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Report to Congressional Requesters

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HAZARDOUS WASTE

Attention to DOD Inventories of Hazardous Materials Needed

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National Security and
International Affairs Division

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The Honorable Vic Fazio
Chairman, Subcommittee on Legislative
Committee on Appropriations
House of Representatives

The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy and Natural Resources
Committee on Government Operations
House of Representatives

This report responds to your request that we evaluate the Department of Defense's (DOD) efforts to minimize the amount of hazardous waste it has to dispose of. Since your request covers many different issues, we divided the work into three reviews. Our first report to you, Hazardous Waste: DOD Efforts to Reduce Waste (GAO/NSIAD-89-35, Feb. 7, 1989), discussed DOD's efforts to reduce hazardous waste through source reduction techniques. This is our second report. It addresses DOD's efforts to minimize hazardous waste generated through changes in inventory management of hazardous materials. Our third report will address DOD's efforts to minimize the quantity of hazardous waste disposed of through reuse, sale, or treatment.

As arranged with your Office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time we will send copies to the chairmen of other appropriate committees; the Secretaries of Defense, the Air Force, the Army, and the Navy; the Director, Office of Management and Budget; and other interested parties.

This report was prepared under the direction of Harry R. Finley, Director, Air Force Issues. Other major contributors are listed in appendix VIII.

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Executive Summary

Purpose

The Department of Defense (DOD) is a major generator of hazardous waste. The Hazardous and Solid Waste Amendments of 1984 require that all hazardous waste generators have minimization programs. In response, DOD delegated responsibility for developing and implementing such programs to the Air Force, the Army, and the Navy.

The Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, and the Chairman, Subcommittee on Legislative, House Committee on Appropriations, requested that GAO determine the status of DOD's program for reducing hazardous waste generation. This is the second of three reports on this issue. This report details GAO's review of DOD's efforts to minimize hazardous waste generation through inventory management of hazardous materials.

Background

Hazardous materials may become hazardous waste that must be disposed of in accordance with environmental laws. The cost of disposal often exceeds the acquisition value of the property being disposed of. Proper management can minimize the amount of hazardous materials disposed of as hazardous waste. Hazardous materials with an acquisition value of about $250 million were transferred to the disposal process during fiscal years 1986 through 1988. The disposal process includes the transfer, donation, sale, and disposal of materials. Materials with an acquisition value of over $195 million were disposed of during fiscal years 1986 through 1988 by sales to the public (43 percent), disposal service contracts (31 percent), reuse within DOD (13 percent), transfer or donation to non-DOD users (12 percent), and miscellaneous disposals (less than 1 percent). The remaining materials will remain in storage until a decision is reached on the manner in which the materials will be disposed of.

To evaluate DOD's inventory management procedures, GAO reviewed a random sample of 769 transfers of hazardous materials to the disposal process in fiscal year 1987.

Results in Brief

DOD's current inventory practices do not minimize the amount of unused hazardous materials that are transferred to the disposal process. In GAO's random sample of hazardous materials transferred to the disposal process from 10 installations, GAO found that 40 percent was unused hazardous materials. GAO found that (1) hazardous materials with short

shelf life may be delivered to users with only minimal shelf life remaining because of the length of time the hazardous materials stay in storage at the various levels of the supply system, (2) the oldest materials are not always issued before newer materials because of exceptions to DOD's policy of issuing oldest materials first, and (3) the condition of the materials is not always evaluated before the materials are transferred to the disposal process because users do not always comply with DOD's requirements to do so.

Principal Findings

Hazardous Materials Not Delivered in a Timely Manner

The time lapse between the purchase and delivery of hazardous materials with short shelf life may result in the end user receiving materials with expired or nearly expired shelf life. If the end user cannot use the materials, they may then be transferred unused to the disposal process. In GAO's sample, 57 percent of the unused hazardous materials with short shelf life had been transferred to the disposal process because the shelf life had expired.

Hazardous materials used by DOD are normally purchased through the General Services Administration or the Defense Logistics Agency. To provide more timely delivery of materials with short shelf life, the General Services Administration, in May 1988, began to test the use of direct delivery contracts for one type of hazardous material with short shelf life supplied to DOD organizations. It plans to expand the program to cover other types of hazardous materials in the future. The Defense Logistics Agency has had a direct delivery program designed to reduce material costs in place since 1983. However, it has not fully applied this program to hazardous materials with short shelf life.

Materials With Shortest Shelf Life Need to Be Issued First

One inventory control procedure for issuing materials is the first-in first-out method. This procedure can minimize the chance of hazardous materials becoming hazardous waste due to shelf life expiration. However, the procedure is not always followed because of a lack of internal controls to ensure compliance with first-in first-out guidance. In addition, in some cases, certain exceptions to the procedure are permitted that do not fully take into account the extra costs that can be incurred in the disposal of hazardous materials. Under these exceptions, newer

items can be issued even if older items are available, thereby risking the possibility that the shelf life of older materials will expire.

Need to Evaluate Condition of Hazardous Materials

DOD regulations require that the condition of hazardous materials be evaluated periodically and, when possible, the shelf life extended after inspection and testing at the depot or installation level. Although the guidelines do not provide for exceptions to these requirements, we found that the evaluations are not always made. Some of the reasons cited by depot and installation officials for not making evaluations included funding constraints, inadequate emphasis by management, or a lack of specific guidance to the users on how to evaluate the condition of hazardous materials. As a result, hazardous materials are sometimes transferred to the disposal process without being tested or evaluated to determine if the materials' shelf life could be extended.

On the other hand, some Army installations keep hazardous materials in their inventories for an extended period of time without evaluating their condition. If this happens, the materials could deteriorate to a point at which no one could use them, thus becoming hazardous waste. If the materials were tested on a regular basis and found not to meet military specifications, they could be transferred, donated, or sold.

Hazardous Material Inventories Need Special Attention

DOD's inventory management procedures are the same for hazardous and nonhazardous materials. If DOD implemented special procedures for managing hazardous material inventories, the cost of unnecessary disposal of hazardous materials could be reduced, and the potential liability for environmental damage and future cleanup costs could be decreased.

On June 20, 1989, the Deputy Chief of Naval Operations (Logistics) signed an instruction that the Navy believes will improve life-cycle management of hazardous materials in its inventories. The instruction contains elements that specifically address the management of hazardous material inventories, including (1) controls over procurement of hazardous materials, (2) management procedures for excess hazardous materials and waste, (3) quality assurance evaluations, (4) documentation, and (5) recordkeeping and reporting. These elements bring a structure to the management of hazardous materials in the Navy. The Air Force and the Army do not have such an effort underway.

Recommendations

GAO recommends that the Secretary of Defense issue instructions to each service to provide special attention to inventory management procedures for hazardous materials that will minimize the generation of hazardous waste from hazardous material inventories. These instructions should include directing

- the Defense Logistics Agency and the General Services Administration, through the memorandum of agreement between DOD and the General Services Administration, to make greater use of direct delivery contracts for hazardous materials with short shelf life;
- supply organizations to make greater use of first-in first-out issue procedures for hazardous materials with shelf life and to discourage exceptions to this policy; and
- supply depots and installations to consistently evaluate the condition of hazardous materials through periodic testing or inspecting of hazardous materials before sending them to the disposal process.

Agency Comments

As requested, GAO did not obtain official agency comments on a draft of this report. However, GAO discussed the matters addressed in this report with DOD officials and considered their comments in preparing the report.

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Abbreviations

DLA	Defense Logistics Agency
DOD	Department of Defense
GAO	General Accounting Office
GSA	General Services Administration

Introduction

In fiscal years 1986 through 1988, the Department of Defense (DOD) purchased through the Defense Logistics Agency (DLA) and the General Services Administration (GSA) a yearly average of over $250 million in hazardous materials in the 13 stock classes we reviewed, which include paints, solvents, various chemicals, lubricants, batteries, and numerous other products. DOD installations use these materials in their industrial repair and maintenance operations on weapon systems and equipment.

If hazardous materials are not properly managed while waiting to be used, they may become hazardous waste, even though they have never been used. This situation can occur when the materials' shelf life expires before they can be used and the hazardous materials are transferred directly from inventory to the disposal process.[1] The first step of the disposal process is to try to locate another DOD customer that can use the materials. If that effort is not successful, the materials may be transferred to another federal agency or donated or sold to non-federal users. If these efforts are also not successful, the unused materials are turned over to a disposal firm that has contracted with DOD to dispose of hazardous waste.

DOD Is a Major Generator of Hazardous Waste

DOD generates over 400,000 tons of hazardous waste each year from industrial processes primarily used to repair and maintain weapon systems (e.g., F-16 aircraft) and equipment (e.g., trucks). This hazardous waste includes contaminated sludge, solvents, acids, and heavy metals, which are dangerous to humans and the environment if disposed of improperly.

National concern about the threat of environmental damage posed by the disposal of hazardous waste has resulted in the enactment of various environmental laws including the Resource Conservation and Recovery Act of 1976, as amended. The Hazardous and Solid Waste Amendments of 1984 to the act require that hazardous waste generators, including DOD, have programs in place that minimize, to the extent practicable, the generation of hazardous waste. In response, DOD delegated responsibility for developing and implementing such programs to the Air Force, the Army, and the Navy.

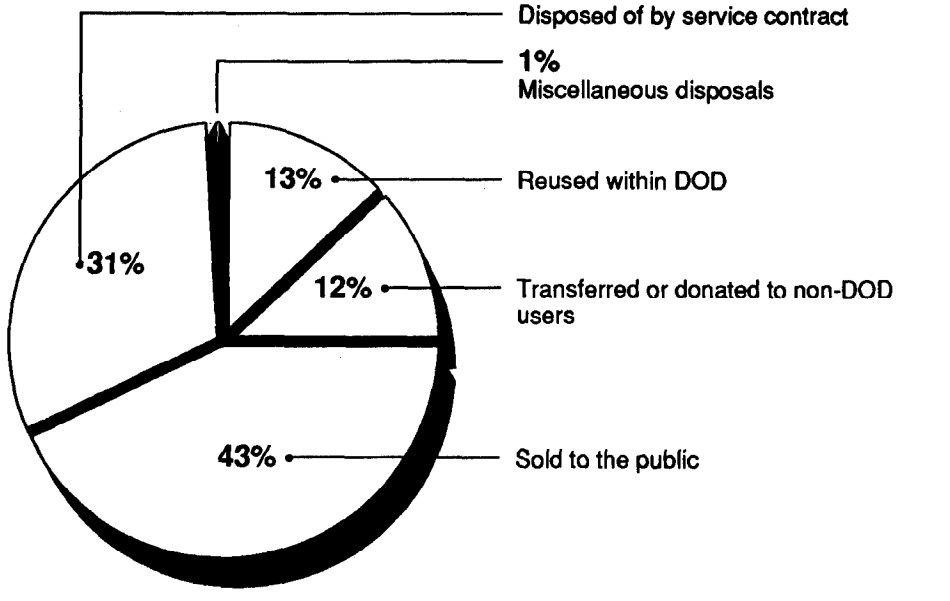
[1] DOD's disposal process includes the transfer, donation, sale, or disposal of property in accordance with the requirements of the Federal Property and Administrative Services Act of 1949, as amended. The disposal process is the responsibility of the DLA and is carried out by its Defense Reutilization and Marketing Service through installation level offices. The actual disposal of hazardous waste from the Defense Reutilization and Marketing Offices is accomplished using service contracts with disposal contractors.

As part of its efforts to comply with the Resource Conservation and Recovery Act, DOD has recognized that proper management of hazardous material inventories is one way to minimize the generation of hazardous waste. Certain hazardous materials in DOD's inventories, such as paints, adhesives, and photographic materials, are often similar to those used in the private sector. However, DOD's hazardous material inventories also include many unique products with specialized needs. Hazardous materials need special handling for safety reasons. In addition, hazardous materials can have a deteriorative nature, which requires them to be assigned a shelf life that defines the approximate limit of time during which the materials will meet military specifications. The materials may remain useful beyond their original shelf life expiration dates, but inspections or testing should be made to confirm that the materials can still be used. Manufacturers also recommend that some hazardous materials be stored in a controlled environment within specified temperature ranges; failure to do so will shorten the useful life of the materials.

Hazardous materials that have not been completely consumed during their use and unused hazardous materials that are excess to requirements, have damaged containers, or have expired shelf life are transferred to the disposal process. The acquisition value[2] of DOD's hazardous materials transferred to the disposal process during fiscal years 1986 through 1988 was over $250 million (see app. I). Hazardous materials with an acquisition value of over $195 million were disposed of during fiscal years 1986 through 1988, as shown in figure 1.1.

[2]Transfers involve many different products, quantities, and types of containers (e.g., boxes, gallons, drums). The only common factor in these transactions is their acquisition value. For this reason, acquisition value is used throughout this report.

Figure 1.1: Disposition of Hazardous Materials



Source: DLA reports for 1986 through 1988

DLA records did not disclose what portion of the materials transferred to the disposal process were partially used or unused. However, our random sample of fiscal year 1987 transfers to disposal revealed that $201,951, or 40 percent, of the $505,743 in acquisition value of hazardous materials represented unused materials (see app. II). These sample results should not be projected due to limitations in our methodology (see p. 12).

The cost of disposing of hazardous property using service contracts, on average, exceeds the acquisition value of the hazardous property by 111 percent. DLA service contract disposal costs for fiscal years 1986 through 1988 was about $194 million (see app. III).

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, and the Chairman, Subcommittee on Legislative, House Committee on Appropriations, requested that we review DOD's efforts to minimize the amount of hazardous waste it has to treat and/or dispose of. We agreed with the Chairmen that we would prepare three reports to respond to their request. Our first report, Hazardous Waste: DOD Efforts to Reduce Waste

(GAO/NSIAD-89-35, Feb. 7, 1989), discussed DOD's efforts to reduce hazardous waste through source reduction techniques. This is our second report, and it details our review of DOD's efforts to minimize hazardous waste generation through inventory management of hazardous materials. Our third report will address how to minimize the disposal of hazardous waste once it is generated.

To accomplish our objectives, we examined DOD's current and planned efforts to manage its hazardous material inventories. We interviewed DOD and service headquarters officials in Washington, D.C., to obtain their comments on DOD's efforts to identify and implement changes in hazardous material inventory procedures that would minimize the generation of hazardous waste (see app. IV).

We discussed inventory management techniques at the major command and installation levels, primarily with logistics and maintenance officials. We also interviewed officials of support organizations, such as supply and internal audit, to determine if they had made any studies identifying needed improvements in hazardous material inventories management procedures.

We reviewed the hazardous material inventory policies and procedures of DLA and GSA to determine their roles in supplying hazardous materials to DOD installations. We visited DLA and GSA headquarters, regional, and field offices to examine procedures for controlling the procurement, requisitioning, and disposal of hazardous materials. We also examined the role of DLA's Defense Reutilization and Marketing Service, which is the DOD organization that processes unneeded material turned in by the installations for transfer, donation, sales, or disposal. We interviewed officials from the Defense Reutilization and Marketing Service's Defense Reutilization and Marketing Offices at 10 DOD installations about their policies and procedures for disposing of the hazardous materials.

We also visited 10 installations (3 Army, 3 Air Force, and 4 Navy) that were geographically dispersed throughout the United States. These installations were selected based on our analysis of the Defense Reutilization and Marketing Service's data on hazardous materials received at their Defense Reutilization and Marketing Offices from the installations during fiscal year 1987, the latest data available at the time of our selection (see apps. V and VI). Our analysis revealed that 13 federal supply classes accounted for about 85 percent of the acquisition value of all DOD hazardous materials transferred to the Defense Reutilization and Marketing Service during fiscal year 1987. Within these 13 supply

classes, the installations selected had at least $100,000 in the total acquisition value of transfers and a variety of hazardous materials. We did not assess the reliability of the Defense Reutilization and Marketing Service's database.

To evaluate DOD's hazardous material inventory management, we selected a random sample of 769 of the 8,441 fiscal year 1987 hazardous material transfers to Defense Reutilization and Marketing Offices in the 13 federal supply classes from 10 installations (see app. VII). The total number of transfers from the 10 installations in the 13 federal supply classes had an acquisition value of $4,839,402, and the 769 transfers in our sample an acquisition value of $505,743. We asked supply and maintenance officials at each installation to explain the reasons for each of the 769 transfers, if possible, and to indicate whether the hazardous materials were in a used or unused condition at the time of transfer.

The sample results should not be projected DOD-wide because our selection of installations and supply classes was based on judgments rather than statistically random choices. We discussed our selection methods and choices of installations and supply classes with DOD officials, and they had no objection to our approach for examining DOD's management of hazardous materials in its inventories.

As requested, we did not obtain official agency comments on this report. However, we discussed its contents with service officials and incorporated their comments as appropriate. We made our review between February 1988 and August 1989 in accordance with generally accepted government auditing standards.

DOD Inventory Practices Do Not Minimize Hazardous Waste Generation

Hazardous materials in DOD inventories require effective management to minimize the generation of hazardous waste. DOD's inventory management procedures are the same for hazardous and nonhazardous materials, and the needed level of management for hazardous materials has not consistently been achieved. This lack of specialized treatment of hazardous material inventories has led to the unnecessary generation of potential hazardous waste. We found that $201,951, or 40 percent, of the $505,743 in hazardous material in our random sample was unused hazardous materials transferred to the disposal process. In addition, $161,528, or 80 percent, of these unused hazardous materials were transferred to disposal because of shelf life expiration. The remaining 60 percent of the materials in our sample had been partially used.

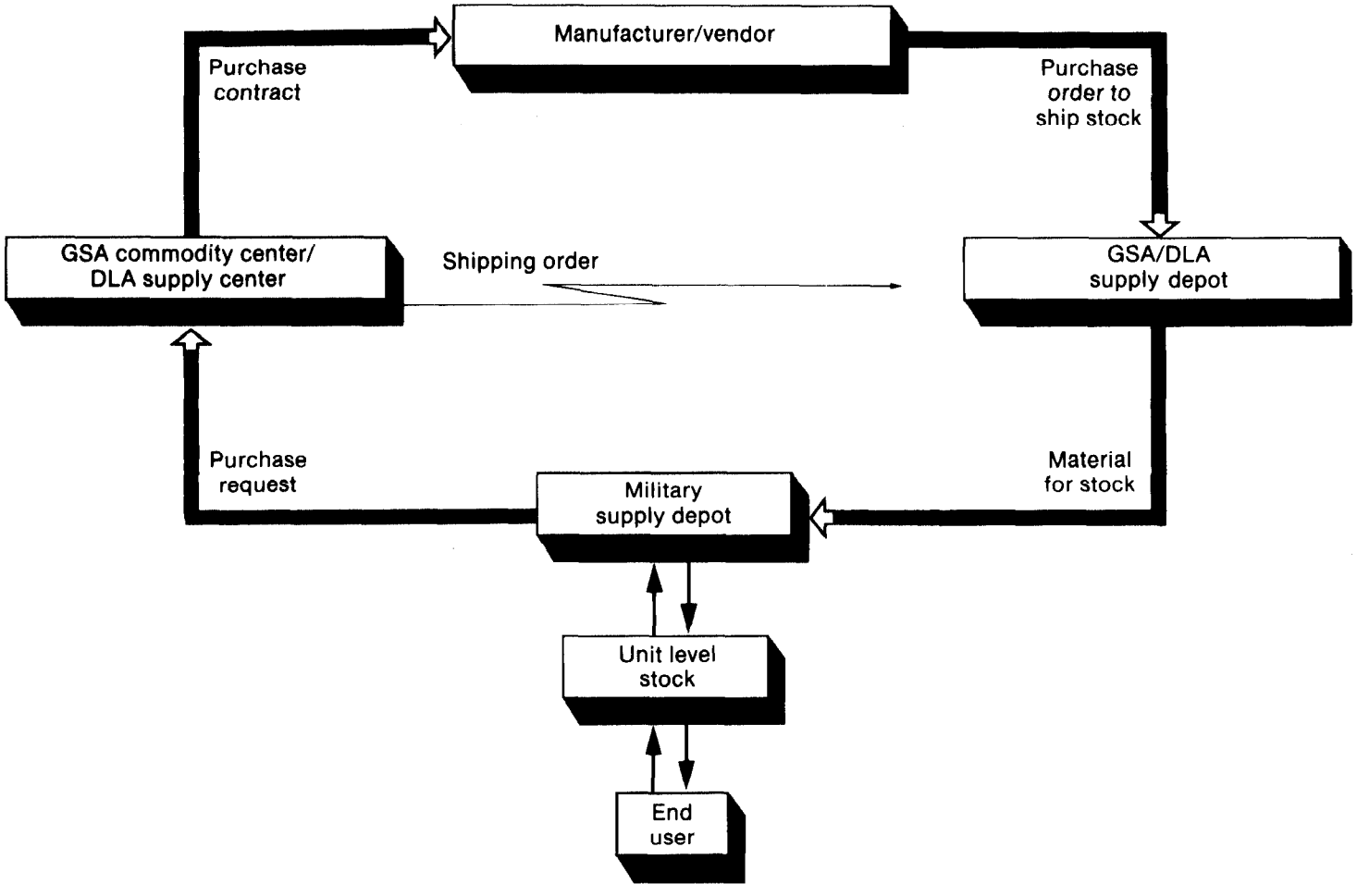
Unless DOD provides special attention to the management of hazardous material inventories, the cost of unnecessary disposal of hazardous material will continue to increase, the potential liability for environmental damage and future cleanup costs will increase, and the services' operational readiness may be affected by the further diversion of limited fiscal and human resources.

Because adequate records were not available, we were unable to determine all of the reasons why unused hazardous materials with a shelf life were transferred to the disposal cycle. However, we identified three conditions that contributed to these transfers: the time lapse between the manufacture of hazardous materials with short shelf life and their delivery to end users, the inconsistent use of the first-in first-out method for issuing hazardous materials with shelf life, and the failure of depot and installation level personnel to make consistent evaluations of the condition of hazardous materials with shelf life before transferring the materials to the disposal process.

Need for More Timely Delivery of Materials With Short Shelf Life

When DOD users need hazardous materials to do their jobs, they generally obtain needed materials from the DOD supply system. Materials in the supply system are normally purchased through DLA or GSA. DOD has worked out a memorandum of agreement with GSA concerning its material requirements and supply procedures. Moving these materials from the manufacturer through DLA and GSA and intermediate storage and distribution at the supply depots may consume a portion of the materials' shelf life. Figure 2.1 provides a general overview of the organizational levels in the DOD supply management system.

Figure 2.1: Organizational Levels in the DOD Supply Management System



The amount of time a hazardous material with short shelf life[3] stays in storage throughout the supply system often consumes a major portion of the material's shelf life. As a result, materials with short shelf life could potentially be delivered to the end user with only a minimal amount of shelf life remaining. If these materials are not used before their shelf life expires, they may be transferred to the disposal process in an unused condition.

[3]The DOD supply community generally recognizes short shelf life as 12 months or less.

In our sample we found that hazardous materials with a short shelf life accounted for about $91,938, or 57 percent, of the $161,528 acquisition value of unused hazardous materials with expired shelf life that had been transferred to the disposal process. Installation officials were generally unable to explain why the shelf life of these materials had expired without being used. However, officials at four installations noted that they sometimes received hazardous materials from supply depots with expired or nearly expired shelf life dates. Adequate data were not available to determine the frequency of such deliveries.

Direct delivery is one way to reduce the time taken to deliver materials from the manufacturer to the end user. Direct delivery involves the end user submitting a requisition to the manufacturer directly, bypassing all of the intermediate supply activities, and the manufacturer then shipping the order directly to the end user. Several advantages to direct delivery contracts are that material is received fresh (no more than 60 days old), users can schedule placement of orders for just-in-time delivery, and the need for testing and updating the materials' shelf life can be minimized.

Supply Agency Efforts to Achieve Timely Deliveries

GSA efforts to resolve the problems with the timely delivery of hazardous material with short shelf life have been on a product-by-product basis. For example, in May 1988 GSA officials said they had implemented a contract for the delivery of 30 hazardous products (sealing compounds) with short shelf life directly from the contractor to installations throughout the country. Since this effort was successful, direct delivery from contractors will be expanded by October 1989 to 90 hazardous products with short shelf life, such as sealants, adhesives, and paints. GSA is also considering direct delivery for about 200 additional hazardous materials with short shelf life.

DLA implemented a direct delivery program in 1983. However, this program was not designed to focus specifically on deliveries of hazardous materials with short shelf life. According to DLA officials, only about 2 percent of DLA's materials with shelf life could be categorized as hazardous materials with short shelf life. DLA's program was established to reduce the cost of doing business with vendors who provide DLA with commercially available products such as lamps, respirators, and photographic supplies. DLA reports this program saved about $9.3 million in fiscal year 1988 primarily through reduced interest costs associated with keeping materials with short shelf life in its inventory. According to DLA, the cost to implement the program has only been about $62,000.

DLA is considering including hazardous materials as part of its direct delivery program.

Oldest Materials With Shelf Life Need to Be Issued First

DOD requires that materials with shelf life be issued using the first-in first-out issue method. Failure to use this method can result in older materials remaining in inventory while newer materials are being issued. If the older materials remain in inventory until their shelf life expires, they are then transferred to the disposal process.

Both the DOD and GSA Inspector Generals have reported that not following first-in first-out procedures is a problem. A February 1989 DOD Inspector General's audit performed at DLA and the military services found that these procedures were not always followed because there were not adequate internal controls. The report noted that 15 of 60 storage sites examined did not issue materials with shelf life in accordance with required first-in first-out procedures.

A May 1988 report by the Fort Worth GSA Regional Inspector General for Audits noted that warehouse personnel at the GSA wholesale distribution center in Fort Worth did not always follow first-in first-out procedures when issuing materials with shelf life. Specifically, materials with different shelf life inspection dates were stored together, and warehouse personnel did not always fill orders with the older materials. In one example, the Inspector General found that 18 of 116 materials with shelf life examined on loading docks had not been selected in accordance with first-in first-out procedures.

DOD permits exceptions to the first-in first-out method, but these exceptions do not always consider whether a product is a hazardous material. Granting exceptions to this method when hazardous materials are involved takes on added significance because hazardous materials may have to be disposed of as hazardous waste. When hazardous waste is generated, additional disposal costs can be incurred, and DOD runs the risk of damaging the environment and incurring substantial future cleanup costs.

Inadequate data precluded us from establishing a direct link between our sample items transferred to disposal and the services' adherence to the first-in first-out method. However, in our discussion with service officials, we found some of the exceptions to the first-in first-out method are based on procedures used for all materials and do not consider the additional problems related to hazardous materials. Because of the

increased emphasis on hazardous waste and the increasing costs associated with hazardous waste disposal, some exceptions to the first-in first-out method that may have been granted in the past may need to be reevaluated.

For example, the Navy's policy of issuing only hazardous materials with 6 to 9 months of shelf life remaining to ships that are to be deployed for a certain period of time precludes the use of hazardous materials with lesser amounts of shelf life remaining. Some of the hazardous materials with shelf life are used throughout the time a ship is at sea. Because some of these materials are used early in the deployment, it may not be necessary for the entire stock of hazardous materials to have 6 or 9 months of shelf life remaining when the ship leaves port.

During our work at the Corpus Christi Army Depot, we found that Army regulations provide that the depots must furnish Army units with newer material from inventory, even though older stock is available, if the user requests them to do so. No additional reasons were required at this depot to circumvent the use of the first-in first-out method.

In contrast to the other services, we found that Air Force guidance is more rigid in requiring the use of the first-in first-out method. At the San Antonio Air Logistics Center, regulations require the supply depot to issue older materials even if newer materials have been requested. This is done to ensure maximum utilization of materials.

We recognize that, on some occasions, mission requirements may justify bypassing the first-in first-out method. However, when hazardous materials are involved, special attention should be given on an item-by-item basis to prevent the generation of hazardous waste from hazardous materials because of shelf life expiration.

Evaluations of Materials' Condition Needed Before Transfer to Disposal

DOD guidelines require that the condition of materials at the supply depot level be evaluated and allow for at least two extensions of the shelf life if the material passes the tests. At the installation level, evaluations on the condition of materials with shelf life are to be made as long as the materials continue to pass these tests. Although the guidelines do not provide for exceptions to these requirements, we found that evaluations are not always made. Some of the reasons cited by depot and

installation officials for not making evaluations include funding constraints, inadequate emphasis by management, or a lack of specific guidance to the user on how to evaluate the conditions of hazardous materials.

Many of the tests needed to extend the shelf life of hazardous materials do not involve sophisticated tests or require extensive testing facilities. For example, some spray paint can be tested by just spraying it on the material to be painted. Moreover, some hazardous materials can be tested on a sample basis, which would not require testing of all of the stock.

A February 1989 audit report by the DOD Inspector General concluded that disposing of materials without testing their condition is a DOD-wide problem. The Inspector General estimated that between July 1, 1986, and May 31, 1987, DOD activities disposed of $12.4 million of materials with shelf life (both hazardous and nonhazardous), without performing tests on the condition of the materials and that about $10.9 million of these materials would have passed the tests and remained in DOD's inventories. The lack of enforcement of internal controls over shelf life management was identified as the cause for the unnecessary disposals.

Disposals at Depot Level

The Chief of the Storage Support Branch, responsible for shelf life management at the Charleston Naval Supply Center, told us that the shelf life of material is extended only once, after which the material is turned in for disposal regardless of its condition. According to supply center officials, the one-time extension of shelf life is generally done through visual inspection rather than through laboratory testing. Laboratory testing for shelf life extensions was discontinued around 1987 due to budget constraints, lack of testing facilities, and the high cost of testing compared to the value of the materials. Unused hazardous materials with expired shelf life accounted for about $26,270, or 54 percent, of the acquisition value of the hazardous materials of the items disposed of by the supply center included in our sample.

At the Pearl Harbor Naval Supply Center, we found that unused materials with expired shelf life were removed from ships when the ships arrive for restocking. These materials were then sent directly to the disposal process without testing for possible shelf life extension.

Disposals at Installation Level

At the installation level, shelf life policy guidelines specify that evaluations on the condition of materials should be performed before the items are sent to disposal. However, this is not always being done. For example, at the Pearl Harbor Naval Shipyard, materials with expired shelf life that are not assigned to a specific repair or maintenance job are not tested before they are sent to the disposal process. Our random sample of disposals at the shipyard showed that about 88 percent of the sampled materials by acquisition value was unused hazardous materials with expired shelf life.

The Air Force installations we visited extended shelf life on materials already in their inventories as long as the items passed required tests. However, a March 1989 study conducted by the Air Force Logistics Command showed that Air Force activities received about 67,000 units of materials with expired shelf life during a 4-month period in 1988. Some of these activities arbitrarily disposed of an unknown quantity of these materials upon receipt without testing for possible shelf life extension. The Air Force Logistics Command was unable to identify a cause for the disposal actions.

Two of the Army installations we visited generally did not perform tests on the condition of materials. Also, they did not consistently transfer hazardous materials with expired shelf life to the disposal process. For example, at Fort Hood, 25 of the 79 items in our random sample were transferred to disposal without testing about 34 months, on average, after their shelf life had expired. Three of the 25 had been in the inventory for 10 years or more after the shelf life had expired. At Fort Carson, we were informed by supply officials that they consider shelf life dates meaningless and that materials are used well beyond their expiration dates.

We agree that materials should be used as long as they are suitable for their intended purpose. However, continued storage of these materials without testing or inspecting their usefulness increases the potential that they will not be usable when the end user requisitions them. If the materials were tested on a regular basis and found not to meet military specifications, someone else could possibly use the materials before they deteriorate to an unusable condition and become hazardous waste.

DOD Hazardous Waste Minimization Program Does Not Include Special Procedures for the Management of Hazardous Material Inventories

DOD's efforts to reduce the amount of hazardous waste generated from hazardous materials have generally been through source reduction methods designed to institute changes in processes and/or substitutions of less hazardous or nonhazardous materials. Our February 1989 report identified these efforts, none of which involved changes in hazardous material inventory management procedures.

DOD has transferred to the disposal process over $250 million of hazardous materials in the past three fiscal years. Although DOD does not have data to show how much of this amount was unused materials, 40 percent of our random sample of hazardous materials disposed of in fiscal year 1987 was unused hazardous materials. Disposal of hazardous materials as hazardous waste added significantly to the cost of the materials. For example, DOD spent an average of $1.11 in disposal costs for every $1.00 in original acquisition cost for the items disposed of. Additionally, disposal of hazardous materials as hazardous waste increased the government's potential liability for future environmental damage and future cleanup costs.

If DOD is to minimize escalating disposal costs and meet the requirements of environmental legislation to minimize the generation of hazardous waste, it must develop a management control program that will identify and develop solutions to the problems encountered in purchasing, storing, and using hazardous materials. The problems we identified in chapter 2 (e.g., timely delivery, use of the first-in first-out method, and condition evaluations) are examples of the type of issues that will need to be addressed by such a program.

Each service has initiated some source reduction efforts to limit the amount of hazardous materials that become hazardous waste. However, the Navy is the only service that has recently taken some steps to establish a management program specifically for hazardous material inventories. On June 20, 1989, the Navy approved a instruction that defined 13 program elements that the Navy believes are essential to achieve the life-cycle management of hazardous materials in its inventories. Five elements focus primarily on program management functions: controls over procurement and acquisition of hazardous materials, management of excess hazardous materials and waste, quality assurance evaluations, program documentation, and recordkeeping and reporting. The other eight elements of the Navy's program deal primarily with safety issues.

Several of these elements bring a structure to the management of hazardous materials that was previously missing. For example, the management of excess hazardous materials and waste establishes the requirement that procedures be established to reduce the quantities of excess hazardous materials in inventories and hazardous waste sent to disposal. Recordkeeping and reporting establishes a framework within which excess hazardous materials can be documented and analyzed to minimize future excess procurement.

The program coordinator in the Chief of Naval Operations (Logistics) told us that there was some concern within the Navy about the cost of implementing such a comprehensive program. According to the program coordinator, the Navy's current position is that the cost of implementing the program is less than the long-term cost of continuing without a comprehensive program. In particular, the regulation notes that hazardous material management is a definite way of increasing the Navy's operational readiness through minimizing hazards to life, property, and the environment and returning accrued savings in staff time, facilities, and supplies to the primary Navy mission.

Conclusions

DOD's management of its hazardous material inventories does not always provide the specialized attention that these materials need to ensure that they do not become hazardous waste. Failure to minimize the generation of hazardous waste increases disposal costs as well as the potential liability for future cleanup costs, and it may impair the services' operational readiness by diverting scarce fiscal and human resources.

Hazardous materials with short shelf life need to reach the users with adequate shelf life remaining. DLA's direct delivery program, in existence since 1983, does not generally address hazardous materials but has realized significant savings for nonhazardous materials. Expanding this program to include all hazardous materials with short shelf life can likely lead to the same type of savings and would minimize the additional costs of having to dispose of the hazardous materials as hazardous waste. GSA, which began to use its direct delivery program for hazardous materials with short shelf life on a trial basis in May 1988, could realize additional savings when GSA expands the program in the future.

Many of the exceptions used to circumvent the first-in first-out method of issuing materials are based on the use of nonhazardous materials. However, bypassing first-in first-out procedures for hazardous materials with short shelf life not only means that DOD will lose the use of the

older materials but also that DOD must pay additional costs to dispose of the hazardous materials. We believe that there is potential for a stricter application of first-in first-out procedures for hazardous materials with shelf life.

The condition of hazardous materials with shelf life needs to be determined through testing or inspection before the materials are transferred to the disposal process. These tests are often relatively simple and inexpensive and do not require elaborate testing facilities. We believe that there is a significant opportunity for DOD activities to do more testing to preclude the unnecessary disposal of hazardous materials as waste.

Recommendations

We recommend that the Secretary of Defense issue instructions to each service to provide special attention to inventory management procedures for hazardous materials that will minimize the generation of hazardous waste from hazardous material inventories. These instructions should include directing

- DLA and GSA, through the memorandum of agreement between DOD and GSA, to make greater use of direct delivery contracts for hazardous materials with short shelf life;
- supply organizations to make greater use of first-in first-out issue procedures for hazardous materials with shelf life and to discourage exceptions to this policy; and
- supply depots and installations to consistently evaluate the condition of hazardous materials through periodic testing or inspecting of hazardous materials before sending them to the disposal process.

Acquisition Value of DOD Hazardous Material Disposal Transfers for Fiscal Years 1986 Through 1988

Description	Acquisition value	Percent
Rechargeable batteries	$94,467,114	37
Paints, dopes, varnishes, etc.	23,346,770	9
Oils, greases, lubricants, etc.	17,335,113	7
Nonrechargeable batteries	16,484,617	7
Miscellaneous chemical specialties	13,489,312	5
Drugs, biologicals, reagents	12,078,764	5
Chemicals	9,166,540	4
Preservatives, sealing compounds	8,514,352	3
Transformers, distributors, etc.	4,938,897	2
Adhesives	4,653,697	2
Ammunition/nuclear ordnance boxes	4,159,462	2
Fire fighting equipment	3,006,073	1
Subtotal	211,640,711	**84**
379 other federal supply classes	40,679,617	16
Total	**$252,320,328**	**100**

Results of Random Sample

Disposal category	Army Amount	Army Percent	Air Force Amount	Air Force Percent	Navy Amount	Navy Percent	DOD Amount	DOD Percent
Unused materials								
Expired shelf life	$36,358	16.54	$21,436	16.64	$103,734	66.02	$161,528	31.95
Demand change	2,873	1.31	13,528	10.50	4,631	2.95	21,032	4.16
Specification changes	303	0.14	0	0.00	0	0.00	303	0.06
Damaged	1,403	0.64	290	0.22	528	0.34	2,221	0.44
Other	8,906	4.05	2,123	1.65	5,838	3.72	16,867	3.33
Subtotal	**49,843**	**22.68**	**37,377**	**29.01**	**114,731**	**73.03**	**201,951**	**39.94**
Used materials								
Waste products	23,311	10.61	500	0.39	0	0.00	23,811	4.71
Mixed waste	110	0.05	1,340	1.04	55	0.03	1,505	0.29
Other	101,161	46.02	71,016	55.13	4,560	2.90	176,737	34.94
Subtotal	**124,582**	**56.68**	**72,856**	**56.56**	**4,615**	**2.93**	**202,053**	**39.94**
Unable to determine	45,376	20.64	18,587	14.43	37,776	24.04	101,739	20.12
Total	**$219,801**	**100.00**	**$128,820**	**100.00**	**$157,122**	**100.00**	**$505,743**	**100.00**

DLA Service Contract Disposal Costs for Fiscal Years 1986 Through 1988

Dollars in millions

Fiscal year	Amount
1986	$46.7
1987	62.3
1988	84.6
Total	**$193.6**

Organizations Contacted

DOD and Service Headquarters

- Office of the Secretary of Defense (Production and Logistics), Washington, D.C.
- Office of the Deputy Assistant Secretary of Defense (Environment), Washington, D.C.
- Office of the DOD Inspector General, Alexandria, Virginia
- Office of the Assistant Secretary of the Army (Installations and Logistics), Washington, D.C.
- Army Deputy Chief of Staff (Logistics, Supply, and Maintenance), Washington, D.C.
- Department of the Army Inspector General, Washington, D.C.
- U.S. Army Materiel Command, Alexandria, Virginia
- U.S. Army Forces Command, Fort McPherson, Georgia
- Chief of Naval Operations, Occupational Safety and Health Branch, Washington, D.C.
- Naval Supply Systems Command, Washington, D.C.
- Air Force Office of Supply Policy, Washington, D.C.
- Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio

DOD Installations

Army

- Corpus Christi Army Depot, Texas
- Fort Hood, Texas
- Fort Carson, Colorado

Navy

- Naval Supply Center, Pearl Harbor, Hawaii
- Naval Shipyard, Pearl Harbor, Hawaii
- Naval Supply Center, Charleston, South Carolina
- Naval Shipyard, Charleston, South Carolina

Air Force

- San Antonio Air Logistics Center, Kelly Air Force Base, Texas
- Minot Air Force Base, North Dakota
- Grand Forks Air Force Base, North Dakota

Defense Logistics Agency

- DLA Headquarters, Alexandria, Virginia
- Defense Reutilization and Marketing Service, Battle Creek, Michigan
- Defense Reutilization and Marketing Offices
  Corpus Christi Army Depot, Texas
  Fort Hood, Texas
  Fort Carson, Colorado
  Pearl Harbor, Hawaii
  Charleston, South Carolina
  East Kelly Air Force Base, Texas
  Minot Air Force Base, North Dakota
  Grand Forks Air Force Base, North Dakota
- Defense General Supply Center, Richmond, Virginia
- Defense Depot, Richmond, Virginia

General Services Administration

- Headquarters, Federal Supply Service, Office of Commodity Management, Crystal City, Virginia
- Office of the GSA Inspector General, Crystal City, Virginia
- Office of the Regional Inspector General, Fort Worth, Texas

- Federal Supply Service, Region 7, Fort Worth, Texas
- Paints and Chemicals Commodity Management Center, Auburn, Washington
- Federal Supply and Services, Contract Management Division, San Francisco, California
- National Distribution Management System Office, Atlanta, Georgia
- Southwest Distribution Center, Fort Worth, Texas
- Western Distribution Center, Stockton, California
- Southeast Distribution Center, Duluth, Georgia
- Northeast Distribution Center, Belle Mead, New Jersey
- Northern Distribution Center, Chicago, Illinois

Acquisition Value of Hazardous Materials in the Top 13 Federal Supply Classes Sent for Disposal in Fiscal Year 1987

Service	Amount	Percent
Army	$45,624,560	61
Navy	14,283,666	19
Air Force	11,574,310	15
Marines	3,384,718	5
Total	**$74,867,254**	**100**

Acquisition Value of Hazardous Materials in the Top 13 Federal Supply Classes Received for Disposal Processing in Fiscal Year 1987

Description	Acquisition value	Percent
Rechargeable batteries	$35,467,086	40
Paints, dopes, varnishes, etc.	7,859,519	9
Oils, greases, lubricants, etc.	6,789,607	8
Nonrechargeable batteries	5,453,295	6
Miscellaneous chemical specialties	5,031,850	6
Chemicals	3,349,249	4
Preservatives, sealing compounds	2,227,783	2
Nonferrous metal refinery	1,817,677	2
Adhesives	1,624,224	2
Drugs, biologicals, reagents	1,545,229	2
Ammunition/nuclear ordnance boxes	1,350,379	2
Transformers, distributors	1,248,508	1
Fire fighting equipment	1,102,848	1
Subtotal	74,867,254	**85**
287 other federal supply classes	13,153,442	15
Total	**$88,020,696**	**100**

Number of Transfers and Dollar Value of Total Population and Random Sample at Each Installation Visited

Service/installation	Total population		Random sample	
	Number of transfers	Amount	Number of transfers	Amount
Army				
Corpus Christi Army Depot, Texas	155	$578,689	60	$34,911
Fort Carson, Colorado	293	197,382	73	42,465
Fort Hood, Texas	450	1,022,013	79	142,425
Subtotal	**898**	**1,798,084**	**212**	**219,801**
Air Force				
San Antonio Air Logistics Center, Texas	1,387	458,854	95	38,138
Minot Air Force Base, North Dakota	128	133,813	55	60,694
Grand Forks Air Force Base, North Dakota	287	168,241	72	29,988
Subtotal	**1,802**	**760,908**	**222**	**128,820**
Navy				
Naval Supply Center, Pearl Harbor, Hawaii	488	615,193	80	27,566
Naval Shipyard, Pearl Harbor, Hawaii	430	396,330	79	57,765
Naval Supply Center, Charleston, South Carolina	4,267	1,035,466	94	48,702
Naval Shipyard, Charleston, South Carolina	556	233,421	82	23,089
Subtotal	**5,741**	**2,280,410**	**335**	**157,122**
Total	**8,441**	**$4,839,402**	**769**	**$505,743**

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Glossary

Disposal Process	Actions by DLA to dispose of materials and waste turned in by DOD activities. These actions, in order of priority, are to (1) reutilize within DOD, (2) transfer to another federal agency, (3) donate to a state or local government or a designated charitable organization, (4) sell to the public, and (5) dispose of through a contractor to an Environmental Protection Agency authorized landfill or destruction facility.
Hazardous Materials	Substances that have the potential to become hazardous waste because of their nature or composition.
Hazardous Waste	A solid waste that exhibits the characteristics of ignitability, corrosivity, toxicity, or reactivity or appears on any of the Environmental Protection Agency's lists of hazardous waste. The Environmental Protection Agency defines solid waste in 40 C.F.R. section 261.2. (A solid waste can be a solid, liquid, or gas.)
Shelf Life	The time period defining the limits of a material's useful life.
Source Reduction	The reduction or elimination of waste generation at the source, usually within a process. Source reduction measures include some types of treatment processes, process modifications, feedstock substitution or improvements in feedstock purity, various housekeeping and management processes, increases in the efficiency of machinery, and recycling within a process. It implies any action that reduces the amount of waste exiting from a process.
Waste Minimization	The reduction, to the extent feasible, of hazardous waste that is generated or subsequently treated, stored, or disposed. It includes any source reduction or recycling activity of a generator that results in either (1) the reduction of the total volume or quantity of hazardous waste or (2) the reduction of the toxicity of hazardous waste, or both, as long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environment.

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