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REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

LM100235

Problems And Progress In Regulating Ocean Dumping Of Sewage Sludge And Industrial Wastes

Environmental Protection Agency
Department of Transportation

This report discusses the following areas:

--Some wastes containing harmful substances that exceeded safety levels were dumped in the ocean.

--The wastes were dumped too rapidly to be assimilated by the marine environment.

--Surveillance by the Coast Guard has been minimal.

--Progress has been made by the Environmental Protection Agency to phase out dumpers of industrial wastes but the dumping of municipal wastes is expected to increase for some time in the future.

--Some of the proposed alternatives to ocean dumping may be more environmentally harmful when viewed in terms of the total environment.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report describes the problems and progress of the Environmental Protection Agency and the U.S. Coast Guard in regulating the ocean dumping of sewage sludge and industrial wastes.

This review was made in order to identify those areas in which the regulation and control of ocean dumping need improvement and to inform the Congress of the progress being made in finding and implementing alternatives to the ocean dumping of municipal and industrial wastes.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget; the Administrator, Environmental Protection Agency; and the Secretary of Transportation.

Comptroller General
of the United States

Contents

ABBREVIATIONS

EPA	Environmental Protection Agency
GAO	General Accounting Office
NOAA	National Oceanic and Atmospheric Administration

GLOSSARY

Advanced waste treatment	A process which may modify secondary treatment or be a more complex process, such as additional chemical treatment or electrochemical processing. Although advanced processes can remove substantially all the biochemical oxygen demand and suspended solids, they are mainly used for the removal of specific substances, such as phosphorous or nitrogen.
Bioassay	The use of living organisms to determine the biological effect of some substance, factor, or condition.
Effluent	The wastewater discharged by an industry or municipality to a receiving water body.
Groundwater	The supply of freshwater under the earth's surface in an aquifer or soil that forms the natural reservoir for man's use.
Heavy metals	Metallic elements--such as mercury and cadmium--with high atomic weights, generally toxic in low concentrations to plant and animal life. Such metals are often residual in the environment and exhibit biological accumulation.
Industrial waste	A broad category of wastes from manufacturing operations or processes. Includes acids, chemicals, poisons and insecticides, heavy metals, and other toxic substances.
Landfill	The disposal of wastes by burying under a shallow layer of ground.
Ocean dumping	The transportation and discharge of waste materials into the ocean.
Pathogens	Any microorganism or virus that can cause disease.
Plankton	The floating or weakly swimming plant and animal life in a body of water, often microscopic in size.

Primary waste treatment	Treatment using screening, skimming, and sedimentation techniques to remove about 30 percent of biochemical oxygen demanding wastes and about 55 percent of suspended solids.
Secondary waste treatment	Treatment using biological processes to accelerate the decomposition of sewage and thereby reduce oxygen-demanding wastes by 80 to 90 percent and suspended solids by 75 to 90 percent.
Sewage sludge	A nonhomogeneous residue resulting from chemical and physical treatment of waste water. Consists of both toxic and nontoxic waste materials, with specific concentrations dependent upon the various municipal and industrial sources discharging into the sewage treatment plant. Constituents of sludge include nutrients--nitrogen, phosphorous, and potassium compounds; heavy metals--cadmium, copper, mercury, nickel, lead, and zinc; chlorinated hydrocarbons--including polychlorinated biphenyls and some pesticides; and pathogenic organisms.

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

PROBLEMS AND PROGESS IN REGULATING OCEAN DUMPING OF SEWAGE SLUDGE AND INDUSTRIAL WASTES
Environmental Protection Agency
Department of Transportation

D I G E S T

Most people in the United States live in the 23 States bordering ocean waters. Each year, millions of tons of harmful sewage sludge and industrial wastes are dumped into these oceans and result in pollution which may seriously damage the environment and endanger human life.

To regulate wastes being dumped in the oceans, the Congress enacted the Marine Protection, Research, and Sanctuaries Act of 1972. In 1973, the Interagency Ocean Dumping Coordinating Committee was established to coordinate the work several agencies were doing to carry out the legislation. (See pp. 2 and 3.) The program begun under the act has had limited success. (See pp. 13 and 22.)

The Environmental Protection Agency can issue permits for dumping wastes in oceans when human health and the environment will not be unreasonably endangered. The Agency has set 1981 as the date after which no industrial and municipal wastes can be dumped. Although some progress has been made to phase out the dumping of industrial wastes, the dumping of municipal wastes continues to increase and is expected to increase for some time. (See pp. 13, 14, and 26.)

Converting to other means of disposal by 1981 could be costly and complicated. Industry might not be able to find other ways to dispose of its large volumes of wastes or to change its manufacturing processes to produce less harmful wastes. Although proposed alternatives for disposal of sewage sludge are being studied, the major municipalities now dumping probably will not be able to convert to these alternatives by 1981. (See pp. 26 to 33.)

The Agency does not know what the environmental effects will be if wastes, formerly dumped in the ocean, are transferred to other parts of the environment--such as air, groundwater, or land--and whether other forms of disposal would be more preferable for the environment than ocean dumping.

Before phasing out municipal and industrial "dumpers," the Agency should thoroughly evaluate the proposed alternatives to insure that they are less harmful than ocean dumping to the environment. The oceans are only a part of the total environment which can be used for disposal of wastes. Problems which affect the oceans, as well as solutions to these problems, must be considered in terms of the total environment. (See pp. 34 to 38.)

Some materials which are ocean dumped contain more of a harmful substance than the Agency has established as safe. Municipal sewage plants in New York, northern New Jersey, and Philadelphia were dumping sludge with excessive levels of highly toxic cadmium and mercury. These wastes were allowed to be dumped, officials said, because no alternative disposal methods could be found. (See pp. 15 to 17.)

Some sewage sludge and industrial wastes are dumped at rates which may be causing harm to the marine environment. The Agency uses a scientific test to determine the rate at which wastes can be safely dumped, but it is not using these tests to set most discharge rates and, instead, is setting discharge rates based on nonscientific factors. (See p. 17.)

GAO recommends that the Administrator, Environmental Protection Agency:

--Take a lead role within the frame work of the Interagency Ocean Dumping Coordinating Committee in locating sites that permit dumping at rates that would not only be safe to the marine environment but also be safe for navigation. (See p. 23.)

--Consider what effect alternatives to ocean dumping would have on the total environment before phasing "dumpers" out of the ocean into other areas that can be even more harmful. (See p. 38.)

For fiscal year 1975 the Third Coast Guard District did not meet its established goals of:

--Boarding 10 percent of waste dumping vessels before departure. No vessels were boarded.

--Assigning ship riders to 60 to 100 percent of the vessels going to the toxic chemical waste site to monitor dumping. Only 7 percent of the vessels were assigned ship riders.

--Observing 10 percent of the dumpings for substances other than toxic chemicals. Only 1 percent--42--were observed.

Goals were not met, Coast Guard officials said, because of a shortage of personnel and other resources and because other missions were considered more important. (See p. 18.)

About one-half of all dumping was done at night. The Coast Guard could not monitor dumping at night because surveillance is more difficult. The Coast Guard is developing new methods, such as electronic surveillance, to monitor compliance with permits to dump wastes. These methods need more work before they will be effective. (See p. 19.)

GAO recommends that the Secretary of Transportation have the Commandant, U.S. Coast Guard:

--Increase the level of ocean dumping surveillance, including the use of ship riders to monitor night dumping.

--Continue to develop new methods to more effectively monitor compliance with ocean dumping permits. (See p. 23.)

The Environmental Protection Agency generally agreed with these recommendations and analysis of some of its regulatory and operational problems encountered in the ocean dumping permit program. It agreed that it must continue to work to eliminate those problems. (See app. III.)

The Department of Transporation agreed in general with these recommendations but took exception to some of the findings stated in the report. The major exception involved the definition of surveillance. The Coast Guard considers its observation of vessels either en route to or returning from dumping as surveillance. Although this type of sighting could be technically considered surveillance, GAO believes that surveillance, to be effective, should be in the vicinity of the dump site area. (See app. IV.)

Tear Sheet

CHAPTER 1

INTRODUCTION

The oceans cover over 70 percent of the earth's surface and are important to human life. The oceans fulfill important functions to man, such as contributing to the oxygen-carbon dioxide balance in the atmosphere, providing a source of food and minerals, and supporting fishing and recreational industries. In the United States, most of the people and the largest urban centers are located in the 23 States bordering ocean waters.

Although the ocean has the natural ability to assimilate pollutants, this capacity is limited. The sheer volume of discharges into the ocean can overload natural systems, and natural processes cannot readily degrade the complex chemicals created by modern industry.

Until recently, only relatively small amounts of material were dumped in the ocean. In the early 1950s, about 1.7 million tons of industrial wastes, sewage sludge, solid wastes, and construction and demolition debris were dumped in the oceans annually. This amount increased to 8.9 million tons a year in 1975, more than a 5-fold increase from the volume dumped in the early 1950s. About 8.5 million tons, or 95 percent, of this amount was sewage sludge and industrial wastes.

The adverse effect from wastes dumped into the ocean, according to a report by the Council on Environmental Quality in 1970, was that marine pollution had seriously damaged the environment and endangered human life in some areas. Shellfish had been found to contain hepatitis virus, polio virus, and other pathogens; pollution had closed at least one-fifth of the Nation's commercial shellfish beds; beaches and bays had been closed to swimming and other recreational use; severly degraded areas had been created in the marine environment; there had been heavy kills of fish and other organisms; and identifiable portions of the marine ecosystem had been profoundly changed.

The Council on Environmental Quality concluded in its report that a critical need existed for a national policy on ocean dumping because, if ocean dumping were allowed to continue, serious harm to the environment and man could result.

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972

Recognizing the need for regulating ocean dumping, the Congress, on October 23, 1972, enacted the Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532) (33 U.S.C. 1401) (Supp. II, 1972) to regulate the dumping of all types of materials into ocean waters over which the United States has jurisdiction or over which it may exercise control. The act became effective April 23, 1973.

The act was to prevent or strictly limit the dumping of any material which would adversely affect human health, welfare or amenities, or the marine environment, ecological systems or economic potentialities. It banned dumping of high-level radioactive wastes and chemical, biological, and radiological warfare agents. In addition, the act brought under strict regulation the dumping of materials, such as sewage sludge and industrial wastes, through the issuance of permits by the Environmental Protection Agency (EPA). The Administrator, EPA, may issue permits for ocean dumping where he has determined that the dumping will not unreasonably degrade or endanger human health, amenities, or the marine environment. In establishing criteria for assessing permit applications, he must consider the need for the dumping; its effects on health and welfare, shorelines and beaches, and the marine ecosystem and its resources; the persistence and permanence of the effects; appropriate locations and methods of disposal; and the effects on alternate uses of the oceans.

INTERNATIONAL CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES

The need for regulating ocean dumping on an international basis has also been recognized. Representatives from over 80 nations, including the United States, attended an international conference on ocean dumping in October and November 1972 to discuss the prohibition and/or control of dumping hazardous materials into the oceans. The parties to the convention recognized that the capacity of the sea to assimilate wastes and render them harmless and the ocean's ability to regenerate natural resources are limited. They agreed to use the best practicable means to prevent such pollution and to develop products and processes which would reduce the amount of harmful wastes to be disposed of in the ocean.

The convention was signed by the United States on December 29, 1972, and ratified by the Senate on August 3, 1973. The Congress amended the Marine Protection, Research, and Sanctuaries Act of 1972 on March 22, 1974, to make it fully consistent with the provisions of the convention.

The convention became effective in September 1975, after being ratified by 15 nations. As of March 1976, 22 nations had ratified the convention.

COGNIZANT FEDERAL AGENCIES

EPA; the Corps of Engineers; the Department of Transportation, through the Coast Guard; and the Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA), have responsibility for implementing the act.

EPA sets criteria to govern the disposal of wastes to the marine environment and issues permits for the discharge, transportation, and dumping of waste materials, except dredged material. The Corps of Engineers issues permits for the disposal of dredged material on the basis of EPA criteria.

The Coast Guard is responsible for conducting surveillance and enforcement activities to prevent unlawful transportation of waste and unlawful dumping. It refers apparent violations to EPA for further enforcement action.

NOAA is required to perform comprehensive research related to the effects of ocean dumping and alternative disposal methods.

In 1973 the Interagency Ocean Dumping Coordinating Committee was established to provide close coordination among EPA, the Corps of Engineers, the Coast Guard, and NOAA. The purposes of the Committee include developing an integrated approach to all aspects of implementing the ocean dumping legislation and coordinating operational activities relating to research, monitoring, permit evaluation, and enforcement. Several interagency agreements to evaluate the impact of ocean dumping at particular sites have been negotiated through representatives of the Committee.

Other Federal agencies having responsibilities under the act include the Department of State which protects the marine environment by establishing international agreements which further the goals of the act. Also the U.S. Attorney General initiates legal actions against ocean dumping violators referred to them by EPA, including injunctions to cease ocean dumping.

FUNDING

From the effective date of the act, April 23, 1973, through June 30, 1976, EPA, the Coast Guard, and NOAA have spent a total of $5.8 million for activities carried out

under the act. An additional indeterminable amount of funds have been spent for activities relating to the act but are not able to be specifically identified because the funds do not directly apply to ocean dumping. For instance, NOAA has underway a major investigation--the Marine Ecosystems Analysis Project in the New York Bight--to gather better information on the effects of ocean dumping, as well as on other environmental problems in the New York Bight. (See map on p. 7.) Also EPA's efforts in the area of research, development, and demonstration for municipal wastewater sludge processing, utilization, and disposal not only affect the disposal of sludge by municipalities along the east coast but also applies to disposal of sludge throughout the United States.

The following table shows the approximate amount of funds which have been authorized, appropriated, and spent under the act. The amounts are exclusive, however, of expenditures which indirectly apply to ocean dumping. In addition, some of the expenditures shown in the table are higher than the appropriations due to funds reprogramed from other areas.

Authorizations, Appropriations, and Expenditures for FYs 1973-76

	1973	1974	1975	1976	Total
	(000 omitted)				
EPA:					
Authorization	$3,600	$5,500	$5,500	$5,300	$19,900
Appropriation	290	1,276	1,329	1,313	4,208
Expenditures	290	1,276	1,329	1,313	4,208
Coast Guard:					
Authorization	-	-	-	-	-
Appropriation	-	-	41	316	357
Expenditures (estimated)	15	227	364	402	a/1,008
NOAA:					
Authorization	16,000	16,000	16,000	12,200	60,200
Appropriation	-	-	-	-	-
Expenditures	-	-	300	300	a/ 600

a/Includes reprogramed funds.

LOCATIONS OF OCEAN DUMPING OPERATIONS

EPA approved 11 ocean dumping sites in the Atlantic Ocean and in the Gulf of Mexico where sewage sludge and industrial wastes could be dumped during fiscal year 1975. There is no dumping of these wastes in the Pacific Ocean, although sewage sludge is discharged to the ocean through outfalls.

The map on page 6 identifies the general location of the 11 dumping sites and the materials being dumped. As can be seen by the map, most of the dumping sites are concentrated off the northeast coast of the United States, and at only 2 of the 11 sites--the New York and the Philadelphia sludge sites--is municipal sewage sludge dumped.

The New York sludge site, about 12 miles offshore, received sludge from treatment plants in the New York-northern New Jersey area that served over 11 million people. Figure 1 shows sludge being dumped in the New York Bight--an area of the Atlantic Ocean that extends seaward over 15,000 square miles from the eastern part of Long Island and southern New Jersey to the edge of the continental shelf, some 80 to 100 nautical miles off shore. The Philadelphia sludge site, located about 50 miles southeast of Delaware Bay, received sewage sludge from Philadelphia, Pennsylvania, and Camden, New Jersey, which have a combined population of about 2 million people.

Sewage sludge and industrial wastes (fig. 2) dumped in the Atlantic accounted for 82 percent of the total volume of these materials dumped in 1968, 90 percent in 1974, and 99 percent in 1975. Most of these wastes were dumped at sites in the New York Bight. (See map, p. 7.)

SCOPE OF REVIEW

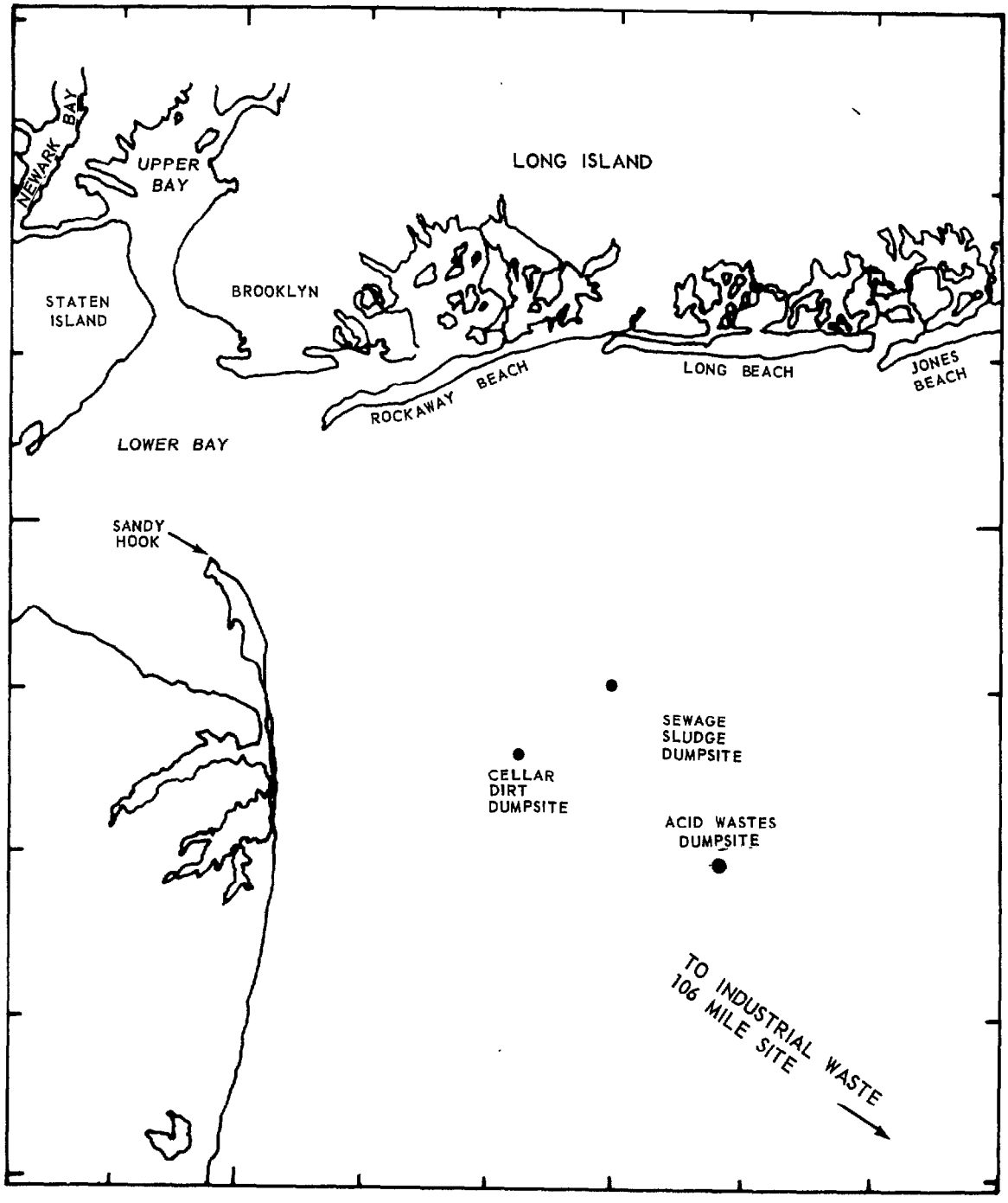
Our review was primarily conducted at EPA and Coast Guard headquarters in Washington, D.C., at EPA regional offices in New York City and Philadelphia and at various activities of the Third Coast Guard District, including the Captain of the Port, New York, and the Captain of the Port, Philadelphia. We also met with officials of municipal sewage authorities and industrial firms engaged in ocean dumping.

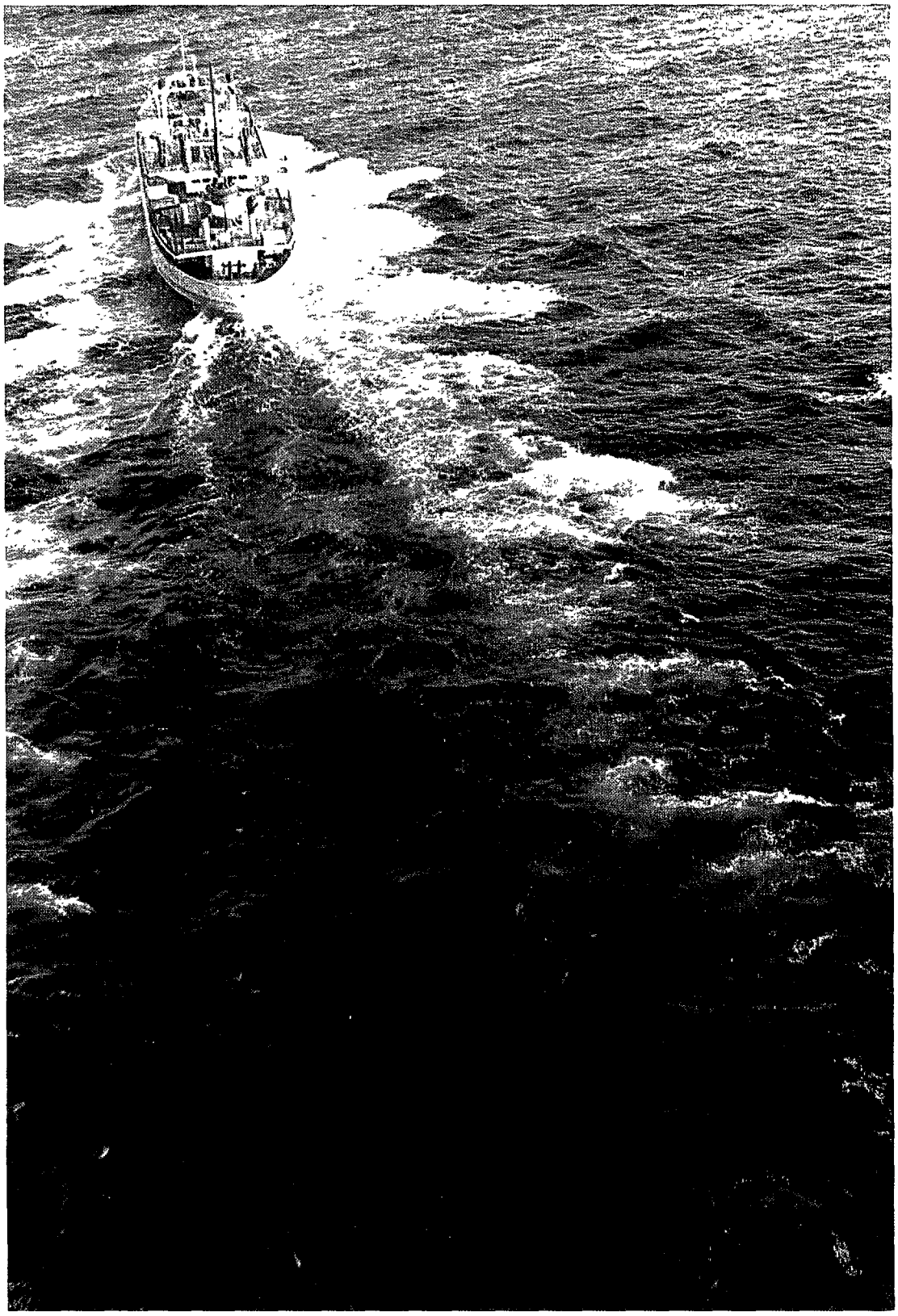
We reviewed applicable legislation and regulations, documents, reports, records, and files and interviewed cognizant agency officials primarily with respect to title I of the act which provided for the issuance of permits by EPA to control the dumping of municipal and industrial wastes. We did not review the Corps of Engineers regulation of the dumping of dredged material under the act.


EPA APPROVED
OCEAN DUMPING SITES
FOR SEWAGE SLUDGE AND
INDUSTRIAL WASTES
MAINE
REGION I
VERMONT
NEW HAMP
MASS.
CONN.
NEW YORK
REGION II
WISCONSIN
MICHIGAN
PENNSYLVANIA
NEW JER
REGION V
ILLINOIS
INDIANA
OHIO
MARYLAND
DEL.
REGION III
WEST VIRGINIA
VIRGINIA
MISSOURI
KENTUCKY
TENNESSEE
NORTH CAROLINA
ARKANSAS
REGION IV
SOUTH CAROLINA
MISSISSIPPI
ALABAMA
GEORGIA
LOUISIANNA
FLORIDA
GULF OF MEXICO
ATLANTIC OCEAN
0 50 150 100 MILES
REGION II
PUERTO RICO
1. REGION I INDUSTRIAL WASTE SITE
2. N.Y. SLUDGE SITE
3. N.Y. ACID SITE
4. N.Y. CELLAR DIRT SITE
5. "106" MILE SITE (Industrial Wastes)
6. DUPONT SITE
7. PHILADELPHIA SLUDGE SITE
8. PUERTO RICO INDUSTRIAL WASTE SITE
9. OCEAN INCINERATION SITE (INDUSTRIAL WASTES)
10. MISSISSIPPI RIVER (INDUSTRIAL WASTES) SITE
11. GALVESTON SITE (INDUSTRIAL WASTES)

INDUSTRIAL AND MUNCIPAL DUMPSITES

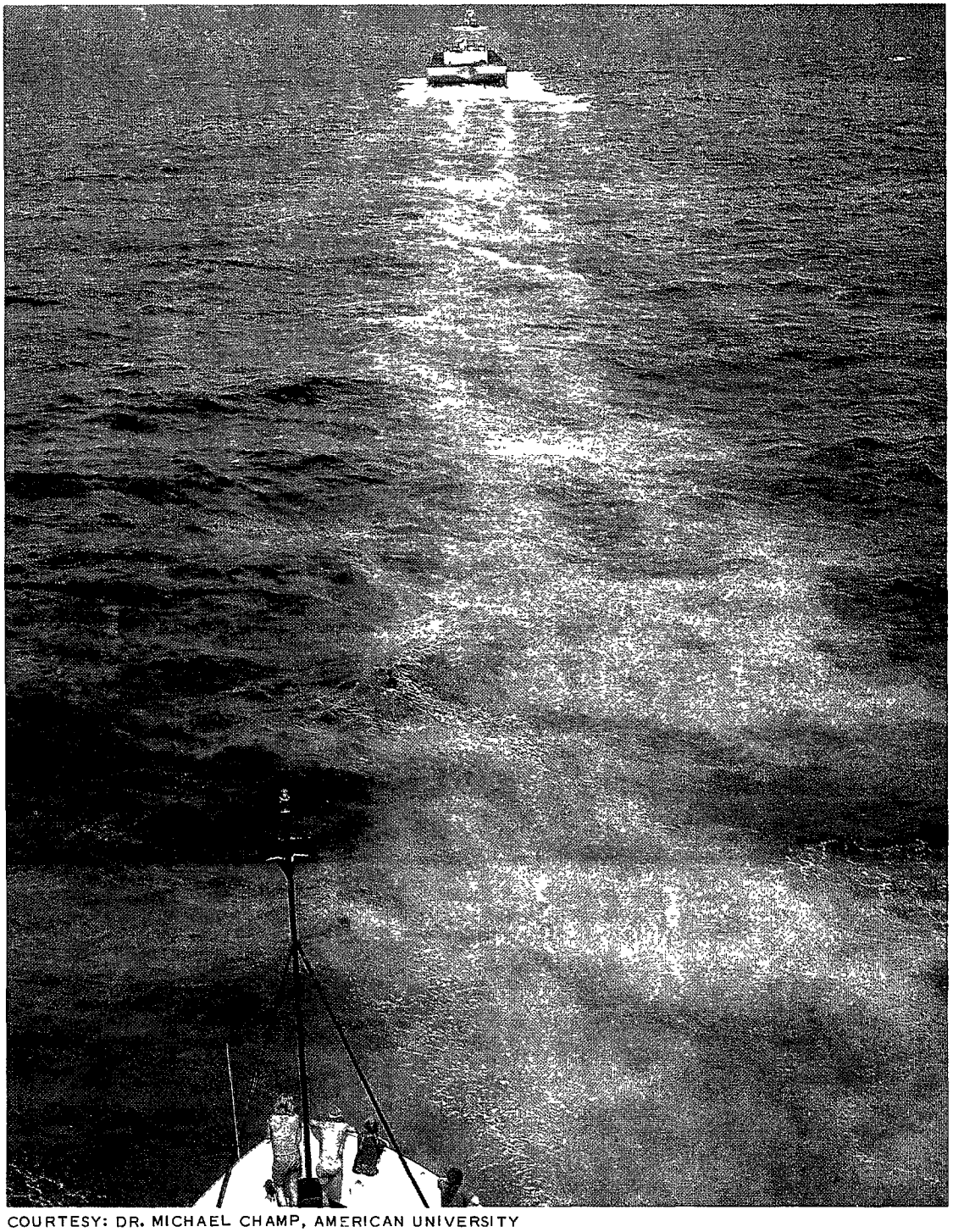
IN THE NEW YORK BIGHT





COURTESY: EPA REGION II

FIGURE 1: SEWAGE SLUDGE BEING DUMPED IN THE ATLANTIC



COURTESY: DR. MICHAEL CHAMP, AMERICAN UNIVERSITY

FIGURE 2: ACID WASTE BEING DUMPED IN THE ATLANTIC

CHAPTER 2

REGULATING OCEAN DUMPING OF INDUSTRIAL AND MUNICIPAL WASTES

The Congress passed the Marine Protection, Research, and Sanctuaries Act of 1972 to minimize or prevent the harmful effects of ocean dumping. Since the act was passed, both EPA and the Coast Guard have had regulatory and operational problems in trying to effectively regulate ocean dumping. Although the previously uncontrolled practice of ocean dumping is now being regulated, EPA's administration of the ocean dumping permit program and the Coast Guard's surveillance activities have resulted in some wastes being dumped which may be harmful to the marine environment.

Sewage sludge was being dumped even though it contained mercury or cadmium in amounts that exceeded EPA established safety levels. Sewage sludge and industrial wastes were also dumped at rates which were not environmentally safe according to EPA regulations. Vessels in the process of dumping were observed by the Third Coast Guard District in less than 1 percent of the cases. In addition, only three fines had been levied against ocean dumping violators as a result of 41 Coast Guard referrals because of the Coast Guard's lack of adequate surveillance, difficulty in obtaining satisfactory evidence to prosecute violators, or because EPA considered the violations to be minor.

Although the regulation of ocean dumping has not been as successful as it could be, both EPA and the Coast Guard have made some progress toward improving the administration of the program. According to EPA, it had not issued a permit to anyone new and had only issued permits to those dumpers who were already dumping when the act became effective. EPA officials told us that over 80 former or potential dumpers had been restricted from ocean dumping or denied permits. According to EPA, the 250 or so municipal waste generators in New York-northern New Jersey metropolitan area, who were dumping prior to 1973, have been reduced to less than 50; industrial dumpers, about 150 prior to 1973, now number 15 in the New York Bight area.

VOLUME OF SEWAGE SLUDGE DUMPED CONTINUES TO INCREASE

The volume of sewage sludge dumped into the ocean has increased steadily since 1968. In 1968 the total volume of sewage sludge dumped, all of which was in the Atlantic, was about 4.5 million tons. This amount increased 13 percent, to 5 million tons in 1975. The volume in 1974 and 1975 would have been even greater, but, according to EPA, construction and repair operations at several New York City treatment plants resulted in a decrease in the generation of sludge during that period. Thus the statistics for sludge dumped do not include these amounts even though the untreated sewage was discharged into New York rivers and eventually contributed to ocean pollution when the rivers flowed into the ocean.

Although the volume of industrial wastes dumped is decreasing, the following table shows that the dumping of sewage sludge has continually increased.

Ocean Dumping of Sewage Sludge and Industrial Wastes

Year	Sewage sludge	Industrial wastes	Total
	(tons)		
1968	4,477,000	4,690,500	9,167,500
1973	4,898,900	5,050,800	9,949,700
1974	5,010,000	4,592,000	9,602,000
1975	5,039,600	3,446,000	8,485,600

The practice of ocean dumping developed over the years, because it was a convenient and inexpensive means of waste disposal. In 1974, according to EPA in its third annual report on "Ocean Dumping in the United States-1975," it cost about $2 to $6 a ton to ocean dump sewage sludge or acid wastes and about $12 to $14 a ton for industrial wastes. The cost to the permittee of ocean dumping as a disposal technique varies with the type of waste, the distance to the dump site, and permit requirements. Although ocean dumping sewage sludge is relatively inexpensive, land-based alternatives are expensive and estimates of costs have ranged from $46 to $120 a ton for handling the sludge.

The volume of sewage sludge dumped into the ocean will probably continue to increase in the future. The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) (33 U.S.C. 1251) (Supp. II, 1972) require that all sewage treatment plants provide a minimum of secondary treatment by July 1,

1977. As more and more municipalities expand their present plants or upgrade their sewage treatment facilities from no treatment or primary treatment to secondary or advanced treatment processes, more and more sludge will be generated. EPA estimated that this upgrading of plants, plus the treatment of present raw sewage discharges, will triple the volume of sludge to be disposed of in the New York Bight.

The anticipated increase in sludge volume is illustrated by a New York City treatment plant that is to serve a section of the city which currently has no sewage treatment facility. The plant, scheduled to open in the 1980s, is to produce about 90 dry-tons of sludge a day, which is about 18 percent of the current daily volume of sludge dumped in the New York Bight. In addition, a study completed in 1975 by the Interstate Sanitation Commission of New York, New Jersey, and Connecticut (an organization administering a sludge management study to search for alternatives to ocean dumping for the New York-northern New Jersey area) estimated that the volume of sewage sludge produced in that area would quadruple by the year 2000.

Although the volume of sewage sludge dumped in the ocean has increased since enactment of the act, the volume of industrial dumping has decreased even though the largest volume industrial dumpers have not, as yet, been phased out. According to EPA, 81 industrial waste dumpers have been phased out or denied permits through February 1976. We believe, however, that some of the alternatives adopted are not environmentally sound. These and other problems associated with phasing out industrial waste dumpers are discussed in chapter 3.

The potential for increased industrial waste dumping at sea remains great because of increasingly stringent water quality standards governing discharges into rivers, lakes, and streams and the expanding level of wastes being generated by industry in the coastal zone.

EPA REGULATIONS DO NOT ADEQUATELY PROTECT THE MARINE ENVIRONMENT

EPA's regulations established concentration levels of mercury and cadmium--both of which are highly toxic--which it believes, if exceeded, will degrade the marine environment. All sewage sludge dumped in the ocean exceeded the EPA-established safety levels for cadmium or mercury.

The 26 municipal permit holders in the New York-northern New Jersey area were dumping sewage sludge containing either cadmium or mercury that exceeded by more than 100 times the established safety levels. (See table, p. 16.) Although it may degrade the marine environment, EPA regulations allow the

dumping of mercury or cadmium in excess of safety levels if the materials are present in sewage sludge.

EPA officials said they realize that these wastes may be degrading the marine environment; however, they stated that they must continue to allow the ocean dumping of municipal sewage sludge until alternative disposal methods are adopted. The following table shows the number of permits which had been issued in April 1975 to municipal dumpers in the New York-northern New Jersey area, which allow dumping to exceed cadmium or mercury safety levels.

New York-Northern New Jersey Permit Holders
Exceeding EPA Safety Levels for Cadmium or Mercury
(based upon data provided by the permittee)

Number of times safety levels were exceeded	For cadmium	For mercury
0	-	-
Less than 1 time	-	2
1 to 4 times	-	5
5 to 9 times	5	9
10 to 19 times	6	5
20 to 39 times	4	4
40 to 59 times	2	1
60 to 99 times	4	-
100 or more times	5	-
Total number of permit holders	26	26

According to the permit issued to Philadelphia in 1975, Philadelphia's sludge also contained high concentrations of these substances. The sludge from one of two Philadelphia treatment plants whose sludge is dumped in the ocean exceeded allowable cadmium and mercury safety levels by 175 and 5 times, respectively. At the other plant, the sludge was 54 times greater than safety levels for cadmium and 5 times more for mercury.

Because the amounts being dumped exceed safety levels, EPA is concerned that mercury and cadmium are accumulating in the tissues of fish and shellfish. For example, less than 1 year after the Philadelphia dump site was moved in 1973, clams and scallops taken from the areas surrounding the new site had accumulated high levels of cadmium.

EPA reported that the sewage sludge dumped in 1974 in the Atlantic contained about 24 tons of cadmium and that sludge dumped in the New York Bight alone contained about 2 tons of

mercury. As more and more of these materials are dumped, there is greater risk to marine life in and around the dumping site. There is also the risk to humans should they eat fish and shellfish which have come from the area.

WASTES ARE BEING DUMPED AT A RATE WHICH MAY BE CAUSING HARM TO THE ENVIRONMENT

Almost all sewage sludge and industrial wastes are being discharged into the ocean at too rapid a rate, which may be causing harm to the environment. To estimate short-term harm to the environment, EPA utilizes a scientific test--commonly referred to as a bioassay--to determine the rate at which wastes can be safely dumped at the dumping locations.

EPA is not, however, utilizing these tests to set discharge rates in most instances and is, instead, setting discharge rates based on nonscientific factors. As a result, very few permit holders are discharging the wastes based upon a rate which has been determined by a bioassay.

According to EPA officials, setting discharge rates solely on the basis of a bioassay would extend considerably the time a vessel must remain in the dump site area in order to dump its wastes. EPA officials further stated that this may not be feasible because of safety, economic, and technical factors that must be taken into consideration. For example, in the New York Bight area, the rate of discharge is much faster than environmentally acceptable, because the Coast Guard believes a slower dumping rate would pose a safety hazard to navigation since the dump sites in this area are in active shipping lanes approaching New York Harbor. For this reason, the dumpers are permitted to remain in the dump site for only a limited time, regardless of the bioassay results. Thus the discharge rate is based primarily on safety rather than environmental considerations.

Extended disposal times would also result in the need for additional vessels to handle the wastes. This would pose an additional financial burden on the dumpers involved, which may be unreasonable, especially for the municipalities, since this dumping is scheduled to be phased out by 1981.

COAST GUARD SURVEILLANCE IS INADEQUATE

We also found problems in the Coast Guard's surveillance of ocean dumping operations. Under the act, the Coast Guard is responsible for conducting surveillance to prevent unlawful transportation and dumping of wastes into the ocean. To carry out is responsibilities, the Coast Guard provides surveillance on a selective basis through vessel boardings, by

vessel patrols and helicopter overflights of the dump sites, and through the use of ship riders.

We reviewed the Third Coast Guard District's ocean dumping surveillance activities for fiscal year 1975 carried out at dump sites in the New York Bight and at various other sites in the Atlantic off the northeastern coast of the United States. These sites accounted for 100 percent of the sewage sludge and over 90 percent of the industrial wastes dumped in the Atlantic.

Our review showed that the Third Coast Guard District did not meet its established surveillance goals for fiscal year 1975 in that:

--Contrary to a goal of boarding 10 percent of ocean dumping vessels prior to departure to check for valid permits, no vessels were boarded. On April 8, 1975, Coast Guard regulations were amended to require the boarding of vessels to check for valid permits on a spot check basis only.

--Although shipriders were to be assigned to 60 to 100 percent of the vessels going to the toxic chemical waste site, they were assigned to only 10, or about 7 percent, of the 135 ocean dumping operations.

--Only 42, or less than 1 percent, of the 6,038 dumpings of substances other than toxic chemicals were observed, compared to a goal of 10 percent. The Coast Guard also reported sighting 519 vessels either en route to or returning from the dump sites. The Coast Guard considered these sightings as surveillance.

Coast Guard officials acknowledged that the ocean dumping surveillance goals were not being met. They stated that, in addition to a shortage of personnel and other resources, the program did not have a high priority, compared to other missions. They stated also that bad weather forced the cancellation of surveillance missions, that surveillance at night was not feasible, and that safety considerations precluded getting close enough to a dumping vessel to observe when it begins and when it stops discharging. We accompanied the Coast Guard on one of its missions and confirmed that it was difficult to determine the precise starting and ending times of the discharge, the types and concentrations of wastes being dumped, and the rate of the discharge. Helicopter overflights are more effective for surveillance, but because of time and cost constraints, the helicopter is not able to hover over the dumping area long enough to observe the dumping operations.

The Coast Guard does not attempt to monitor ocean dumping operations in the Atlantic at night because its surveillance efforts depend primarily on visual observation. Of the 6,038 dumping operations at nontoxic dump sites about 2,800, or 46 percent, were conducted from 6:00 p.m. to 6:00 a.m.

According to two marine scientists who testified before a joint subcommittee of the House Merchant Marine and Fisheries Committee in January 1976, the Coast Guard is not detecting many of the ocean dumping violations that are occurring. They stated that their experiences in both the New York Bight and off Delaware Bay indicated that violations of dumping regulations were quite frequent and that a better deterrent system should be established through either increased fines or more surveillance.

To increase its surveillance capabilities, the Coast Guard is developing an electronic ocean dumping surveillance system, which is planned to be installed on ocean dumping vessels. The system is designed to record the trackline of the vessel on tape and to aid the vessel's crew in accurately locating the dump site. The Coast Guard is to obtain the tape after the dumping operations and analyze it to determine whether the vessel reached the dump site and how long it remained there.

The system is being developed and is planned to be operational in fiscal year 1978. This time frame, however, may be somewhat optimistic. Testing of a prototype of the system, completed in January 1976, identified various equipment problems--such as the receiver not operating properly, equipment shorting out because of water leakage, and vibrations of the vessel causing equipment to operate incorrectly.

The Coast Guard estimated that the cost for each system could be kept below $10,000. The transporter will be required, through conditions in his permit, to purchase and maintain the system. The system will only supplement, and not replace, current methods of surveillance because (1) the system is not "real time" surveillance (the recorded data must be retrieved and analyzed after the dumper has completed his mission and has returned to port) and (2) there is a question as to the acceptability and sufficiency of the system's tapes as sole evidence of ocean dumping violations.

FEW REFERRALS FROM THE COAST GUARD HAVE RESULTED IN PENALTIES

The Coast Guard's lack of adequate surveillance and problems in obtaining satisfactory evidence to prosecute violators have resulted in only a few penalties being assessed.

According to the act, penalties of up to $50,000 can be assessed for each violation of the act, regulations, or permit conditions. From inception of the program through December 1975, EPA has brought enforcement actions against 6 of the 41 apparent violations referred to them by the Coast Guard. Three of the enforcement actions resulted in penalties totaling $66,500; one action has been withdrawn; and two cases, involving dumping outside the dump site, were still pending as of July 1976.

The following table lists apparent violations referred to EPA by the Coast Guard from April 1973 to December 1975.

Type of violation	Number of case referrals
Dumping short	9
Dumping long	1
Dumping without permit	2
Attempted dumping without permit	1
Violating permit conditions	9
Failure to notify the Captain of the Port that wastes are going to be dumped	15
Liquid wastes spilled en route	3
No permit on board	1
Total	41

In certain cases, EPA found that the violation was minor or had not occurred. For example, 15 cases involved the transporters' failure to notify the Coast Guard that they were leaving port. In these cases, EPA did not take enforcement action and only sent them letters of warning.

Although some of the apparent violations may be minor, EPA believes the Coast Guard needs to obtain better evidentiary material in order to have an effective enforcement program toward major violators. In a letter to the Coast Guard dated July 18, 1974, EPA requested several refinements and additions to the Coast Guard procedures for ocean dumping surveillance and reporting. EPA's recommendations for improving the program

> "* * * derive from [its] experience with four or five presently pending enforcement proceedings against violators of ocean dumping permits issued pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972. The changes we have requested reflect

our needs for improved evidentiary material at the enforcement hearings. Implementation of these or similar new procedures is essential to an effective enforcement program in this field."

EPA believed that, in order to obtain reliable evidence to make convincing cases against apparent violators, the Coast Guard should insure that:

--Every surveillance team include a photographer equipped with an adequate camera.

--When a violation is sighted, each crew member aboard the vessel or aircraft [in a position to do so] observe the violation.

--Each incident of unauthorized dumping be observed for not less than 10 to 15 minutes.

--A signed, written statement prepared by each witness to an ocean dumping violation accompany the final report of violation.

--A sampling be made of materials in the water during an alleged discharge to prove that a violation occurred.

Coast Guard officials stated, however, that several factors affect their ability to obtain evidence in this manner. Most vessels discharge the wastes through outlets that are underwater, and, unless the water becomes discolored, as shown by figures 1 and 2, the actual discharge is generally not observable. Coast Guard officials stated also that they did not take water samples from the ocean because it was not always possible to get close enough to a barge to take such samples or to determine when the discharge begins and ends and, in the case of helicopter surveillance, it might not be possible to hover in an area for 15 minutes to observe incidents of unauthorized dumping.

CONCLUSIONS

In its first 3 years of regulatory authority over ocean dumping, both EPA and the Coast Guard have experienced serious problems in trying to effectively regulate ocean dumping. Problems in EPA's administration of the ocean dumping permit program and with the Coast Guard's surveillance activities have resulted in wastes being dumped which may be harmful to the marine environment.

In our opinion, the ocean dumping program initiated under the Marine Protection, Research, and Sanctuaries Act of 1972 has had limited success in minimizing the harmful effects from ocean disposal of municipal and industrial wastes. Until ocean dumping of municipal and industrial wastes is either phased out or research demonstrates that certain wastes can be dumped without causing unreasonable degradation of the marine environment, a strong regulatory program is needed to minimize the harmful effects of ocean dumping.

With higher levels of waste treatment being required at both municipal and industrial facilities, the potential is great for ocean disposal of wastes to continue and possibly increase in the future. Unless stronger regulatory action is taken by the responsible agencies, degradation of the marine environment will not be minimized.

We recognize, however, that there are practical problems which have to be overcome before harm to the marine environment can be minimized. For instance, little can be done to prevent municipalities' sludge, containing excessive amounts of mercury and cadmium, from being ocean dumped until suitable alternative disposal methods are adopted. There is little that can be done to reduce the volume of sludge being generated in ever-increasing amounts as municipalities install more-advanced forms of sewage treatment. But we believe there are areas where the degradation from ocean dumping can be minimized.

The rate of ocean dumping of municipal and industrial wastes in the New York Bight area is still, for the most part, not being determined on the basis of a bioassay. Because the Coast Guard has limited the time a dumper can remain at the dump site, for navigational safety reasons, EPA's criteria for determining safe discharge rates cannot be applied to the dumpers in the New York Bight area. We believe that EPA and the Coast Guard need to work together to set discharge rates that will not only be environmentally safe but also be safe for vessels and crew. It might be possible for the dump sites to be moved away from active shipping lanes to the New York Harbor so that discharge times can be lengthened, which would thereby reduce the acute toxic effect to the marine environment. Until EPA and the Coast Guard work toward this kind of a solution, degradation of the ocean will continue.

We believe that the Interagency Ocean Dumping Coordinating Committee is a vehicle by which problems of this nature can be discussed and mutually agreeable resolutions developed. According to an EPA official, however, other factors, such as additional costs to dumpers, municipalities, and the Federal Government, and whether relocation of the site is technically

feasible must be carefully considered before the dump site is relocated. As of November 1976 this matter has not been brought before the Committee.

In addition, the Coast Guard needs to increase its level of surveillance to allow effective detection of ocean dumping violations and to provide a deterrent to potential violators. Observing less than 1 percent of actual legally authorized ocean dumping is not adequate to detect or prevent unlawful dumping activities.

The Coast Guard also needs to improve its surveillance of dumping operations at night by using such methods as ship riders to detect unlawful dumping. Since Coast Guard's surveillance primarily depends on visual observation, we believe ship riders would be the most effective deterrent to unlawful dumping.

The Coast Guard is developing an electronic surveillance system to improve monitoring of compliance with permit conditions. However, some problems have been experienced in the development of this system and additional efforts will be needed before it can be implemented.

RECOMMENDATIONS

We recommend that the Administrator, EPA:

--Take a lead role within the frame work of the Interagency Ocean Dumping Coordinating Committee in locating sites that permit dumping at rates that would not only be safe to the marine environment but also be safe for navigation.

We also recommend that the Secretary of Transportation have the Commandant, U.S. Coast Guard:

--Increase the level of ocean dumping surveillance, including the use of ship riders to monitor night dumping.

--Continue to develop new methods to more effectively monitor compliance with ocean dumping permits.

AGENCY COMMENTS AND OUR EVALUATION

EPA agreed in general with the report's recommendations and our analysis of some of the regulatory and operational problems that EPA has had in implementing the ocean dumping permit program and agreed that it must continue to work to eliminate those problems.

EPA took exception, however, to our statement that the ocean dumping program has had limited success in minimizing the harmful effects from ocean disposal of municipal and industrial waste. Our conclusion was based on a number of reasons. While there has been a slight decrease in the overall level of wastes being dumped, the volume of municipal waste continues to increase and most likely will continue to increase for the next several years. The dumping that is going on is not minimizing harm to the environment because the permits being written by EPA are not based on the best scientific evidence available. All sewage sludge dumped in the ocean exceeded EPA safety levels for cadmium or mercury and almost all sewage sludge and industrial wastes are being discharged too rapidly, which may be causing harm to the environment.

EPA, in it comments to us, agreed that, unfortunately, very few permits have been written so that the rate of discharge will minimize harm to the environment. In addition, EPA does not consider whether disposal methods selected in lieu of ocean dumping would adversely affect other areas of the environment more than ocean dumping.

We recognize that there are practical problems and inherent constraints which may preclude great reductions in the amount of ocean dumping which have to be overcome before harm to the environment can be minimized. In those instances where the wastes cannot be dumped in the ocean safely, EPA issues interim permits if the waste generator can demonstrate need and no feasible alternative disposal method. According to EPA, issuing such a permit requires the development and timely implementation of an alternative or bringing the waste within compliance with safe discharge amounts and rates within a reasonable time.

The Department of Transportation concurred in our recommendations but took exception to some of our findings. According to the Department it is now meeting its goal of providing surveillance to 10 percent of the ocean dumping operations at the nontoxic dump sites because of increased emphasis on ocean dumping surveillance. The Department stated that surveillance of toxic dumping activity, while falling short of program goals, had greatly improved in the past several months and further improvements were anticipated. The Department further added that the electronic navigational recorder should be operational by the end of 1977.

One matter of concern to the Department was that our definition of surveillance did not include situations where Coast Guard vessels sighted ocean dumping vessels either on their way to, or returning from, ocean dumping operations.

We did not consider the sighting of an ocean dumping vessel en route to or returning from a dump site area to be effective surveillance. Unless the Coast Guard's sighting of a vessel involves the dump site area, the Coast Guard will not know whether the type of wastes dumped, the rate of dumping, and the pattern and location of dumping was in accordance with permit conditions.

Most of the Coast Guard sightings are of short duration and only occur because the Coast Guard observes the dumping vessel while engaged in one of its general surveillance missions. The Coast Guard does little, if any, intercepting and/or escorting of vessels to observe the vessels' dumping patterns and rate of dumping at the dump site area.

The Department also took exception to a statement in the report that the Coast Guard had a goal of boarding 10 percent of the vessels to check for permits. The Department said the Coast Guard did not have such a goal and referred to a published guideline, which required that checking for permits be done on a spot-check basis. This guideline was not effective until April 1975 and, for the first three-quarters of fiscal year 1975, the Coast Guard did have a goal of boarding 10 percent of the vessels to check for permits.

A number of other points raised by the Department have been considered, where appropriate, in the report.

CHAPTER 3

PROGRESS AND PROBLEMS IN ABATING POLLUTION FROM OCEAN DUMPING

The Marine Protection, Research, and Sanctuaries Act of 1972 reflected the public's concern for the assessing and controlling of the cumulative effects of man's activities on coastal and ocean resources and the undesirable and possibly irretrievable changes to ocean ecosystems that these activities may have. Since passage of the act in October 1972, the ocean dumping program has experienced both problems and progress in preventing harmful wastes from entering the ocean. Although EPA has phased out many industrial dumpers and has required municipal dumpers to examine alternatives to ocean dumping of sewage sludge, the volume of municipal sludge dumped continues to increase and most of the large industrial dumpers continue to dump their wastes.

EPA has set 1981 as the date for completing the phaseout of industrial and municipal dumping. However, the phaseout could be complicated and costly in that problems might arise if major industrial dumpers cannot find alternatives to accommodate large volumes of wastes or cannot modify their manufacturing processes to reduce the harmful nature of the waste produced. Also many of the proposed alternatives for disposal of sewage sludge are still being studied, and it is unlikely that major municipal dischargers will be able to meet the 1981 mandate.

To minimize the effects of ocean dumping, EPA has relocated some dumping sites and might relocate others. Although such relocations may reduce some of the risks to public health by moving ocean dumping further offshore, they also transfer the degradation of the marine environment from one location to another.

Another problem related to phasing out ocean dumping of municipal and industrial wastes concerns the lack of knowledge regarding the effect these wastes will have on the environment once alternative methods of disposal are selected. Although the act allows the use of ocean dumping as a method of waste disposal, EPA has determined that ocean dumping of all these wastes is to be phased out by 1981 even though the alternatives selected may be more environmentally damaging than allowing the wastes to be dumped into the ocean.

EFFORTS TO PHASE OUT MUNICIPAL DUMPERS

Although ocean dumping of municipal sludge has increased over the years and will probably continue to increase for some time, steps are being taken to reduce the amount of municipal sludge being dumped into the ocean. As part of the permit conditions imposed by EPA regions II and III, dumpers of sewage sludge have been required to examine alternatives to ocean dumping. Camden, New Jersey, developed a regional waste treatment plan whereby the two treatment plants in the city are to be upgraded and expanded. Sludge handling facilities are to be constructed that will incinerate the sludge, and the residual ash will be used for landfill. Camden, however, had problems in meeting its planned implementation schedule. Philadelphia developed a plan whereby sludge was to be disposed of by 10 different methods so that it would no longer have to be ocean dumped.

The New York-northern New Jersey area has been awarded a $169,000 grant from EPA to demonstrate the feasibility of an alternative called pyrolysis (the decomposition of organic matter by heating in an oxygen-deficient atmosphere) on a pilot basis. Whether any of the alternatives being tried by these localities prove successful in handling the present as well as the expected increase in sludge remains to be seen.

Although EPA has made progress in phasing out the dumping of industrial wastes, no major dumper of sewage sludge has stopped dumping. EPA's goal is to phase out, by 1981, ocean dumping by all of the major municipal areas (New York-northern New Jersey area, Camden, and Philadelphia).

Meeting the 1981 deadline, however, will depend on many factors, such as whether (1) the proposed alternative methods of handling sludge can be implemented on a sufficient scale, (2) legal and institutional matters can be resolved, and (3) the application of sludge to land will not present any serious harm to humans. Because of the many problems which can arise in demonstrating the feasibility of methods that are promising but largely unproven in large-scale applications, it is very likely that ocean dumping of sewage sludge will continue for several years beyond the 1981 deadline. The following sections describe in greater detail the projects being undertaken by Philadelphia, Camden, and the New York-northern New Jersey areas to resolve their sludge disposal problems.

Philadelphia

Philadelphia is presently authorized to ocean dump about 1 million tons of sewage sludge a year. In the permit issued to Philadelphia on June 5, 1976, EPA directed the city to reduce its volume of sludge dumped by 40 percent by 1979 and to discontinue all dumping by 1981.

To comply with the phaseout deadline of 1981, the city submitted on November 13, 1975, a 10-point Sludge Disposal Master Plan which involves the following programs for getting rid of sludge.

--Public Giveaway program.

--Dewatering program.

--Recycling Center program.

--Demonstration Program for Liquid Sludge Application.

--Expanded Liquid Sludge Application program.

--Wet Oxidation program.

--Pyrolysis Demonstration program.

--Strip Mine Reclamation program.

--Landfill Operation program.

--Digester Improvement program.

The city had hoped that all 10 programs could function on a sufficient scale to allow cessation of ocean dumping by 1981. However, as of June 1976, only one--the Public Giveaway program--was progressing satisfactorily. This program began in March 1976 and is a small-scale sludge disposal system. It is designed to make the beneficial, soil conditioning aspects of sludge solids available to the public. According to EPA the giveaway program will be seasonal and probably will not be used in the winter months.

One alternative with the potential for reducing ocean dumping is the wet oxidation sludge treatment process. In the wet oxidation process, sludge is introduced to air at high temperature and high pressure and thus results in a considerable reduction of organic matter. The gas produced by the process contains very little residual pollutants except for odor and this can be removed by an afterburner.

In May 1975 EPA awarded a grant of $450,000 to the city to determine whether the system will work. Although the system was expected to be operational by fall 1976, its completion is now in doubt because the contractor wants to discontinue his involvement. EPA issued a stop work order in May 1976. This order is still in effect and completing the system and demonstrating its feasibility will be delayed until this situation is resolved.

Camden

Camden had a permit to ocean dump about 74,000 tons of sewage sludge a year. Initially Camden was going to upgrade and expand its two treatment plants. Sludge handling facilities were to be constructed to thicken and incinerate the sludge. Camden has failed, however, to prepare an environmental impact statement on the air pollution which would result from the incineration of the sewage sludge. One of the recent permits issued to Camden contained an implementation schedule for five potential alternatives to ocean dumping that Camden was to investigate and report on. The five alternatives were the public giveaway program, soil conditioning, landfill, chemical fixation, and composting.

However, Camden did not comply with the alternatives investigation and reporting requirements. Consequently, on October 2, 1976, the Regional Administrator, EPA Region III, accepted a hearing panel's recommendations and ordered Camden to stop ocean dumping when its permit expired November 10, 1976. The hearing panel concluded that Camden had enough time to implement the ocean disposal alternatives it was developing, considering Camden's storage capacity and the generation rate of sludge.

Camden protested the ban and submitted an application for a new permit, but the application was rejected by EPA because it was incomplete. In December 1976, however, EPA's Administrator had to issue Camden an emergency ocean dumping permit for sewage sludge. The emergency permit was given to Camden because the U.S. District Court of New Jersey ordered the Administrator to issue an emergency ocean dumping permit for a period not to exceed 90 days during which time the city is to be seeking and implementing alternatives to ocean dumping. The emergency permit was ordered by the court on its finding that the accumulated sludge was exceeding the available storage capacity at the city's sewage treatment facility and that immediate action to permit ocean dumping was necessary to avoid health problems that would be presented by other disposal alternatives.

New York-Northern New Jersey

The municipal treatment plants in this area serve more than 11 million persons and dump about 5 million tons of sewage sludge a year into the ocean.

In searching for alternatives to ocean dumping, these communities as a group initiated a sludge management study administered by the Interstate Sanitation Commission of New York, New Jersey, and Connecticut, under an EPA grant of $500,000.

The Commission's report, issued in June 1975, recommended that pyrolysis be adopted as the method of processing the area's sewage sludge and proposed that a pilot project be undertaken. The report estimates that the first full-scale installations could be fully operational by 1985 and would cost between $400 and $500 million based on 1975 dollars.

The report made the following points in support of the pyrolysis process:

--Dewatering of the sludge after chemical conditioning to obtain a minimum of 40 percent solids and then pyrolyzing the material and burning the pyrolysis products, gas and char, achieves maximum recovery of energy value of the sludge. This sytem requires no auxiliary fuel, except during startup, and produces more electrical power than is required in the sludge processing facility. The extra power produced can be used for lighting and air-conditioning of offices and in the waste treatment plant, if located nearby.

--The impact on air quality is a fraction of that presented by incineration. The impact on land is reduced to practically zero if the ash from the char is controlled in secured landfills.

--This processing and disposal system requires next to the lowest capital investment of all the disposal systems evaluated and has the least total costs. The low net costs are achieved due to the system being self-sufficient.

Appendix I compares the costs of pyrolysis with other sludge processing methods as contained in the Commission's June 1975 report. Another aspect of the Commission's work involves examining the legal and institutional matters that have to be resolved before the regional sludge management program can become a reality. The Commission is analyzing the New York and the New Jersey environmental control statutes and administrative regulations; examining whether sludge collection and disposal should be handled at the State level;

and drafting sample statutes and/or interlocal and interstate agreements and contracts needed to implement a regional sludge management program.

In May 1976 EPA awarded a grant of $168,725 to the Commission to undertake the recommended pyrolysis demonstration project, and in July 1976 the Commission issued another report stating that "With the recent rate of development of this technology, pyrolysis could be in practical use by the early 1980s." The report went on to say, however, that:

> "The study area is part of the New Jersey-New York-Connecticut Interstate air quality control region, which is not attaining Federal air quality standards. According to current EPA policy guidance, new air pollution sources (such as pyrolysis units) could not be operated unless there is at least an equivalent decrease in pollutant discharged from other sources. EPA would have to be willing to waive this requirement in order to stop ocean dumping in the early 1980's."

Furthermore, phasing out ocean dumping in the New York area could be prolonged because of the financial crisis facing New York City. Requests for funds for pyrolysis facilities will have to compete with requests for other capital projects.

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It appears unlikely that all three municipal areas will be able to cease ocean dumping by the 1981 EPA target date. Because of technical, funding, legal, and public acceptance problems that have to be resolved before alternatives can be implemented, it appears that the ocean will likely remain the receptacle for municipal wastes until such time that some of the proposed alternatives are proven on a full-scale basis. A February 1976 report prepared for EPA on the use of innovative technology in municipal wastewater treatment pointed out that:

--Landspreading of sludge needs more full-scale work on control of heavy metals and viruses, as well as techniques for application to the soil.

--Landfill disposal of sludge is of limited use in high watertable areas.

--Incineration of sludge creates air pollution problems unless emissions are controlled by expensive stack gas treatment systems.

--Composting faces serious public acceptance problems, as well as some technical difficulties.

--Pyrolysis is a process needing more demonstration before finding widespread acceptance.

EFFORTS TO PHASE OUT INDUSTRIAL DUMPERS

Since passage of the act in 1972, EPA has required industrial dumpers to either stop ocean disposal immediately or phase out the practice within a period of years. Eighty-one dumpers have ceased ocean dumping, and seven additional dumpers were to be phased out by June 1976. Industrial wastes pose a special problem due to the very large number of compounds involved and the need to develop specific treatment methods for many classes of these substances.

As more is learned about the harmful effects of possible alternatives, requests to ocean dump industrial wastes may have to be considered or environmentally acceptable alternatives found. For example, two counties in the New York City area have banned the disposal of certain industrial wastes in landfills. One county found that this method of waste disposal allowed toxic metals to degrade the quality of the groundwater on which the county relied for drinking water. EPA region II tentatively decided to allow these industrial wastes to be ocean dumped until environmentally acceptable alternative disposal methods could be implemented.

EPA requires ocean dumpers of industrial wastes to submit detailed reports on their efforts to find and implement alternative disposal methods. As of December 31, 1975, 32 industries had permits to dump wastes in the Atlantic Ocean. Some of these permit holders had target dates for phasing out ocean dumping completely, and others were still searching for alternatives. Even in cases where target dates for phasing out have been established, the dates may be extended by EPA. For example, two dumpers scheduled to phase out ocean dumping in October 1975 were given extensions to March 1976 and November 1976, respectively.

Industrial waste dumpers are examining a variety of alternatives for allowing them to discontinue ocean dumping. For example, one firm currently has a permit to ocean dump about 7,000 tons a year of liquid waste resulting from the production of manganous carbonate. The firm conducted tests to determine if ammonium chloride, a salable product, can be recovered from the waste. It is also investigating an alternative manufacturing process which produces ammonium nitrate, a fertilizer and commercial ingredient, as a by-product rather than ammonium chloride. If markets cannot be developed for

these by-products, the firm plans to proceed with an ammonia recovery program that will allow it to discontinue ocean dumping by July 1978.

Another firm had a permit to dump about 50,000 tons a year of liquid wastes resulting from the blending and canning of fruit drinks and fruit juices. The firm hired a consultant to find an alternative. The consultant recommended a system to evaporate the liquid wastes and incinerate the residue. Pilot tests were successful, and the firm is no longer ocean dumping.

One alternative which shows particular promise is the incineration of industrial wastes at sea. A research project involving ocean incineration of toxic industrial wastes was carried out in the Gulf of Mexico from October 1974 to January 1975. A specifically designed incinerator ship (see picture on p. 35) capable of burning 4,200 metric tons of chemical wastes per trip incinerated organic chloride wastes with greater than 99.9 percent efficiency at a site 135 miles south of Galveston, Texas. Incineration converted these wastes to hydrogen chloride and carbon dioxide in quantities not harmful to the oceans and the atmosphere.

Various methods which would allow the discontinuation of ocean dumping are being examined, including the modification of manufacturing processes to reduce the volume of wastes produced and the recovery of salable by-products from the wastes. There is a need, however, to assure that the alternatives selected are not more harmful to the environment than ocean dumping.

EFFORTS TO MINIMIZE EFFECTS OF OCEAN DUMPING BY MOVING THE DUMP SITES

EPA has relocated some dumping sites and might relocate others to minimize the effects of ocean dumping. Although such relocations may reduce some of the risks to public health by moving ocean dumping further offshore, they also transfer the degradation of the marine environment from one location to another.

Industrial waste dumpers who formerly disposed of wastes at the sewage sludge dump site in the New York Bight were moved to the toxic chemical waste site 106 nautical miles from the entrance to New York Harbor. This site was established in 1965 for wastes which State health authorities would not allow to be disposed of in landfills or in streams because of possible water supply contamination. In 1973 EPA moved the sewage sludge dump site used by Philadelphia and Camden from about 12 miles offshore to a point 50 miles southeast of

Delaware Bay. In addition, EPA might relocate the sewage sludge dump site in the New York Bight if it is subsequently determined that the existing site cannot safety accommodate any more sewage sludge.

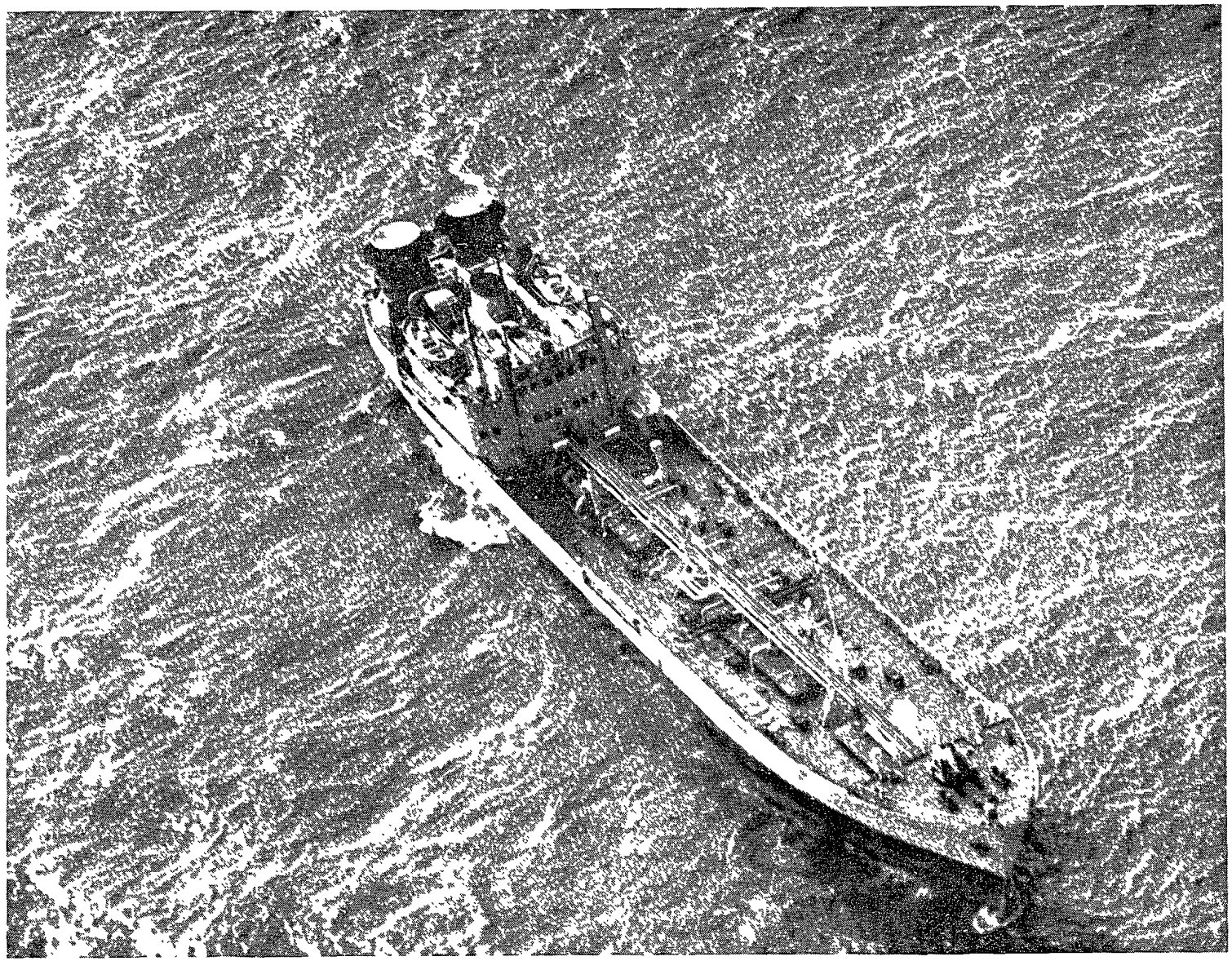
In 1974 EPA proposed that a new site for sludge dumping be designated for use until sludge dumping could be replaced by environmentally, technically, and economically viable land-based disposal methods. EPA took this action as a precaution against any possible public health effects that might result from overtaxing the existing dump site. To determine the best possible way of preventing public health hazards and coastal water quality degradation, EPA made an evaluation of the possibility of moving the present site and any alternatives to it. Based on its evaluation, EPA concluded in the February 1976 "Draft Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight" that to move the present sewage sludge dump site at this time was environmentally unnecessary and might, in fact, be more environmentally damaging than taking no action whatsoever. EPA's position was that (1) the present sewage sludge dump site should continue to be used, (2) a comprehensive monitoring program for the existing dump site should be started, and (3) a designation should be made of an alternative dump site that can be used if and when the monitoring program indicates that the existing site cannot safety accommodate any more sewage sludge.

ADVERSE EFFECTS OF ALTERNATIVES TO OCEAN DUMPING NEED TO BE CONSIDERED

The Marine Protection, Research, and Sanctuaries Act of 1972 allows ocean dumping to be used as a method of waste disposal unless EPA determines that such dumping unreasonably degrades the marine environment.

Sections 2(b) and 102(a) of the act are the primary sections which delineate the desires of the Congress on how ocean dumping is to be regulated. Section 2(b) states:

> "The Congress declares that it is the policy of the United States to regulate the dumping of all types of materials into ocean waters and to prevent or strictly limit the dumping into ocean waters of any material which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities." (Underscoring supplied.)



INDUSTRIAL WASTES BEING INCINERATED IN THE GULF OF MEXICO

COURTESY EPA REGION II

Section 102(a) states:

> "* * * the Administrator may issue permits * * * for the transportation * * * of material for the purpose of dumping it into ocean waters * * * where the Administrator determines that such dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities." (Underscoring supplied.)

Also an April 27, 1976, report by the House Committee on Merchant Marine and Fisheries and a May 13, 1976, report by the Senate Committee on Commerce reported that ocean dumping should be considered an acceptable disposal method for the present time, though strictly controlled and only when it will not unreasonably degrade or endanger human health or the marine environment. EPA has taken a highly restrictive approach by electing to eliminate ocean dumping of all municipal and industrial wastes by 1981. EPA has required dumpers to seek alternatives even when their wastes met EPA safety criteria. Although EPA's setting of mandatory phase-out dates appears to be consistent with the intent of the act, EPA does not consider whether disposal methods selected in lieu of ocean dumping would adversely affect other areas of the environment more than ocean dumping.

For example, we noted the following two situations in which the alternatives selected to ocean dumping may not be environmentally sound.

Dumping off of Puerto Rico

Five permit holders in Puerto Rico plan to cease ocean dumping and, instead, discharge the wastes into a regional waste treatment plant with an ocean outfall 3,300 feet offshore in about 50 feet of water. This waste treatment plant provides only primary treatment and will not change the nature of these liquid industrial wastes. As a result untreated wastes that were dumped 42 nautical miles offshore in more than 12,000 feet of water could now be discharged only 3,300 feet from shore.

In addition to the five existing firms, EPA has made a tentative decision to issue a permit to another firm in Puerto Rico, to ocean dump 5 million gallons a year of liquid pharmaceutical wastes. That firm also identified, as an alternative to ocean dumping, the future use of this primary treatment plant.

Landfilling industrial wastes

Many former ocean dumpers of industrial wastes have adopted landfilling as an alternative. In September 1975 EPA performed a limited followup of disposal methods used by companies which previously ocean dumped the wastes. Of 45 companies surveyed, 29 were found to be landfilling the wastes. Of these, the survey disclosed that 21 companies send their material to the same landfill, one of several in New Jersey authorized by that State to accept hazardous substances and liquid wastes.

The EPA survey indicated that this landfill site was of questionable adequacy for acceptance of large volumes of industrial liquids. It is located on the west bank of the Raritan River, and the entire area is nearly at sea level, with depth to groundwater generally little more than a few feet. During periods of high rainfall, parts of the landfill are submerged. Seepage from the landfill has been a recurring problem and can occasionally be seen running from the banks of the Raritan into the river. Although monitoring of the site by New Jersey has been minimal, the survey concluded that it was also possible that harmful materials were moving directly into the river by means of the groundwater and creates the likelihood that material diverted initially from the ocean is being carried back into it by the river.

Effective July 18, 1976, however, the landfill was ordered to stop accepting liquid chemical and hazardous wastes. Although all industrial disposal operations at the site have been terminated and the wastes are being disposed of by some other means, the New Jersey Department of Environmental Protection does not know where the wastes are now being disposed of.

EPA's July 1976 "Draft Environmental Impact Statement," regarding proposed revisions to ocean dumping criteria, recognized that alternatives to ocean dumping may adversely affect other parts of the environment.

According to EPA:

> "Enforcement of the proposed revisions to the criteria will require many dumpers, especially those dumping sewage sludge, to find other alternatives to ocean dumping for ultimate disposal of their wastes. This will result in adverse impacts on air, land, or other parts of the aquatic environment, depending on what the means of final treatment and the location for ultimate disposal may be."

* * * * *

"Thus, if the criteria are applied in such a fashion as to force dumpers out of the ocean into less environmentally acceptable alternatives, there may be adverse impacts on other parts of the environment as a result of using these alternatives."

CONCLUSIONS

Since the passage of the Marine Protection, Research, and Sanctuaries Act of 1972, EPA has experienced both problems and progress in preventing harmful wastes from entering the ocean. Although some progress has been made in phasing out the dumping of industrial wastes, the dumping of municipal wastes continues to increase and is expected to increase for some time. Problems in phasing out industrial dumpers may arise if the dumpers cannot find environmentally acceptable alternatives to ocean dumping or cannot modify their manufacturing processes to reduce the harmful nature of the wastes they produce. Also many of the proposed alternatives for municipal dumpers are still being studied, and it is unlikely that the alternatives will be developed to the extent that they would allow cessation of ocean dumping of municipal sludge by 1981.

Although EPA has set 1981 as the date after which industrial and municipal wastes can no longer be dumped, it does not know whether the transferring of these wastes to other parts of the environment, such as air, groundwater, or land, will have a positive or negative effect on the total environment.

Alternatives to ocean dumping being implemented by some industrial dumpers may not be environmentally sound and may actually be resulting in more harm to the environment than ocean dumping. Before phasing out municipal and industrial dumpers, we believe EPA should thoroughly evaluate the proposed alternatives to make certain that they are not more harmful than ocean dumping. As the results of research now underway by EPA and other agencies becomes available, it may be possible for EPA to become more selective in permitting the disposal of some wastes by ocean dumping if it can be shown that the disposal will not cause unreasonable degradation of the marine environment. The oceans are only a part of the total environment which can be used for disposal of wastes, and problems which affect the oceans and solutions to these problems must be viewed in terms of their interrelation with the total environment.

RECOMMENDATION

We recommend that the Administrator, EPA:

--Consider what effect alternatives to ocean dumping would have on the total environment before phasing dumpers out of the ocean into less environmentally acceptable alternatives.

AGENCY COMMENTS AND OUR EVALUATION

In commenting on our report, EPA stated that it could only require a dumper to develop and implement an environmentally acceptable alternative so long as his ocean dumping permit was in force. Although it may be true that EPA has little control over the alternative ultimately selected by a dumper, EPA does possess a broad base of knowledge regarding the effects various pollutants might have on air, land, and water and is in a position to actively encourage dumpers to select reliable alternatives. We believe that EPA has responsibility to protect the overall environment and that it should not eliminate ocean dumping unless selected alternatives are less harmful than ocean dumping.

EPA pointed out that there is an inherent conflict that must be recognized between immediately minimizing adverse impact (unreasonable degradation) to the marine environment while, at the same time, selecting the most environmentally acceptable method of disposal for the wastes which society produces. According to EPA, the report criticizes dumping which has not been eliminated but, at the same time, criticizes the attempt to implement ocean dumping alternatives.

Although we are pointing out that a large volume of industrial and municipal wastes are still being ocean dumped, we are not implying any criticism of attempts to implement alternatives to the ocean dumping of these wastes. To the contrary, we believe EPA should continue to pursue alternative methods of waste disposal but wastes which are harmful to the marine environment should not be disposed of by alternative means without considering the environmental consequences. Eliminating ocean dumping is a laudable goal only if the wastes can be disposed without causing more environmental harm than is currently resulting from ocean dumping.

Where appropriate, changes were made to the report regarding the other comments made by EPA.

COMPARATIVE COSTS OF DIFFERENT SLUDGE PROCESSING AND DISPOSAL SYSTEMS

System	Total costs	Operation and maintenance costs	Net costs (note a)
	(per ton)		
Incineration-pyrolysis (chemical conditioning and filter press):			
without afterburner	$56.30	$32.10	$46.80
with afterburner	64.60	39.70	46.70
Incineration-pyrolysis (heat conditioning and filter press):			
without afterburner	77.15	42.70	77.15
with afterburner	80.25	45.50	80.25
Wet-air oxidation (intermediate pressure)	103.00	61.50	103.00
Carver-Greenfield (dehydration incineration process)	106.00	52.70	106.00
Drying--Sale of product	110.00	67.80	80.00
Composting--Sale of product	75.00	53.50	60.00
Land application (as stabilized liquid or dewatered cake; 100 miles from study area)	110 to 120	10 to 35	110 to 120

[a] These costs are the total costs to build and operate the system less any revenue received from resources recovered by the process.

Note: Information taken from the "Phase I Report of Technical Alternatives to Ocean Disposal of Sludge in the New York City-New Jersey Metropolitan Area" (June 1975) prepared for the Interstate Sanitation Commission.

ADVERSE EFFECTS OF OCEAN DUMPING OF SEWAGE SLUDGE AND INDUSTRIAL WASTES

We reviewed several studies concerning the ocean dumping of sewage sludge and industrial wastes. The studies were prepared by such organizations as the:

--Council on Environmental Quality.

--U.S. Army Corps of Engineers Coastal Engineering Research Center.

--National Academy of Sciences.

--National Oceanic and Atmospheric Administration.

Most of the studies agreed that, although additional research was needed, ocean dumping does produce harmful effects to the marine environment. The following sections describe in more detail the adverse effects that may result from ocean dumping.

HEAVY METALS CONTAMINATION

Toxic heavy metals--including mercury, cadmium, zinc, arsenic, copper, and lead--can kill marine life and can produce sublethal effects, including reduced species vitality or growth, reproductive failure, and interference with sensory functions.

The toxic effects of heavy metals in marine plants and animals may be persistent and cumulative over a long period. Shellfish are known to concentrate heavy metals in their tissues which, if eaten, pose a health danger to man. Organisms feeding on marine plant life pass the pollutants on to higher organisms, and, as this process moves through the food chain, concentrations reach their highest levels in marine mammals, birds, and man.

In a 1972 report on marine water quality criteria, the National Academy of Sciences suggested that there should be no artificial additions of cadmium to the marine environment and that inputs of mercury, beyond those occurring naturally, should be eliminated. Other studies concerning heavy metals contamination have reported:

--Concentrations of heavy metals in the New York Bight exceeded permissible limits. One study found

concentrations of copper which indicated widespread copper contamination.

--While 10 parts per million (ppm) of zinc in sea water is considered toxic to marine life, one analysis showed that an average of 2,459 ppm of zinc was contained in sewage sludge.

--After less than 1 year of dumping at the present Philadelphia sewage sludge dump site, clams and scallops had accumulated high levels of four metals at one or more survey stations in the 1,000-square-mile area surrounding the dump site.

--The abnormal concentrations of heavy metals, microorganisms, and organic materials were correlated with reduced species diversity and generally impoverished bottom-dwelling populations in the New York Bight dumping area. Very few juvenile rock crabs were present, and adult crabs found on the sludge beds were frequently diseased or moribund. Since the sewage sludge dump site in this area is in the path of crabs and lobsters which seasonally migrate from inshore to offshore waters, this study concluded that the wastes resulted in the mortality of migrating crustaceans.

--Preliminary results of another study of the New York Bight dumping area showed that fish had higher than normal levels of heavy metals in their tissues. An analysis of fish for mercury showed that weakfish with fin-rot disease had the greatest amount of mercury in their tissues. Compared with weakfish collected off the Virginia coast, which had a average of 0.31 ppm in liver tissue, diseased fish from the New York Bight had an average of 0.54 ppm in the liver tissue.

HEALTH HAZARDS

Human health can be affected by direct contact with polluted water during recreational or other activities and also by consuming contaminated fish or shellfish.

Sewage sludge contains pathogens from human fecal matter. Pathogens are bacteria and viruses that cause diseases. Viruses are the smallest known pathogenic entities and are capable of causing a variety of severe, sometimes fatal,

diseases. There is concern that, even in ocean waters, viruses may survive for a period of days to weeks following discharge.

The Council on Environmental Quality recommended in 1970 that the ocean dumping of sewage sludge with large quantities of pathogens be stopped as soon as possible. About 40 percent of all sludge dumped in the New York Bight is of this type.

Another health hazard involves the human ingestion of contaminated fish. One report indicated that many of the cases of infectious hepatitis in the United States in 1972 were traced to the eating of raw shellfish taken from sewage-polluted coastal regions.

ECONOMIC EFFECTS

The coastal areas are used for recreational purposes, including swimming, boating, and sport fishing, and for commercial fishing and shellfishing, each of which has economic value to the area served.

Ocean pollution has three broad effects detrimental to various segments of the fishing industry.

--Closure of areas to fishing and shellfishing.

--Prohibiting sale of products because of contamination.

--Impact on mortality, growth, and reproduction rates of living marine resources.

A major loss to the economy is incurred when commercially valuable fish and other seafood species are killed directly or indirectly or rendered inedible by ocean pollution. The Council on Environmental Quality estimated that in 1969 the U.S. shellfish industry incurred losses of about $63 million, or about 20 percent of the value of the potential catch, due to pollution.

One difficulty in evaluating the economic impact of pollution is the attachment of dollar values to the social costs which are outside the usual market pricing system. Calculating the monetary value of ocean-related activities that may be affected by pollution in near-shore areas is difficult.

The New Jersey Department of Environmental Protection reported in 1974 that the pollution of the New York Bight

poses a potential threat to the proposed Gateway National Recreation area. This area is expected to serve 15 million visitors each year.

OXYGEN DEPLETION

Oxygen is necessary for the support of marine and aquatic life and for the biological degradation of organic materials. The ocean dumping of heavy loads of organic wastes depletes the oxygen level of the water necessary to support life and alters the diversity of marine organisms. Oxygen deficiency in an area may be self-perpetuating. The accumulation of organic matter, sulfides, and some metals can act as a reservoir of future oxygen demand. Even after the disposal of the organic matter is stopped, it may be a long time before the area recovers.

Sewage sludge contains organic materials. In the New York Bight, where sewage sludge has been dumped for more than 50 years, the oxygen concentration as a percent of saturation declined from 61 percent in 1949 to 29 percent in 1969 and was as low as 10 percent in the center of the dump site. During late July through mid-October, the dissolved oxygen content of bottom waters over the sewage sludge dump site in the New York Bight is frequently less than two parts per million over several miles and is insufficient to support marine life. One study showed that sizable areas of the sea floor in the New York Bight, primarily near the sewage sludge dump site, were nearly devoid of marine life.

BIOSTIMULATION

Biostimulation is the accelerated fertilization of plant life, such as algae. This condition produces excessive quantities of plant life. When these plants die, oxygen necessary to support marine life is used in their decomposition. This process changes the nature of bottom sediments and, thus, whole communities of bottom-dwelling organisms.

Sewage sludge is rich in nutrients, such as phosphates and nitrates, that cause biostimulation. For example, areas which formerly supported surf clams in sand may become covered with algal mud, a situation to which the surf clams cannot adapt.

A report issued by the New Jersey Department of Environmental Protection in January 1974 indicated that biostimulation caused by the addition of too much of a necessary nutrient or of unnatural nutrients may have contributed to

plankton blooms which have plagued some of our shore areas for several years. This has caused aesthetic and recreational problems as well as concern for the safety of marine life harvested for consumption.

APPENDIX III

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 8 1976

OFFICE OF
PLANNING AND MANAGEMENT

Mr. Henry Eschwege, Director
Community and Economic Development Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

We received copies of GAO's draft report to Congress entitled, "Progress and Problems in Regulating Ocean Dumping of Sewage Sludge and Industrial Wastes," for review and comment September 3, 1976. Attached are the Agency's comments as prepared by the Office of Water and Hazardous Materials.

We appreciate the opportunity to review and comment on the report prior to its submission to Congress.

Sincerely yours,

Alvin L. Alm
Assistant Administrator
for Planning and Management

Enclosure

APPENDIX III

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 28 1976

SUBJECT: Draft GAO Report to the Congress on Progress and Problems in Regulating Ocean Dumping of Sewage Sludge and Industrial Wastes

FROM: John T. Rhett, Deputy Assistant Administrator
Office of Water Program Operations (WH-546)

TO: Malcolm S. Stringer, Director
Office of Audit (PM-209)

THRU: Andrew W. Breidenbach, Assistant Administrator
Office of Water and Hazardous Materials (WH-556)

We have reviewed the draft General Accounting Office (GAO) Report to Congress on Progress and Problems in Regulating Ocean Dumping of Sewage Sludge and Industrial Wastes.

The ocean dumping permit program was first authorized 3 1/2 years ago under the Marine Protection, Research, and Sanctuaries Act of 1972. The GAO Report outlines some of the regulatory and operational problems that the Environmental Protection Agency (EPA) has encountered in implementing the new permit system. We, basically, agree with the GAO analysis of the problems that have occurred and we agree that EPA must continue to work to eliminate those problems. However, we think that the report does not adequately acknowledge the operational progress that has been made or the legislative restraints that are involved. There is little recognition of any progress and we cannot agree with the conclusion drawn in the Report that "the ocean dumping program . . . has had limited success in minimizing the harmful effects of ocean disposal of municipal and industrial wastes."

Since the ocean dumping permit program went into effect on April 23, 1973, the previously uncontrolled practice of ocean dumping has now come under strict regulation. In over 80 cases, former or potential dumpers have been phased out of ocean dumping or denied permits. In addition, EPA has issued no permits to new dumpers (those who had not been ocean dumping before the Act became effective).

APPENDIX III

The EPA policy in implementing the permit program has been to strictly regulate all ocean dumping and to phase out all dumping that adversely affects human health and welfare or the marine environment. As the Act specifies in Section 102(a), EPA has required all permit applicants to evaluate the need for ocean dumping and the alternatives to ocean dumping, as well as the possible impacts of the proposed dumping.

The Draft Report particularly emphasizes two aspects of the EPA ocean dumping permit program: the criteria for evaluating wastes, including the discharge rate for particular wastes, and the development of alternatives to ocean dumping.

Criteria

EPA has developed criteria for evaluating wastes proposed for ocean dumping and for setting limits for the discharge of wastes. Best scientific evidence indicates that these limits are sufficient to protect the marine environment from adverse impact. The criteria include a limiting permissible concentration (LPC) for each waste which is set by determining the toxicity of individual wastes to appropriate marine organisms through a bioassay, by applying a safety factor of that toxicity, and by determining dilution of the waste after initial mixing. The LPC is used to determine a rate of discharge which should protect the marine environment, although exceeding this rate will not necessarily degrade marine ecosystems.

Initially the bioassay utilized the brine shrimp, not as an "appropriate sensitive marine organism," but as a test organism for ranking relative toxicity of wastes to be ocean dumped. This test was used only until appropriate marine organisms could be designated and approved testing procedures developed. In 1975 at the recommendation of the EPA Office of Research and Development, three organisms (fin-fish, phytoplankton, zooplankton) were designated for use in bioassay tests for determination of the LPC. These tests are also utilized to monitor the toxicity of wastes dumped. The bioassay procedures have recently been formalized in an EPA methods manual on bioassays.

Unfortuantely, only a limited number of permittees have been issued permits utilizing a discharge rate from the LPC based on the "appropriate sensitive marine organism" bioassay. All other permittees find that it is either technically infeasible or economically unreasonable to meet LPC; i. e., to discharge wastes over a period of 30 to 200 hours. In addition, the barges dumping wastes over the extended discharge time would create a navigational hazard near some active shipping lanes.

While, as correctly pointed out in the Draft GAO Report, the majority of municipal and industrial wastes presently dumped in the ocean, fail to meet EPA's Criteria, the Report does not note that the Agency has issued only Interim permits to those waste generators. Under EPA's regulations, an Interim Permit may be issued where the waste generator fails to meet Criteria, but can demonstrate need and no feasible alternative disposal method. Issuance of such a permit requires the development and timely implementation of an alternative or the bringing of the waste within compliance with the Criteria within a reasonable time frame.

In this regard, the Draft GAO Report also does not note that all present municipal and industrial ocean dumpers were dumping prior to April 23, 1973, the effective date of the Act. EPA has not issued a permit to a new dumper, and, in fact, has phased out or denied permits to many historic dumpers. The 250 or so municipal waste generators in the New York-Jersey metropolitan area, who were dumping prior to 1973, have been reduced to less than fifty. Industrial dumpers, about 150 prior to 1973, now number fifteen in the New York Bight.

Alternatives

Under interim permit conditions, all waste generators are required to develop and implement environmentally acceptable, technically feasible, and economically reasonable alternative disposal methods. These alternatives are reviewed by EPA staff and, where appropriate, by the respective State. If the alternative involves the NPDES permit program, then EPA and/or State personnel would monitor the compliance of the waste discharger with permit conditions and environmental regulations. If the alternative involves land application, then the appropriate State agency usually would monitor compliance. If incineration or some other thermal treatment is considered, then the alternative is evaluated under the applicable portions of the Clean Air Act.

There is an inherent conflict that must be recognized between immediately minimizing adverse impact (unreasonable degradation) to the marine environment, while at the same time selecting the most environmentally acceptable method of disposal for the wastes which society produces. The Report criticizes dumping which has not been eliminated, at the same time criticizing the attempt to implement alternatives to ocean dumping.

It should be pointed out in the development of environmentally sound alternatives that EPA cannot require a waste generator to obtain a new ocean dumping permit, if he wishes to utilize another alternative disposal method. It can only require while a permit is in force that he develop and implement an environmentally acceptable (i.e., legal) alternative.

APPENDIX III

GAO Recommendations

The Draft Report makes two recommendations for EPA: (1) to establish a task force to locate sites that would permit dumping at rates that would not only be safe to the marine environment but also would be safe for navigational purposes and (2) to consider the effect of alternatives on the total environment.

Rather than setting up a separate task force, the already existing Interagency Ocean Dumping Coordinating Committee could be utilized to locate ocean dumping sites for continuing use. EPA has already established a program of writing voluntary Environmental Impact Statements on ocean dumping sites to determine whether use should be continued or terminated. However, the relocation of disposal sites for navigational safety will not alone solve the problem of an extended discharge time for dumpers, since there are other factors including economic and technical feasibilities.

The evaluation of alternatives will continue to be a key aspect of the ocean dumping permit program. We agree that the total environmental impact must be considered in phasing dumpers out of ocean dumping.

A number of proposed technical changes have been submitted informally to the GAO auditors with advance copies of our comments.

ASSISTANT SECRETARY
FOR ADMINISTRATION

OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

October 7, 1976

Mr. Henry Eschwege
Director
Community and Economic Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in response to your letter of September 2, 1976, requesting comments from the Department of Transportation on the General Accounting Office draft report entitled, "Progress and Problems in Regulating Ocean Dumping of Sewage Sludge and Industrial Wastes." We have reviewed the report in detail and prepared a Department of Transportation reply.

Two copies of the reply are enclosed.

Sincerely,

/s/ William P. Davis for
William S. Heffelfinger

Enclosures

GAO note: Page number references in this appendix may not correspond to pages of this report.

APPENDIX IV

DEPARTMENT OF TRANSPORTATION REPLY

TO

GAO DRAFT REPORT OF 2 SEPTEMBER 1976

ON

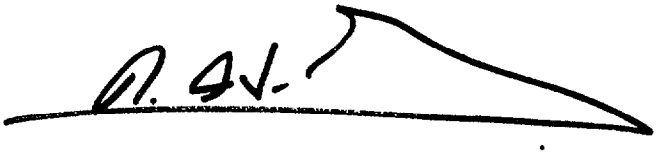
PROGRESS AND PROBLEMS IN REGULATING OCEAN DUMPING OF SEWAGE SLUDGE AND INDUSTRIAL WASTES
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TRANSPORTATION

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS:

GAO's draft report concludes that Coast Guard surveillance of ocean dumping activities in the New York Bight area during fiscal year 1975 was inadequate. The draft report recommends an increase in the overall level of ocean dumping surveillance, including the use of shipriders to monitor night dumping operations, and the continuation of efforts to develop new methods whereby compliance with permit conditions may be more effectively monitored.

DEPARTMENT OF TRANSPORTATION POSITION:

The Department of Transportation concurs in the recommendations of the draft report but takes exception to some of the findings stated in the report. Increased emphasis has been placed on the ocean dumping surveillance effort such that program goals are now being met with regard to non-toxic dumping activity. Surveillance of toxic dumping activity, while falling short of program goals, has improved significantly in the past several months and further improvements are anticipated. Development of an electronic navigational recorder to more effectively monitor compliance with permit conditions is progressing with operational utilization expected by the end of CY 1977. Specific comments regarding the content of the report are listed in Enclosure (1).



Rear Admiral, U.S. Coast Guard
Chief of Staff

COMMENTS REGARDING THE CONTENT OF THE REPORT:

1. Page 20, line 1: The inference is that the remarks apply to the Coast Guard-wide surveillance effort while the statement on page 20 indicates that the GAO review was limited to Third Coast Guard District surveillance activities.

2. Page 20, lines 3-5: The contention that there is a program goal of boarding 10 percent of the vessels to check for valid permits is erroneous. Attached hereto are the published guidelines for the ocean dumping surveillance program, paragraph 4.a.(1) of which requires the checking for valid permits to be accomplished on a "spot-check basis." Furthermore, the statement that "no vessels were boarded" is inconsistent with the next statement in the report which states that seven percent of the toxic dumpers had Coast Guard shipriders on board. One of the primary functions of the shiprider is to check for a valid permit. Shiprider missions are also recorded as "boardings."

3. Page 20, lines 10-14: This item infers that the Coast Guard's goal of providing surveillance over 10 percent of the non-toxic dumping activity is restricted to observing the vessels while actually engaged in the dumping operation. The attached surveillance guidelines do not require actual observation of the dumping activity. Paragraph 4.a.(3)(a) recognizes intercepting the vessel as surveillance while paragraph 4.a(4) even provides for surveillance over former sites and other potential disposal areas where, hopefully, no dump vessels will be sighted. While observation of the dumping operations is occasionally desirable to verify dispersal rate, this, as pointed out in the report, is often difficult to accomplish. The Coast Guard feels that the possibility of dumping enroute to or from the site poses the greater environmental threat and therefore concentrates its surveillance efforts on the transportation segment of the disposal operation. This will be amplified in a soon to be issued revision of the surveillance guidelines. Using the figures presented in the GAO statement, 42 vessels were observed dumping while 519 were observed while in transit, resulting in surveillance of 561 vessels or 9.3 percent of the 6,038 dumping missions.

4. Page 21, second paragraph: Comment number (1) above applies. While the Coast Guard did not provide night surveillance over non-toxic disposal activities in the New York Bight area, during fiscal year 1975, this comment does not apply Coast Guard wide. Non-toxic dumps occurring in the San Francisco area are monitored day and night by radar.

5. Page 21, third paragraph: The allegations of frequent violations of the ocean dumping regulations should be deleted or the specifics of the alleged violations documented. While these two scientists are very positive in their testimony that these violations occurred, no reports of the alleged violations have been submitted to the Coast Guard for investigation, and the Coast Guard is therefore unable to confirm these charges.

APPENDIX IV

6. Page 28, second sentence in first paragraph: Again, the GAO has interpreted the Coast Guard goal of monitoring 10 percent of non-toxic dumping to be surveillance of the actual dumping operation as authorized by the permit. As stated in comment 3, the Coast Guard considers surveillance of the transportation routes of dumping vessels to be more significant than monitoring of dumping in the authorized dumping area since most serious violations involve off site dumping enroute to or from the dump site. Surveillance of the actual authorized dumping operation will not detect the illegal off site dumps. The report states that observation of less than one percent of ocean dumping operations is not adequate. The inference is that less than one percent of all aspects of dumping operations were monitored. This inference should be corrected to indicate that less than one percent of actual legally authorized dumping was observed. However, an additional 8.6 percent of the dumping vessels were monitored in transit to detect illegal off site dumping.

7. Page 28, second paragraph: It is agreed that the use of shipriders would be an effective deterrent to illegal nighttime dumping by the vessels on which they are embarked. However, it should be recognized that shipriders provide no deterrent to the unlawful activities of unaccompanied vessels. Vessel patrols, while having detection problems at night, present an unannounced and unknown threat and therefore a deterrent to all would-be violators. The most effective deterrent to illegal dumping at night would be a balanced program using both methods of surveillance.

APPENDIX IV

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
U S COAST GUARD (G-WEP-5/73)
400 SEVENTH STREET SW
WASHINGTON, D.C. 20590
PHONE 202-426-9578

COMDTINST 5922.9A

8 APR 1975

COMMANDANT INSTRUCTION 5922.9A

Subj: Guidelines for Ocean Dumping Surveillance and Enforcement

1. Purpose. The purpose of this Instruction is to publish policy relating to the Coast Guard's responsibilities pursuant to the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972.

2. Cancellation. Commandant Instruction 5922.9, dated 19 March 1971, is cancelled.

3. Discussion.

a. Title I of the MPRSA prohibits, with certain exceptions, the dumping or transportation for dumping, without a permit, of "materials" into "ocean waters" as defined in the Act. The administration of the ocean dumping program is primarily the responsibility of the U.S. Environmental Protection Agency (EPA), which will issue all permits for ocean disposal except those for dredge spoils which will be issued by the U.S. Army Corps of Engineers (COE). Section 107(c) of the MPRSA assigns to the Department of Transportation (USCG) the responsibility for surveillance and other appropriate enforcement activity to prevent unlawful dumping or transportation for dumping.

b. Surveillance, for the purposes of implementing Title I of the MPRSA, is considered to include those activities necessary to ensure that ocean dumping is executed in accordance with the Act or other appropriate laws and regulations, and in accordance with a permit issued pursuant to the Act.

c. Research and monitoring, for the purposes of implementing Title II of the MPRSA, includes the collection of data to determine the long and short term effects of ocean dumping on the marine ecosystem, such as the toxic effects of pollutants on the biota, and the physical/chemical interactions of dumped material within the marine environment. EPA will direct the laboratory-oriented efforts, NOAA will direct those activities utilizing ocean survey techniques, and COE will direct research on the effects of dredge spoils disposal.

d. Permits. There are two main classes or types of ocean dumping permits. These are "general" and "special."

(1) General permits may be authorized by the Administrator of the EPA for such materials which he determines will have a minimum adverse environmental impact. General permits are authorized for non-toxic materials generally disposed of in small quantities. Two general permits presently in existence are for burials at sea and the sinking of U.S. Navy target

vessels. General permits are published in the Federal Register and specify the types and amounts of materials which may be dumped, the designated sites or areas for such dumping activities, and any other conditions deemed appropriate by EPA. These permits are effective for an indefinite period of time.

(2) Special permits are issued to a specific applicant and have a fixed expiration date. Any person desiring to dump material (with the exceptions of fish wastes and any materials covered by a general permit) or to transport material from the U.S. for the purpose of ocean dumping, must first obtain a special permit from EPA or COE as specified in the Act. Emergency, interim, and research permits are variations of special permits. Permit categories are defined in Section 220.3 of EPA's Ocean Dumping Regulations and Criteria (40 CFR, Chapter 1, Subchapter H). Special permits may be issued to an applicant after evaluation of the need, effect on the environment, and alternatives. Permits will specify the type and quantity of material authorized to be dumped, the site, disposal criteria such as the distance to be traversed during the discharge, the permit expiration date, and other appropriate conditions. Approved dump sites are listed in EPA's Ocean Dumping Regulations.

4. Action.

a. Surveillance. Coast Guard surveillance in support of the ocean dumping program will range from the checking for valid permits to the escorting of dumping vessels to the disposal site. The degree of Coast Guard involvement in each particular operation will depend upon the type of material to be dumped as well as the availability of Coast Guard resources. It is emphasized that surveillance of ocean dumping is not restricted to dedicated surveillance missions or in response to a specific ocean disposal activity. Any Coast Guard unit that observes a suspected violation shall report it to the appropriate district commander (m). District commanders are to issue appropriate guidance to field units directly engaged in the ocean dumping surveillance and enforcement mission. This guidance will specify the location and primary use of active dump sites under his purview and such additional guidance deemed necessary to effectively carry out the intent of this Instruction.

(1) Dumping vessels will be checked for valid permits on a spot check basis.

(2) Resources permitting, surveillance will be provided to oversee the following ocean disposal activities to the extent indicated;

(a) All ocean dumping of toxic materials.

(b) Each dump for which EPA has specifically requested surveillance.

(c) 10% of other ocean disposal activities.

(3) Surveillance will normally be accomplished utilizing one of the following methods based on practicability and resource availability:

(a) Assignment of a vessel to intercept and/or escort the transporting vessel to the dump site.

(b) Surveillance of the assigned dump site by aircraft in response to a given disposal activity.

(c) Assignment of a shiprider to ride the towing vessel to the dump site. Shipriders must be provided quarters and subsistence by the permittee equivalent to that provided for other personnel aboard. Shipriders are to act solely as observers, and will neither make changes to the provisions of the dumping permits, nor direct or influence the actions of the permittee in any way.

(d) Radar coverage of the dump site.

(4) Random general surveillance missions should be conducted to discourage illegal dumping. Examples of illegal dumping include dumping without a permit, not in accordance with a valid permit, or at other than the authorized site. Missions should not be limited to authorized sites but should include former sites and other potential disposal areas.

(5) No dedicated surveillance missions are presently anticipated for the enforcement of general permits. However, suspected violations observed by Coast Guard units shall be reported to the appropriate district commander (m) for evaluation and possible referral to EPA.

b. Monitoring. EPA, NOAA, and other agencies may request assistance in monitoring the ecological effects of ocean dumping and other man-induced changes to the ocean ecosystem. Operations permitting, district commanders will provide appropriate support such as sample taking, providing site overflights, or transporting of personnel to the disposal site or towing vessel.

c. Enforcement. Pursuant to Section 107(c) of the MPRSA, information concerning violations of the Act, of the regulations promulgated pursuant thereto (40 CFR 226), and of ocean dumping permit conditions, shall be forwarded using Form CG-2636, Report of Violation, to the appropriate EPA regional administrator(s) for his information and/or action. Information copies shall be forwarded to Commandant (G-WEP).

d. Application Review. EPA's Ocean Dumping Regulations call for the EPA regional administrators to forward copies of ocean dumping permit applications to the cognizant Coast Guard district commander. District commanders are to request copies of all permit applications processed by COE. District commanders will review the applications and may request imposition of additional provisions/conditions on the permit to facilitate surveillance and enforcement activities. Examples of special conditions

APPENDIX IV

that might be included in a permit are the use of specific navigation techniques, the transmittal to the Coast Guard of certain vessel logs or records, or the requirement to communicate towing vessel movement and activities information to the Coast Guard. When the requirement for shipriders appears likely, permit conditions must state that shipriders are to be provided quarters and subsistence by the permittee equivalent to those provided for other personnel aboard. District commanders are to insure that those Coast Guard facilities engaged in spot checking for valid permits are provided copies of the final permits issued.

e. Operational Waste Disposal.

(1) While the ocean disposal of ship generated operational wastes is not considered ocean dumping under the provisions of the MPRSA, the U.S. Department of Agriculture (USDA) plant and animal pest regulations prohibit the disposal of garbage from vessels in foreign trade into U.S. navigable waters. In addition to any other action taken (such as referral to U.S. Attorney for Refuse Act prosecution), Coast Guard units aware of a possible violation should notify the nearest office of USDA's Animal and Plant Health Inspection Service (APHIS). APHIS inspectors are located at most major seaports.

f. Reports. Quarterly summaries of ocean dumping activities are required to determine the impact of the program on Coast Guard resources. Therefore, all district commanders will submit quarterly reports to Commandant (G-WEP-5/73) within twenty days of the end of the reporting period, commencing with Fourth Quarter FY75. Enclosure (1) contains a listing of the required information which may be duplicated for transmittal to Commandant (G-WEP-5/73). Additional comments and suggestions are encouraged. (RCS-G-WEP-14017) applies.

R. L. PRICE
Chief, Office of Marine Environment and Systems

Encl: (1) Sample Ocean Dumping Activities Report Format

DIST: (SDL No. 100)

A: abcde(3); fhmv(2); remainder(1)
B: c(20) f(15); g(11); e(10); r(7); h(6); b(3); j(2); dpq(1)
C: a(5); be(3); go(2); m(1)
D: d(1)
E: no(1)
F: None

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ENCL (1) to COMDTINST 5922.9A
8 APR 1975

CCGD_ Quarter ending __

A. Applications and permits received:

(1) ___EPA applications ___EPA permits
___COE applications ___COE permits

B. Loads dumped

(1) ___Toxic loads dumped
(2) ___Non-toxic loads dumped

Note: Unless otherwise indicated, all loads that are dumped at a toxic site are to be considered toxic dumps.

C. Surveillance missions conducted

(1) Toxic load missions:

(a) ___vessel missions ___vessel hours
(b) ___aircraft missions ___aircraft hours
(c) ___shiprider missions ___shiprider hours

(2) Other missions for known dumping activities

(a) ___vessel missions ___vessel hours
(b) ___aircraft missions ___aircraft hours
(c) ___shiprider missions ___shiprider hours
(d) ___inport boardings ___man hours

(3) General surveillance missions as defined in 4.a(4) of COMDTINST 5922.9A

(a) ___ vessel missions ___vessel hours
(b) ___ aircraft missions ___aircraft hours

Note: The sum of 1, 2, and 3 above will be the total number of missions and hours expended on operational surveillance missions.

D. Specific mission requests from other agencies:

(1) ___surveillance missions requested ___missions conducted
(2) ___monitoring missions requested ___missions conducted

E. Administrative hours:

(1) ___district man hours
(2) ___field man hours

F. Violations

(1) ___Violations reported to EPA (attach copies)

G. Comments

PRINCIPAL OFFICIALS RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

ENVIRONMENTAL PROTECTION AGENCY

	Tenure of office From	To
ADMINISTRATOR:		
Russell E. Train	Sept. 1973	Present
John R. Quarles, Jr. (acting)	Aug. 1973	Sept. 1973
Robert W. Fri (acting)	Apr. 1973	Aug. 1973
William D. Ruckelshaus	Dec. 1970	Apr. 1973
ASSISTANT ADMINISTRATOR FOR WATER AND HAZARDOUS MATERIALS:		
Andrew Breidenbach	Sept. 1975	Present
James L. Agee	Apr. 1974	Sept. 1975
Roger Strelow (acting) (note a)	Feb. 1974	Apr. 1974
Robert L. Sansom (note a)	Apr. 1972	Feb. 1974
DEPUTY ASSISTANT ADMINISTRATOR FOR WATER PROGRAM OPERATIONS:		
John T. Rhett	Mar. 1973	Present
Louis De Camp (acting)	Sept. 1972	Mar. 1973
Eugene T. Jensen	June 1971	Sept. 1972

DEPARTMENT OF TRANSPORTATION

SECRETARY OF TRANSPORTATION:		
William T. Coleman, Jr.	Mar. 1975	Present
John W. Barnum (acting)	Feb. 1975	Mar. 1975
Claude S. Brinegar	Feb. 1973	Feb. 1975
John Volpe	Jan. 1969	Feb. 1973
COMMANDANT, UNITED STATES COAST GUARD:		
Adm. Owen W. Siler	May 1974	Present
Adm. Chester R. Bender	June 1970	May 1974

[a] Before Apr. 22, 1974, the position title was Assistant Administrator for Air and Water Programs.

APPENDIX V

	Tenure of office	
	From	To
CHIEF, OFFICE OF MARINE ENVIRONMENT AND SYSTEMS:		
Rear Adm. Anthony F. Fugaro	June 1976	Present
Rear Adm. Robert I. Price	June 1974	June 1976
Rear Adm. William M. Benkert	Oct. 1971	May 1974

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