

Appendix W: Solid and Hazardous Waste

The Department of Defense (DoD) places a strong emphasis on pollution prevention and waste reduction. Recent efforts focus on taking additional steps to reduce the amount of solid and hazardous waste entering the waste stream as a result of DoD activities. Through maximized pollution prevention and source reduction, the Department enhances the warfighter's mission with increased safety, land availability, cost reduction, and overall environmental compliance.

Solid waste, as defined in 40 Code of Federal Regulations (CFR) §261.2, is any discarded material that is typically found in the solid waste stream, including municipal solid waste, construction and demolition (C&D) debris, and non-hazardous industrial waste. Hazardous waste is a subset of solid waste, and is any waste containing properties that are dangerous or potentially harmful to human health or the environment.

DoD generates residential and commercial waste, non-hazardous industrial waste, non-hazardous process waste, C&D debris, yard waste, and logistics waste such as packaging. DoD is committed to accomplishing waste reduction goals with integrated solutions, including reducing waste generation through the diversion of materials from the waste stream. Improved management and promotion of additional recycling opportunities will support these reduction goals and lessen future cleanup costs related to processing items from an installation or facility's waste stream.

Applicable Requirements

Historically, waste diversion and reduction first appeared in legislation under the Solid Waste Disposal Act (SWDA) of 1965, which was a broad attempt to address the solid waste problems confronting the nation at the time. In 1976, the SWDA was amended to account for additional types and quantities of wastes created by advancements in technology. The SWDA amendment, commonly known as the Resource Conservation and Recovery Act (RCRA), established the Affirmative Procurement Program (APP) in §6002(i), requiring DoD to develop a strategy for maximizing its purchases of Environmental Protection Agency (EPA)-designated items. APPs are developed in a manner that ensures items composed of recovered materials are purchased to the maximum extent practicable consistent with Federal procurement law. The Department's APP consists of four elements: (1) a preference program; (2) a promotion program; (3) procedures for obtaining estimates and certifications of recovered materials content and, where appropriate,

reasonably verifying those estimates and certifications; and (4) procedures for monitoring and annually reviewing the effectiveness of the APP.

In January 2007, Executive Order (E.O.) 13423 was signed by the President, requiring each identified agency to reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency. It also requires that each agency increase diversion of solid waste as appropriate; and maintain cost-effective waste prevention and recycling programs at its facilities.

The 2007 Defense Installations Strategic Plan, Objective 2.2 further requires the development of goals and an action list for pollution prevention and toxic or hazardous materials management to meet sustainability requirements in E.O. 13423. Additionally, DoD Directive (DoDD) 4715.4, Pollution Prevention, establishes policy to reduce pollution and the use of hazardous materials through improved resource utilization, and incorporates pollution prevention into all phases of the life-cycle management approach using an environmental management system (EMS).

Requirements to collect, manage, and use environmental data, as well as budget for such expenses pertaining to solid and hazardous waste, can be found in DoDD 4715.1E, Environment, Safety, and Occupational Health, and DoD Instruction 4715.6, Environmental Compliance.

Current Management Practices and Performance Evaluation Criteria

DoD continues to deploy an integrated waste management approach to enhance and sustain mission readiness, comply with requirements, and reduce resource consumption. Regulatory drivers such as the RCRA, E.O. 13423, and internal DoD policies help ensure that the Department sets proper goals to decrease the use of hazardous materials; increase diversion of solid waste; and maintain cost-effective recycling programs. Within the Department, pollution prevention is the first priority in achieving compliance. Pollution prevention also is incorporated into

all phases of the weapons system lifecycle development: acquisition, operations and sustainment, and disposal. It requires Components to plan, program, and budget; implement appropriate training; promote partnerships; and implement innovative pollution prevention technologies and business practices. DoD emphasizes the environmental hierarchy of source reduction of pollutants, reuse and recycling, treatment, and then disposal.

Integrated Solid Waste Management

Integrated solid waste management programs have been employed throughout DoD to enable managers to make systematic waste diversion or disposal decisions based on a more refined environmental management hierarchy. These practices promote successful waste diversion at installations through a comprehensive approach encompassing waste prevention, reuse, composting, mulching, recycling, and donation programs. In response, installations are better equipped to make good business decisions that reduce waste volume, maximize diversion, and realize potential cost savings.

DoD demonstrated commitment to increase the diversion of non-hazardous solid wastes in 1998, by setting a solid waste diversion goal of 40 percent or greater by the end of Calendar Year (CY) 2005. DoD established the total solid waste diversion rate metric to support goals for reducing waste at the source and to calculate the rate at which installations prevent non-hazardous municipal solid waste from entering a disposal facility. This goal was met in Fiscal Year (FY) 2001 when DoD's solid waste diversion rate reached 45 percent. However, few management practices were in place to quantify C&D debris, given that this debris often varies in definition, type, and sampling procedures across states. In FY2005, DoD revised the solid waste reporting metrics to separately identify C&D debris and municipal solid waste diversion rates.

In FY2008, DoD released the DoD Integrated (Non-Hazardous) Solid Waste Management (ISWM) Policy Memorandum and established corresponding DoD ISWM

Guidelines. The ISWM policy implemented a 40 percent diversion goal for non-hazardous solid waste without C&D waste by 2010. The goal for C&D debris waste is 50 percent diversion by 2010. Progress toward the 2010 diversion goals is monitored using DoD solid waste and recycling metrics.

E.O. 13423 requires all appropriate facilities to maintain waste prevention and recycling programs in the most cost-effective manner possible. Additionally, each agency is required to meet or surpass the national 35 percent recycling goal established by EPA. DoD is implementing Qualified Recycling Programs (QRPs) at the installation level in order to recover value for materials diverted from the waste stream, in addition to avoiding disposal costs. QRP proceeds are distributed in accordance with 10 United States Code (U.S.C.) §2577, which provides guidance for offsetting costs associated with the disposal and sale of scrap material. Any remaining balance is first used to cover the costs directly attributable to all installation recycling programs, then may be used for pollution abatement and prevention, composting, alternative fuel vehicle infrastructure support, vehicle conversion, energy conservation, or occupational safety and health projects. The DoD Combined Services Solid Waste and Recycling Working Group is assessing each Component's unique QRP compliance assessment process in an effort to increase accountability and effectiveness.

In FY2008, DoD began to certify its intensive QRP management and program certification training course through the Interservice Environmental Education Review Board (ISEERB). The course provides a comprehensive overview of the QRP, including current regulations and policies, partnerships, tracking tools, and success stories. Certifying the course with ISEERB will improve efficiency and ensure proper management of DoD recycling programs through development of the requirements and processes needed to implement a certification program for the installation QRP manager and staff.

Hazardous Waste Reduction and Disposal

DoD has sustained a strong dedication to reducing hazardous waste with a 50 percent decrease in the total amount of hazardous waste disposed since CY1996. The hazardous waste reduction rate is calculated on a calendar year basis and includes hazardous waste treated onsite and shipped offsite domestically or overseas. In CY2005, DoD revised the hazardous waste metric to include hazardous waste treated onsite among certain waste categories targeted for reduction. Prior to CY2005, the metric included mainly hazardous waste shipped offsite (both recycled and disposed). Therefore, the inclusion of hazardous waste treated onsite category starting in CY2005 is one source of the increase in hazardous waste disposal quantities shown across DoD.

In January 2008, DoD deployed the agency-level Toxic and Hazardous Chemicals Reduction Plan, which outlines the DoD programs, initiatives, and actions necessary to reduce procurement, use, release, and disposal of toxic and hazardous chemicals under E.O. 13423. DoD also established the Toxic and Hazardous Chemicals Reduction Plan Working Group, on behalf of the larger DoD E.O. 13423 Implementation Working Group, which is responsible for ensuring that the Components are meeting toxic and hazardous waste reduction efforts outlined in the plan. The plan strives to clarify DoD's current status and planned next steps, leveraging an EMS framework to align and coordinate relevant programs at all organizational levels for the purpose of reducing toxic and hazardous chemicals. The Toxic and Hazardous Chemicals Reduction Plan was strengthened by the DoD policy memorandum, Implementing E.O. 13423 Toxic and Hazardous Chemicals Reduction Plan, which provided for the lifecycle management of chemicals focusing on acquisition, operations and sustainment, and disposal of weapon systems and facilities.

Major pollution prevention efforts have been successfully implemented with regards to hazardous waste disposal. DoD is currently looking to implement new technologies,

process redesign, and introduce chemical reduction or substitution early into the design and acquisition process to assist with overall hazardous waste reduction goals. As DoD's supply chain integrator and manager of many of the Services' hazardous chemicals, the Defense Logistics Agency (DLA) is assisting the Services in their efforts to comply with the plan.

Areas of opportunities for future initiatives include the Electronic Product Environmental Assessment Tool (EPEAT)-registered products as it pertains to toxic and hazardous chemicals reduction. EPEAT requires all certified products to be compliant with the Institute of Electrical and Electronics Engineers (IEEE) 1680 Standard for Environmental Assessment of Personal Computer Products (including laptop and desktop computers, and monitors). Section 4 of the IEEE 1680 Standard requires all covered products to comply with the final requirements of the European Reduction of Hazardous Substances Directive 2002/95/EC, which restricts certain hazardous substances (e.g., cadmium, mercury, and lead) in electronic equipment.

Other opportunities may expand to incorporate greenhouse gases and alternative or renewable energy requirements. Local legislation, such as California's proposed ban on hexavalent chromium, also is being evaluated to determine the extent of any potential impact on DoD. Overseas regulatory drivers also may affect DoD's management practices, including the European Union's (EU's) Registration, Evaluation, Authorization, and Restriction of Chemical Substances initiative, which is designed to provide a centralized repository of chemicals entering or being used in the EU. Each of these areas presents new challenges and potentially new mission directives within DoD in an effort to reduce toxic and hazardous chemicals throughout the life cycle development.

DoD

The Department demonstrates a strong commitment to protecting human health and the environment through a sustained focus on diverting non-hazardous solid waste from entering disposal facilities and reducing disposal of hazardous waste. Each year, the percentage of solid waste diverted varies depending on the amount, location, and types of solid waste generated. DoD's C&D solid waste diversion rate also is dependent on the schedule for construction, demolition, and renovation projects, which produce large quantities of C&D debris.

DoD generated a total of nearly 6.2 million tons of solid waste, consisting of 3.9 million tons of C&D debris and 2.2 million tons of non-hazardous municipal solid waste in FY2008. The generation of municipal solid waste equates to 3.2 pounds per person each day. As shown in Figure W-1, the Department had an overall diversion rate of 63 percent in FY2008. This includes diversion rates of 76 percent for C&D debris and 40 percent for non-hazardous municipal solid waste. DoD has not only met, but exceeded agency goals of land resource management by reducing the flow of waste, thereby extending the lives of the landfills. Achievement of solid waste program goals through integrated solid waste management practices also has led to a cost avoidance of \$259.7 million through a reduction in the amount of solid waste and C&D debris received by landfills or incinerators, and the associated costs.

In CY2007, DoD disposed over 180 million pounds of hazardous waste, as illustrated in Figure W-2. While this data represents an increase from the CY2006 total of 38 million pounds, DoD has reduced hazardous waste disposal by over 106 million pounds since CY1996. This disposal is largely due to continual efforts throughout the Department to identify opportunities for reducing hazardous waste generation. Reduction and elimination of hazardous materials use will decrease health risks to personnel and reduce the number of accidents that can occur when using these materials and any associated cleanup costs.

Figure W-1 DoD Solid Waste Diversion Rate

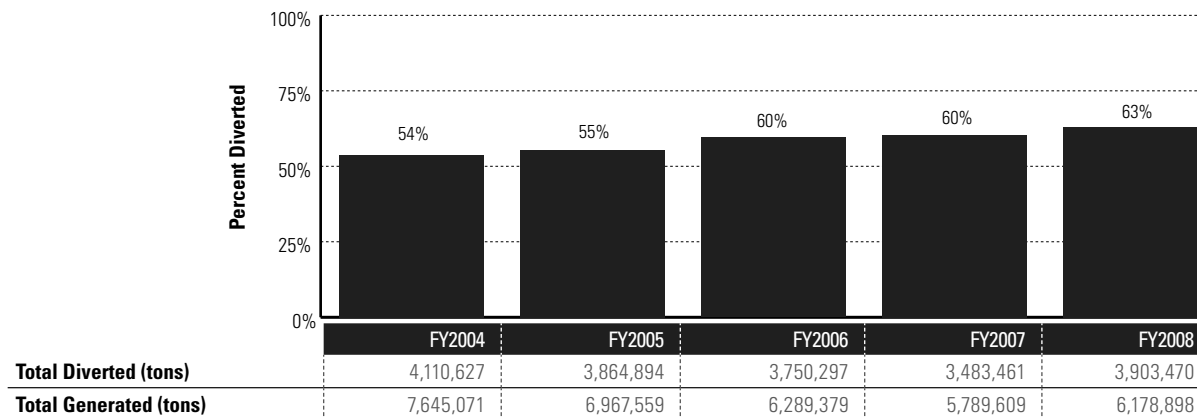
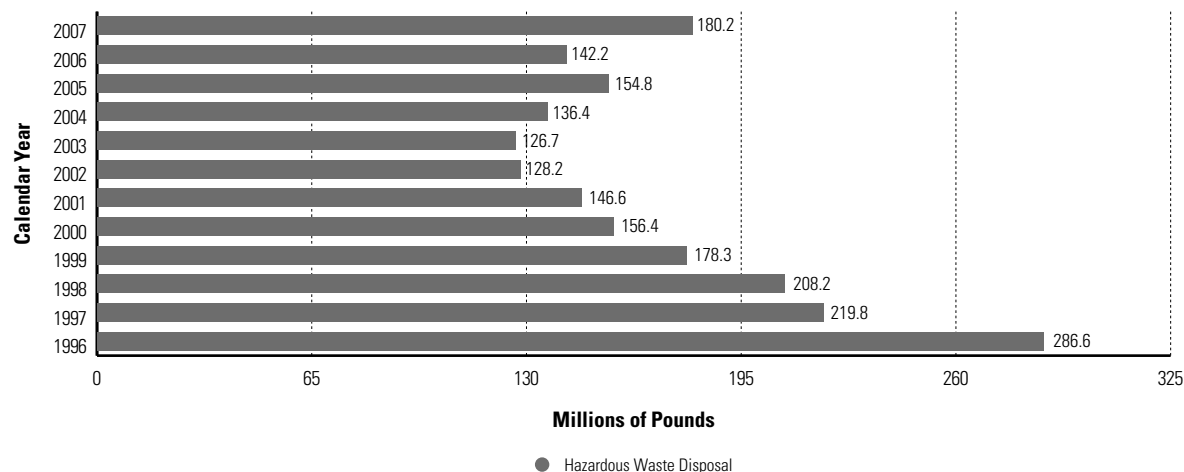


Figure W-2 DoD Hazardous Waste Disposal



Army

To face the many challenges associated with waste management, the Army has maintained its solid and hazardous waste reduction programs effectively, realizing successes through regulatory compliance and economic benefit.

According to Figure W-3, diversion accounted for 58 percent of all Army solid waste disposal in FY2008. The Army effectively demonstrated commitment to solid waste reduction in C&D processes, with 71 percent of this debris from landfills diverted into productive reuse. Excluding C&D debris, the Army diverted 42 percent of non-hazardous municipal solid waste from entering the waste stream. The Army's efforts to divert waste from landfills and incinerators have resulted in an avoidance of \$96 million in solid waste disposal costs. The Army's QRP posted gross revenues of \$43 million. Most of these proceeds went toward operation and improvement of the program.

The Army disposed of over 76 million pounds of hazardous waste in CY2007, as shown in Figure W-4. This amount represents an increase in hazardous waste disposal for the Army compared to CY1996. The Army recorded a 75 percent increase in overall hazardous waste disposal since CY2006 due to increased maintenance, rebuild, and production activity at Army industrial installations in support of Operation Iraqi Freedom and Enduring Freedom.

Figure W-3 Army Solid Waste Diversion Rate

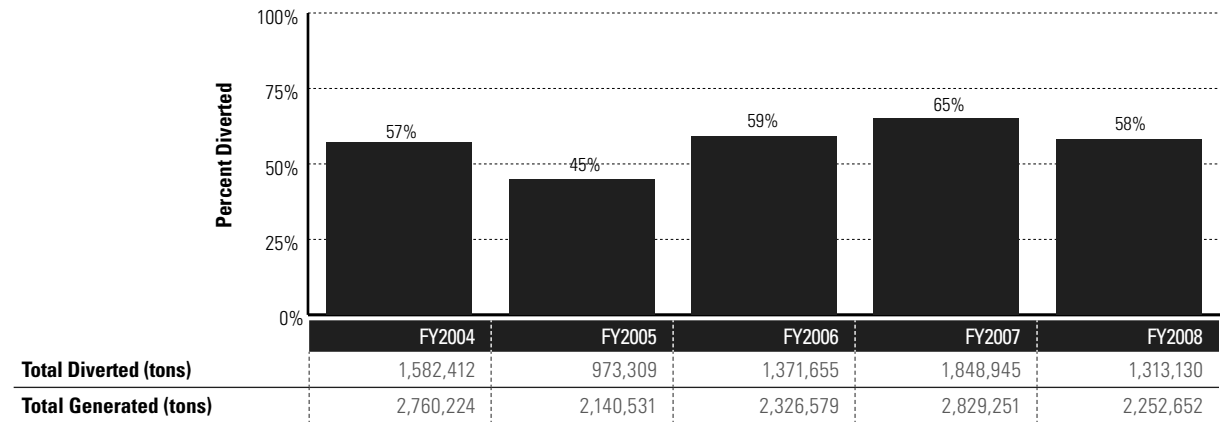
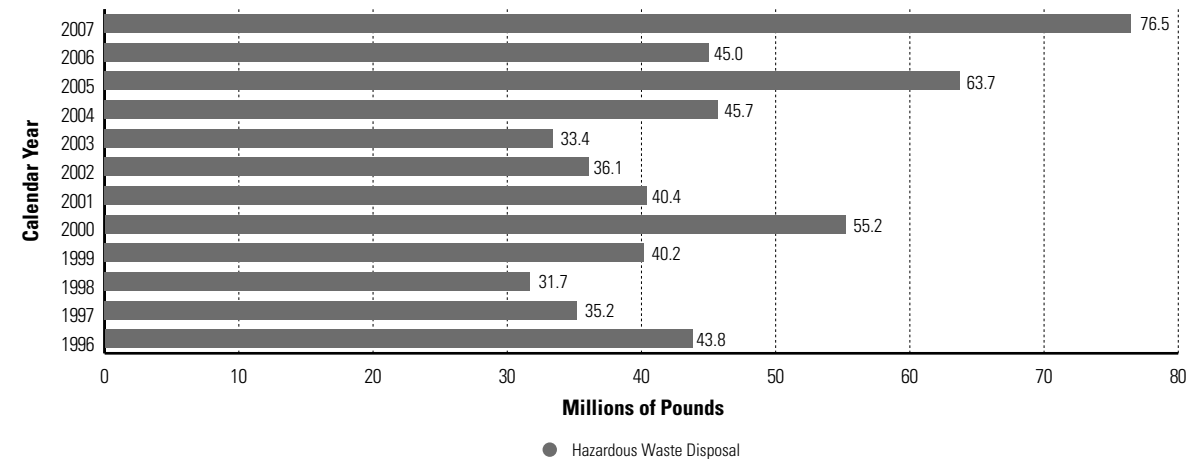


Figure W-4 Army Hazardous Waste Disposal



Navy

The Navy has made significant efforts to promote human health and the environment through initiatives that strictly comply with DoD and Navy policies regarding solid and hazardous waste management.

In FY2008, the Navy achieved an overall diversion rate of 43 percent through ISWM practices, illustrated in Figure W-5. The Navy effectively accomplished this reduction through a 54 percent diversion of C&D debris and a 32 percent diversion of non-hazardous municipal solid waste. Effective solid waste diversion practices resulted in a cost savings for the Navy of \$18.7 million in FY2008.

The Navy's progress in reducing hazardous waste targeted for reduction is demonstrated through a reduction rate of 50 percent since CY1996. In CY2007, the Navy disposed of 70.0 million pounds of hazardous waste, which includes 60.8 million pounds of hazardous wastes in the United States, and almost 9.2 million pounds of hazardous wastes at overseas installations. In CY2005, DoD revised the hazardous waste metric to include hazardous waste treated onsite among certain waste categories targeted for reduction, which accounts for the 23 percent increase since CY2005.

Figure W-5 Navy Solid Waste Diversion Rate

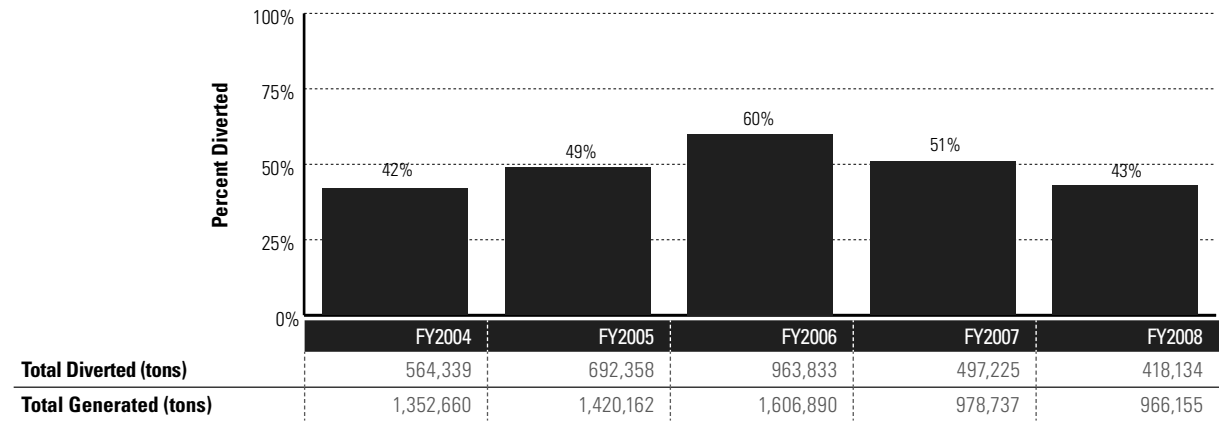
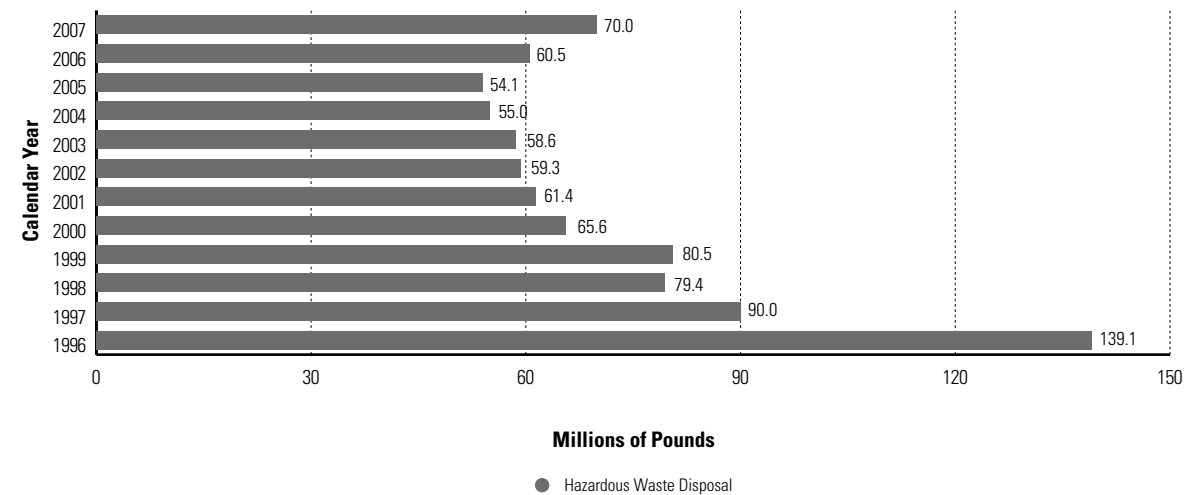


Figure W-6 Navy Hazardous Waste Disposal



Marine Corps

The Marine Corps consistently demonstrates progress toward achieving DoD's solid and hazardous waste reduction goals, and a strong commitment to diversion and reduction of materials from the waste stream.

The Marine Corps achieved a 75 percent diversion rate of all solid waste, as shown in Figure W-7. In FY2008, the Marine Corps diverted 95 percent of C&D debris and 36 percent of non-hazardous municipal solid waste from entering the waste stream.

The Marine Corps demonstrated further advancement in hazardous waste reduction with a 78 percent decrease in the total amount of hazardous waste disposal since CY1996. As shown in Figure W-8, the Marine Corps disposed of 16.4 million pounds of hazardous waste in CY2007.

Figure W-7 Marine Corps Solid Waste Diversion Rate

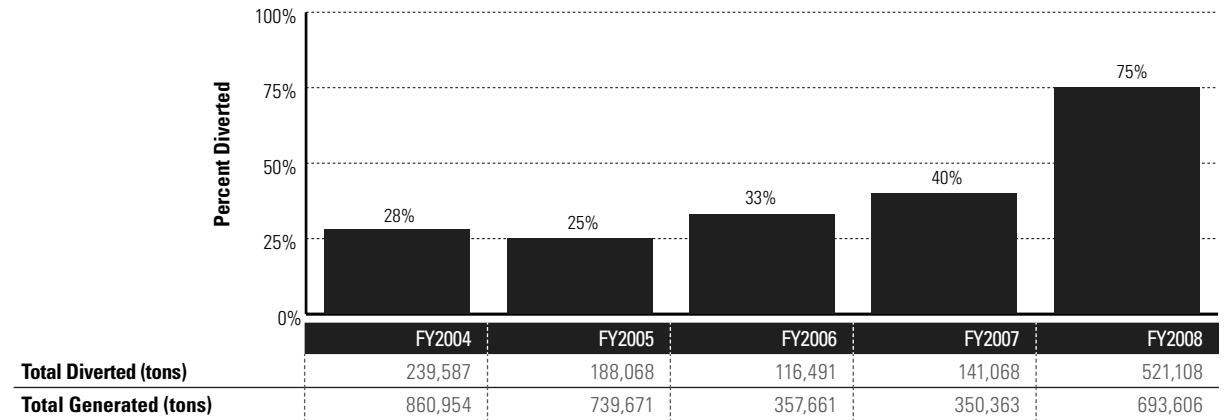
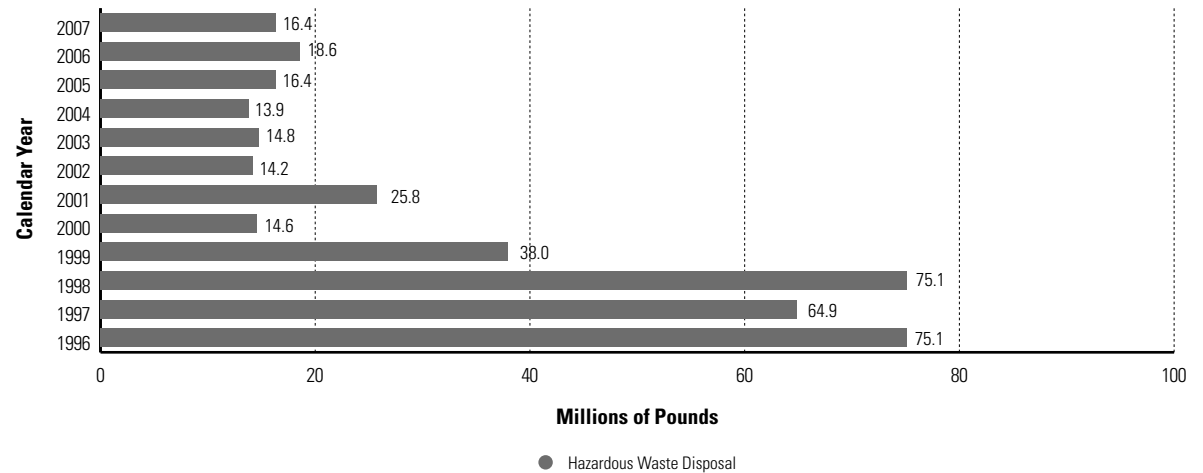


Figure W-8 Marine Corps Hazardous Waste Disposal



Air Force

The Air Force continues to promote solid and hazardous waste management by diverting non-hazardous municipal solid waste from landfills, recycling wastes that could potentially be hazardous, and preventing waste at its source through the implementation of broad acquisition and supply programs to procure more environmentally preferable products.

In FY2008, the diversion of 81 percent of C&D debris and 45 percent of non-hazardous municipal solid waste resulted in Air Force cost savings of \$127.6 million dollars. As shown in Figure W-9, the Air Force had an overall diversion rate of 73 percent during FY2008.

Figure W-10 illustrates progress with regard to hazardous solid waste diversion and cost avoidance. In CY2007, the Air Force disposed of 17.0 million pounds of hazardous waste. Since CY1996, the Air Force has engaged in many successful initiatives, which have resulted in a 32 percent reduction of hazardous waste disposal. Effective implementation of shelf-life management and streamlining of processes have reduced the amount of hazardous waste disposed of, leading to improved operations and a decrease in occupational and environmental risks.

Figure W-9 Air Force Solid Waste Diversion Rate

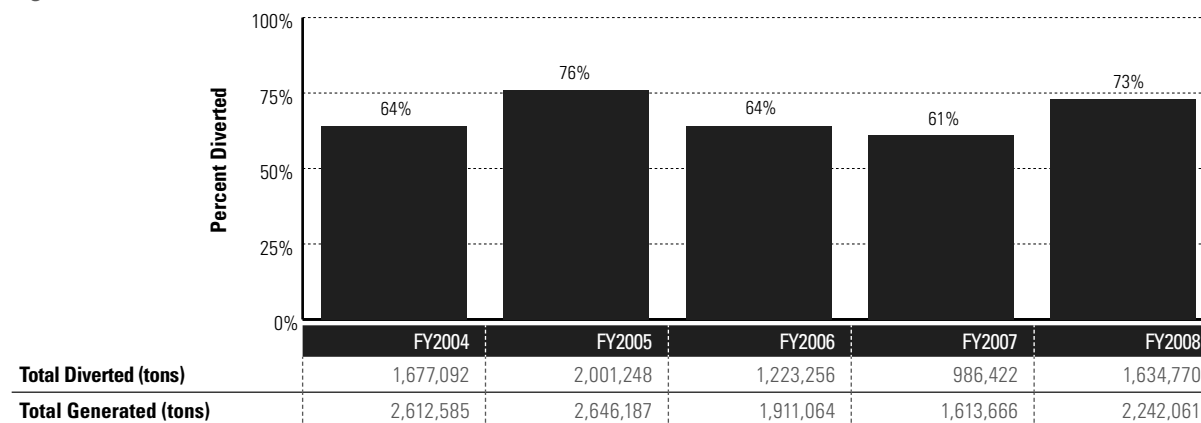
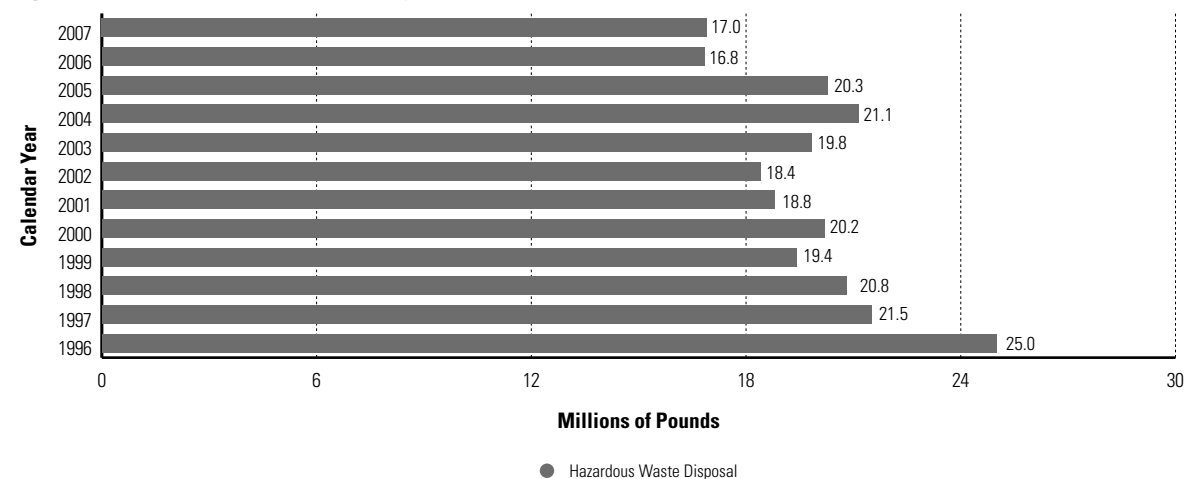


Figure W-10 Air Force Hazardous Waste Disposal



DLA

DLA values solid and hazardous waste reduction and diversion through consistent efforts and accomplishment of goals, resulting in greater protection of human health and the environment.

In FY2008, DLA achieved a 67 percent solid waste reduction rate, as shown in Figure W-11. This represents an 11 percent improvement since FY2007. DLA diverted 81 percent and 60 percent of C&D waste and municipal solid waste, respectively.

Figure W-12 demonstrates DLA's hazardous waste program achievement, which reduced hazardous waste disposal by 88 percent since CY1996. This includes waste disposed by the Defense Reutilization and Marketing Service, which disposed 0.01 million pounds in CY2007. DLA's reduction rates not only demonstrate a strong compliance with federal and DoD hazardous waste standards, but a reduction in occupational and environmental risk among all DLA installations.

Figure W-11 DLA Solid Waste Diversion Rate

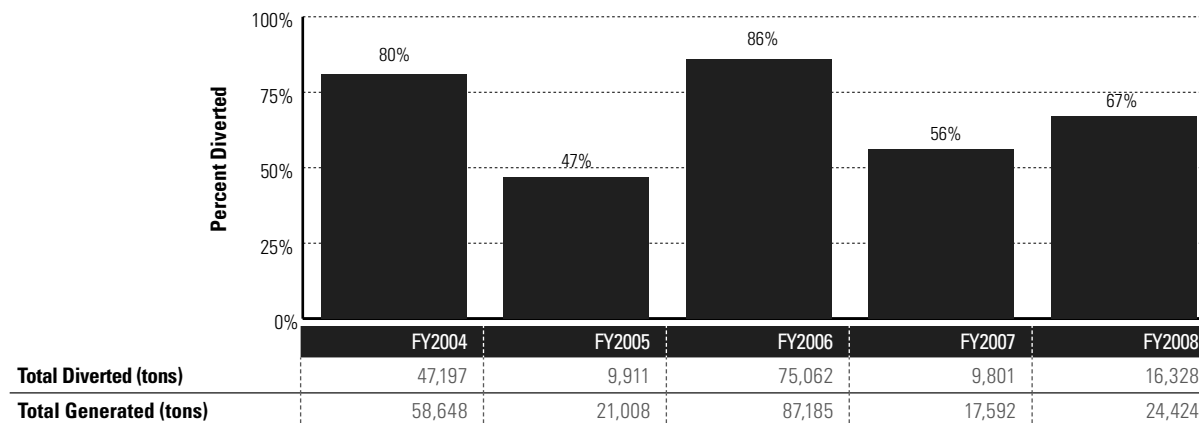


Figure W-12 DLA Hazardous Waste Disposal

