



Department of Energy
Washington, DC 20585
April 21, 2005

The Honorable Thomas V. Skinner
Acting Assistant Administrator
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
Washington, DC 20460

Dear Mr. Skinner:

The Department of Energy (DOE) is pleased to transmit the enclosed annual report in fulfillment of the reporting requirements under Executive Order (EO) 13148, *Greening the Government Through Leadership in Environmental Management*. The report was prepared in accordance with the guidance provided in your letter to Agency Environmental Executives, dated March 11, 2005.

The report provides DOE's performance for 2004 in implementing the EO 13148 environmental leadership requirements. Specifically, it addresses the progress made in 2004 to establish environmental management systems at DOE sites and the Department's progress in meeting pollution prevention goals.

If you or your staff have questions or need more information, please contact Jane Powers of my staff at (202) 586-7301.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Spitaleri Shaw".

John Spitaleri Shaw
Assistant Secretary for
Environment, Safety and Health

Enclosure

cc: D. Kling, Director, Office of Federal Facilities Enforcement
W. Garvey, Office of Federal Facilities Enforcement

Executive Order 13148

Greening the Government Through Leadership in Environmental Management

Annual Progress Report: 2004



U.S. Department of Energy
Office of Environment, Safety and Health
April 2005

TABLE OF CONTENTS

	Page
I. Introduction	1
A. Background	1
B. Report Structure	2
II. Implementation Progress	2
A. Interagency Environmental Management Workgroup Activities	2
B. Implementation Strategy	3
B.1 Directives, Policies and Documents	3
B.2 Acquisition	4
B.3 Training	5
C. Environmental Management System Implementation	6
C.1 Department-Level Progress in Implementing Environmental Management Systems	6
C.2 Site-Level Progress in Implementing Environmental Management Systems	8
C.3 Summary	9
D. DOE and the White House Awards	10
D.1 Agency-Wide Awards	10
D.2 White House Closing-the-Circle Competition	16
E. DOE Toxic Chemical Reduction Goals: Baselines and Achievements	17
E.1 Overview	17
E.2 TRI Releases	17
E.3 Compliance with EPCRA TRI Reporting	19
F. Reduction in the Generation of Hazardous, Radioactive, Radioactive Mixed, and Sanitary Waste	20
G. Ozone-Depleting Substances (ODS) Goal: Baseline and Achievements	24
H. Waste Reduction Accomplishments Revitalization Initiative	25

Appendix A: Department of Energy Pollution Prevention Leadership Goals

Appendix B: DOE Order 450.1, Environmental Protection Program

Appendix C: Appropriate Facilities for Implementation of EMS

Appendix D: TRI Reporting by Chemical and by Site

Appendix E: ODS Phase-Out Progress by Site

Appendix G: Representative Examples of Site-Specific Notable P2 Practices

I. INTRODUCTION

A. Background

Executive Order (EO) 13148, *Greening the Government Through Leadership in Environmental Management*, was issued to ensure that Federal agencies integrate environmental accountability into daily decision making and planning in all their activities. The EO, issued in 2000, complemented and reinforced already existing pollution prevention goals and environmental stewardship objectives that the Department of Energy (DOE or Department) developed in 1999 and reaffirmed by the Department's Agency Environmental Executive (AEE) in 2002 (see Appendix A). It also reinforced the implementation of environment, safety and health management systems at DOE facilities.

EO 13148 defines pollution prevention as source reduction and "other practices that reduce or eliminate the creation of pollutants through: (a) increased efficiency in the use of raw materials, energy, water, or other resources; or (b) protection of natural resources by conservation." Source reduction pertains to any practice that reduces the amount of hazardous substances, pollutants, or contaminants entering waste streams or the environment prior to recycling, treatment, or disposal, and the hazards to public health and the environment associated with them.

The Department has expanded the EO definition of pollution prevention to include recycling. This expanded definition is consistent with that used in the *International Organization for Standardization (ISO) 14001-96 Environmental Management Systems — Specification with Guidance for Use* document and by the President's Council on Environmental Quality.

This report describes the Department's progress toward meeting the EO 13148 goals.

Executive Order 13148 Goals

Federal agencies shall:

- develop and implement environmental management systems,
- establish and implement environmental audit programs,
- prevent or reduce pollution at the source whenever feasible and cost-effective,
- reduce Toxic Release Inventory (TRI) releases,
- reduce use of selected chemicals, hazardous substances, and pollutants or reduce generation of hazardous waste,
- phase out procurement of Class I ozone-depleting substances, and
- implement cost-effective, environmentally sound landscaping practices.

B. Report Structure

This is the fifth annual progress report to the U.S. Environmental Protection Agency (EPA) and the Office of the Federal Environmental Executive (OFEE) as required by Section 307 of the EO. The activities described in this report occurred in calendar year 2004 unless otherwise noted.

The following sections describe DOE's participation in the EO 13148 Interagency Environmental Management Leadership Workgroup; strategies for implementing the EO; and progress made in 2004 in meeting the EO goals, specifically regarding the Department's efforts to implement environmental management systems and prevent pollution pursuant to the EO and its own pollution prevention goals. The appendices contain copies of the Department's pollution prevention leadership goals; DOE Order 450.1, *Environmental Protection Program*, (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/o4501c1.pdf>); the data used to generate the findings described in the body of the report; and brief summaries of representative site pollution prevention activities.

II. IMPLEMENTATION PROGRESS

A. Interagency Environmental Management Leadership Workgroup Activities

Representatives from DOE's Office of Environment, Safety and Health (EH) and Office of Science (SC) participated in meetings and activities of the EO 13148 Interagency Environmental Management Leadership Work Group. Involvement included EH participation in an interagency team reviewing and synthesizing agency responses to the Federal Agency Environmental Compliance Survey. The review identified trends in the relationships between how agencies monitor and manage compliance and their actual compliance performance and status. EH involvement also included presentations of the team's analysis to the Workgroup and the OFEE.

DOE continued to participate in the Workgroup's environmental management system subgroup. In 2004, the *Environmental Management System (EMS) Agency Self-Declaration Protocol for Appropriate Federal Facilities*, developed by the subgroup, was transmitted by the OFEE to all Federal agencies. The Protocol establishes the framework agencies can use in formulating the process and guidance for their facilities to self-declare compliance with the EMS requirements of EO 13148.

DOE's continued involvement in the Workgroup's metrics subgroup included proposing and developing criteria for the annual agency scorecard of agency EMS implementation and reviewing and issuing definitions that clarify the EMS self-declaration process.

DOE also participated in the following activities of the Workgroup:

- developing a discussion paper on the possible synergism between EMS and agency actions under the National Environmental Policy Act (NEPA);
- creating a crosswalk between EMS and NEPA elements;

- evaluating and commenting on EPA's proposed list of priority chemicals for use reduction; and
- reviewing and commenting on drafts of the Report to the President's Management Council in response to the Environmental Compliance Survey and in development of the Environmental Compliance Management Improvement Initiative recommendations.

EH and SC serve as information conduits between the Workgroup and DOE headquarters and field elements for news about the availability of tools and guidance to advance the goals of EO 13148. DOE's [Environmental Policy & Guidance Website](http://www.eh.doe.gov/oepa) (<http://www.eh.doe.gov/oepa>), [Pollution Prevention Website](http://www.eh.doe.gov/p2) (www.eh.doe.gov/p2), [Environmental Stewardship Clearinghouse \(EPIC\)](http://epic.er.doe.gov/epic) (epic.er.doe.gov/epic), and monthly conference calls are used to disseminate information between DOE headquarters and field elements.

B. Implementation Strategy

1. Directives, Policies and Guidance Documents

In January 2003, the Department issued DOE Order 450.1, *Environmental Protection Program*, a new directive that implements the EMS and other requirements of EO 13148 (see Appendix B). It is DOE's policy to integrate environmental management systems at its sites within the overall environment, safety and health management framework established by DOE Policy 450.4, *Safety Management System Policy* (in place since 1996), which requires DOE sites to establish Integrated Safety Management Systems (ISMS) to ensure the protection of workers, the public, and the environment.

In August 2004 DOE issued DOE Policy 450.7, *Department of Energy Environment, Safety and Health (ES&H) Goals* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/p4507.pdf>), that reaffirms the Department's commitment to integrate respect for the environment into all operations and activities through implementing and evaluating the effectiveness of EMSs. Also in 2004, the following series of guides was issued on implementing an EMS and meeting the requirements of DOE Order 450.1.

DOE Guide 450.1-1, *Implementation Guide for Use with DOE O 450.1, Environmental Protection Program* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-1.pdf>), provides background information on the Order, an overview of the EMS/ISMS integration process, and guidance relating to the preliminary steps that DOE sites should undertake to meet the Order's requirements.

DOE Guide 450.1-2, *Implementation Guide for Integrating Environmental Management Systems into Integrated Safety Management Systems* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-2.pdf>), offers detailed guidance on integrating EMS into a site's ISMS. Recognizing that many DOE sites have already implemented their ISMSs and therefore have many of the elements of

an EMS already in place, the document focuses on providing guidance to assist DOE sites in identifying any missing EMS elements and integrating them into the site's ISMS.

DOE Order 450.1 requires sites to consider the protection of cultural resources in their integrated EMS/ISMSs. DOE Guide 450.1-3, *[Environmental Guidelines for Development of Cultural Resource Management Plans-Update](http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-3.pdf)* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-3.pdf>), provides guidance to meet this requirement and implement the policies established pursuant to DOE Policy 141.1, *[Management of Cultural Resources](http://www.directives.doe.gov/pdfs/doe/doetext/neword/141/p1411.pdf)* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/141/p1411.pdf>).

DOE Guide 450.1-4, *[Implementation Guide Wildland Fire Management Program for Use with DOE O 450.1, Environmental Protection Program](http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-4.pdf)* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-4.pdf>), offers guidance on including protection of resources from wildland and operational fires in sites' integrated EMS/ISMSs.

DOE Guide 450.1-6, *[Ground Water Surveillance Monitoring Implementation Guide for Use with DOE O 450.1, Environmental Protection Program](http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-6.pdf)* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-6.pdf>), describes the elements of an integrated site-wide ground water surveillance monitoring program that can be adapted to the unique physical conditions and programmatic needs at each DOE site to meet the requirements of DOE O 450.1.

DOE Guide 450.1-10, *[Senior Managers Implementation Guide for Use with DOE O 450.1, Environmental Protection Program](http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-10.pdf)* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-10.pdf>), provides a summary description of an EMS for DOE senior managers. It includes senior managers' responsibilities as they apply to the successful implementation of an ISMS/EMS and the expected benefits to be derived from such implementation.

2. Acquisition

The DOE Procurement Executive issued a formal announcement of the Department's early adoption of the U.S. Department of Agriculture (USDA) Biobased Products Program. It identified contracting and subcontracting opportunities at DOE's sites for which the use of environmentally preferable biobased services or products could be pursued.

DOE also promoted early adoption of biobased product purchases through creation of the Preferred Procurement Partnership. The Partnership is comprised of the Offices of Environment, Safety and Health; Energy Efficiency and Renewable Energy; and Management, Budget, and Evaluation, the primary offices within the Department that share responsibility for and commitment to green purchasing. The Partnership promoted the purchase of environmentally preferable products, including biobased products,

through information sharing and networking via teleconferences with sites across the DOE complex, and outreach to purchasers, users and suppliers.

Additionally, DOE hosts a website for its acquisition personnel entitled [Acquisition and the Environment](http://professionals.pr.doe.gov/ma5/MA-5Web.nsf/Procurement/Acquisition+and+the+Environment?OpenDocument) (<http://professionals.pr.doe.gov/ma5/MA-5Web.nsf/Procurement/Acquisition+and+the+Environment?OpenDocument>) with links to the greening the government Executive Orders and training opportunities.

3. Training

On November 29, 2004, the Assistant Secretary for Environment, Safety and Health, issued a memorandum announcing the publication of DOE G 450.1-10, [Senior Managers Implementation Guide for Use with DOE O 450.1, Environmental Protection Program](http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-10.pdf) (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-10.pdf>). An accompanying training manual was also developed and posted on the DOE environmental policy and guidance website at http://homer.ornl.gov/oepa/ems/senior_manager_ems_training.ppt. This manual is incorporated as a module in DOE's Nuclear Executive Leadership Training program which is under development.

DOE initiated a tele-video conference series through which DOE sites could share information and experiences related to EMS development and implementation. The tele-video conferences consisted of presentations by DOE sites on their methods and experiences in developing and implementing the EMS and integrating it with the ISMS. Eight (8) tele-video conferences were held from February through June 2004. Proceedings from several of the conferences are available at <http://www.eh.doe.gov/oepa/ems/tvcs.html>.

Through its liaison with the Environmental Subgroup of the Energy Facility Contractors Group (EFCOG), DOE participated in the subgroup's November 17-18, 2004 meeting in Albuquerque, NM. The meeting included sessions sharing experiences and lessons-learned about EMS and pollution prevention. DOE and EFCOG collaborated on developing a two-day EMS workshop offered in March 2005, focusing on case studies in pollution prevention and EMS implementation, lessons learned, and best practices.

Complex-wide teleconferences were held on April 27 and July 22, 2004 to kick off DOE's Early Adopter Buy Bio Initiative. Participants shared information on which products purchased in large quantities by DOE have available biobased counterparts. Representatives from the six national laboratories (Argonne National Laboratory, Idaho National Engineering and Environmental Laboratory (now Idaho National Laboratory), National Energy Technology Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory, and Pacific Northwest National Laboratory) that comprise the DOE National Bioenergy Center (NBC) described their experiences with replacing an existing product used at the lab with a biobased product and testing its function and cost. Biobased paints and sorbents, cleaning products, cream abrasives, detergents, and biodiesel are among the products tested through the NBC biobased program.

C. Environmental Management System Implementation

The Interagency Environmental Management Leadership Workgroup identified criteria to describe milestones for EMS implementation by Federal agencies. These criteria were used by the OFEE to prepare an annual "scorecard" to track the progress of DOE and other Federal agencies toward full implementation of EMS by December 2005. The following sections describe the Department's progress toward meeting calendar year (CY) 2003, 2004, and 2005 criteria.

C.1 Department-Level Progress in Implementing Environmental Management Systems

C.1.1 Agency Directives: *CY04 Criterion: Agency has incorporated the EMS goals and requirements of EO 13148 into existing agency environmental directives, policies, and documents.*

DOE Order 450.1 *Environmental Protection Program*, was issued on January 15, 2003, as part of the Department's Directives system. It incorporates the EMS goals and requirements of EO 13148.

In particular, the Order includes a requirement to establish EMSs at all appropriate DOE sites by December 31, 2005 (§4.a.) and identifies implementation responsibilities (§5.c.(1); §5.d.(1)&(2)). The EMS is to include policies, procedures, and training to:

- identify activities with significant environmental impacts;
- manage, control, and mitigate the potential impacts of site activities with significant environmental impacts; and
- assess performance and implement corrective actions where needed.

Section B.1 of this report lists and describes the policies and guidance documents DOE issued in 2004 to support EMS implementation.

C.1.2. Self-Declaration Protocol: *CY04 Criterion: Agency has issued a Self-Declaration Protocol based on the Federal Self-Declaration Protocol guidance.*

DOE Guide 450.1-1, *Implementation Guide for Use with DOE O 450.1, Environmental Protection Program* (<http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/g4501-1.pdf>), contains DOE's Self-Declaration Protocol guidance.

DOE Order 450.1 specifically requires the manager of a DOE operations office, field office or site office "to report by December 31, 2005, to the Cognizant Secretarial office the status regarding whether the EMS requirements of DOE O 450.1" have been integrated into the existing ISMS at the site (§5.d.(1)).

Chapter 9 of DOE Guide 450.1-1, entitled "Assessing and Reporting Implementation of the Management System Requirements of DOE O 450.1," describes the self-declaration

process. Attachment 2 of the Guide provides a self-declaration procedure that DOE sites may use. Alternatively, sites may use “other self-declaration procedures that credibly establish and document that they have an EMS that conforms to the requirements of DOE O 450.1.” Chapter 9 includes a discussion of third-party registration of an EMS and the report letter requirement for the operation/field/site office manager.

C.1.3. Resources Distributed: *CY04 Criterion: Agency has provided resources (e.g., dollars, FTE) for EMS implementation to its appropriate facilities.*

DOE sites have received funding for EMS implementation through the amounts annually budgeted for site management. The progress made by the Department’s sites in developing EMSs indicates that the Department’s approach is appropriate and effective.

In implementing EMSs, DOE is pursuing the same successful approach it took in implementing its ISMS program whereby all environmental, safety and health (ES&H) activities considered a necessary and important aspect of line management program responsibilities are funded as part of overall site operations. Resources for implementing ISMSs and EMSs are drawn from line management program operating budgets rather than a specific or separate ES&H budget line item. To that end, the DOE Budget Call Guidance prepared by the Department’s Chief Financial Officer instructs line management to ensure that ES&H requirements are supported in their program budget submissions. DOE Order 450.1 requires managers at the field and headquarters levels to request through the annual Departmental budgetary process the funding and resources needed for implementing the requirements of the Order (§§ 5.c.(2); 5.d.(7)). Under this approach, funding resources for operation and maintenance of the EMS and continual improvement of the EMS are also considered a necessary and important aspect of line management program responsibilities, and are funded as part of the cost of operating a DOE site.

C.1.4 EMS Training for Senior-Level Managers: *CY03 Criterion: Agency has provided EMS training for appropriate agency-level senior managers.*

In February 2003, the Department conducted EMS training as part of a DOE Order 450.1 workshop to familiarize Department managers and operational personnel with the elements that need to be considered in an EMS. This workshop was broadcast from DOE Headquarters to approximately 20 DOE sites across the country and included presentations from representatives of the OFEE and civilian and defense Federal agencies.

On October 24, 2004, DOE issued DOE Guide 450.1-10, *Senior Manager’s Guide to Environmental Management System*, highlighting the Department’s commitment to and the role of senior management in implementing EMS as part of ISMS. It is supported by a “Frequently Asked Questions” list for use in briefing senior management, training programs, and self-training.

DOE previously issued an [Environmental Management Systems Primer for Federal Facilities](http://www.eh.doe.gov/oepa/guidance/ems/emsprimer.pdf) (<http://www.eh.doe.gov/oepa/guidance/ems/emsprimer.pdf>) (developed jointly with EPA) to assist Departmental personnel in implementing EMSs. DOE conducted extensive training and Department-wide workshops on integrated safety management for DOE and contractor personnel at Headquarters and in the field from 1998 to the present. Section B.3 of this report describes the training offered in 2004. These training workshops brought together line managers, line workers, and environment, safety, and health support staff from DOE sites, and included sessions on environmental management systems and integrating EMS into ISMS.

C.2 Site-Level Progress in Implementing Environmental Management Systems

C.2.1 Identification of “Appropriate Facilities” for EMS Implementation

EO 13148 states that each agency should determine its appropriate facilities based on the “size, complexity, and the environmental aspects of facility operations.” DOE currently identifies 47 sites or organizations as “appropriate facilities” for implementing an EMS. The list of sites is included in Appendix C. Appendix C also identifies changes in this list since the EO 13148 2003 Annual Progress Report.

The EO 13148 Interagency Environmental Management Leadership Workgroup recognizes that it may be appropriate to implement one EMS for an organization which operates several similar facilities, and has defined an appropriate facility for EMS implementation as “any Federal property, properties, organization or operation that conducts activities that can have a significant impact on the environment, either directly or indirectly, individually or cumulatively, due to operations of that facility's mission, processes or functions.”

Within DOE, the term “site” is used to identify contiguous geographic areas under Departmental ownership. DOE's sites often have numerous facilities and normally a site is managed under a single management system. In addition, some organizations that manage several similar sites are implementing a single EMS.

DOE Order 450.1 requires EMS to be integrated into a site's ISMS so that all DOE sites required to implement an ISMS are considered “appropriate facilities” for EMS implementation. In addition, some DOE organizations that are exempt from ISMS (e.g., the Power Marketing Administrations) are required to implement an EMS.

Ten DOE sites have been certified by third-party registrars to the ISO 14001 EMS standard (three have chosen not to renew the registration) and five sites are members of EPA's National Environmental Performance Track program. These sites are identified in Appendix C.

C.2.2 Facility EMS Policy: *CY03 Criterion: Appropriate facilities have issued an EMS policy statement.*

Based on reports from the responsible program offices, 42 of DOE's 47 sites (89%) have issued an EMS policy statement.

C.2.3 Facility Implementation Training: *CY03 Criterion: Appropriate facilities have provided EMS implementation training to the personnel responsible for implementing EMS.*

Based on reports from the responsible program offices, 43 of DOE's 47 sites (91%) have provided implementation training to personnel responsible for implementing EMS.

C.2.4 Facility Significant Environmental Aspects: *CY03 Criterion: Appropriate facilities have identified and documented their significant environmental aspects.*

Based on reports from the responsible program offices, 40 of DOE's 47 sites (85%) have documented their significant environmental aspects.

C.2.5 Facilities with Measurable Objectives and Targets: *CY04 Criterion: Percent of appropriate facilities that have documented measurable environmental objectives and targets.*

Based on reports from the responsible program offices, 38 of DOE's 47 sites (81%) have documented measurable environmental objectives and targets.

C.2.6. Facilities with Environmental Management Programs: *CY04 Criterion: Percent of appropriate facilities that have established environmental management programs specifically to achieve each of their environmental objectives and targets.*

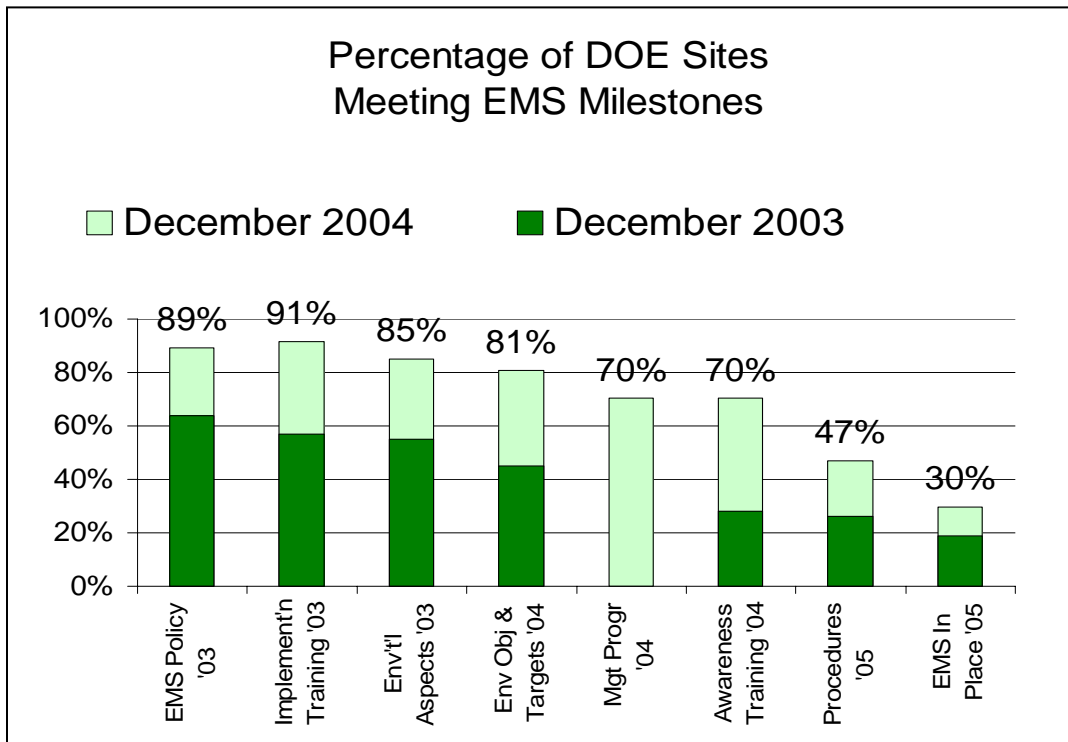
Based on reports from the responsible program offices, 33 of DOE's 47 sites (70%) have established environmental management programs specifically to achieve each of their environmental objectives and targets

C.2.7 Facilities with Awareness Training Program: *CY04 Criterion: Percent of appropriate facilities that have developed a program for EMS awareness training.*

Based on reports from the responsible program offices, 33 of DOE's 47 sites (70%) have developed a program for EMS awareness training.

C.3 Summary

In addition to progress in achieving the 2003 and 2004 EMS implementation criteria, many DOE sites made significant advances in satisfying the 2005 criteria for EMS implementation. As shown in Figure 1, 47% of DOE sites have established all EMS procedures, and 30% have an EMS in place (either self-declared or third-party certified).

Figure 1. EMS Implementation Progress To Date

D. DOE and White House Awards

D.1. Agency-wide Awards

The DOE pollution prevention awards program is in its eleventh year. Awards were granted in seven categories: affirmative procurement, education/outreach and information sharing, environmental management systems, environmentally preferable products use, recycling, sustainable design/green buildings, and pollution prevention. In April 2004, the Department's Program Secretarial Officers awarded 25 "best in class" pollution prevention awards for activities conducted in 2003 at DOE sites under their purview. These award-winning activities are grouped by category and briefly described below. Additional information on these pollution prevention award activities is available at http://www.eh.doe.gov/p2/p2awards/nomination_list_2003.jsp.asp.

Affirmative Procurement

Five Keys to Success: Continuous Improvement for Construction Purchases

Sandia National Laboratories/New Mexico (Sandia/NM) continuously improved its construction contracts purchasing system. Purchases of material containing recycled content increased 40% over the previous year due to training, performance monitoring, and contractual reporting provisions.

Education And Outreach/Information Sharing

Sustainable Design Integrated Educational Workshop Series

Sandia/NM conducted a Sustainable Design Integrated Education series of workshops to ensure that sustainable design principles were integrated in all design and construction efforts. Series' workshops educated all involved parties on the benefits and requirements of recycling, purchasing recycled content and environmentally preferable products, energy efficiency, water conservation, and the related environmental performance of buildings. Conducted for less than \$4,000 by utilizing in-house experts, the seven workshops drew 289 design and construction professionals from the site, the local community, and elsewhere in DOE.

Sustainable NREL: Education, Outreach and Information Sharing

A major priority for the Sustainable NREL (National Renewable Energy Laboratory) program has been educating staff and the public on the goals and objectives of relevant Greening the Government Executive Orders and DOE Orders. Pollution prevention was made "personal" for staff and incorporated building energy use, computer power management, and recycling principles in internal and external web sites, traveling exhibits, print products.

Education of Chemical Management Systems to the DOE Complex

Lawrence (Butch) Byers was recognized for outstanding leadership in educating the Stanford Linear Accelerator Center and DOE communities on the Chemical Management System model in order to effect substantial culture changes in hazardous materials procurement and management.

Savannah River P2 Outreach and Employee Awareness Program

Ms. Sarita Berry was recognized for championing the Savannah River Site Pollution Prevention (P2) Employee Awareness and Outreach Program. Under her leadership, the Program established a heritage of excellence and touched thousands of employees and community members through high quality and successful activities and events.

Environmental Management Systems

Achieving a Positive EMS Return on Investment

The Strategic Petroleum Reserve implemented an EMS to improve managing the risk posed by more than 624 million barrels of stored oil. Performance metrics validated EMS effectiveness: exploration and production petroleum waste was reduced by over 24,000,000 pounds, and the EMS produced over \$2,400,000 in savings/avoidances (paying for itself nearly 13-times over). Key EMS components are seamless integration with business systems, aggressive innovation to generate cost benefits, maximizing employee involvement, and engaging the community.

Positive Experiences in Undergoing ISO-14001 Certification Process at National Energy Technology Laboratory (NETL)

By structuring its EMS to conform to the ISO 14001 standard, NETL demonstrated excellence in environmental performance through increasing recycling of sanitary waste streams to 51% and reducing nonhazardous waste generation by 67% and hazardous waste generation by 92% (compared to 1993 baseline). Energy consumption was reduced by 33% (compared to 1990 baseline).

Corporate Commitment to Environmental Stewardship and Enhanced EMSs

Three of the national laboratories managed/co-managed by Battelle Memorial Institute, Brookhaven National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest National Laboratory, established EMSs that are fully integrated with business systems, and go beyond the ISO 14001 standard. All have experienced substantial improvements in accountability, hazard and waste reductions, cost savings, and compliance.

Employing Environmental Accountability and Aspect Integration at Yucca Mountain Project

Yucca Mountain Project staff promoted a culture change and established strategies and procedures, including an EMS program, to incorporate sustainable design and environmental accountability into daily activities and long-term planning. The EMS drives continuous improvement beyond compliance and recognizes the integral role of technical staff and management in environmental management strategy.

Energy Savings Performance Contract Exemplifies Life Cycle Assessment

The Savannah River Site EMS is implemented by all major site contractors and organizations. P2, including energy conservation, is integrated into daily operations. Regulatory compliance and cost effectiveness through Life Cycle Cost Assessment (LCA) drive all P2 project implementation decisions.

Environmentally Preferable Purchasing*Alternative Fuel Initiatives*

The Vehicle Management and Fueling Program of Fermi National Accelerator Laboratory met the federally required FY05 goal for reducing, by 20%, the use of petroleum based fuel by increasing the percentage of alternatively fueled vehicles from 10% in FY99 to 26% in FY03; installing a 6,000-gallon E85 underground storage tank and pump dispenser; and installing a Compressed Natural Gas (CNG) system.

Mortar-Lining Project for Water Distribution

The Hanford Site refurbished 28 miles of degraded waterline at half the cost of replacement by using mortar-lining, an innovative, commercially-available technology. Pipelines are restored in place using minimal excavation, reducing worker risk of exposure to possibly contaminated soils. Waste avoidance is estimated to exceed 6,000 metric tons of replacement pipe.

Manganese Nitrate Substitution Avoids High Level Waste Generation

A Savannah River Site (SRS) team championed the substitution of manganese nitrate for ferrous sulfamate as a supplemental neutron poison for plutonium and uranium solution transfers to the SRS high-level waste system. The resulting savings were estimated at over \$7 million due to the reduction of over 16,000 pounds of high-level waste sludge.

Recycling*Construction Waste Recycling at Sandia National Laboratories/New Mexico*

Sandia/NM developed a construction waste-recycling program for new building construction projects that resulted in diverting over 80% (by weight) of waste materials generated in constructing the Joint Computational Engineering Laboratory from direct landfill disposal. Key aspects of the program are identification of recycling pathways, contractual recycling requirements, planning, and tracking and reporting performance.

Scintillator Plastic Recycling at Fermi National Accelerator Laboratory

Fermi National Accelerator Laboratory avoided disposing 3,000 to 6,000 pounds of plastic waste per month from its plastic scintillator extrusion line through proactive pollution prevention thinking by a site technician. All the waste material is recycled.

Sustainable NREL (National Renewable Energy Laboratory): Recycling Program

Sustainable NREL's organizational responsibility is to implement and oversee sustainability across the Laboratory's operations in synergy with the Laboratory's mission. The Laboratory's Sustainability Management Framework includes a formal Materials Recycling Policy and supports recycling of a comprehensive suite of material.

Lead Program Project

Idaho National Engineering and Environmental Laboratory recycled 200,000 pounds (99 metric tons) of radioactively contaminated lead into lead bricks for use at the Idaho State University Accelerator Center allowing the Center to increase the number of experiments it can perform and prolonging the life of the Center by 50 years. The lead recycle and reuse project achieved savings of \$1.4 million by avoiding disposal costs and the Center's purchase of new lead bricks.

Nitrate Recycling

Employees of Idaho National Engineering and Environmental Laboratory sought consumers for 11,200 pounds of laboratory grade sodium nitrate and 4,130 pounds of ACS grade potassium nitrate thereby eliminating their disposal as waste.

Greening Property Management at the Yucca Mountain Project

The Yucca Mountain Project effort to dispose of 10,000 metric tons of obsolete and outdated equipment and material in a timely, coordinated, cost-effective, and "green" manner led to recycle or reuse of 98% of the material in a four-month timeframe at a cost of \$250,000. The baseline cost and schedule to disposition the material was estimated at \$6.9 million over a three-year period, with a majority of the material being considered waste.

Comprehensive Recycle Options

Savannah River Site's comprehensive industrial and office waste recycling programs resulted in recycling over 4,700 metric tons of hazardous and non-hazardous materials in FY2003. In addition, the site developed an alternative fuel system to convert paper waste to a biomass fuel cube to replace about 30% of coal used at its A-Area steam plant.

Sustainable Design/Green Buildings*Sustainable NREL (National Renewable Energy Laboratory): New Buildings Program*

NREL's New Buildings Design Policy included implementation strategies to exceed the 10 CFR 434 Model Energy Code by 30% or more, and to achieve, at a minimum, Leadership in Energy and Environmental Design (LEED Silver level ratings for all new buildings. In addition, the laboratory space of all new buildings will apply the principles of the EPA/DOE "Laboratories for the Twenty First Century." Three new buildings currently under design or construction exceed the Model Energy Code by 50%; one is a prototype Zero Energy Building and the largest of the three is designed at the LEED's Gold level.

Integration of Environmental Sustainability Principles at Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) has embraced environmental sustainability and uses its EMS structure in achieving long-term efficiency, cost reduction, and environmental goals to reduce environmental impact. ORNL aggressively integrates environmental sustainability principles into all laboratory operations through new facility design, biobased-fuel vehicle selection, comprehensive energy management program implementation, and pollution prevention program integration.

Design Assessments for the Pit Disassembly and Conversion Facility

Early collaboration with design engineers, tailored sustainable design/pollution prevention training, and comprehensive design and process assessments led to identifying and analyzing 33 sustainable design/pollution prevention opportunities across the lifetime of DOE's Pit Disassembly and Conversion Facility at the Savannah River Site. The result is an estimated \$40 million in cost avoidance over the seven-year life of the facility.

Pollution Prevention*Mixed Waste Elimination through Process Modification*

A team of scientists from Brookhaven National Laboratory eliminated a mixed waste stream through modifying a wet-chemistry type analytical process by purchasing a Kinetic Phosphorescence Analyzer. This modification could be applied across the nation in the analysis of uranium in groundwater and soil.

Formamide Replacement in Genetic Sequencing

Los Alamos National Laboratory researchers discovered that a water-based solution gave even better results than formamide, a hazardous chemical, for resuspending DNA during

the sequencing process. This product substitution resulted in elimination of a hazardous waste stream and total annual savings of approximately \$78,000.

Microplate Scintillation Counter Reduces Mixed and Radioactive Waste

Brookhaven National Laboratory scientists investigated alternatives to using a standard scintillation counter that was labor intensive, generated costly amounts of mixed waste, and was less sensitive than other available technologies. The solution was a microplate Scintillation and Luminescence counter that results in about a 90% reduction in mixed solvent waste generation and reduces count times for each sample from 1 to 3 minutes to about 6 seconds.

Waste Water Reduction Activities at the Oak Ridge National Laboratory

Oak Ridge National Laboratory implemented two waste-water reducing initiatives associated with solvent distillation operations and with nanoparticle and sol-gel synthesis. The initiatives eliminated more than 190,000 gallons of waste water per year, required a one-time cost of approximately \$7,400, resulted in annual cost avoidance of more than \$4,000, increased operational flexibility and reproducibility of chemical processes, and decreased the potential of damage from leaks associated with once-through cooling water systems.

Y-12 Innovative Roadway Paving Application

The Y-12 National Security Complex maintenance operations integrated cost-effective pollution prevention into roadway resurfacing activities by recycling damaged pavement into 2,825 metric tons of usable asphalt product. Through reuse rather than disposal of the damaged pavement, the site eliminated a waste stream and avoided the need to buy limestone base gravel. Costs of more than \$141,000 were thereby avoided.

Oil Bypass Filter Technology Evaluation: A Study in Oil Conservation

Idaho National Engineering and Environmental Laboratory personnel evaluated the effectiveness of oil bypass filter systems in its fleet of 8 diesel buses to extend engine oil drain intervals and eliminate waste oil generation. Although almost 260 thousand miles were driven, no oil changes were needed saving 185 gallons of oil from use and disposal.

Reduction of Perchloric Acid in the Analysis of Alpha Emitting Isotopes

Environmental Survey and Site Assessment Program personnel from the Oak Ridge Institute for Science and Education significantly reduced the amount of perchloric acid used in the analysis of alpha emitting isotopes by researching and developing an analytical approach that combined total dissolution of samples with extraction chromatography. The new procedure modification maintained high performance levels, reduced analytical turn around times by approximately 40%, eliminated one waste stream of 30 kg of hazardous organic waste, and saved approximately \$39,000 annually.

Minimizing the Copy Hog at the Yucca Mountain Project

The Yucca Mountain Project targeted source reduction to augment its already strong paper recycle program. A root cause analysis of source reduction opportunities led to a Paper Use Reduction Campaign that resulted in a 30% reduction in paper use and is well on the way to achieving a 50% reduction goal.

Tritium Hot Calibration Laboratory

The Savannah River Site established the Tritium Hot Calibration Laboratory to calibrate tritium-contaminated instrumentation rather than discard it as done previously. The site significantly minimized a radioactive waste stream and is saving about \$700,000 in replacement costs and waste management.

P2 Implementation in Savannah River Site Closure Business Unit

Through innovation and effective resource management, the Savannah River Site's Closure Business Unit P2 Team avoided the generation of over 2,000 cubic meters of low level radioactive waste resulting in savings exceeding \$40 million in life cycle costs for projects implemented in FY2003.

D.2 White House Closing the Circle Competition

The prestigious White House Closing the Circle Awards recognize Federal employees and their facilities for efforts which resulted in significant contributions to environment stewardship. The competition is open to all Federal departments and agencies and receives hundreds of nominations annually.

The Department received two of the twelve Closing the Circle Awards granted for 2003 activities from a pool of 200 nominations. The DOE Closing the Circle Award winners were Battelle Memorial Institute for its corporate commitment to environmental stewardship and environmental management systems at three of the DOE national laboratories it manages or co-manages and Sandia National Laboratories/New Mexico for its continuous improvement in purchasing construction materials containing recycled content.



The Department also received two of the fifteen Honorable Mentions recognized by the Closing the Circle Competition. The Honorable Mention awards went to the Yucca

Mountain Project for its efforts to significantly reduce paper use and the Strategic Petroleum Reserve for its commitment to implementing an EMS.

E. DOE Toxic Chemical Reduction Goals: Baselines and Achievements

E.1 Overview

The Department's 1999 Pollution Prevention Leadership Goals include a release reduction goal for toxic chemicals subject to section 313 reporting under the Emergency Planning and Community Right-to-Know Act (EPCRA). This goal is to reduce releases of toxic chemicals subject to Toxic Release Inventory (TRI) reporting by 90% by 2005, using 1993 release levels as a baseline. This particular reduction goal applies to the total TRI releases to the environment as reported under Section 8.1 of the EPCRA section 313 Form R report. Releases include the amount of toxic chemicals directly discharged to air, water, land, and injected underground at the site, as well as amounts sent off-site for disposal.

E.2 TRI Releases

Since DOE established its TRI goals in 1999, the EPA has made changes to TRI reporting requirements. The effect of these changes has resulted in an increased number of DOE facilities that are required to report their TRI releases and an increase in the amounts of releases reported by the Department. Given these changes, DOE can no longer measure its progress toward attaining its 2005 TRI goal using a common data set. The resultant effect of these changes is that the total amount of reported TRI chemicals released complex-wide increased by 448 metric tons (80%) between year 2002 and 2003. Figure 2 shows the top six TRI chemicals in terms of pounds released (lead and lead compounds, zinc compounds, nitrate compounds, hydrochloric acid, methanol and sulfuric acid) that represent about 94% of the total reported releases. Lead and lead compounds were the single largest category (disposal of 1,394,328 pounds in 2003) and accounted for approximately 67% of the total reported releases. By way of contrast, only 10,986 pounds of lead and lead compounds were released for reporting year 2000.

The increased reporting for releases of lead described above is largely the result of two factors. First, the reporting threshold for lead significantly changed in 2001 when lead was listed as a persistent, bioaccumulative and toxic (PBT) chemical. EPA changed the reporting threshold from 25,000 pounds for manufacture or process and 10,000 pounds for other use to 100 pounds for manufacture, process, or use. Accordingly, more DOE sites were required to report their releases and more releases were required to be reported than in previous years. Second, DOE radiation protection policy precludes the recycling of lead from radiological control areas. The effect of this prohibition has been the disposal rather than the recycling of some lead which may contain residual radioactivity from stockpiles at DOE sites. Notwithstanding, in the prior year to the 2001 TRI reporting threshold changes, the Department realized a 84% reduction in TRI releases compared to the 1993 baseline.

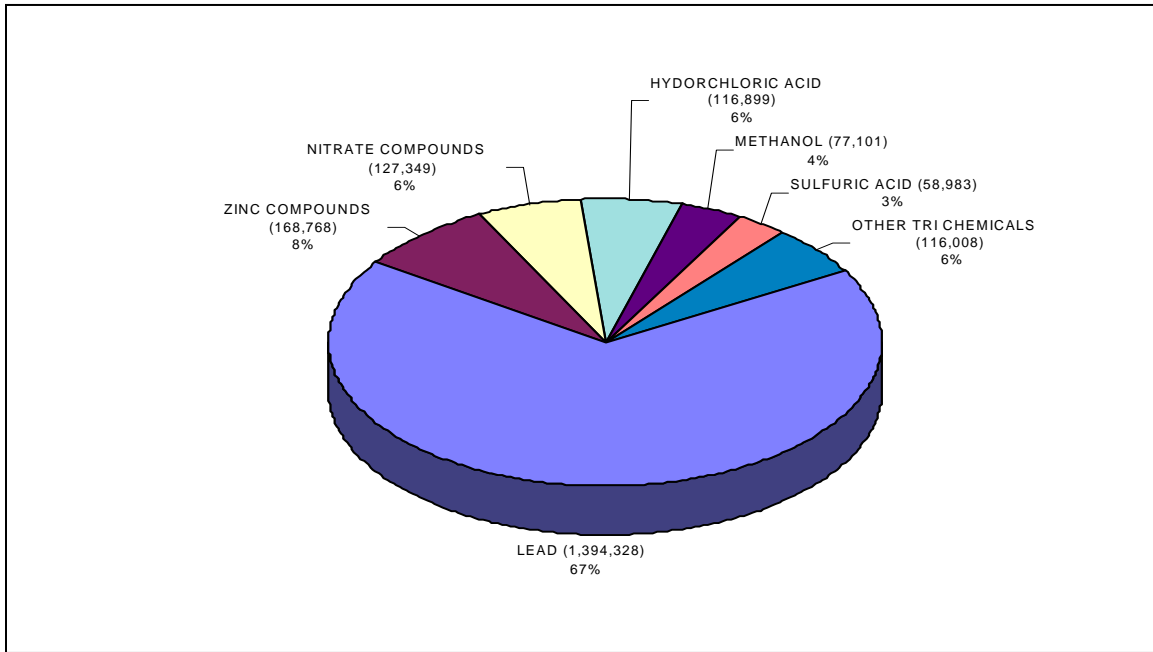
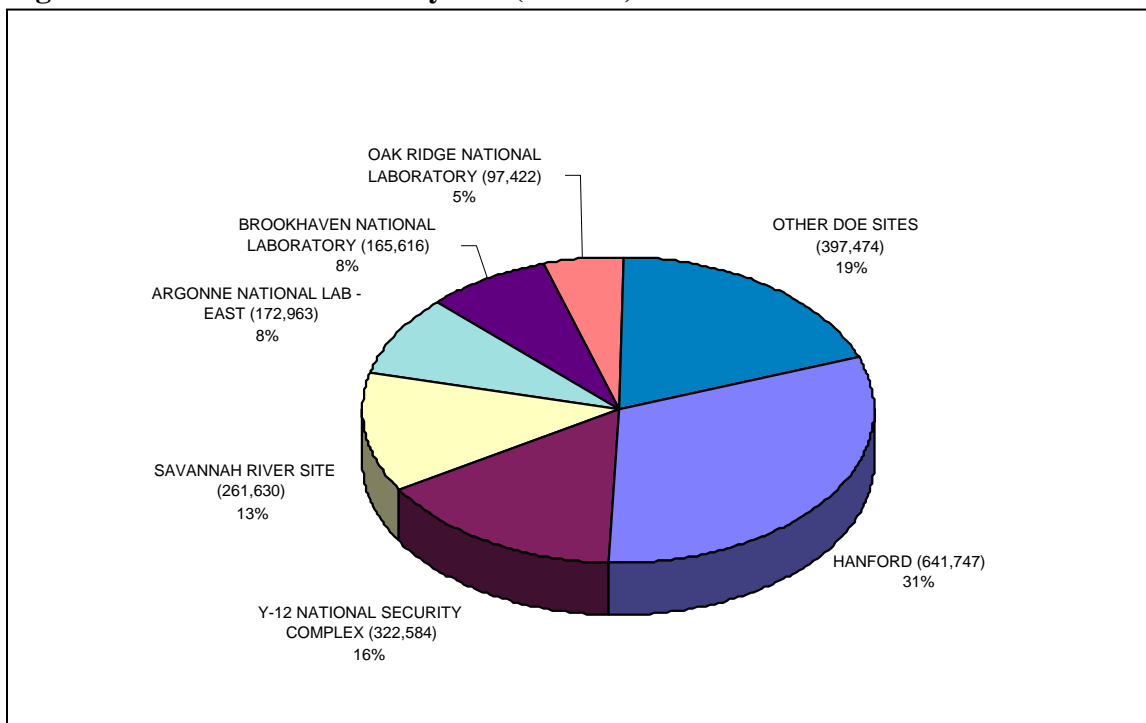
Figure 2. DOE TRI Releases by Chemical (Pounds)

Figure 3 shows TRI releases (quantity and percentage) reported by the six DOE sites with the highest releases. Reported TRI releases from six sites (Hanford, Y-12 National Security Complex, Savannah River, Argonne National Laboratory-East, Oak Ridge National Laboratory and Brookhaven National Laboratory) in year 2003 represented about 81% of the DOE total, complex-wide releases. Lead and lead compounds constituted 100% of the reported releases at Argonne-East and almost 100% of the reported releases at Hanford and Brookhaven. Nitrate represented 82% of the releases at Oak Ridge and derives primarily from the site waste water treatment plant. Hydrochloric and sulfuric acid releases derive primarily from the coal-fired steam plant at Y-12. Reported releases of zinc compounds rose in the late 1990's primarily as a result of the coal-burning power plant at the Savannah River Site and have remained at this level over the past several reporting periods.

Figure 3. DOE TRI Releases by Site (Pounds)

Appendix D provides additional site- and chemical-specific TRI information for reporting year 2003.

E.3 Compliance with EPCRA TRI Reporting

EO 13148 encourages Federal facilities to use computerized software for the electronic submission of TRI reports. Information collected during the validation of year 2003 reporting data indicated that 21 out of 23 reporting sites used computer based reporting software with 17 sites reporting electronically and four sites reporting on paper copies generated from the software.

EO 13148 directs all Federal facilities to comply with the EPCRA reporting requirements for planning for chemical emergencies (Section 302-303); emergency notification of chemical accidents and releases (Section 304); and reporting of hazardous chemical inventories (Section 311 and 312). These provisions require DOE to notify state emergency response commissions (SERCs) and local emergency planning committees on the inventories and environmental releases of those substances. The intent of these requirements is to provide the public with information on hazardous chemicals in their communities, enhance public awareness of chemical hazards, and facilitate development of state and local emergency response plans. Table 3 below provides a summary of DOE site EPCRA reporting for 2003, based on information collected during TRI reporting validation.

Table 3: 2003 EPCRA Reporting by DOE Facilities

Report Type	Number of Sites Meeting Reporting Criteria And Submitting Specified Reports
EPCRA 302-303: Planning Notification	11
EPCRA 304: EHS Release Notification	3
EPCRA 311-312: MSDS/Chemical Inventory	24

F. Reduction in the Generation of Hazardous, Radioactive, Radioactive Mixed, and Sanitary Waste

In 1999, the Secretary of Energy established pollution prevention goals for routine generation of transuranic, low-level radioactive, low-level mixed, hazardous, and sanitary waste. The goals are to be achieved in 2005 using 1993 as the baseline year. These goals serve the Department in meeting the requirements of EOs 13148 and 13101 for Federal agencies to establish pollution prevention goals.

In 2004, DOE surpassed its 2005 pollution prevention goals in terms of reducing the total amount of generated wastes. The collective waste generation goal is a reduction from the 1993 baseline of 181,648 metric tons per year to 40,966 metric tons per year by 2005; in 2004 DOE achieved a reduction to 39,529 metric tons.

The Department tracks both its routine and non-routine waste generation. "Routine" wastes are those associated with all other site activities (e.g., waste from national security operations, scientific research, program administration, site infrastructure, and maintenance and refurbishing of facilities in standby status) and are covered in this annual report. "Non-routine" wastes are those associated with cleanup and stabilization of legacy wastes.

Table 4 illustrates the progress DOE made in 2004 in meeting its 2005 goals for the routine generation of transuranic, low-level radioactive, low-level mixed (radioactive and hazardous), hazardous, and sanitary wastes, and the progress it needs to make to achieve the low-level radioactive waste reduction goal. In 2004, DOE sites collectively met or exceeded the challenge of a 90% reduction in hazardous waste; an 80% reduction in transuranic, and low-level mixed waste; and a 75% reduction in sanitary waste relative to the 1993 baseline.

Table 4: DOE Progress Toward Meeting Pollution Prevention Goals*

Type of Waste	1993 Baseline: Waste Generated	2005 Goal: Waste Generated	2004 Status: Waste Generated	Waste Reduction Needed to Meet 2005 Goal	% Reduction Made to Date	2005 Goal % (baseline reduction)
Transuranic	708	142	135	0	81%	80%
Low-level Radioactive	41,653	8,331	10,791	2460	74 %	80%
Low-level Mixed	3,324	665	315	0	91%	80%
Hazardous	14,419	1,442	794	0	94%	90%
Sanitary Waste	121,544	30,386	27,494	0	77%	75%

* Units are in metric tons (1 metric ton equals 1 cubic meter)

Table 5 and the charts that follow demonstrate the waste amounts generated each year since the baseline year of 1993. Data spikes from year-to-year can be attributed to programmatic needs such as the initiation or termination of research projects or site stockpiling of wastes until an opportunity arose for safe, cost-effective recycling, reuse or disposal.

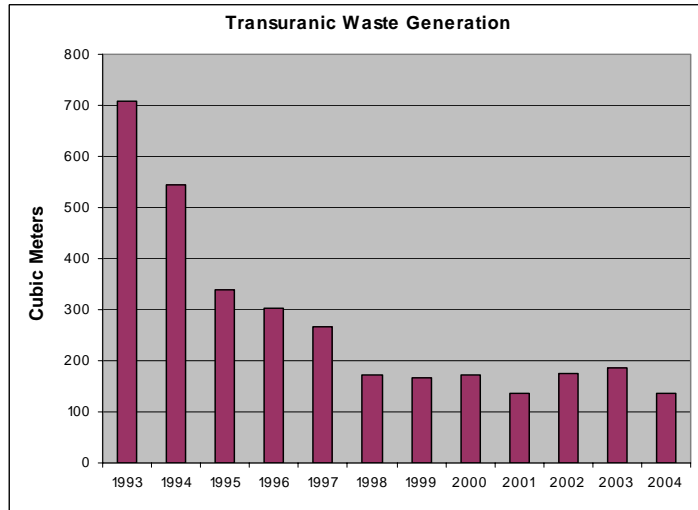
Table 5: Routine Waste Generation from Baseline Year to 2004 Reporting Year*

Waste Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Transuranic	708	546	339	303	267	172	167	173	137	175	171	135
Low-level Radioactive	41,653	31,870	21,895	15,051	16,533	13,653	11,105	10,257	10,640	12,167	14,269	10,791
Low-level Mixed	3,324	3,133	1,333	1,372	1,369	1,198	807	794	968	476	309	315
Hazardous	14,419	12,516	4,098	3,054	2,875	2,061	1,036	998	1,194	1,368	1,302	794
Totals without Sanitary	60,104	50,136	30,160	22,450	23,037	19,321	15,488	14,080	15,930	17,093	18,974	12,035
Sanitary	121,544	107,996	96,999	89,183	61,867	48,568	48,224	38,529	36,879	38,263	48,522	27,494
Totals	181,648	158,132	127,159	111,633	84,904	67,889	63,712	52,609	52,809	55,356	67,496	39,529

* Units are in metric tons (1 metric ton equals 1 cubic meter)

Transuranic Waste (TRU)

Transuranic (TRU) waste contains alpha-emitting radionuclides with an atomic number greater than 92 (heavier than uranium). It is generated primarily through production of nuclear weapons but non-defense research activities can also create TRU waste. TRU waste generation was reduced 81% from the 1993 baseline.

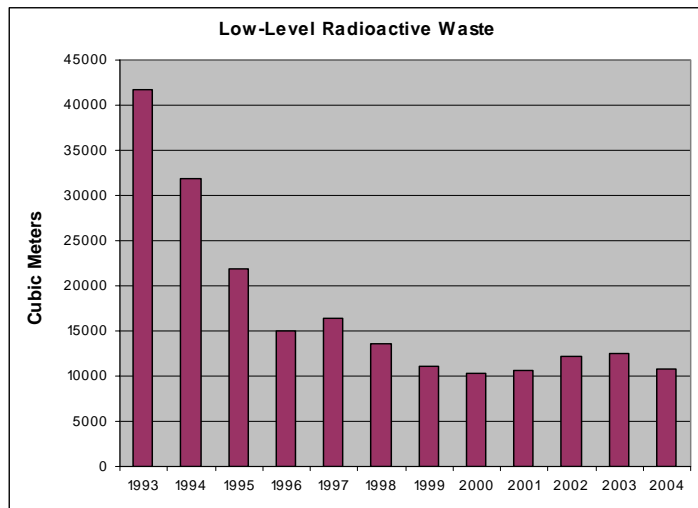


About half (67 metric tons) of the DOE's total 2004 reported routinely-generated transuranic waste resulted from the Savannah River Site, SC (SRS) operations, an Office of Environmental Management (EM) landlord site. SRS generates TRU waste in its stabilization and preparation of legacy weapons and heat-source radioactive materials for long-term storage. SRS classified all TRU waste from its B-line and associated lab operations as "routinely" generated. Activities in these facilities included: process de-inventory, material stabilization and packaging of Pu-239 product and waste in FB-line, and the processing of Pu-238, Pu-239, and Np-237 product and waste in HB-line. Although the waste operations in both FB- and HB-Lines were predominately associated with de-activation operations that could be defined as clean-up or "non-routine" wastes, SRS categorizes these as on-going "routine" operations for waste reporting purposes.

Sixty-two metric tons of TRU originated at National Nuclear Security Administration (NNSA) sites, 61 of which came from Los Alamos National Laboratory due to an increase in mission and associated research operations related to nuclear weapons programs.

Low-Level Radioactive Waste

Low-level radioactive waste is generated from the use of radioactive materials in research and operations and consists of items such as contaminated tools and protective clothing. Low-level radioactive waste generation has dropped 74% from 1993. About 40% of the low-level wastes came from the SRS. In FY 2004, SRS

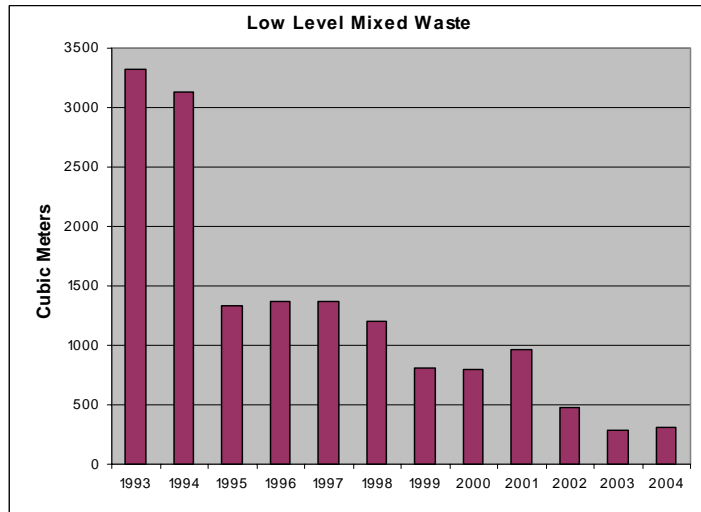


classified all low-level radioactive waste from on-going EM and NNSA operations as “routine” generation. This included process and job control waste from operations as well as the waste resulting from on-going radioactive waste management, remediation, storage, and disposal.

DOE sites collectively will need to reduce the generation of routine low-level radioactive waste by 2,460 metric tons to achieve the 2005 goal which is 8,331 metric tons, an 80% reduction from the 1993 baseline year.

Low-Level Mixed Waste

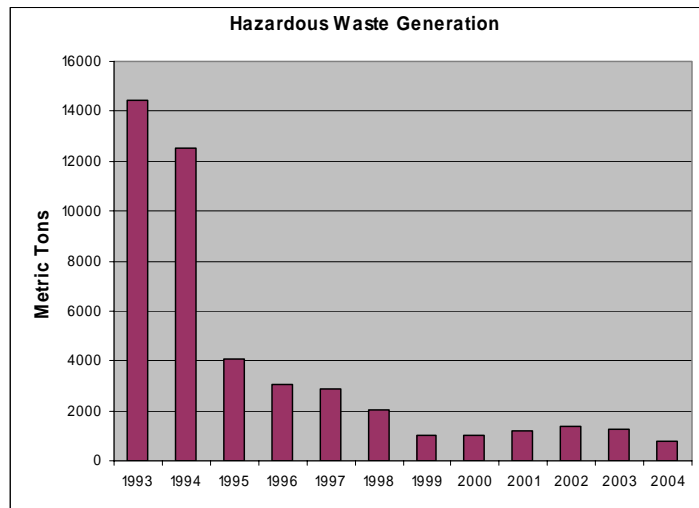
Low-level mixed waste is low-level radioactive waste that has become mixed with hazardous waste regulated by the Resource Conservation and Recovery Act (RCRA) or the Toxic Substances Control Act (TSCA). The mixing of these wastes can occur when hazardous solvents are used to clean radioactively contaminated surfaces or through research and laboratory activities. Sites achieved a 91% reduction in low-level mixed waste against the 1993 amount and surpassed the 80% reduction level established as a 2005 goal.



Over two-thirds of the routine low-level mixed wastes reported this year were generated at EM sites. Office of Science (SC) sites accounted for another 20% that derived from past and current research in four primary areas: nuclear fuel cycle, weapons production, medical research, and sub-atomic physics.

Hazardous Waste

Hazardous wastes are those regulated either by RCRA, TSCA, or state laws because of their potentially harmful effect if improperly managed or released into the environment. They are generated from the use of hazardous materials such as solvents in routine cleaning or production. Hazardous waste

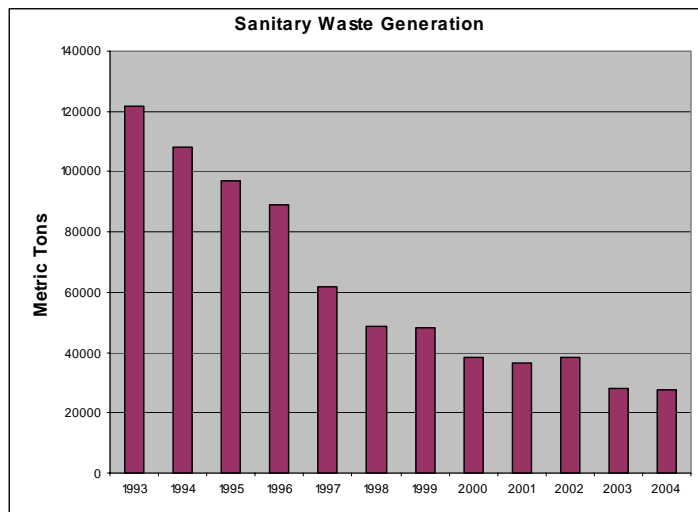


generation has decreased at DOE sites by 94% from the 1993 baseline and surpassed the 2005 90% reduction goal.

About 45% of the reported waste is attributable to NNSA sites while SC sites account for 32% of the reported waste. SC sites generate hazardous waste from research activities encompassing diverse fields of study such as biology, energy research, material sciences, chemistry, and physics. Hazardous waste from these activities can include specialty chemicals and solvents as well as wastes more commonly associated with industry such as sewage sludge, fly ash, automotive waste, and building construction and demolition waste (commonly asbestos, PCBs, lead-based paint, and hazardous metals from solder and electrical systems).

Sanitary Waste

Sanitary wastes are generated through normal operations such as office work, food service operations, and normal housekeeping services. They are neither hazardous nor radioactive and can be recycled or disposed in regular (sanitary) landfills. For purposes of this report, “sanitary waste” refers to municipal solid waste as defined by EPA and does not include other materials such as construction and demolition debris. Sanitary waste generation was reduced by 77% from the baseline year, surpassing the 75% goal established for 2005.



NNSA sites accounted for about two-thirds of the sanitary waste with major contributions coming from the Nevada Test Site, NV, Knolls Atomic Power Laboratory, NY, and Bettis Atomic Power Laboratory, PA.

G. Ozone-Depleting Substances (ODS) Goal: Baseline and Achievements

Since the early 1990s, DOE has been reducing its inventory and use of Class I ODS in a cost-effective manner. The principal drivers directing the Department’s elements to move towards discontinuing their use of ODS are the Section 505 requirements in EO 13148, the EPA’s Clean Air Act stratospheric ozone protection regulations, and two ODS phase-out goals that are part of DOE’s 1999 Pollution Prevention Leadership Goals. The ODS-related goals require the retrofit or replacement by 2005 of large, aging chillers that use Class I refrigerants, and the elimination of Class I ODS use by 2010, to the extent economically practicable. During the past year, DOE’s Office of Air, Water and Radiation Protection Policy and Guidance at Headquarters has issued guidance and an analysis of a final EPA stratospheric ozone protection rule promulgated in 2004 on

refrigerant recycling for substitute refrigerants, in order to enhance awareness and implementation of the new rule by DOE sites.

Recent progress in the phase-out of ODS at select DOE sites is reported in Appendix E.

H. Waste Reduction Accomplishments Revitalization Initiative

The Office of Pollution Prevention and Resource Conservation (EH-43) issued a lessons-learned report, *Compilation of Pollution Prevention Best Practices In Support of the Waste Reduction Revitalization Initiative*, in April 2004. This report highlights over thirty successful, site-specific waste reduction projects and practices that can be implemented at other DOE sites in a timeframe that supports DOE meeting the 2005 pollution prevention goals. The report is available at http://homer.ornl.gov/oepa/data/eo13148/wrri_accomplishments04.pdf.

Representative examples of additional notable site-specific pollution prevention projects and practices undertaken in 2004 are summarized in Appendix F.

Appendix A

Department of Energy Pollution Prevention and Energy Efficiency Leadership Goals*

*Secretary of Energy Memorandum for Heads of Departmental Elements, dated November 12, 1999.

DOE will strive to minimize waste and maximize energy efficiency as measured by continuous, cost-effective improvements in the use of materials and energy, with the years 2005 and 2010 as interim measurement points.

Reducing Waste and Recycling.

1. Reduce waste from routine operations by 2005, using a 1993 baseline, for these waste types:

Hazardous	90 percent
Low Level Radioactive	80 percent
Low Level-Mixed Radioactive	80 percent
Transuranic (TRU)	80 percent

2. Reduce releases of toxic chemicals subject to Toxic Chemical Release Inventory reporting by 90 percent by 2005, using a 1993 baseline
3. Reduce sanitary waste from routine by 75 percent by 2005, and 80 percent by 2010, using a 1993 baseline.
4. Recycle 45 percent of sanitary wastes from all operations by 2005 and 50 percent by 2010.
5. Reduce waste resulting from cleanup, stabilization, and decommissioning activities by 10 percent on an annual basis.

Buying Items with Recycled Content.

6. Increase purchases of EPA-designated items with recycled content to 100 percent, except when not available competitively at reasonable price or that do not meet performance standards.

Improving Energy Usage.

7. Reduce energy consumption through life-cycle cost effective measures by:

40 percent by 2005 and 45 percent by 2010 per gross square foot for buildings, using a 1985 baseline

20 percent by 2005 and 30 percent by 2010 per gross square foot, or per other unit as applicable, for laboratory and industrial facilities, using a 1990 baseline.

8. Increase the purchase of electricity from clean energy sources:
 - (a) Increase purchase of electricity from renewable energy sources by including provisions for such purchase as a component of our request for bids in 100 percent of all future DOE competitive solicitations for electricity
 - (b) Increase the purchase of electricity from less greenhouse gas-intensive sources, including, but not limited to, new advanced technology fossil energy systems, and other highly efficient generating technologies.

Reducing Ozone Depleting Substances and Greenhouse Gases.

9. Retrofit or replace 100 percent of chillers greater than 150 tons of cooling capacity and manufactured before 1984 that use class I refrigerants by 2005.
10. Eliminate use of class I ozone depleting substances by 2010, to the extent economically practicable, and to the extent that safe alternative chemicals are available for DOE class I applications.
11. Reduce greenhouse gas emissions attributed to facility energy use through life-cycle cost effective measures by 25 percent by 2005 and 30 percent by 2010, using 1990 as a baseline.

Increasing Vehicle Fleet Efficiency and Use of Alternative Fuels.

12. Reduce our entire fleet's annual petroleum consumption by at least 20 percent by 2005 in comparison to 1999, including improving the fuel economy of new light duty vehicle acquisitions and by other means.
13. Acquire each year at least 75 percent of light duty vehicles as alternative fuel vehicles, in accordance with the requirements of the Energy Policy Act of 1992.
14. Increase usage rate of alternative fuel in departmental alternative fuel vehicles to 75 percent by 2005 and 90 percent by 2010 in areas where alternative fuel infrastructure is available.

Appendix B

DOE Order 450.1 Environmental Protection Program

SUBJECT: ENVIRONMENTAL PROTECTION PROGRAM

1. OBJECTIVES. To implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by Department of Energy (DOE) operations and by which DOE cost effectively meets or exceeds compliance with applicable environmental; public health; and resource protection laws, regulations, and DOE requirements. This objective must be accomplished by implementing Environmental Management Systems (EMSs) at DOE sites. An EMS is a continuing cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental goals. These EMSs must be part of Integrated Safety Management Systems (ISMSs) established pursuant to DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.
2. CANCELLATION. DOE O 5400.1, General Environmental Protection Program, dated 11-9-88 and DOE N 450.4, Assignment of Responsibilities for Executive Order 13148, Greening the Government Through Leadership in Environmental Management, dated 2-05-01. Cancellation of a Directive does not, by itself, modify or otherwise affect any contractual obligation to comply with the Directive. Cancelled Directives that are incorporated by reference in a contract remain in effect until the contract is modified to delete the references to the requirements in the cancelled Directives.
3. APPLICABILITY.
 - a. DOE Elements .
 - (1) Except as noted in paragraph 3c, this Order applies to all DOE elements listed on Attachment 1 that are responsible for the management and operation of the Department's facilities, including elements of the National Nuclear Security Administration and power administrations.

The Administrator of NNSA shall assure that NNSA employees comply with their respective responsibilities under this Order.
 - (2) Where ISMSs are not applicable, DOE elements must ensure the implementation of EMSs. These DOE elements must interpret all references to ISMSs within this Order to mean EMSs.
 - b. DOE Contractors.
 - (1) The Contractor Requirements Document (CRD), Attachment 2, sets forth requirements of this Order that will apply to contractors responsible for the

Vertical line denotes change.

management and operation of the Department-owned facilities whose contracts include the CRD.

- (2) This CRD must be included, as appropriate, in all site/facility management contracts involving activities associated with the use, storage, disposal and transportation of waste; emissions to air; discharges to water; and management of cultural and other natural resources.
- (3) This Order does not apply to other than site/facility management contracts. Any application of any requirements of this Order to other than site/facility management contracts will be communicated separately from this Order.
- (4) The office identified in paragraph 5.d. is responsible for notifying the contracting officer of which contracts are affected. Once notified, the contracting officer is responsible for incorporating the CRD into each affected contract via the laws, regulations, and DOE directives clause of the contract.
- (5) As the laws, regulations, and DOE directives clause states, regardless of the performer of the work, a contractor with the CRD incorporated into its contract is responsible for compliance with the requirements of the CRD. An affected contractor is responsible for flowing down the requirements of this CRD to subcontracts at any tier to the extent necessary to ensure the contractor's compliance with the requirements.

c. Exclusions.

- (1) Activities conducted under the authority of the Director, Naval Nuclear Propulsion Program, as described in Executive Order 12344 and set forth in Public Laws 98-525 and 106-65.
- (2) Activities conducted by the Bonneville Power Administration as authorized by Delegation Order No. 00-033.00A.
- (3) Activities conducted by the Office of the Secretary, Chief Information Office, Office of Congressional and Intergovernmental Affairs, Office of Counterintelligence, Departmental Representative to the Defense Nuclear Facilities Safety Board, Office of Economic Impact and Diversity, Energy Information Administration, Office of General Counsel, Office of Hearings and Appeals, Office of Inspector General, Office of Intelligence, Office of Policy and International Affairs, Office of Public Affairs, and Secretary of Energy Advisory Board.

4. REQUIREMENTS.

- a. General Requirements. All DOE elements must ensure that site ISMSs include an EMS that does the following.
- (1) Provides for the systematic planning, integrated execution, and evaluation of programs for—
 - (a) public health and environmental protection,
 - (b) pollution prevention (P2), and
 - (c) compliance with applicable environmental protection requirements.
 - (2) Includes policies, procedures, and training to identify activities with significant environmental impacts, to manage, control, and mitigate the impacts of these activities, and to assess performance and implement corrective actions where needed.
 - (3) Includes measurable environmental goals, objectives, and targets that are reviewed annually and updated when appropriate.
- b. Integration of an EMS into ISMS. As part of integrating EMSs into site ISMSs, DOE elements must do the following.
- (1) Consider the following for inclusion as applicable:
 - (a) conformity of DOE proposed actions with State Implementation Plans to attain and maintain national ambient air quality standards,
 - (b) implementation of a watershed approach for surface water protection,
 - (c) implementation of a site-wide approach for groundwater protection,
 - (d) protection of other natural resources including biota,
 - (e) protection of site resources from wild land and operational fires, and
 - (f) protection of cultural resources.
 - (2) Promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle.

- (3) Reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of Class I ozone-depleting substances (ODS) through source reduction, re-use, segregation, and recycling and by procuring recycled-content materials and environmentally preferable products and services.
 - (4) Ensure the early identification of, and appropriate response to, potential adverse environmental impacts associated with DOE operations, including, as appropriate, preoperational characterization and assessment, and effluent and surveillance monitoring.
5. RESPONSIBILITIES. All DOE elements, as specified in paragraph 3a of this Order, are responsible for implementing the requirements specified in paragraph 4. Corporate responsibilities for management of environment, safety and health assigned to DOE elements are delineated in Section 9 of DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, dated 5-22-01. Specific responsibilities for implementing this Order are set forth below.
- a. Assistant Secretary for Environment, Safety and Health, in coordination with other DOE elements, must do the following.
 - (1) Develop or revise, as needed, existing DOE environmental protection directives, policies, guidance, requirements, and procedures to—
 - (a) provide guidance to Program Secretarial Offices (PSOs) and field organizations for ensuring site ISMSs provide for EMSs that promote the protection of the environment, efficient compliance with environmental requirements, and enhanced environmental performance in the conduct of DOE operations (guidance must include instruction for integration of EMS self-assessment requirements into ISMS self-assessment protocols); and
 - (b) maximize the use of safe alternatives to, evaluate present and future uses of, and disseminate information regarding successful efforts to phase out ODS.
 - (2) Serve as the Agency Environmental Executive pursuant to Executive Order 13101, “Greening the Government Through Waste Prevention, Recycling and Federal Acquisition,” with responsibility for—
 - (a) coordination, in conjunction with the Office of Management, Budget and Evaluation, of environmental programs relating to waste prevention, recycling, and acquisition;

- (b) preparation of annual corporate reports on the Department's progress in implementing Executive Order 13101 and Executive Order 13148, "Greening the Government Through Leadership in Environmental Management" based on input from Departmental elements; and
 - (c) submission of the reports indicated in paragraph 5a(2)(b) above to the Office of Management and Budget, the Council on Environmental Quality, and the Environmental Protection Agency.
- b. Program Secretarial Officers, the Administrator for the National Nuclear Security Administration, Administrators for Power Administrations, and DOE Operations/Field/Site Office Managers must assess implementation of EMSs as a component of the implementation of DOE P 450.5, *Line Environment, Safety and Health Oversight*, dated 6-26-97.
- c. Program Secretarial Officers, the Administrator for the National Nuclear Security Administration, and Administrators for the Power Administrations, in addition to the requirements in paragraph 5b, must do the following.
 - (1) Ensure that by December 31, 2005, all sites under their purview have implemented the management system requirements of this Order.
 - (2) Request through the annual Departmental budgetary process, the funding and resources needed for implementing the requirements of this Order and funding to address findings and recommendations from oversight and self-assessment activities conducted in accordance with DOE P 450.5.
 - (3) Ensure sites under their purview include site-specific goals in their ISMS that contribute to the accomplishment of DOE P2 and energy efficiency (P2E2) goals. (P2E2 goals are contained in a memorandum signed by the Secretary on November 12, 1999, <http://www.eh.doe.gov/P2>)
 - (4) Ensure sites under their purview develop and implement cost-effective P2 programs that use life-cycle assessment concepts and practices in determining program return-on-investment (ROI).
 - (5) Evaluate on an annual basis P2 nominations from sites under their purview, select "best in class" nominees, and transmit the nominating information to the Office of Environment, Safety and Health for submittal to the White House's "Closing the Circle Awards" program.
 - (6) Ensure sites under their purview monitor progress toward meeting the P2 requirements of paragraph 4b(3) of this Order, and make such information available annually to the Office of Environment, Safety and Health.

- d. DOE Operations/Field/Site Office Managers, in addition to the requirements in paragraph 5b and in coordination with their reporting sites and PSOs, must do the following.
- (1) Report by December 31, 2005, to the Cognizant Secretarial Officer the status regarding whether the EMS requirements of DOE O 450.1 have been integrated into ISMSs by site contractors.
 - (2) Ensure contractors with approved ISMS descriptions update the ISMS descriptions, as necessary, to include the EMS requirements of this Order.
 - (3) Obtain, as appropriate, local community advice relevant to aspects of Executive Order 13101; Executive Order 13221, "Energy Efficiency Standby Power Devices"; Executive Order 13123, "Greening the Government Through Efficient Energy Management;" Executive Order 13148; and Executive Order 13149, "Greening the Government Through Federal Fleet and Transportation Efficiency," through new or existing outreach programs.
 - (4) Incorporate, where appropriate, environmentally and economically beneficial landscape practices into all new landscaping programs, policies, and practices for facilities under their purview, in furtherance of compliance with Executive Order 13148.
 - (5) Where appropriate, ensure implementation of centralized procurement and distribution programs (e.g., pharmacy) for purchasing, tracking, distributing, and managing materials with toxic or hazardous content at facilities under their purview.
 - (6) Conduct operational assessments, such as Pollution Prevention Opportunity Assessments, of site operations to identify opportunities for source reduction, material segregation, recycle/reuse, or other P2 projects. Based on the results of these assessments, implement cost-effective P2 projects, using life-cycle assessment concepts and practices in determining ROI.
 - (7) Ensure site annual budgetary processes include the funding and resources needed to implement this Order, including P2 program implementation and monitoring.
 - (8) Notify the Director, Office of Strategic Materials, Office of Legacy Management as to the type and quantity of ODS transferred to the Department of Defense (DoD) ODS Reserve.

- (9) Monitor progress toward meeting the P2 requirements of paragraph 4b(3) of this Order, and make such information available annually to the Office of Environment, Safety and Health.
- (10) Develop and implement a program and procedures to maximize the use of safe alternatives to ODS whereby—
 - (a) procurement of Class I ODS for all nonexcepted uses is discontinued by December 31, 2010, consistent with Executive Order 13148, and
 - (b) coordination is conducted within DOE and with DoD, as appropriate, before disposal of ODS removed or reclaimed from equipment (including disposal as part of a contract, trade, or donation), and for situations in which the recovered ODS is a critical requirement for DoD missions, the DOE facility transfers the ODS to DoD.
- (11) Consider P2 in the specification and acquisition of departmental supplies to cost effectively maximize procurement of environmentally preferable products.
- (12) Coordinate all acquisitions with the Department's "Green Acquisition Advocates" established pursuant to Acquisition Letter, AL-2000-03, dated 05/16/00, as appropriate.
- (13) Comply with the requirements of the Emergency Planning and Community Right-to-Know Act (EPCRA or Title III of Superfund Amendments and Reauthorization Act of 1986), 42 U.S.C. 11001, and the Pollution Prevention Act of 1990, 42 U.S.C. 13101, et seq.
- (14) Conduct environmental monitoring, as appropriate, to support the site's ISMS, to detect, characterize, and respond to releases from DOE activities; assess impacts; estimate dispersal patterns in the environment; characterize the pathways of exposure to members of the public; characterize the exposures and doses to individuals, to the population; and to evaluate the potential impacts to the biota in the vicinity of the DOE activity.
- (15) Ensure the analytical work supporting environmental monitoring is implemented using—
 - (a) a consistent system for collecting, assessing, and documenting environmental data of known and documented quality;

- (b) a validated and consistent approach for sampling and analysis of radionuclide samples to ensure laboratory data meets program-specific needs and requirements within the framework of a performance-based approach for analytical laboratory work; and
 - (c) an integrated sampling approach to avoid duplicative data collection.
 - (16) Ensure contractor ES&H self-assessment programs are established within the framework of DOE P 450.5 and continue to be effective.
 - (17) Ensure, through the annual ISM review process [established pursuant to DEAR 970.5223-1 (e)] that contractor ES&H performance objectives, performance measures, and commitments include appropriate environmental elements based on the environmental risks, impacts of activities at the site and established Departmental P2E2 goals. (P2E2 goals are contained in a memorandum signed by the Secretary on November 12, 1999, <http://www.eh.doe.gov/P2>).
 - (18) Determine which contracts are affected by the requirements of this Order and ensure that the CRD is incorporated into only those contracts for which it is appropriate.
- e. Office of Independent Oversight and Performance Assurance must evaluate the effectiveness of DOE Headquarters and field organization implementation of the requirements of this Order.
- f. Director of Management, Budget and Evaluation, in coordination with other DOE elements, must develop or revise existing DOE directives, policies, and documents to accomplish the following.
- (1) Include, as appropriate, training on environmental requirements and EMSs in the standard senior-level management training for program managers, contracting personnel, procurement and acquisition personnel, facility managers, and other personnel.
 - (2) Include, as appropriate, the successful implementation of EMSs in the position descriptions and performance evaluations for Senior Executive Service and career Headquarters managers and operations/field/site office managers.
 - (3) Ensure DOE's personal property management policies and procedures preclude the Department's disposal of ODS without prior coordination with DoD.

- (4) Ensure procurement policies and procedures encourage the Department's acquisition of recycled-content materials and environmentally preferable products and services.
 - (5) Incorporate DOE's P2E2 goals into the Department's strategic and annual performance plans required by the Government Performance and Results Act of 1993.
 - (6) Ensure that requests for funding to implement the requirements of this Order, made by PSOs are considered in the formulation of DOE's annual budget request.
 - (7) Ensure incorporation of planning and management requirements for historic property and environmental management pursuant to Section 3 (b)(vi) of Executive Order 13327, "Federal Real Property Asset Management."
- g. Director, Office of Legacy Management, must, in addition to their PSO responsibilities in paragraphs 5b and 5c, coordinate with other DOE elements and DoD to dispose of critical Class I ODS.

6. CONTACT. For assistance contact the Office of Environmental Policy and Guidance at 202-586-7870.

BY ORDER OF THE SECRETARY OF ENERGY:



KYLE E. McSLARROW
Deputy Secretary

DOE ORGANIZATIONS TO WHICH DOE O 450.1 IS APPLICABLE

DOE O 450.1 is applicable to the following organizations and all sites under their purview:

Office of Civilian Radioactive Waste Management

Office of Energy Efficiency and Renewable Energy

Office of Environment, Safety and Health

Office of Environmental Management

Office of Fossil Energy

Office of Independent Oversight and Performance Assurance (to the extent noted in paragraph 5e of the Order)

Office of Management, Budget and Evaluation and Chief Financial Officer (to the extent noted in paragraph 5f of the Order)

National Nuclear Security Administration

Office of Nuclear Energy, Science and Technology

| Office of Security

Office of Science

| Office of Legacy Management

Office of Energy Assurance

Southeastern Power Administration

Southwestern Power Administration

Western Area Power Administration

CONTRACTOR REQUIREMENTS DOCUMENT
DOE O 450.1, *Environmental Protection Program*

Regardless of the performer of the work, contractors with this Contractor Requirements Document (CRD) incorporated into their contracts are responsible for (1) compliance with the requirements of the CRD and (2) flowing down the requirements of the CRD to subcontracts at any tier to the extent necessary to ensure the contractors' compliance with the requirements.

This CRD requires contractors to integrate numerous environmentally related requirements already placed on it by existing statutes, regulations, and policies through the use of an Environmental Management System (EMS) incorporated into an Integrated Safety Management System (ISMS). EMS requirements must be addressed in the contractor's ISMS which must be submitted for DOE review and approval under DEAR 970.5223-1, Integration of environment, safety, and health into work planning and execution.

Contractors must:

1. General Requirements. Ensure their integrated safety management systems (ISMSs) include environmental management systems (EMSs) that do the following.
 - (a) Provide for the systematic planning, integrated execution, and evaluation of programs for—
 - (1) public health and environmental protection,
 - (2) pollution prevention (P2), and
 - (3) compliance with applicable environmental protection requirements.
 - (b) Include policies, procedures, and training to identify activities with significant environmental impacts, to manage, control, and mitigate the impacts of these activities, and to assess performance and implement corrective actions where needed.
 - (c) Include measurable environmental goals, objectives, and targets that are reviewed annually and updated when appropriate.
2. Integration of an EMS into ISMS. As part of integrating EMSs into their ISMSs, do the following.
 - (a) Consider the following for inclusion as applicable:
 - (1) conformity of DOE proposed actions with State Implementation Plans to attain and maintain national ambient air quality standards,

- (2) implementation of a watershed approach for surface water protection,
 - (3) implementation of a site-wide approach for groundwater protection,
 - (4) protection of other natural resources including biota,
 - (5) protection of site resources from wildland and operational fires, and
 - (6) protection of cultural resources.
 - (b) promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle;
 - (c) reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of Class I ozone-depleting substances (ODS) through source reduction, re-use, segregation, and recycling, and by procuring recycled-content materials and environmentally preferable products and services;
 - (d) ensure the early identification of, and appropriate response to, potential adverse environmental impacts associated with DOE operations, including as appropriate, preoperational characterization and assessment; and effluent and surveillance monitoring.
3. Update approved ISMS descriptions as necessary to include EMS requirements of this CRD. Report to DOE operations/field/site office managers within 12 months after insertion of this CRD into the contract on the status of implementation of appropriate management system elements of this CRD.
 4. Assist the Department in meeting its requirements and in its efforts to obtain, as appropriate, local community advice relevant to aspects of Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling and Federal Acquisition;" Executive Order 13221, "Energy Efficiency Standby Power Devices;" Executive Order 13123, "Greening the Government Through Efficient Energy Management;" Executive Order 13148, "Greening the Government Through Leadership in Environmental Management;" and Executive Order 13149, "Greening the Government Through Federal Fleet and Transportation Efficiency."
 5. Assist the Department in meeting its requirements under Executive Order 13148 by ensuring, where appropriate, implementation of centralized procurement and distribution programs (e.g., pharmacy) for purchasing, tracking, distributing, and managing materials with toxic or hazardous content at facilities under their purview.
 6. Incorporate, where appropriate, environmentally and economically beneficial landscape practices into all new landscaping programs, policies, and practices for facilities. [See requirements placed on Federal agencies in Executive Order 13148, "Greening the Government Through Leadership in Environmental Management."]

7. Monitor progress toward meeting the P2 requirements of paragraph 2c above, and make such information available annually to the DOE operations/field/site office.
8. Consider P2 in the specification and acquisition of supplies to cost effectively maximize procurement of environmentally preferable products. As appropriate, all acquisitions must be coordinated with the DOE operations/field/site office "Green Acquisition Advocate." [See Acquisition Letter AL-2000-03, dated 05/16/00]
9. Conduct operational assessments, such as Pollution Prevention Opportunity Assessments, of site operations to identify opportunities for source reduction, material segregation, recycle/reuse, or other P2 projects. Based on the results of these assessments, implement cost-effective P2 projects, using life-cycle assessment concepts and practices in determining return-on-investment.
10. Conduct environmental monitoring, as appropriate, to support the site's ISMSs, to detect and characterize releases from DOE activities; assess impacts; estimate the dispersal patterns in the environment; characterize the pathways of exposure to members of the public; and characterize the exposures and doses to individuals, and to the population; and to evaluate the potential impacts to the biota in the vicinity of the DOE activity.
11. Ensure the analytical work supporting environmental monitoring is implemented using—
 - (a) a consistent system for collecting, assessing, and documenting environmental data of known and documented quality;
 - (b) a validated and consistent approach for sampling and analysis of radionuclide samples to ensure laboratory data meets program-specific needs and requirements within the framework of a performance-based approach for analytical laboratory work; and
 - (c) an integrated sampling approach to avoid duplicative data collection.
12. Develop and implement a program and procedures to maximize the use of safe alternatives to ODS whereby—
 - (a) the procurement of Class I ODS for all nonexcepted uses is discontinued by December 31, 2010 [See Executive Order 13148], and
 - (b) disposal of ODS removed or reclaimed from equipment (including disposal as part of a contract, trade, or donation) is coordinated within DOE and with DoD, and for situations in which the recovered ODS is a critical requirement for DoD missions, the facility transfers the ODS to DoD.

13. Assist the Department with its requirement under Executive Order 13148 by meeting reporting and planning requirements under the Emergency Planning and Community Right-to-Know Act (EPCRA or Title III of Superfund Amendments and Reauthorization Act of 1986), 42 U.S.C. 11001, and the Pollution Prevention Act of 1990, 42 U.S.C. 13101.
14. Assist the Department with its requirement under Executive Order 13327, “Federal Real Property Asset Management”, Section 3(b)(vi), by ensuring incorporation of planning and management requirements for historic property and environmental management.

Appendix C:

Appropriate Facilities for Implementation of EMS

2004 Department of Energy “Appropriate Facilities” for Implementation of EMS¹

NOTE: This list is different from the list reported in 2003 in that Sandia-NM and Sandia-CA are now listed as a single organization with a single EMS.

DOE Site	Location	EMS Recognition
Albany Research Center	Albany OR	
Ames Laboratory	Ames IA	
Argonne National Laboratory – West ²	Idaho Falls ID	
Argonne National Laboratory – East	Argonne IL	
Bettis Atomic Power Laboratory	West Mifflin PA	
Bonneville Power Administration	Portland OR & multistates	
Brookhaven National Laboratory	Upton NY	ISO 14001, NEPT
East Tennessee Technology Park	Oak Ridge TN	
Fermi National Accelerator Laboratory	Batavia IL	
Fernald Environmental Management Project	Cincinnati OH	
Grand Junction Office	Grand Junction CO	
Hanford -- Office of River Protection	Richland WA	
Hanford -- Environmental Restoration Project	Richland WA	
Hanford -- Project Hanford	Richland WA	
Idaho National Eng. & Env. Laboratory ²	Idaho Falls ID	ISO 14001
Idaho Advanced Mixed Waste Treatment Facility ²	Idaho Falls ID	
Kansas City Plant	Kansas City MO	ISO 14001
Knolls Atomic Power Laboratory	Niskayuna NY	
Lawrence Berkeley National Laboratory	Berkeley CA	
Lawrence Livermore National Laboratory	Livermore CA	
Los Alamos National Laboratory	Los Alamos NM	
Miamisburg Environmental Management Project	Miamisburg OH	
National Energy Technology Laboratory	Pittsburgh PA Morgantown WV Tulsa OK	ISO 14001
National Renewable Energy Laboratory	Golden CO	NEPT
Naval Petroleum and Oil Shale Reserves CO/UT/WY	Casper WY	
Nevada Test Site	North Las Vegas NV	
Oak Ridge Institute for Science and Education	Oak Ridge TN	
Oak Ridge National Laboratory	Oak Ridge TN	ISO 14001
Pacific Northwest National Laboratory	Richland WA	ISO 14001; NEPT
Paducah Site	Paducah KY	
Pantex Plant	Amarillo TX	
Portsmouth Gaseous Diffusion Plant	Portsmouth OH	

¹ DOE uses the term “sites” rather than “facilities.” Within DOE, the term “site” is used to identify a contiguous geographic area under DOE ownership, such as the Savannah River Site; DOE’s sites often have numerous “facilities.” Normally, a site is managed under a single management system, but sometimes different organizations have separate EMSs. Some DOE organizations have multiple locations under a single management system. In addition, DOE’s Power Administrations have numerous powerlines and substations located across multiple states. They organize their management system system-wide, or by regions; DOE tallies each site organization with a distinct EMS as a separate “facility.”

² Reorganization of these facilities, embodied in a new contract in early 2005, will be reflected in next year’s EO 13148 report.

DOE Site	Location	EMS Recognition
Princeton Plasma Physics Laboratory	Princeton NJ	
Rocky Flats Site	Golden CO	
Sandia National Laboratory	Albuquerque NM Livermore CA	
Savannah River Tritium Facility ³	Aiken SC	ISO 14001 ³
Savannah River Site	Aiken SC	ISO 14001 ³
Southwestern Power Administration	Gore OK & multistates	
Stanford Linear Accelerator Center	Stanford CA	
Strategic Petroleum Reserve	Bayou Choctaw LA New Orleans LA West Hackberry LA Big Hill TX Bryan Mound TX	ISO 14001; NEPT
Thomas Jefferson National Accelerator Facility	Newport News VA	
Waste Isolation Pilot Plant ISO	Carlsbad NM	ISO14001 ³
West Valley Demonstration Project	West Valley NY	NEPT
Western Area Power Administration	Lakewood CO and 15 states	
Y-12 National Security Complex	Oak Ridge TN	
Yucca Mountain Project	Las Vegas NV	

ISO 14001: Third-party certified to the ISO 14001 Standard.

NEPT: Member of EPA's National Environmental Performance Track program.

³ Site chose not to renew its ISO 14001 registration

Appendix D

TRI Reporting by Chemical and by Site

Comparison of 1993 & 2003 DOE TRI Reporting by Toxic Chemical (pounds)

TRI Chemical	1993 EPCRA Form R (Sec. 8.1)	2003 EPCRA Form R (Sec. 8.1)	1993-2003 % Change
Methanol	3,665,169	77,101	(98%)
Sulfuric Acid	301,703	58,983	(80%)
Dichlorotetrafluoroethane	170,000	--	(100%)
Hydrochloric Acid	146,369	116,899	(20%)
Nitric Acid	125,978	13,677	(89%)
Ammonia	113,200	--	(100%)
1,1,1- Trichloroethane	17,800	--	(100%)
Chlorine	18,003	483	(97%)
Xylene (mixed isomers)	16,644	--	(100%)
Toluene	12,408	1,477	(88%)
Methyl Ethyl Ketone	9,800	--	(100%)
Methyl Isobutyl Ketone	9,000	--	(100%)
Lead	8,600	1,394,328	16,213%
Trichloroethylene	7,600	--	(100%)
Dichloromethane	6,319	--	(100%)
Hydrogen Fluoride	3,519	--	(100%)
Trichlorofluoromethane	1,800	--	(100%)
Acetone	1,700	--	(100%)
Methyl Tert-Butyl Ether	1,674	--	(100%)
Ethylene Glycol	1,599	--	(100%)
Manganese Compounds	1,300	6,696	515%
1,2,4- Trimethylbenzene	573	--	(100%)
Zinc Compounds	550	168,768	30,685%
Ethylbenzene	400	251	(62%)
Benzene	378	--	(100%)
Nitrate Compounds	N/A	127,349	N/A
Copper	N/A	26,518	N/A
Freon 113	N/A	32,020	N/A
Chromium Compounds	N/A	8,997	N/A
Cadmium	N/A	13,659	N/A
Other TRI Chemicals	50	12,430	24,060%
TOTAL	4,642,136	2,059,636	(56%)

See section E.2 of this report for explanations of TRI release increases.

Comparison of 1993-2003 DOE TRI Reporting by Site (pounds)

DOE Site	1993 EPCRA Form R (Sec. 8.1)	2003 EPCRA Form R (Sec. 8.1)	1993-2003 % Change
Naval Petroleum Reserve #1	3,782,920	--	(100%)
Idaho National Engineering Lab	369,000	91,851	(75%)
Portsmouth Gas. Diff. Plant	171,918	163	(100%)
Energy Tech. Engr. Center	101,200	--	(100%)
Savannah River Site	79,155	261,630	331%
Y-12 National Security Complex	74,201	322,584	435%
Pinellas Plant	22,324	--	(100%)
Stanford Linear Accelerator	8,300	512	(94%)
Oak Ridge National Lab	7,353	97,422	1,325%
East Tennessee Technology Park	6,388	72,048	1,128%
Brookhaven National Lab	4,600	165,816	3,605%
Los Alamos National Lab	5,570	14,443	259%
Rocky Flats Plant	3,555	93,475	2,629%
Fermi Lab	1,872	17,843	953%
Kansas City Plant	1,400	8	(99%)
Naval Petroleum Reserve #3	95	--	(100%)
Mound Plant	19	--	(100%)
Argonne National Lab-East	7	172,963	N/A
Hanford	0	641,747	N/A
Waste Isolation Pilot Plant	0	81,707	N/A
Other DOE Sites	2,259	25,424	2,400%
TOTAL	4,642,136	2,059,636	(56%)

See section E.2 of this report for explanations of TRI release increases.

Appendix E

ODS Phase-Out Progress by Site

ODS Phase-Out Progress

DOE SITE	ODS PHASE-OUT PROGRESS
Brookhaven National Laboratory	<ul style="list-style-type: none"> ▪ 2330 pounds of R-11 were recovered and reclaimed from chillers that were removed from service. ▪ 550 pounds R-11, 1 pound of R-12, 327 pounds of R-22, and 650 pounds of R-123 were recovered and recycled from refrigeration equipment still in service. ▪ A 130-ton R-11 centrifugal chiller was replaced with a more energy-efficient 80-ton R-134A (a hydrofluorocarbon (HFC) refrigerant that does not contribute to stratospheric ozone layer depletion) centrifugal chiller.
Oak Ridge National Laboratory	<ul style="list-style-type: none"> ▪ Since the last report, three chillers containing Class I refrigerants have been removed from service. Each chiller had a cooling capacity greater than 150 tons and was manufactured before 1984.
Pantex Plant	<ul style="list-style-type: none"> ▪ Replaced or removed most Halon-based fire protection systems, and replacements do not use ozone-depleting chemicals. ▪ Recovered Halon-based chemicals have been shipped to the DOE's Halon Repository at the Savannah River site.
Portsmouth Gaseous Diffusion Plant	<ul style="list-style-type: none"> ▪ Since the last report, one chiller was retrofitted and one was taken out of service (abandoned in place), each with greater than a 150 ton cooling capacity.
Savannah River Site	<ul style="list-style-type: none"> ▪ Reduced Class I refrigerant usage in large sources of ODS from 180 pounds in 2002 to 50 pounds in 2003. ▪ Halon 1301 total inventory on site decreased from 102,285 pounds in 2002 to 75,777 pounds in 2003. ▪ 15,000 pounds of Halon 1301 were shipped to the Defense Logistics Agency in Virginia, reducing total stored inventory. ▪ Halon operating systems were reduced from 110 in 2002 to 95 in 2003.
Strategic Petroleum Reserve	<ul style="list-style-type: none"> ▪ 2048 pounds of Halon 1301 were removed in 2003, and SPR planned to have all remaining Halon removed during 2004.
Thomas Jefferson National Accelerator Facility	<ul style="list-style-type: none"> ▪ Two of its three remaining chlorofluorocarbon (CFC) refrigerant chillers were replaced with high efficiency non-CFC refrigerant units in 2003.

Appendix F

Representative Examples of Site-Specific Notable P2 Practices

In addition to the activities described in other sections of this report, DOE sites engaged in a variety of noteworthy pollution prevention activities. Several of them are described below; point-of-contact information is also provided.

Argonne National Laboratory received the 2004 State of Illinois award for Outstanding Government Leadership for its recycling efforts. The award, sponsored by the Illinois Environmental Protection Agency in conjunction with the Illinois Recycling Association, recognized the significant decrease in sanitary waste generated by the Laboratory. In the ten years from 1993 to 2003, the Laboratory reduced its sanitary waste generation by 77%. Contact: Barbara Markwenas, 630-252-8306, bmarkwenas@anl.gov

The Bonneville Power Administration (BPA) won a “Champions for Environmental Leadership and ‘Green’ Government Innovation” competition sponsored by EPA Region 10. BPA received its award for achieving energy savings that ranged from 10 to 38% at plant areas through project clustering. The savings average 500,000 kilowatts per facility and reduce approximately 70 tons of carbon dioxide annually. Contact: Steve Sander, 503-230-4724, srsander@bpa.gov

The following activities took place at the Savannah River Site. Contact: John Harley, 803-557-6332, john.harley@srs.gov

- Completion of a Six-Sigma Process Improvement Project (PIP) resulted in a 47 percent reduction in the number of analytical methods, a 40 cubic meter per year reduction in low level waste, and a 48 % reduction in laboratory job-hours.

Sample analysis codes for each process system were evaluated in painstaking detail to identify the minimum essential samples and analyses to support both the new highly enriched uranium blend-down mission and ongoing operational requirements.

- Reusing a retired Paducah shipping cask and re-evaluating/reclassifying a special high-activity waste that formerly had no approved disposal path were combined to shave twenty-eight months off a cleanup schedule. The reclassification and use of the cask allowed the material to be disposed on site as opposed to off-site transport and disposal.

Employees of the vehicle maintenance shop at Los Alamos National Laboratory received the National Pollution Prevention Roundtable’s Most Valuable Pollution Prevention (MVP2) award for their efforts to reduce waste. The employees determined that the failure of aluminum fittings was the root cause of most oil leaks. Replacing them with stronger, although more expensive, fittings led to a 70% reduction of oil spills. The employees also implemented an on-site innovative treatment of oil-contaminated soil to further reduce the amount of waste that must be disposed. Contact: Denny Hjeresen, 505-667-9890, dlh@lanl.gov

These activities took place at the Fernald Environmental Management Project. Contact: Ed Skintik, 513-246-1369, Ed.skintik@fernald.gov

- An evaluation of the past uses of the Silo 4 structure revealed that it had never been subject to radiological contamination. This determination allowed a significant rolling back of the radiation control area affected by the structure's demolition. It also meant that the materials, including metals, within the structure could be released for recycle or disposal as non-radioactive waste. The pre-demolition assessment netted savings of \$23,300.
- Evaluation and assessment of the East Trailer Complex indicated that it was free of any contamination and could therefore be free-released for recycle and disposal. Free-release, as opposed to on-site disposal as low-level radioactive waste, allowed for the recycle of some materials. Furthermore, it avoided the necessity for building an additional on-site disposal cell at a pro-rated cost of \$10 million.
- Modeling and assessment allowed considerable downsizing of the design for dismantlement of the Advanced Wastewater Treatment (AWWT) facility. As a result, 90% of the dismantled materials could be disposed on-site now rather than shipped off-site in 2015. The net savings of \$17,364,000 is based on transportation and off-site disposal, assuming continued availability and 2004 pricing, versus on-site disposal.

Brookhaven National Laboratory and its community Advisory Council sponsored a free, one-day workshop on fleet-maintenance pollution prevention techniques. The Laboratory uses alternative-fuel vehicles, vegetable-based hydraulic fluids, and re-refined motor oil and other environmentally preferable products as part of its fleet operation. The workshop was an opportunity to share information on those products with fleet managers from the public and private sectors. About 50 participants attended. Contact: George Goode, 631-344-4549, goode@bnl.gov

The three following activities were completed at Oak Ridge National Laboratory. The point-of-contact is Susan Michaud, 865-576-1562, michaudsr@ornl.gov

- Through incorporating pollution prevention opportunity assessments into design reviews for the Spallation Neutron Source (SNS), the SNS Team evaluated designs for condensates (air handlers), operational discharges (sinks, drains, etc.), and storm water runoff. This intensive review resulted in design and subsequent field changes wherein waters were diverted from the process waste streams to either surface runoff or the sanitary sewer system. These combined changes are expected to eliminate approximately 63,600 cubic meters of liquid process waste from entering the site treatment plant over the planned forty-year operational lifetime of the facility.

- The lab's Fabrication Division replaced a plasma arc welder with a water jet cutter, providing a much safer, cleaner, efficient, and versatile one-step process for machining metal. The water jet cutter recycles the water used within the system, eliminates both the noise hazard caused by the plasma arc welder and the need for an air permit, and reduces the amount of waste material generated. In addition, the water jet cutter can cut thicker metal pieces and is significantly more precise, which provides more operational flexibility and eliminates the need for additional machining once the initial cutting is complete. The use of this more environmentally preferable technology improved safety and operational efficiency, expanded operational capabilities, reduced the amount of metal used by 1,500 kilograms (kg) annually, eliminated the generation and subsequent recycling of metal waste (400 kg per year), and resulted in an approximate cost avoidance/improved operational efficiency of \$120,000 per year.
- Through up-front planning and commitment to pollution prevention, safety, and cost savings, the lab's Legacy Materials Disposition Initiative consolidated and reused a significant amount of instruments, equipment, and supplies during the Biology Cleanout action. The comprehensive use of source reduction, reuse, segregation, and recycling in the initiative resulted in diverting 2,400 cubic yards of material from landfilling, and saving \$140,000 in disposal costs, \$135,000 in acquisitions and \$245,000 in materials resale.

Battelle Columbus Laboratories used CAP-88 to develop an air dispersion model of the effects of an open air demolition. The model indicated that open air demolition was safe so demolition could be done with building components in place. A 50-ton crane and a high-density concrete cell wall were among the building components. The open air demolition process resulted in savings of \$100,000. Contact: Steve Schmucker, 614-879-6941, ext. 307, sschmucker@ecce2.com

These activities were conducted at the Y-12 National Security Complex. Contact: Jan Gilbert Jackson, 865-241-2567, gilbertjm@y12.doe.gov

- Through proper activity planning and cost-effective integration of pollution prevention techniques, Y-12 innovatively applied the as low as reasonably achievable (ALARA) principle and downposted a large portion of radiological facilities from High Contamination Areas (HCA) to Fixed Contamination Areas (FCA) using sound engineering controls. The amount of solid low-level radioactive waste was also reduced through segregation of roofing materials from process areas. As a result of these activities, 227 cubic meters of solid low-level radioactive waste was not generated and approximately \$2.4 million was saved.
- By revising its method for determining oil and grease in aqueous samples, the Analytical Chemistry group eliminated two metric tons of hazardous waste with an associated cost avoidance of \$22,000. A solid phase extraction with hexane method replaced the liquid-liquid extraction with Freon method resulting in the elimination of a waste stream.

- Y-12 and the Savannah River Site joined forces to avoid the disposal of excess nitric acid. The Savannah River Site was able to use 13,800 gallons of Y-12's excess nitric acid in its operations thereby eliminating the generation of 70.38 metric tons of generated hazardous waste with an associated cost avoidance of more than \$1.2 million.

Pre-demolition assessments of facilities at the Miamisburg Environmental Management Project (formerly the Mound Plant) and applying pollution prevention techniques led to savings of \$1,888,000. Assessing the radiological condition of facilities slated for demolition allowed rolling back radiological control area boundaries which significantly reduced the amount of low-level radioactive waste that was generated. In addition, waste segregation led to greater opportunities for recycling and generating revenues from the recycled metals. Contact: Frank Schmaltz, 937-847-8350, Frank.Schmaltz@ohio.doe.gov

The following activities occurred at the Hanford Site. Contact: Thomas Ferns, 509-376-7474, Thomas_w_Ferns@rl.gov.

- The Waste Receiving and Processing Facility (WRAP) avoided producing .061 metric tons of regulated hazardous waste annually by developing a new system for gasket preparation and installation in the drum repackaging process. Under the new system, methyl ethyl ketone (MEK) and a mastic containing MEK are no longer used and a non-regulated naphtha based solvent is used for cleaning. In addition, worker health is protected and use of the new system requires less time than the previous method.

- Working closely with regulators and using innovative characterization techniques, workers were able to accurately segregate wastes and thereby reduce management and disposal costs. Upon characterization and segregation, the volume of potential transuranic waste dropped from 76.46 cubic meters to 4.25 cubic meters. This avoided disposal of 72.21 cubic meters in the Waste Isolation Pilot Plant and life-cycle costs of over \$2,738,000.

- The Hanford Site/Richland Operations Office also won a "Champions for Environmental Leadership and 'Green' Government Innovation" competition sponsored by EPA Region 10. Hanford was recognized for using mortar-lining as an environmentally friendly and cost-effective method to extend the life of existing water lines.

The following activities occurred at the Paducah Gaseous Diffusion Plant. Contact: Brian Bowers, 270-441-5057 babowers@lan-ky.com

- Twice each year, spent carbon from the Northwest Plume Groundwater Treatment System is changed out and shipped to a regeneration facility where it is reactivated through a thermal treatment process, then returned and reused.

Efficiency in the form of waste reduction is about 50 - 75% for each change out. This process also results in an approximately 50% cost reduction when compared to the disposal of spent carbon and purchase of new carbon.

- Ownership of 54 out-of-service fluorine cells was transferred from DOE to a private entity for reuse. Reuse rather than disposal of the fluorine cells and their hazardous contents (electrolyte) yielded savings of \$2.5 million and eliminated 147 metric tons of waste.
- Work area isolation and waste segregation were implemented to reduce the volume and toxicity of personal protective equipment, soil, and plastic associated with taking soil borings and installing and removing groundwater monitoring wells as part of a landfill investigation. Use of these pollution prevention techniques eliminated 65 cubic meters of waste.

The Fermi National Accelerator Laboratory (Fermilab) won an Illinois Governor's Pollution Prevention Award in the Service Category. The Fermilab nomination was for implementation of a nitrogen recovery system at the DZero detector that increases system efficiency, reduces the heat load on other cooling systems, and reduces purchase volume. Contact: Sally Arnold, 630-840-2239, Sally.Arnold@ch.doe.gov

The following activities took place at the Rocky Flats Environmental Technology Site. Contact: Dave Hicks, 303-966-3122, Dave.Hicks@rf.doe.gov

- During decommissioning of a former plutonium processing building, excess chemicals and equipment were transferred to the Site Property Utilization and Disposal (PU&D) group for resale at auction in lieu of hazardous waste disposal. Savings from resale and avoided waste management and disposal were estimated at \$20,945,000.
- Stainless steel, copper, iron, lead, and aluminum were recycled from decontamination and decommissioning activities. Recycling avoided generating 2,835 metric tons of waste. Cost savings of \$283,460,000 are calculated from revenue generated and sanitary waste disposal fees avoided.
- Asphalt surfaces were removed as part of site closure. In FY04, 439 metric tons were transferred to an asphalt recycler in lieu of sanitary waste disposal.