree that such requirements had been established. We noted, however, that contractors had not actually performed the required assessments and ORP had not taken action to compel their completion.

Appendix 1

OBJECTIVE To determine whether the Department and its contractors are maintaining an effective pollution prevention program.

SCOPE The audit was performed between January 2004 and January 2005. We conducted work at Headquarters, Washington, D.C., and Germantown, MD; NNSA Service Center and Sandia National Laboratories (Sandia), Albuquerque, NM; Los Alamos National Laboratory (Los Alamos), Los Alamos, NM; and the Richland Operations Office and Office of River Protection at the Hanford Site, Richland, WA.

METHODOLOGY To accomplish our audit objective, we:

- Reviewed laws, regulations, contractual requirements, as well as, policies and procedures relevant to Departmental pollution prevention and waste minimization activities;
- Reviewed site pollution prevention program plans and other site specific guidance where available;
- Held discussions with Headquarters program officials regarding pollution prevention and waste minimization at the Department;
- Held discussions with officials from the NNSA Service Center, Richland Operations Office, Office of River Protection, and contractor officials from Sandia, Los Alamos and the Hanford Site regarding pollution prevention and waste minimization at the individual sites;
- Selected a judgmental sample of 20 recent pollution prevention opportunities documented at the Sandia and Los Alamos National Laboratories and conducted a review to determine whether cost-effective feasible opportunities were being implemented;
- Reviewed Pollution Prevention Opportunity Assessments at other Departmental sites not visited during our audit;

Appendix 1 (continued)

- Reviewed pollution prevention accomplishment reports for the years 2000-2003 at the Hanford Site to determine whether recent reductions in the pollution prevention program have reduced reported accomplishments; and,
- Participated in the Department's first Pollution Prevention Televideo Conference.

The audit was performed 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. We did not identify any performance measures required by the *Government Performance and Results Act of 1993* applicable to the Department's pollution prevention program. Because our review was limited, it would not necessarily disclose all internal control deficiencies that may have existed at the time of our audit. We did not rely on computer processed data to accomplish our audit objective.

An exit conference was held with officials from the Offices of Environmental Management and Environment, Safety and Health on March 8, 2005. NNSA waived the exit conference.

Appendix 2

POLLUTION PREVENTION PROPOSALS

Location	Opportunity	Description	Waste Reduced	Initial Cost of Project	Life-Cycle Cost Savings
1. Sandia	Refillable Aerosol Containers	Replace current aerosol cans for a number of cleaners, paints and adhesives with refillable spray bottles.	Eliminates the solid and potentially hazardous waste stream generated by aerosol cans.	\$450	\$6,329
2. Sandia	Wood Chipper	Purchase of a new wood chipper to fully accommodate the green waste production on site.	Approximately 660 cubic yards of green waste.	\$15,600	\$50,129
3. Sandia	Solvent Distillation Unit/ Paint Gun Washer	1. Install an on-site distillation unit that would recycle all solvents used in the Paint Shop. 2. Install a paint gun washer which provides closed-loop cleaning and is more efficient than cleaning by hand.	Reduce annual disposal costs for spent solvent by approximately 75%.	\$4,000	\$26,211
4. Sandia	Parts Wash Rack	Install a closed-loop, aqueous spray system to replace the current method of cleaning metal parts by hand in preparation for painting.	Decreases the quantity of waste disposal by 85%.	\$33,095	\$78,351
5. Sandia	Paint Shop Specification Modifications	Reduce the types and colors of paint called for in the specifications from 75 to 25, and eliminate the requirement that contractors leave extra paint on site.	Approximately 85% of the paint waste streams could be eliminated.	\$0	\$55,000*
6. Los Alamos	Lead-Free Ammunition	Replace traditional lead bullets with environmentally friendly lead-free bullets at the outdoor firing range.	Eliminates 1000 KG of lead waste per year.	\$35,000	\$2,427,500*
7. Los Alamos	Cooling Tower Sand Filter	Install a "seed crystal" filter to remove silica from cooling tower systems to protect the heat transfer surfaces and allow operation at increased cycles of concentration.	Eliminates nearly 41 million gallons of water wasted and associated chemicals per year.	\$60,000	\$2,506,130*
8. Los Alamos	Leaking Laboratory Faucets	Replace leaking faucets with user friendly faucets which permit water to be completely shut off after use.	Eliminates 1.1 million liters of clean water per year that is being treated as radioactive liquid waste.	\$2,500	\$295,955*
9. Los Alamos	Equipment Room Shower Heads	Replace current shower heads with low flow shower heads.	Reduces discharge to Radioactive Liquid Waste Treatment Facility by 341,262 liters per year.	\$1,500	\$84,265*
TOTALS:				\$152,145	\$5,529,870

* OIG calculations based on information provided by site officials.

PRIOR REPORTS

- *Department of Energy's Waste Minimization Program (DOE/IG-0298, September 6, 1991).* The audit found that while waste minimization progress was being made, significant opportunities to eliminate waste still existed. Waste minimization opportunities were not being implemented because of limited use of incentives, minimal program guidance, and funding uncertainties. The report also noted that in generating excessive amounts of waste, the Department will continue to be exposed to acknowledged environmentally dangerous conditions that will require costly remedial actions.
- *The U.S. Department of Energy's Value Engineering Program (HQ-B-98-01, July 17, 1998).* The audit found that the Department had not fully developed and implemented an effective value engineering program. Some value engineering savings were not always supported or not truly the result of the formal value engineering methodology and some field activities had not consistently computed and reported value engineering savings. The Department's success with value engineering was limited by inadequate policy and procedures and lack of annual plans, goals, and objectives. As a result, the intended value engineering goals of reducing costs, increasing productivity, streamlining operations, and improving quality may not have been achieved to the fullest extent possible.



Department of Energy
National Nuclear Security Administration
Washington, DC 20585



FEB 04 2005

MEMORANDUM FOR George Collard
Assistant Inspector General
for Audit Operations

FROM: Michael C. Kane
Associate Administrator
for Management and Administration

SUBJECT: Comments on IG Draft Report on Pollution
Prevention Program

The National Nuclear Security Administration (NNSA) appreciates the opportunity to have reviewed the Inspector General's (IG) draft report, "The Department's Pollution Prevention Program." We understand that because regulations require us to ensure that sites develop, implement, and budget for cost-effective pollution prevention programs and, because of the extent of waste generation, the IG wanted to determine whether we are maintaining an effective pollution prevention program.

NNSA generally agrees with the report and the recommendations. The conclusions reached by the IG are similar to the conclusions reached during our own FY 2004 site reviews. We will include the IG findings into a memorandum we plan to send to the Site Managers with our own conclusions, since they are similar. We do believe that it is inappropriate to portray NNSA as a program office. As you know, NNSA is a separately organized agency within the Department composed of seven distinct programmatic elements headed by Deputy Administrators and Associate Administrators.

With separate cover, we are providing technical comments gathered from Sandia and Los Alamos Site Offices and from our Environmental, Safety and Health Advisor for the auditors to consider in the preparation of the final report. Should you have any questions about this response, please contact Richard Speidel, Director, Policy and Internal Controls Management. He may be reached at 202-586-5009.

cc: Robert Braden, Senior Procurement Executive
James Mangeno, Environmental, Safety & Health Advisor
Karen Boardman, Director, Service Center

Memorandum

DATE: February 17, 2005

REPLY
TO
ATTN OF: EM-23 (Greg McBrien, 301-903-1385)

SUBJECT: Draft Audit Report on the Department's Pollution Prevention Program

TO: Rickey R. Hass, Assistant Inspector General for Audit Operations
Office of Inspector General

My office has reviewed the Draft Audit Report entitled "The Department's Pollution Prevention Program" issued January 14, 2005. Part of the Office of Environmental Management (EM) mission is to find innovative solutions to clean up past contamination problems and, where possible, use waste minimizing approaches to cut the cleanup risk, schedule, and cost. There are a number of projects underway across EM that have and will continue to result in waste reduction. One major example is tank waste separation which minimizes the amount of waste to be disposed of at the National Geologic Repository. An innovative approach to reduce transuranic waste disposal from the Hanford 233-S Plutonium Facility Demolition Project was selected for a Department of Energy (DOE) "Best in Class" Pollution Prevention Award in 2005. In addition, Savannah River Site has developed processes to allow greater waste loadings for high-level waste disposal canisters to reduce risk and cost associated with high-level waste disposal.

As stated in the draft report, we have reaffirmed in a memorandum from Acting Assistant Secretary Golan dated August 12, 2004, the responsibility of Field Managers to continue conducting pollution prevention activities at EM sites. The memorandum to the Field Managers reminded them of the need to conduct specific pollution prevention activities consistent with DOE Order 450.1. We will, however, provide additional guidance to the Field Managers on the need to conduct opportunity assessments for pollution prevention, and will develop and implement performance measures for pollution prevention in conjunction with the Office of Environment, Safety, and Health.

Attached is the Office of River Protection's comments regarding statements about the Hanford site on page 1 of the Draft Report. In addition, we received the following comment from the Richland Operations Office: "No reference is made to the sections of DOE Order 450.1 that are not being implemented at the various sites, e.g., funding, Opportunity Assessments, staffing, performance measures in contracts, etc."

Questions on the Draft Report comments should be directed to Mr. Greg McBrien, Core Technical Group, at (301) 903-1385.



**Paul M. Golan
Acting Assistant Secretary for
Environmental Management**


Attachment



Department of Energy
Washington, DC 20585

FEB 04 2005

MEMORANDUM TO: Rickey R. Hass
Assistant Inspector General
For Audit Operations
Office of Inspector General

FROM: John Spitaleri Shaw 
Assistant Secretary for
Environment, Safety and Health

SUBJECT: Response to Draft Report on *The Department's
Pollution Prevention Program*

I am writing in reply to your memorandum of January 14, 2005, entitled Draft Report on The Department's Pollution Prevention Program, requesting comments on the subject report.

The Office of Environment, Safety and Health has some concerns that we would like to raise and for you to address. As a primary concern, we are not in agreement with the draft report's opening sentence:

"The Department of Energy (Department) has not maintained an effective pollution prevention program."

Although the draft report identifies areas where improvements in the implementation of the Department's pollution prevention program can be made, my office does not believe that those findings support the overall statement cited above. To the contrary, there are many successful pollution prevention activities ongoing across the Department. As evidence of these efforts, I am enclosing a copy of the Department's recent submittal of thirty-three nominations for the White House's *Closing the Circle Awards* for excellence in pollution prevention performance. We believe that the draft report, as a whole, does not recognize Department's numerous pollution prevention successes.

We would also note that the sentence cited above is not fully supported by the statements that follow which identify problems found at sites "in some cases" or instances where sites "did not always implement" cost-effective pollution prevention measures [emphasis added]. We recommend that this opening sentence be rewritten to more fully reflect both the conclusions and recommendations made in the draft report.



Appendix 4 (continued)

The draft report's recommendations direct the Administrator, National Nuclear Security Administration (NNSA) and the Assistant Secretary for Environmental Management (EM) to ensure site implementation of the pollution prevention provisions of DOE Order 450.1 by conducting pollution prevention operational assessments and to employ innovative strategies to fund pollution prevention programs. The recommendations further call on NNSA and EM to develop pollution prevention performance measures and hold managers accountable for program implementation. These actions are to be carried out "in conjunction with the Assistant Secretary for Environment, Safety and Health." While the phrase "in conjunction with" is not defined, we would note that our office is not in a position to "ensure" that actions are undertaken at DOE sites, nor can we hold site managers "accountable." These are Program Office roles. However, in working in conjunction with NNSA and EM, my office will support them by monitoring site performance in implementing the pollution prevention provisions of DOE Order 450.1 and providing information that will assist them in carrying out the report's recommendations.

My staff and I would be happy to discuss these issues with you further. If you have any questions concerning this memorandum, please contact Thomas Traceski of my staff at 202-586-2481 or thomas.traceski@eh.doe.gov.

Attachment

cc: Paul Golan, Acting Assistant Secretary, Office of Environmental Management
Linton Brooks, Administrator, National Nuclear Security Administration

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