

November 1994

# POLLUTION PREVENTION

## The Navy Needs Better Plans for Reducing Ship Waste Discharges





**National Security and  
International Affairs Division**

B-259190

November 4, 1994

The Honorable Joseph I. Lieberman  
United States SenateThe Honorable Gary A. Franks  
House of Representatives

This report responds to your request that we review the Navy's Shipboard Solid and Plastics Waste Management Program planning. Specifically, it assesses (1) past and current planning for the shipboard solid waste management program and (2) program results thus far.

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**Background**

In 1973, the United States and other maritime nations signed the International Convention for the Prevention of Pollution from Ships. The treaty, now in force with its 1978 protocol, includes five annexes. Annex V regulates the discharge from ships of garbage and other solid waste—paper, cardboard, metal, glass, and a wide range of plastics (such as garbage bags, coffee cups, shrink wrap, and wire insulation). It prohibits the discharge of paper, cardboard, metal, and glass waste near land and in “special” areas<sup>1</sup> and of plastics anywhere at sea. The treaty exempts warships and other naval vessels of the signing states, but encouraged governments to apply the pollution controls to such ships to the extent practicable. To implement the treaty, Congress passed the Act for the Prevention of Pollution from Ships in 1980. The act exempted U.S. Navy ships from its coverage. Later in 1987, Congress required the Navy to comply with the discharge requirements of Annex V by December 31, 1993. If unable to comply, the Navy was to report to Congress by December 31, 1991.

The Navy sent its compliance report to Congress in August 1993. As required by law, the report listed (1) actions taken in response to the 1987 amendments; (2) impediments to meeting prohibitions on discharge of plastics anywhere at sea, discharge requirements of solid waste near land by December 31, 1993, and solid waste discharges in special areas; and (3) ships that cannot achieve full compliance. This report recommended changes to requirements. Specifically, the Navy requested Congress to extend the compliance deadline to December 31, 1998; permit discharge of nonplastic, nonfloating processed solid waste in special areas; and provide

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<sup>1</sup>Special areas now in place include the North Sea, the Baltic Sea, the wider Caribbean region, and the Antarctic Region.

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certain exemptions for submarines. In November 1993, Congress extended the Navy's compliance deadlines, but did not change the requirements. Specifically, the solid waste compliance date for surface ships was extended to December 31, 1998; the special area compliance date for surface ships was extended to December 31, 2000; and the submarine compliance date was extended to December 31, 2008.

In August 1994, we provided a chronology of Navy actions to develop solid waste processing equipment.<sup>2</sup> Appendix I expands and updates this chronology.

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## Results in Brief

The Navy's two prior plans for meeting requirements for discharge of ships' solid waste reflected the Navy's belief that it could comply in part by 1998 or later, rather than in full by 1993. The prior planning did not appear well-coordinated and did not include interim milestones for measuring progress toward minimizing waste. The coordination for its expected November 1996 plan has improved, but the planning still does not include tasks or milestones to achieve near-term compliance for other than plastics. At the time the Navy expects to submit its 1996 plan to Congress, the Navy will have 4 years to develop and install new technologies to meet requirements in special areas and 2 years for other areas.

After years of research, the Navy does not have an approach to meet future legal requirements for the discharge of solid waste. Of about \$80 million appropriated through fiscal year 1994, about \$52 million has been spent on four types of equipment. Although the Navy has made some limited progress, three of the four primary Navy equipment development projects have been canceled, suspended, or reduced. Further, insufficient consideration has been given to determining whether lessons can be learned from non-Navy ships and individual Navy ships that report progress in complying with discharge requirements.

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## Initial Plans Were Not Accepted and Current Planning Lacks Specifics

The Navy's 1993 plan assumed that it would be exempted from complying with statutory requirements in certain areas, but Congress did not approve exemptions for the Navy. As a consequence, the Navy lost valuable time that could have been used to develop a compliance plan and now must restart the process for all but plastics. Also, the Navy would benefit from establishing detailed tasks and milestones for nonplastic waste and from

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<sup>2</sup>Pollution Prevention: Chronology of Navy Ship Waste Processing Equipment Development (GAO/NSIAD-94-221FS, Aug. 18, 1994).

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further investigating lessons learned from other federal agencies and commercial carriers.

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### Key Planning Assumptions Were Not Accepted by Congress

Since 1987, the Navy has put forth two separate planning proposals that were ultimately not successful and is now in the process of developing a third plan.

In 1987, Navy officials testified before Congress that the Navy was preparing a plan to bring the Navy into compliance with future legal requirements quickly. However, Navy planning at that time envisioned compliance beyond 10 years. The Navy's 1987 Shipboard Solid and Plastics Waste Management Program Plan set two objectives. First, within 5 years, the Navy planned to reduce overboard discharges of plastics by decreasing the amount of plastics brought onboard and by segregating and storing plastics onboard. Second, by 1998—5 years after the date called for in the law—Navy-unique versions of shipboard solid waste processing equipment would be developed and installed on Navy ships.

In 1993, the Navy developed its second compliance plan, with no interim milestones for measuring progress toward minimizing waste. Although Congress had required the Navy to report on any inability to comply with discharge requirements by the end of 1991, it was not until August 1993 that the Navy reported to Congress that it could not meet the December 31, 1993, deadline. The Navy's revised plan stated that it would comply with discharge requirements by December 31, 1998. However, this was based on an assumption that Congress would revise requirements so the Navy could discharge waste overboard as long as it did not float and was not plastic.

In the 1993 amendments to the 1980 act, Congress extended the Navy's compliance deadline, but did not grant the Navy's requested changes to the Annex V requirements. Congress also mandated some milestones. The Navy was to issue a request for proposals for the plastics processors by October 1, 1994,<sup>3</sup> and to install the first production unit of the plastics processor in a Navy ship by July 1, 1996. The requirement to install processors for plastics increased from 25 percent of ships needing the processor by March 1, 1997; to 50 percent by July 1, 1997; 75 percent by July 1, 1998; and all ships needing the processor by December 31, 1998.

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<sup>3</sup>The request for proposal for the plastics processor was released on September 29, 1994.

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In addition, the 1993 amendments required the Navy to develop its third plan by November 30, 1996. To oversee development of the plan, in April 1994, the Navy established the Shipboard Solids and Plastics Waste Steering Committee. The Committee is to facilitate preparation, agency consultation, public participation, and submittal of the plan. Thus far, with the assistance of a senior staff-level working group, the Committee has developed a work plan and a milestone schedule for preparing the final plan. Developing the plan is estimated to cost \$7.5 million, principally for salaries and studies. In one study, the Center for Naval Analyses is exploring options other than Navy-unique versions of equipment.

In developing the plan, the Navy is consulting with other federal agencies and the public to explore technologies and ideas. It will then group these alternatives into various categories,<sup>4</sup> which will be subsequently analyzed. The analyses are planned to be reviewed by federal agencies beginning in late 1995 and by the public in early 1996.

For significant portions of the Navy's compliance planning, neither specific tasks nor associated milestones accomplishing those tasks have been set. For example, the stated planning does not include a task to identify whether current non-Navy ship and Navy ship practices can be used to achieve near-term compliance with Annex V requirements. Furthermore, the Navy plans no actions until 1996, after Congress comments on its third plan. In addition, by 1996, when the Navy's plan is scheduled to be completed, the Navy will have about 4 years left to develop and install new technologies to meet requirements in special areas for surface ships, and only about 2 years in other areas.

For submarines, the compliance date is not until 2008, but the Navy now has no tasks or milestones at all—for example, to describe current practices, quantify discharges, and identify preliminary options. The Navy does not expect to identify tasks or milestones until after it submits its 1996 plan to Congress. At present, according to the Navy, a technology has not been identified that would allow submarines to comply with requirements.

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<sup>4</sup>The Navy's categories of alternatives will consist of onboard destruction of waste alternatives, storage and retrograde waste alternatives, "environmentally benign" processed waste alternatives, and combinations of these technologies.

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## Operational Factors Considered Unique by the Navy

According to Navy officials, the Navy has several operational characteristics that make it distinctive. As a result of these, the Navy believes that technologies that work effectively for other federal agencies and commercial carriers are not suitable for its ships. Characteristics cited by the Navy include the following:

- Navy ships are unique because of their mission and special operating constraints.
- The ships' design and operational characteristics are different than most commercial ships.
- The Navy's mission requires that ships sustain operations at sea for long periods, including replenishment of supplies.
- Navy ships have large crews that require handling and processing a large volume of solid waste and potentially increase space constraints for waste storage.
- Navy ships normally operate in harsh environments. Therefore, waste processing equipment must be designed and constructed for sustained performance in a combat environment.
- Since Navy personnel perform most of the repairs onboard, the equipment must also require minimum maintenance.

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## Non-Navy Ships Have Implemented Approaches to Achieve Compliance

Non-Navy ships are using various approaches to meet discharge requirements. These practices include incinerating plastics, compacting solid waste, and establishing shipboard recycling programs. In contrast to the Navy's 3/20-day rule,<sup>5</sup> the Coast Guard and the National Oceanic and Atmospheric Administration prohibit discharging plastics anywhere at sea and prohibit discharging solid waste near land and in special areas.

Although the Navy must maintain flexibility to meet its mission, our work indicates that operational characteristics cited by the Navy are not in all cases exclusive to the Navy. For example, the Coast Guard's two polar icebreaker cutters are at sea for 6 months at a time and, as well as other Coast Guard cutters, contend with limited storage space. Also, transoceanic cruise ships have trip segments exceeding 3 days, carry a large number of passengers, and generate a large volume of waste. Although the Navy's characteristics may delay its full compliance with the future requirements, we identified practices used by other federal agencies and commercial carriers that could apply to the Navy's efforts to comply with discharge requirements.

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<sup>5</sup>Under its 3/20-day rule, the Navy is to retain food-contaminated plastics for the last 3 days at sea and nonfood-contaminated plastics for at least the last 20 days.

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Compaction is a key element in other federal and commercial solid waste management programs. For example, the Coast Guard plans to install 182 compactors by the end of fiscal year 1996 for solid waste onboard its cutters. In addition, officials from the National Oceanic and Atmospheric Administration and commercial carriers said that compaction is important in their processing of solid waste.

Non-Navy ships' efforts to meet discharge requirements have been aided by recycling programs. For example, some commercial carriers we visited recycled plastics, glass, paper, aluminum, tin, and cardboard. Additionally, the Coast Guard and the National Oceanic and Atmospheric Administration have agencywide recycling programs. The Coast Guard has issued an instruction establishing its shore facilities and shipboard recycling program. The Navy has an established shore-based recycling program, but its shipboard recycling effort varies by operating units.

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## Limited Progress in Achieving Program Results

Two Navy ships reported progress in compliance, and headquarters' initiatives have improved operations in some respects. Headquarters' initiatives have included such operational improvements as supply system changes to reduce the amount of wrapping materials brought onboard. However, Navy headquarters had limited coordination with fleet operating units. The headquarters primary focus has been on developing equipment that met Navy specifications, but three of its four long-term projects have been canceled, suspended, or reduced.

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## Two Navy Ships Reported Progress in Achieving Compliance

USS Theodore Roosevelt and USS Saratoga officials told us that they achieved compliance beyond the Navy's 3/20-day rule by compacting, storing, and offloading materials and by burning waste, including plastics. Some Navy ships burned all solid waste, including medical and dental waste. USS Theodore Roosevelt personnel said that they achieved compliance with discharge requirements in part by storing compacted materials aboard ships and offloading them at designated port reception facilities.

The ships' strategies were affected by Navy headquarters actions during 1993. The Navy decided in March 1993 that the requirement for trash compactors no longer existed because the Navy decided that the pulper and shredder could better meet its needs. At that time, the Navy terminated its contract. In August 1993, the Navy directed fleet operating units to stop incinerating plastics at sea. Navy headquarters officials said

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that they discontinued burning plastics at sea due to the concerns of environmental groups represented in the Keystone Dialogue Group.<sup>6</sup>

However, the Navy provided no alternative plan with its changes, so the ships reverted to the Navy's 3/20-day rule. In a 6-month deployment that began in March 1993, the USS Theodore Roosevelt's log showed no reported plastics discharge prior to the Navy's August 1993 message prohibiting the incineration of plastics. Within days after the message, the USS Theodore Roosevelt logged periodic discharges of plastics.

In discussing this issue, headquarters Navy officials said that the above ship was using the Navy's prototype pulper, which can process nonfood waste. They said the ship may not have fully met discharge requirements to the extent that nonfood waste may have been discharged by its pulper near land or in special areas.

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### Navy Headquarters Initiatives Resulted in Operational Improvements

In 1989, the Navy established the Plastics Removal in Marine Environment program to reduce the volume of plastic material taken onboard Navy ships. This reduction has been accomplished by product substitution and by minimizing plastic packaging and packing materials. For example, the program led to the Navy canceling a contract for 1 million plastic laundry bags, substituting paper cups for styrofoam cups, and introducing paper trash bags. Such initiatives have resulted in the Navy avoiding the acceptance of over 500,000 pounds per year of plastic items.

Also in 1989, the Navy established a policy that Navy surface ships follow the 3/20-day rule to control plastics discharges at sea. Although an early Navy evaluation indicated that implementing the rule would reduce the service's plastics discharge by 70 percent, no studies or analyses reflect that this was accomplished.

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### Limited Navy Coordination With Operating Units

Navy headquarters had limited coordination with operating units. For example, some operating unit officials were unaware that the Navy canceled the trash compactor contract. Further, Navy headquarters was not involved in operating units' procurement of commercial trash compactors. During most of the period that Navy headquarters had contracts to develop its compactor, Navy operating units purchased commercial trash compactors. One operating unit we visited purchased

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<sup>6</sup>The dialogue group first met in October 1987 as the Ad Hoc Advisory Committee on Plastics under the auspices of the Keystone Center. The Keystone Center is a neutral, nonprofit organization that mediates and facilitates multiparty dialogues on environmental issues.

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120 commercial trash compactors in 1991, about 7 months before Navy headquarters awarded a contract for 94 of its compactors.<sup>7</sup> Navy headquarters was not involved in the operating unit's procurement. During the latter part of our work, we observed that coordination between Navy headquarters and operating units had improved, especially in developing the congressionally required report for 1996.

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### Focus Was on Developing Equipment to Meet Navy Specifications

Over the past 15 years, the Navy has conducted research to develop shipboard solid waste processing equipment—a vertical trash compactor, a solid waste pulper, a plastics waste processor, and a metal/glass shredder. In 1979, the Navy's first contract to design a trash compactor was awarded. The trash compactor was to be designed to process nonindustrial and nonhazardous waste into trash slugs that sink to the bottom of the ocean. In 1985, the Navy began developing a solid waste pulper. The pulper was designed to tear and grind food, paper, and cardboard waste into a slurry of small particles that could be pumped overboard and dispersed in the sea. In 1987, the Navy began developing a plastics waste processor, which generally consists of a shredder and three compress-melt units that shred, compress, and heat plastics into solid plastic disks. The plastic disks are stored onboard ships for later landfill disposal. In 1993, the Navy began developing a metal/glass shredder. The shredder was initially designed to crush and cut metal and glass into pieces that will sink in bags to the bottom of the sea. In 1994, preproduction prototypes of the pulper, shredder, and plastics processor were installed on the USS George Washington for evaluations, which are still underway.

Through fiscal year 1994, the Navy had appropriations of \$79.8 million to research, develop, procure, and operate shipboard solid waste processing equipment (see table 1).<sup>8</sup> The Navy spent \$51.5 million from fiscal years 1979 through 1994, and, as of October 25, 1994, it had \$28.3 million in fiscal year 1993 and 1994 ship construction appropriations for future obligations, varying by ship from 5 to 10 years.

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<sup>7</sup>The Navy subsequently canceled the headquarters' acquisition of the trash compactors after deciding that the requirement for a trash compactor no longer exists.

<sup>8</sup>In our August 18, 1994, report, the Navy estimated it had spent \$26 million through fiscal year 1993 on equipment projects. Subsequently, the Navy increased this amount to \$42.5 million to correct some reported actual expenditures and to include 1993 ship construction appropriations for future expenditures.

**Table 1: Funding by Appropriation and by Equipment (Fiscal Years 1979-94)**

Dollars in thousands

Type of equipment	Research and development	Ship construction	Operation & maintenance	Other procurement	Total
Plastics processor	\$20,710	\$28,300	\$6,539	\$301	\$55,850
Solid waste pulper	14,970	0	0	0	14,970
Metal/glass shredder	4,848	0	0	0	4,848
Trash compactor	4,175	0	0	0	4,175
<b>Total</b>	<b>\$44,703</b>	<b>\$28,300</b>	<b>\$6,539</b>	<b>\$301</b>	<b>\$79,843</b>

Source: Naval Sea Systems Command.

## Status of Equipment Development

The equipment projects yielded mixed results, with only the plastics processor proceeding at this time. The Navy reported \$27.5 million spent on the plastics processor thus far, and \$28.3 million appropriated in fiscal years 1993 and 1994. The Navy plans to install the production version of the plastics processor in surface ships that need them by the end of 1998. According to a Navy document, shipboard plastics amounts to only 6.5 percent of the solid waste generated by weight, but represents a major environmental concern.

In March 1993, the Navy canceled the trash compactor contract because other equipment could better meet the Navy's needs. Thus far, the Navy has spent \$4.2 million for the trash compactor effort.<sup>9</sup>

The Navy had continued to develop the solid waste pulper and the metal/glass shredder in anticipation that Congress would accept its proposed modification of the regulations implementing Annex V. In the Navy's 1993 compliance report, the Navy recommended that Congress allow it to discharge pulped or shredded waste, such as paper, glass, and metal near land and in special areas. Congress did not adopt the Navy's proposal in the 1993 amendments, which were signed on November 30, 1993. In May 1994, the Navy suspended efforts to acquire and install the pulper (\$15 million spent), and it reduced the role of the metal/glass shredder (\$4.8 million spent). Shredders to be used as a part of the Navy's plastics processors were retained. Navy officials said that the Navy is studying the shipboard solid waste discharges from pulpers and shredders and that the results may be of use in setting future requirements.

<sup>9</sup>The Navy and the contractor have not agreed on the trash compactor contract termination cost. The contractor's current net proposed settlement is \$2.1 million.

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The Navy has several research projects underway for destroying or treating shipboard waste that are not in its Shipboard Solid and Plastics Waste Management Program. These include projects—such as plasma arc, pulsed plasma arc, and molten salt destruction, and ram-jet incineration—for destroying or treating shipboard waste. Through fiscal year 1994, the Navy has spent \$6 million on these projects, which are in the early research phase.

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## Recommendations

We recommend that the Secretary of the Navy direct the Commander, Naval Sea Systems Command, to ensure that headquarters' planning efforts include the (1) tasks and interim milestones to measure progress toward long-term goals for nonplastic solid waste for both surface ships and submarines and (2) necessary mechanisms to coordinate among all involved activities, especially to pass on lessons learned from non-Navy ships and individual Navy ships that report progress in complying with discharge requirements.

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As requested, we did not obtain official agency comments on this report. However, we discussed our findings and recommendations with Navy officials and have included their additional information and comments where appropriate. Our objectives, scope, and methodology are discussed in appendix II.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time, we will make copies available to interested congressional committees, the Secretary of the Navy, and the Office of Management and Budget. We will also make copies available to others on request.

Please call me at (202) 512-8412 if you or your staff have any questions concerning this report. Major contributors are listed in appendix III.



Donna M. Heivilin, Director  
Defense Management and NASA Issues

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# Chronology of Events Occurring While Navy Attempts to Comply With Requirements

The following chronology<sup>1</sup> shows the Navy's efforts to comply with a treaty (the 1973/1978 International Convention for the Prevention of Pollution from Ships) and accompanying legislation (Act for the Prevention of Pollution from Ships of 1980 and the 1987 and 1993 amendments to the act). The treaty sets forth agreements for controlling worldwide marine pollution, and the subsequent legislation makes portions of this treaty law.

Date	Event
1970s	The Navy begins research on the disposal of solid waste (food, paper, cardboard, metal, glass, and plastics) from Navy ships.
1973	The International Convention for the Prevention of Pollution from Ships is drafted to control marine pollution worldwide.
1978	The International Convention for the Prevention of Pollution from Ships is amended by a protocol. The treaty and protocol exempt government-owned ships in noncommercial service.
1973/78	Annex V of the treaty and protocol prohibits discharge of food, paper, cardboard, metal, and glass waste near land; bans discharge of plastics anywhere at sea; and prohibits all waste discharges, except food, in special areas. (A special area is a sea area where more stringent limitations on discharge of solid waste are considered necessary; special areas now in place include the North Sea, the Baltic Sea, the wider Caribbean region, and the Antarctic Region.)
1979	The Navy awards a contract for a trash compactor design study.
1980	The Navy awards a contract to develop and test one prototype trash compactor and two preproduction compactors. The compactors are to convert solid waste into sinkable trash slugs.
1980	To implement the International Convention for the Prevention of Pollution from Ships, Congress passes the Act for the Prevention of Pollution from Ships. The act exempts U.S. Navy ships from its coverage.
1982	The contractor for the trash compactor is acquired by another contractor. Everything dealing with the compactor is relocated to its plant where a new compactor design is developed (on which the production compactor is based).
1985	The Navy begins developing a solid waste pulper to process food, paper, and cardboard.
1987	The Navy begins developing a plastics waste processor that will shred, compress, and heat plastics into a solid plastic disk that can be stored onboard ships for later landfill disposal. The Navy plans to install the plastics processor in surface ships by the end of 1998.
1987	At a congressional hearing, the Assistant Secretary of the Navy for Shipbuilding and Logistics indicates that the Navy will quickly comply with the United States commitment to Annex V.
1987	The Navy participates in the Ad Hoc Advisory Committee on Plastics to develop an approach to reduce plastics waste. Its membership is composed of Navy personnel, congressional staff members, and representatives of environmental groups.

(continued)

<sup>1</sup>This chronology expands and updates the one reported earlier in Pollution Prevention: Chronology of Navy Ship Waste Processing Equipment Development (GAO/NSIAD-94-221FS, Aug. 18, 1994).

**Appendix I  
Chronology of Events Occurring While Navy  
Attempts to Comply With Requirements**

<b>Date</b>	<b>Event</b>
Nov. 1987	The Navy presents its Shipboard Solid and Plastics Waste Management Program Plan and estimates that the program will cost \$404 million. The plan calls for reducing plastics discharges from Navy ships within 5 years. The long-term objective (11 years) is to comply fully with Annex V by completing the development of a trash compactor, a pulper, and a plastics processor for Navy ships.
Nov. 1987	The Navy encourages surface ships with incinerators to use them at sea for destroying nonplastic solid waste, such as paper and cardboard.
Dec. 1987	The Marine Plastic Pollution Research and Control Act (or the 1987 amendments) is enacted. The act gives the Navy 5 years to comply with Annex V and requires it to report to Congress in 3 years if it cannot meet the deadline.
June 1988	The Keystone Dialogue Group prepares a report for the Assistant Secretary of the Navy that contains recommendations to meet the Navy's solid waste management goals by December 31, 1993. These include the Navy's continued development of three shipboard solid waste processing systems. They are (1) a trash compactor, (2) a plastics processor, and (3) a pulper.
Aug. 1988	The Navy issues a survey report on how the plasma arc destruction process could destroy or treat waste. The plasma arc process is a technology that converts most waste into gases or fused slag. (Subsequently, research on other alternative technologies—pulsed plasma arc, molten salt, and ram-jet incineration—is initiated.)
Dec. 1988	Annex V is entered into force for the United States. The Marine Plastic Pollution Research and Control Act, which amended the provisions of the 1980 Act for the Prevention of Pollution from Ships, takes effect, implementing Annex V pollution control requirements for Navy ships during peacetime operations.
Jan. 1989	Navy policy is to store food-contaminated plastics for the last 3 days before entering port and to store nonfood-contaminated plastics for at least the last 20 days.
Oct. 1989	The Navy establishes the Plastics Removal in Marine Environment program to reduce plastic packaging and other plastic items that are used onboard Navy ships.
Aug. 1991	The Navy issues a shipboard pollution discharge restrictions guide (OPNAV Publication P-45-111-91) to fleet commanders, Navy supply centers, naval training centers, and others.
Aug. 1991	For its ships, the Naval Surface Force Atlantic purchases 120 trash compactors (20 large compactors and 100 small compactors) that are specially designed for the Navy. Compactors are to be delivered over the next 6 months, by February 28, 1992. (From July 1985 through March 1994, numerous purchases of one to four compactors are also made from the same manufacturer.)
Oct. 1991	The Navy creates the Ship Environmental Technology Task Force to coordinate the development of technical solutions to emerging environmental compliance challenges faced by Navy ships.
Dec. 1991	The Navy's draft report on its inability to comply with requirements is forwarded to the Assistant Secretary of the Navy for Installations and Environment.
Mar. 1992	The Navy awards a \$4.5-million contract for a prototype trash compactor and 25 production trash compactors.
Sept. 1992	As part of the March 1992 contract, the Navy orders 23 more trash compactors at \$3.3 million.
Jan. 1993	As part of the March 1992 contract, the Navy orders 45 more trash compactors at \$6.7 million.

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**Appendix I  
Chronology of Events Occurring While Navy  
Attempts to Comply With Requirements**

<b>Date</b>	<b>Event</b>
Mar. 1993	The Navy cancels the March 1992 trash compactor contract after deciding that the requirement for a trash compactor no longer exists. (To date, the Navy and the contractor have not agreed on the contract termination cost. The contractor's current net proposed settlement is \$2.1 million.)
Mar. 1993	The Chief of Naval Operations' Executive Panel Task Force on the Environment briefing states some concerns with overall environmental requirements and issues, including that environmental requirements, research and development, and acquisition are not integrated.
Apr. 1993	The Navy begins developing a metal/glass shredder to replace the trash compactor. (Subsequently, Navy officials decide that this same shredder will be used with the plastics processor to shred plastics waste.)
Apr. 1993	The Navy issues its revised Shipboard Solid and Plastics Waste Management Program Plan and estimates that the program will cost \$896 million (updated to \$901 million in September 1993). The Navy states that it will comply with discharge requirements after December 31, 1998, eliminates the compacting requirement, adds the shredder requirement, and retains the requirements for the pulper and plastics processor.
June 1993	The Navy publishes its compliance report for Congress. The report lists actions taken in response to the Marine Plastic Pollution Research and Control Act, impediments to full compliance by December 31, 1993, and ships that cannot achieve full compliance. The Navy recommends changes to some requirements.
Aug. 1993	The Chief of Naval Operations directs fleet commanders to terminate the incineration of plastics at sea, citing beliefs that incineration presents safety and health hazards.
Aug. 1993	The Navy reports to Congress on Annex V compliance. Proposed amendments to the Marine Plastic Pollution Research and Control Act would extend the Navy's compliance date regarding the discharge of plastics from December 31, 1993, to December 31, 1998; extend submarines' compliance with discharge requirements to 2008; and adopt a special area standard of "no floating waste, no plastic waste."
Sept. 1993	The Naval Sea Systems Command Ship Environmental Technology Task Force report revises shipboard environmental issues identified in the Task Force Report Document of March 9, 1992. The report includes solid and plastics waste management.
Nov. 1993	The Navy issues its study addressing the incineration of plastics aboard ships. The study concludes that 100-percent plastics waste yields higher levels of dioxins and furans than lesser percentages, but does not address health exposure concerns.
Nov. 1993	In the 1993 amendments to the Act to Prevent Pollution from Ships, the solid waste compliance date for surface ships is extended to December 31, 1998; the special area compliance date for surface ships is extended to December 31, 2000; and the solid waste compliance date and special area discharge requirements for submarines is extended to December 31, 2008. The 1993 amendments require the Navy to (1) issue a request for proposals for the plastics processors by October 1, 1994; (2) install the first production unit of the plastics processor in a Navy ship by July 1, 1996, 25 percent of ships by March 1, 1997, 50 percent by July 1, 1997, 75 percent by July 1, 1998, and all ships requiring a processor by December 31, 1998; and (3) develop a compliance plan by November 30, 1996.
Dec. 1993	The Navy notifies fleet operating units that a violation of the 3/20-day rule for storing plastic waste, except for discharges that are made because of ship safety, crew health, or saving a life at sea, is a felony offense under federal law.

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**Appendix I**  
**Chronology of Events Occurring While Navy**  
**Attempts to Comply With Requirements**

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<b>Date</b>	<b>Event</b>
Apr. 1994	The Navy establishes a steering committee to oversee development of the congressionally required compliance plan and to ensure the plan is coordinated with federal agencies and the public. The Navy estimates that developing the plan will cost \$7.5 million.
May 1994	The Navy starts at-sea evaluations of preproduction prototype pulper, shredder, and plastics processor onboard the USS George Washington.
May 1994	The Navy suspends acquisition and installation of the pulper and shredder because they will not enable Navy ships to meet requirements. The pulper and shredder were being developed based on anticipated congressional approval of the Navy's proposal to ease requirements.
Aug. 1994	Fleet operating units continue to purchase commercial compactors and other commercial solid waste processing equipment.
Aug. 1994	Navy waste washes up on an 8-mile stretch of a North Carolina beach. The waste is traced to the USS Inchon, USS Trenton, and USS Gunston Hall. Waste attributed to Navy ships includes cups (with ship logo), an oven cleaner can, a medicine bottle, an empty paint can, and plastic general purpose cleaner bottles. This is the latest incident of the Navy discharging solid waste from ships.
Sept. 1994	The Navy meets with the public to discuss new shipboard waste processing technology and Navy compliance with requirements.
Sept. 1994	The Navy releases a "request for proposals" for purchasing plastics processors.
Oct. 1994	The Navy begins a study addressing shipboard solid waste discharges from its pulper and shredder.
1994	The Navy is reconsidering its Shipboard Solid and Plastics Waste Management Program and is scheduled to complete its compliance plan by the end of 1996.

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# Objectives, Scope, and Methodology

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On January 13, 1994, we were asked to determine the results and cost of the Navy's Shipboard Solid and Plastics Waste Management Program to date, identify and analyze future program plans and actions, and consider opportunities to improve program implementation. On August 18, 1994, we reported (GAO/NSIAD-94-221FS) on the results and cost of the Navy's program through fiscal year 1993. This report updates our chronology on the results and cost of the program to date. It also assesses past and current planning for the shipboard solid waste management program and program results thus far.

To update the results and cost of the Navy's Shipboard Solid and Plastics Waste Management Program and to identify the Navy's plan of action and milestones to modify program strategy, we visited the Office of the Deputy Under Secretary of Defense for Environmental Security and the Department of the Navy—Office of the Assistant Secretary of the Navy for Installations and Environment, the Office of the Chief of Naval Operations, and the Naval Sea Systems Command, Washington, D.C.; the Naval Surface Warfare Center, Annapolis, Maryland; the Commander in Chief Atlantic Fleet, the Commander Naval Air Force Atlantic, the Commander Naval Surface Force Atlantic, and the Commander Naval Submarine Force Atlantic, Norfolk, Virginia; the Commander Naval Air Force Pacific and the Commander Naval Surface Force Pacific, San Diego, California; and selected Navy ships (the USS Theodore Roosevelt, USS Saratoga, and USS George Washington). At these locations, we reviewed documents and interviewed officials. We used Navy cost data to calculate the costs associated with shipboard solid waste processing equipment.

In considering the practices of others and available options, we visited the Environmental Protection Agency; the Department of State; the Department of Transportation (the Coast Guard), Washington, D.C.; the Department of Commerce (the National Oceanic and Atmospheric Administration), Rockville, Maryland; selected commercial carriers (Sea-Land Service, Inc., Elizabeth, New Jersey; International Council of Cruise Lines, Washington, D.C.; Florida Caribbean Cruise Association and Royal Viking, Coral Gables, Florida; Costa Cruise Lines, Miami, Florida; Princess Cruises and Crystal Cruises, Los Angeles, California); an equipment manufacturer and an equipment distributor that represented several manufacturers (Chicago Trashpacker Corporation, Marengo, Illinois; and Big Stuff, Inc., Capitol Heights, Maryland, respectively). At these locations, we obtained information on (1) solid waste disposal practices of other federal agencies and commercial carriers and (2) available options from public- and private-sector organizations.

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**Appendix II**  
**Objectives, Scope, and Methodology**

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We performed our review from January 1994 through September 1994 in accordance with generally accepted government auditing standards.

# Major Contributors to This Report

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