

Audit



Report

RETURN ON INVESTMENT FROM
DOD POLLUTION PREVENTION PROGRAMS

Report Number 99-256

September 17, 1999

Office of the Inspector General
Department of Defense

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Acronyms

MCAGCC
P2

Marine Corps Air Ground Combat Center
Pollution Prevention



**INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884**

September 17, 1999

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION
AND TECHNOLOGY
DEPUTY UNDER SECRETARY OF DEFENSE
(ENVIRONMENTAL SECURITY)
ASSISTANT SECRETARY OF THE NAVY (FINANCIAL
MANAGEMENT AND COMPTROLLER)
ASSISTANT SECRETARY OF THE AIR FORCE
(FINANCIAL MANAGEMENT AND COMPTROLLER)
AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Audit Report on Return on Investment from DoD Pollution Prevention
Programs (Report No. 99-256)

We are providing this report for your information and use. The audit was requested by the Assistant Deputy Under Secretary of Defense (Environmental Quality). Because this report contains no findings or recommendations, no written comments were required, and none were received.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. Joseph P. Doyle at (703) 604-9348 (DSN 664-9348) or Ms. Beth A. Kilborn at (703) 604-9232 (DSN 664-9232). See Appendix D for the report distribution. The audit team members are listed inside the back cover.

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Report No. 99-256
(Project No. 8CK-5035)

September 17, 1999

Return on Investment from DoD Pollution Prevention Programs

Executive Summary

Introduction. The audit was requested by the Assistant Deputy Under Secretary of Defense (Environmental Quality). The IG, DoD, was asked to quantify the monetary and nonmonetary benefits accruing from pollution prevention (P2) programs at selected installations. The Services use P2 funds for compliance-type requirements that are satisfied by source reduction (pollution elimination or reduction at the source), pollutant minimization, or recycling approaches. The Services included \$752.6 million for P2 in the President's Budget for FYs 1996 through 1998.

Objectives. The overall audit objective was to identify the return on P2 investments and determine how DoD was spending P2 funds. We also reviewed the management control program as it related to the audit objective.

Results. The P2 projects we reviewed were good investments. The 22 pollution prevention projects we reviewed, valued at \$5.8 million, resulted in annual returns on investment of \$4.4 million and one-time savings of \$27.5 million. In addition, the projects improved operations and enhanced quality of life and safety. The reengineered processes that resulted from the P2 projects allowed DoD to operate more efficiently while reducing or eliminating pollution at the source. The management controls that we reviewed were adequate in that no material management control weaknesses were identified. See Appendix A for details on the management control program.

Management Comments. We provided a draft of this report on July 23, 1999. Because this report contains no findings or recommendations, written comments were not required, and none were received. Therefore, we are publishing this report in final form.

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Background

The audit was requested by the Assistant Deputy Under Secretary of Defense (Environmental Quality). The House Committee on National Security requested that DoD provide Congress a report on the return on investment from DoD pollution prevention (P2) programs. The Assistant Deputy Under Secretary of Defense (Environmental Quality) asked the IG, DoD, to provide field level data from a select mix of DoD installations for their use in responding to Congress. Specifically, the IG, DoD, was asked to quantify the monetary and non-monetary benefits accruing from P2 programs at the selected installations.

P2 Defined. The Environmental Protection Agency defines P2 as source reduction and other practices that reduce the amount of pollutants entering a waste stream prior to out-of-process recycling, treatment, or disposal. The DoD defines P2 requirements in DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996, as compliance requirements that are satisfied by source reduction (pollution elimination or reduction at the source), pollutant minimization, or recycling approaches. In this way P2 differs from compliance activities and projects that utilize end-of-pipe treatment or disposal methods to meet applicable environmental requirements. End-of-pipe treatment occurs after pollution is generated as opposed to actions taken to prevent the pollution from occurring in the first place. The instruction requires the Services to plan, program, and budget for P2 and compliance requirements in accordance with environmental quality budget classes, as well as the definitions of P2 and compliance. The Services report environmental requirements and expenditures under one of three environmental quality programs: compliance, P2, or conservation.

P2 Budget. The Services included \$752.6 million for P2 projects in the President's Budget for FYs 1996 through 1998 as illustrated in the table below.

Pollution Prevention Budget				
(Dollars in millions)				
	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>Total</u>
Army	\$ 73.4	\$ 83.4	\$101.3	\$258.1
Navy	65.0	81.5	76.3	222.8
Air Force	86.3	83.3	53.1	222.7
Marine Corps	13.7	13.6	21.7	49.0
Total	\$238.4	\$261.8	\$252.4	\$752.6

P2 Program. The DoD P2 program consists of multiple installation-level projects. In keeping with the policy to reduce the use of hazardous materials and the generation or release of pollutants; environmental managers undertake projects to substitute hazardous materials, redesign products, recycle waste, and modify or replace equipment and processes. DoD does not track the number of P2 projects beyond the installation level, however, we identified 265 P2 projects, valued at \$42.9 million, at the 6 installations we visited.

Objectives

The overall objective was to identify the return on P2 investments and determine how DoD was spending P2 funds. We also reviewed the management control program as it related to the audit objective. See Appendix A for a discussion of the scope and methodology and our review of the management control program, and Appendix B for a summary of prior coverage.

Return on P2 Investments

The P2 projects we reviewed were good investments. The value realized from those projects included monetary benefits, improved operations, and enhanced quality of life and safety. The reengineered processes that resulted from the P2 projects allowed DoD to operate more efficiently while reducing or eliminating pollution at the source.

P2 Investments

The 22 P2 projects we reviewed, valued at \$5.8 million, resulted in annual returns on investment of \$4.4 million and one-time savings of \$27.5 million. The benefits accrued to various functional areas within and outside the P2 arena and included reductions in hazardous material procurements and disposals, toxic air emissions, and labor hours, as well as improved quality of life and safety benefits. Examples of the benefits are discussed below. See Appendix C for a brief discussion of each P2 project reviewed and a description of the return on investment for each project.

Reduced Hazardous Material Procurement and Hazardous Waste Disposal. Fort Lewis invested \$190,600 in a P2 project to develop a Fuel Filtration and Reuse Facility that resulted in a 53,000-gallon reduction in the amount of hazardous material procured and a 425,000-pound reduction in hazardous waste. The Fuel Filtration and Reuse Facility consolidates and filters contaminated fuel that was previously disposed of as hazardous waste. The filtered fuel is used in tactical vehicles. As a result, Fort Lewis realized an annual savings of about \$159,000.

Reduced Toxic Air Emissions. Warner Robins Air Logistics Center invested \$190,000 in a feasibility study and development of a wire arc coating system prototype. Warner Robins had used an epoxy primer and polyurethane coating applied with paint guns to paint aircraft maintenance stands every 5 years. This process produced toxic air emissions and overspray during application. The wire arc coating system, on the other hand, is a thermally sprayed zinc and aluminum coating that eliminates the release of volatile organic compounds, hazardous air pollutants, and liquid and solid toxic wastes during application; and is expected to last for 20 years. Use of the wire arc coating system prototype resulted in reductions in labor hours to paint the stands, surface preparation costs, and material purchases. When this reengineered process becomes fully operational, Warner Robins anticipates a 13,000-pound per year reduction in hazardous waste disposal. The anticipated return on investment is about \$715,000 over 20 years with an average annual return on investment of about \$36,000.

Reduced Labor Hours. Norfolk Naval Base invested \$10,700 in a cable cleaner that resulted in annual reductions of 900 labor hours to clean ships' cables and 2,900 pounds of hazardous waste. Norfolk Naval Base used to manually clean and grease ships' cables with rags, which took 1,080 hours per year and resulted in 3,000 pounds of hazardous waste in the form of oily rags.

The cable cleaner automatically cleans and greases cables more efficiently in just 180 hours per year while generating less than 100 pounds of hazardous waste. Norfolk Naval Station realized an annual savings of \$25,700 from this reengineered process.

Quality of Life and Safety Benefits. The Marine Corps Air Ground Combat Center (MCAGCC) had seven environmental projects for remedial lead contamination at the Small Arms Range Complex. MCAGCC invested \$2.4 million of P2 funds for three P2 projects to install bullet catchers. The other four compliance projects were to remove heavy metals from the berms. The projects eliminated two major health and safety hazards caused by bullets passing through small arms range targets, ricochet and exposure to heavy metals in range dust. Over time, the build up of heavy metals in the berms caused bullets striking it to ricochet back at soldiers on the range. The dust that flared up when the range was in use was also a health hazard as it contained excess amounts of lead and other heavy metals. MCAGCC removed the accumulated lead in the berms surrounding the small arms ranges and installed bullet catcher systems to preclude future heavy metal buildups including lead, copper, zinc, and steel in the impact berms. In addition to the health and safety benefits derived from this project, MCAGCC realized an annual savings of about \$206,000 in range operations and medical costs.

Conclusion

The reengineered processes that resulted from the Services' implementation of P2 projects allowed DoD to operate more efficiently and reduce costs in various functional areas while reducing or eliminating source pollution. Calculated returns on the \$5.8 million of P2 investments reviewed cannot be projected beyond the projects themselves. However, for the projects we reviewed, DoD will realize significant benefits. We calculate that DoD will realize annual savings of \$4.4 million and has realized one-time savings of \$27.5 million. In addition, DoD will benefit from improved operations as well as enhanced quality of life and safety.

Appendix A. Audit Process

Scope

Work Performed. We reviewed DoD FY 1996 through FY 1998 P2 programs to determine how P2 funds were used. We also reviewed contractual and budgetary documents to determine the return on selected P2 investments made during this period. In conjunction with the Services, we selected a total of six Army, Navy, Air Force and Marine Corps installations for inclusion in the audit. The six installations collectively had 265 P2 projects valued at \$42.9 million. From the 265 projects, we judgmentally selected for review a sample of 22 P2 projects valued at \$5.8 million. The projects were selected based on their value or the uniqueness of the P2 solution. The scope of the review is shown in the table below.

Scope of Review of P2 Projects				
<u>Installations</u>	<u>Total P2 Program</u>		<u>P2 Projects Reviewed</u>	
	<u>Number of Projects</u>	<u>Value</u>	<u>Number of Projects</u>	<u>Value</u>
Fort Lewis	54	\$ 3,127,000	4	\$1,168,800
Norfolk Naval Base	50	6,487,800	6	351,900
Naval Air Station North Island	46	4,303,600	2	17,600
Seymour Johnson Air Force Base	26	1,008,100	3	484,500
Warner Robins Air Logistics Center	66	16,570,200	5	1,158,000
Marine Corps Air Ground Combat Center	<u>23</u>	<u>11,393,400</u>	<u>2</u>	<u>2,574,400</u>
Total	265	\$42,890,100	22	\$5,755,200

DoD-Wide Corporate-Level Government Performance and Results Act Goals. In response to the Government Performance and Results Act, the DoD established 6 DoD-Wide corporate-level performance objectives and 14 goals for meeting the objectives. This report pertains to achievement of the following objective and goal.

Objective: Fundamentally reengineer DoD and achieve a 21st century infrastructure. **Goal:** Reduce costs while maintaining required military capabilities across all DoD mission areas. (DoD-6)

DoD Functional Area Reform Goals. Most major DoD functional areas have also established performance improvement reform objectives and goals. This report pertains to achievement of the following acquisition functional issue area objective and goal.

Objective: Fostering Partnerships. **Goal:** Reduce total release of toxic chemicals by 20 percent. (ACQ-2.4)

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in the DoD. This report provides coverage of the Defense Financial Management high-risk area.

Methodology

At the six sites audited, we:

- reviewed FY 96 through FY 98 P2 budget and execution data, and interviewed environmental personnel to determine how DoD installations spent P2 funds;
- reviewed P2 project cost analyses and supporting documentation, and interviewed environmental and operational personnel to identify the return on P2 investments;
- interviewed management control officials to identify controls relating to P2 programs and reviewed management's self-evaluation processes; and
- reviewed applicable Environmental Compliance reports to determine whether there had been any prior findings related to the audit objectives and, if so, the status of corrective actions. There were no findings related to our audit objectives.

Audit Type, Dates, and Standards. We performed this economy and efficiency audit from September 1998 through June 1999 in accordance with auditing standards that the Comptroller General of the United States issued, as implemented by the Inspector General, DoD. We did not use computer-processed data to perform this audit. We included tests of management controls considered necessary.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD. Further details are available on request.

Management Control Program

DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

Scope of Review of the Management Control Program. We reviewed the adequacy of management controls over the returns on P2 investments and the spending of P2 funds. We did not assess management's self-evaluation of those controls.

Adequacy of Management Controls. The management controls were adequate in that we identified no material management control weaknesses.

Appendix B. Summary of Prior Coverage

During the last 5 years, the General Accounting Office has issued one report, the Inspector General, DoD, has issued two evaluation reports, and the Army Audit Agency and Air Force Audit Agency have each issued one audit report discussing P2 programs.

General Accounting Office

United States General Accounting Office, GAO/NSIAD-95-13 (OSD Case #9766A), "Pollution Prevention, Status of DoD's Efforts," November 1994.

Inspector General, DoD

Inspector General, DoD, Report No. 98-001, "Evaluation of the Department of Defense Pollution Prevention Program," October 3, 1997.

Inspector General, DoD, Report No. 97-118, "Evaluation of Environmental Measures of Merit," April 7, 1997.

Army

U.S. Army Audit Agency, Audit Report AA 97-114, "Managing the Army's Pollution Prevention Program," February 3, 1997.

Air Force

Air Force Audit Agency, Project 95052003, "Management of Ozone Depleting Chemicals," March 18, 1996.

Appendix C. Synopses of P2 Projects

Fort Lewis

	Value	Number of Projects
Total P2 Projects	\$3,127,000	54
P2 Projects Reviewed	\$1,168,800	4

Weapons Cleaning System

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$119,400 (FY 1997)

Return on Investment: Military manpower put to other use valued at \$2,747,500 annually. In addition, there is a reduced hazardous waste stream because hazardous materials are no longer being disposed of improperly.

Savings were identified by a contractor, WasteMinCo; however, we could not identify a reduction in troop strength resulting from this project. Soldiers used to clean their rifles with solvents and rags, and improperly disposed of the solvents. The cleaning process took an average of 3 hours per rifle to complete. Now, soldiers clean their rifles in cleaning stations and the process takes approximately 15 minutes to complete. Also, cleaning solvents that used to be released into the environment are now contained and properly disposed of.

Hazardous Material Control Center

Driver: Pollution Prevention Act of 1990

Investment: \$839,400 (FY 1997 through 1998)

Return on Investment: \$714,300 annually

Savings of \$588,500 accrue to manpower, \$129,300 to procurement from a reduction of hazardous material purchases, and \$32,700 to the compliance fund for a reduction in hazardous waste disposal costs. The annual return on investment includes an offset by \$36,200 for new costs to operate the Hazardous Material Control Center. The Hazardous Material Control Center is used for ordering, issuing, and storing hazardous materials and distributing the materials to authorized users in quantities limited to immediate needs.

Fuel Filtration and Reuse

Driver: Puget Sound Air Pollution Control Agency Regulations

Investment: \$190,600 (FY 1997)

Return on Investment: \$158,900 annually

Savings of \$47,300 accrue to base operating funds from a 53,000-gallon reduction in hazardous material procurement, \$117,300 to the compliance fund

from a 425,000-pound reduction in the disposal of hazardous waste, \$47,900 to manpower, and \$28,900 to procurement. The return on investment includes an offset by \$82,500 for new requirements. The project established a facility for consolidating, filtering, and reusing contaminated fuel that would have otherwise been disposed of as hazardous waste. The filtered fuel can be used in tactical vehicles.

Silver Recovery

Driver: Federally Owned Treatment Works Effluent Discharge Standards

Investment: \$19,400 (FY 1996)

Return on Investment: \$19,400 annually

Savings of \$25,400 accrue to the compliance fund from a 9,000-gallon reduction in hazardous waste disposal. There are additional savings of \$2,700 from the sale of reclaimed silver and \$15,400 in regulatory compliance costs. The return on investment includes an offset by \$24,100 for new material and labor requirements. Photographic development processes at 7 medical and dental clinics generate spent fixer solution that contains ionic silver. This project removes the silver from the spent fixer solution, recycles the silver, and reduces a waste stream.

Norfolk Naval Base

	Value	Number of Projects
Total P2 Projects	\$6,487,800	50
P2 Projects Reviewed	\$ 351,900	6

HAZMAT/Consolidated Hazardous Material Reutilization and Inventory Management Program

Driver: Pollution Prevention Act of 1990

Investment: \$254,700 (FY 1996 through 1998)

Return on Investment: \$12.4 million for FY 1996 through 1998 and a 3 million-pound reduction in hazardous waste disposal.

Savings at Norfolk Naval Base accrue to various organizations and the compliance fund. For FY 1996 through FY 1998, the installation realized \$7.1 million savings from reduced hazardous material procurements, and \$5.3 million savings from reduced hazardous waste disposal. These savings are realized from the free issue program. Management regionalized the Norfolk Naval Base HAZMAT program within the Hampton Roads area to include additional Army, Navy, Air Force, and Coast Guard customers. In addition to the savings realized at Norfolk Naval Base, the free issue program savings attributable to the regionalization for FY 1996 through 1998 are \$707,500 from avoided hazardous material procurement costs and \$762,500 from diverting 425,000 pounds of materials from hazardous waste streams.

Powder Coating System on Spruce Barge

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$57,000 (FY 1998)

Return on Investment: \$302,500 annually

Savings of \$2,000 accrue to the compliance fund from a 1,600-pound reduction in hazardous waste disposal, \$256,200 to manpower for reduced time required to paint items, and \$58,000 to procurement. The return on investment includes an offset of \$13,700 for new material costs. Powder coating technology is more efficient and cost-effective than conventional painting systems. The powder coating system significantly reduces the amount of paint released into the air and water, takes a fraction of the time conventional paints take to apply, and practically eliminates the drying time required for conventional paints.

Oxygen Breathing Apparatus Canisters

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$400 (FY 1998)

Return on Investment: \$96,400 annually

Savings of \$80,800 accrue to the compliance fund from a 35,700-pound reduction in hazardous waste disposal and \$15,600 accrue to procurement as a cost avoidance realized from recycling steel and potassium hydroxide. The Navy used to dispose of whole canisters as hazardous waste. Now they take apart the canister, recycle the steel and potassium hydroxide, and dispose of only the barium candle as hazardous waste.

Cable Cleaner

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$10,700 (FY 1998)

Return on Investment: \$25,700 annually

Savings of \$12,800 accrue to manpower from a 900-hour reduction in the time required to clean ship's cables and \$5,300 to the compliance fund from a 2,900-pound reduction in hazardous waste disposal. In addition, there is a savings of \$7,600 in procurement costs. The Navy used to manually clean and grease ship's cables. Now they use the cable cleaner to efficiently clean and grease cables automatically.

Large Aqueous Parts Washer

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$8,300 (FY1997)

Return on Investment: \$21,300 annually

Savings of \$15,000 accrue to manpower from a 1,200-hour reduction in the time required to clean jet parts. In addition, there is a savings of \$7,000 because of the elimination of the need for a Safety-Kleen contract. Return on investment includes an offset by \$700 for new detergent and sludge removal. The washer cleans parts with a non-hazardous material and reduces the amount of hazardous waste disposal.

Maintenance Free Batteries

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)
Investment: \$20,800 (FY1997 through 1998)
Return on Investment: \$3,400 in the first year and \$24,200 per year thereafter.

Savings in the first year are from a reduction in hazardous waste disposal costs. Annual savings of \$13,800 accrue to procurement, \$5,700 to manpower, and \$4,700 to the compliance fund from a 3,000-pound reduction in hazardous waste disposal. This project replaced batteries that required monthly maintenance with batteries that require no maintenance.

Naval Air Station North Island

	Value	Number of Projects
Total P2 Projects	\$4,303,600	46
P2 Projects Reviewed	\$ 17,600	2

Aqueous Parts Washer

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)
Investment: \$15,000 (FY 1997)
Return on Investment: \$18,500 annually

Savings accrue entirely to the Aircraft Intermediate Maintenance Department Ground Support Equipment Shop operating funds from elimination of the Safety-Kleen contract. Safety-Kleen used to service the hazardous solvents used by the Ground Equipment Support Shop to clean aircraft parts. Now, the aqueous washer cleans the parts with a non-hazardous material, which reduces the volume of hazardous waste disposal.

Fluid Purifier

Driver: Pollution Prevention Act of 1990

Investment: \$2,600 (FY 1998)

Return on Investment: \$2,000 annually

Savings of \$1,200 accrue to the base operating fund from reduced hazardous material procurement and \$800 to the compliance fund from reduced hazardous waste disposal. The fluid purifier is a magnetic particle fluid purifier that extracts waste from used kerosene. The cleaned kerosene is reused in a Magnaflux process, a procedure that uses kerosene and magnetic particles to inspect aircraft parts for cracks and defects.

Seymour Johnson Air Force Base

	Value	Number of Projects
Total P2 Projects	\$1,008,100	26
P2 Projects Reviewed	\$ 484,500	3

Green Construction

Driver: Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (Executive Order 13101)

Investment: none

Return on Investment: \$98,100 one-time savings in FY 1998.

Savings accrue to military construction from a change in business practices. The contractor agrees to divert construction waste from municipal landfills by recycling specified fixtures and building materials. The contract cost to the Government is reduced by the anticipated value accruing to the contractor from the sale of the agreed upon recyclable materials.

Centrifuge

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$33,100 (FY 1998)

Return on Investment: \$8,800 annually

Savings of \$6,400 accrue to the compliance fund from a 15,200 pound reduction in hazardous waste disposal, and savings of \$2,400 accrue to procurement from reduced drum purchases. The centrifuge spins used fuel out of absorbent pads and the pads are disposed of as solid waste rather than hazardous waste. The salvaged fuel is reused.

HAZMAT Pharmacy

Driver: Pollution Prevention Act of 1990

Investment: \$451,400 (FY 1995 through FY 1998)

Return on Investment: For FY 1998, the installation reduced its hazardous materials inventory by 188 types of material and 12,600 units of material; transferred \$106,500 of unexpired hazardous materials to Marine Corps and Air Force customers; and realized an undetermined annual savings accruing to the base operating fund from reduced hazardous material procurement and to the compliance fund from reduced hazardous waste disposal.

Warner Robins Air Logistics Center

	Value	Number of Projects
Total P2 Projects	\$16,570,200	66
P2 Projects Reviewed	\$ 1,158,000	5

HAZMAT Pharmacy

Driver: Pollution Prevention Act of 1990

Investment: \$571,300 (FY 1997 and FY 1998)

Return on Investment: \$14.9 million for FY 1996 through 1998

Klynveld Peat Marwick Goerdeler, Limited Liability Partnership, validated the Depot Maintenance – Hazardous Material Management System and HAZMAT Pharmacy program for FY 1996 and FY 1997. The validation identified a \$14.1 million savings compared to the FY 1993 baseline, \$5.7 million in FY 1996 and \$8.4 million in FY 1997. The savings accrued to procurement from avoided hazardous material purchases. In addition, we determined that the HAZMAT free issue program saved \$695,800 realized from reductions in hazardous material procurements between FY 1996 and FY 1998 and \$57,600 realized from reductions in hazardous waste disposal costs between FY 1997 and FY 1998. The majority of the savings accrue to various operating funds across the organization.

Wire Arc Coating for Aircraft Maintenance Stands

Driver: Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (Executive Order 12856)

Investment: \$190,000 (FY 1996)

Return on Investment: \$715,200 estimated savings over 20 years.

Savings of \$102,100 accrue to manpower from reduced time to paint the stands; \$99,600 accrue to the compliance fund from reduced hazardous waste disposal; \$422,500 accrue to the base operating fund from reduced surface preparation costs (sandblasting old paint off of stands); and \$91,000 to procurement for reduced material purchases. The installation used to paint the aircraft

maintenance stands every 5 years, now they plan to use a wire arc to coat the stands with zinc aluminum every 20 years. This project was studied and prototyped, and will be implemented at Robins.

Ultraviolet Light Disinfection System at Wastewater Treatment Plant

Driver: Clean Air Act requirement for a risk management plan for accidental chlorine release.

Investment: \$299,800 (includes feasibility study and construction of facility) (FY 1997)

Return on Investment: \$19,600 annually; a one time cost avoidance of \$24,800; and the elimination of 15,550 pounds annually of an extremely hazardous substance that is a catastrophic risk to humans, wildlife, and the surrounding environment.

Savings of \$23,400 accrue to civil engineering operations & maintenance funds from reduction in manpower. Return on investment includes an offset of \$3,800 for ultraviolet lamps and electricity consumption. Since the quantity of chlorine on Robins Air Force Base exceeded the threshold quantity, the installation would have had to develop a risk management plan by June 21, 1999. This project, which uses ultraviolet light to kill bacteria, eliminates the use of chlorine to disinfect domestic sewage and the need to develop a risk management plan.

Engine Oil Bypass Filters and Analysis of Robins Air Force Base Vehicles

Driver: Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy (Executive Order 12780)

Investment: \$48,500 (FY 1998)

Return on Investment: \$3,900 every other year

Savings of \$4,500 accrue to the base operating fund from a 4,600-quart reduction in oil procurement every other year. Return on investment includes an offset of \$600 for a bypass replacement insert. This project represents the adoption of new technology that resulted in a reduced waste stream. The bypass filters constantly clean and maintain oil by keeping out moisture. The analyses determine when oil needs to be replaced and result in less frequent oil changes than arbitrary schedules. In addition, the improved condition of the oil appears to be extending the life of vehicles.

Can Crusher

Driver: Resource Conservation and Recovery Act

Investment: \$48,400 (cost of 24 crushers and 3 washers) (FY 1997)

Return on Investment: \$2,400 annually

Savings of \$600 accrue to depot maintenance funds from avoiding the cost to dispose of contaminated cans in municipal landfills and \$1,800 from the sale of scrap metal (crushed cans). Before using can crushers, Warner Robins Air Logistics Center received 4 Notices of Violation because paint cans were not

properly emptied before being placed in dumpsters. This infraction risked potential fines of \$27,500 a day per violation and the cost of cleaning landfills contaminated with paint. Adoption of the can crusher technology and a change in business practices allowed Warner Robins to avoid the short-term fines and penalties as well as the long-term liability of having to clean up contaminated landfills. Now, cleaned, crushed cans are diverted from the landfill and sent to the Defense Reutilization and Marketing Office for sale as scrap metal.

Marine Corps Air Ground Combat Center Twenty Nine Palms

	Value	Number of Projects
Total P2 Projects	\$11,393,400	23
P2 Projects Reviewed	\$2,574,400	2

Remedial Lead Contamination (3 ranges)

Driver: Pending State of California Munitions Rule; Health & Safety; Comprehensive Environmental Response, Compensation and Liability Act; and Resource Conservation and Recovery Act

Investment: \$ 2,381,700 (FY 1997 through 1998)

Return on Investment: \$205,900 annually

Savings of \$204,100 accrue to range operations and \$1,800 to Navy medical funds. Nonmonetary benefits include improved personnel safety from reduced exposure to lead dust, and the elimination of ricochet and bullet pass-through hazards. Also, lessons learned and shared across the Department could save other implementing sites \$409,100 of design and ambient air monitoring costs. In addition to the P2 investment identified above, this project received \$3,894,500 of compliance funds for a total project cost of \$6,276,200.

Consolidated Hazardous Material Reutilization and Inventory Management Program

Driver: Pollution Prevention Act of 1990

Investment: \$192,700 (FY 1998)

Return on Investment: \$15,000 in FY 1998 (based on 2 of 6 units on line)

Savings accrue to the compliance fund from reduced hazardous waste disposal. This program represents a change in business practices used for ordering, issuing, and storing hazardous materials and distributing the materials to authorized users in quantities limited to immediate needs.

Appendix D. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
Deputy Under Secretary of Defense (Environmental Security)
Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
Deputy Chief Financial Officer
Deputy Comptroller (Program/Budget)

Department of the Army

Auditor General, Department of the Army

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Auditor General, Department of the Navy
Dudley Knox Library, Naval Postgraduate School

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Department of the Air Force

Other Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
Director, National Security Agency
Inspector General, National Security Agency
Inspector General, Defense Intelligence Agency
Director, Defense Systems Management College

Non-Defense Federal Organizations

Office of Management and Budget
General Accounting Office
National Security and International Affairs Division
Technical Information Center

Congressional Committees and Subcommittees, Chairman and Ranking Minority Members

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Forces
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
Committee on Government Reform
House Subcommittee on National Security, Veterans Affairs, and International
Relations, Committee on Government Reform

Audit Team Members

The Contract Management Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report.

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