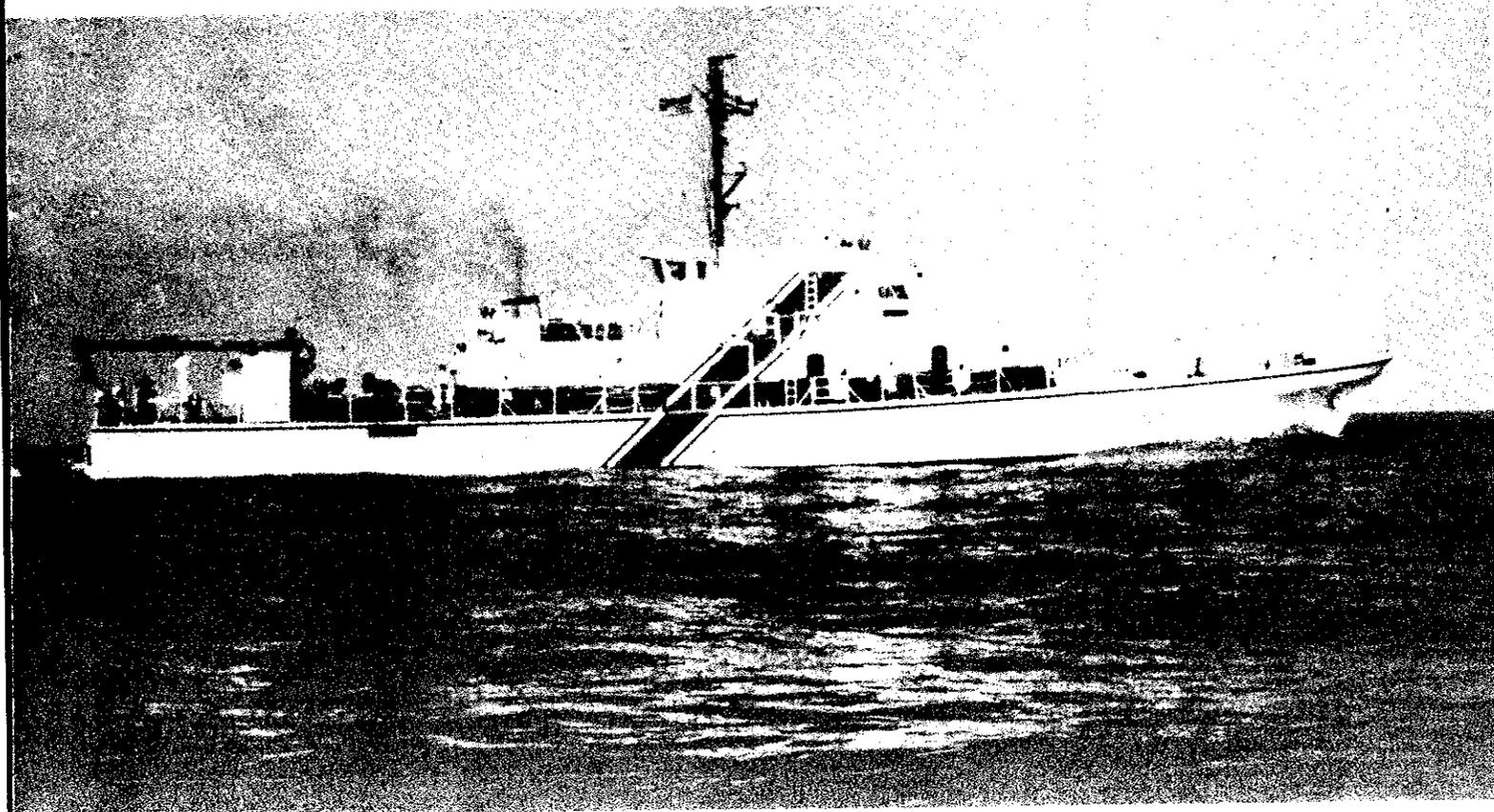


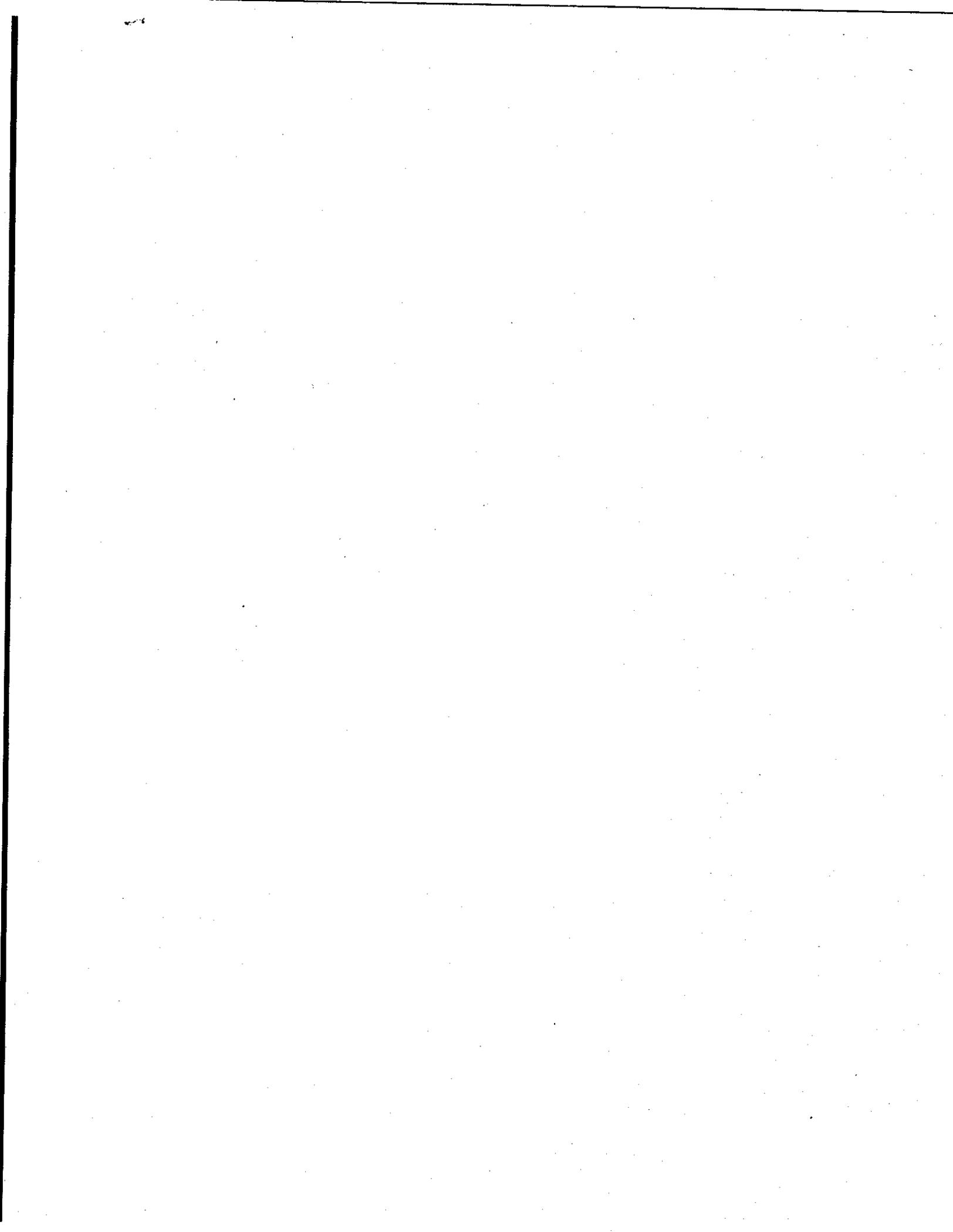
Water



Annual Report to Congress Jan. - Dec. 1980

On Administration of the Marine
Protection, Research, and
Sanctuaries Act of 1972, as
Amended (P.L. 92-532) and
Implementing the International
Ocean Dumping Convention







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

DEC 30 1981

THE ADMINISTRATOR

Honorable Thomas P. O'Neill, Jr.
Speaker of the House
of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

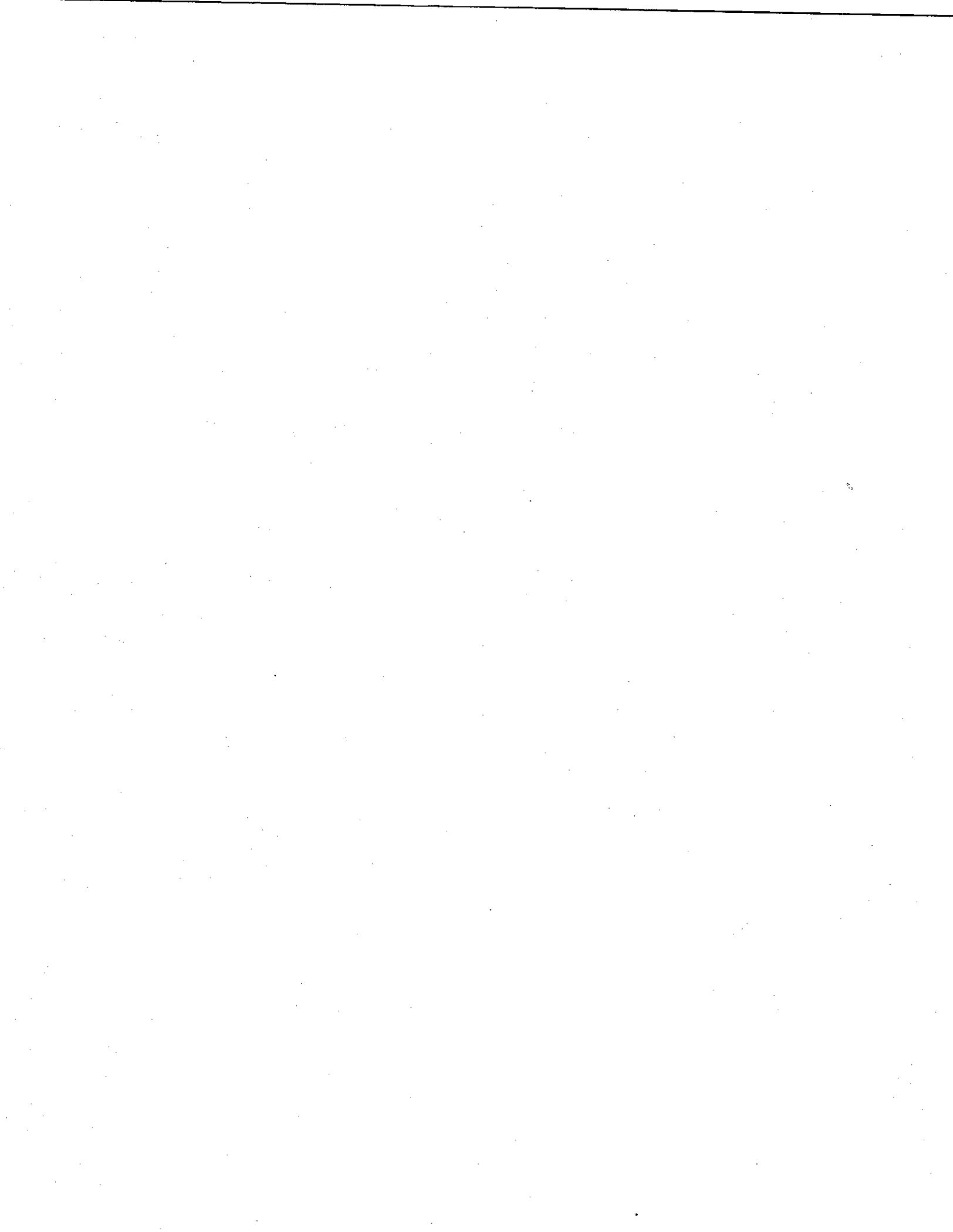
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The ocean dumping permit program became effective on April 23, 1973, and final regulations and criteria were published on October 15, 1973. Revisions to those regulations and criteria were published on January 11, 1977. This report covers the activities carried out under the Act and those necessary to implement the London Dumping Convention during calendar year 1980.

The dumping into ocean waters of all material, except dredged material, is regulated by EPA permits; the U.S. Army Corps of Engineers issues permits for dredged materials. We hope that the information provided in this report will be useful to the House of Representatives in assessing the status and direction of the program.

Sincerely yours,


Anne M. Gorsuch





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

DEC 30 1981

THE ADMINISTRATOR

Honorable George Bush
President of the Senate
Washington, D.C. 20510

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Sincerely yours,

A handwritten signature in black ink, appearing to read "Anne M. Gorsuch".

Anne M. Gorsuch



ANNUAL REPORT TO CONGRESS JAN. - DEC. 1980

ON ADMINISTRATION OF THE MARINE
PROTECTION, RESEARCH, AND SANCTUARIES
ACT OF 1972, AS AMENDED (P.L. 92-532)
AND IMPLEMENTING THE INTERNATIONAL
LONDON DUMPING CONVENTION



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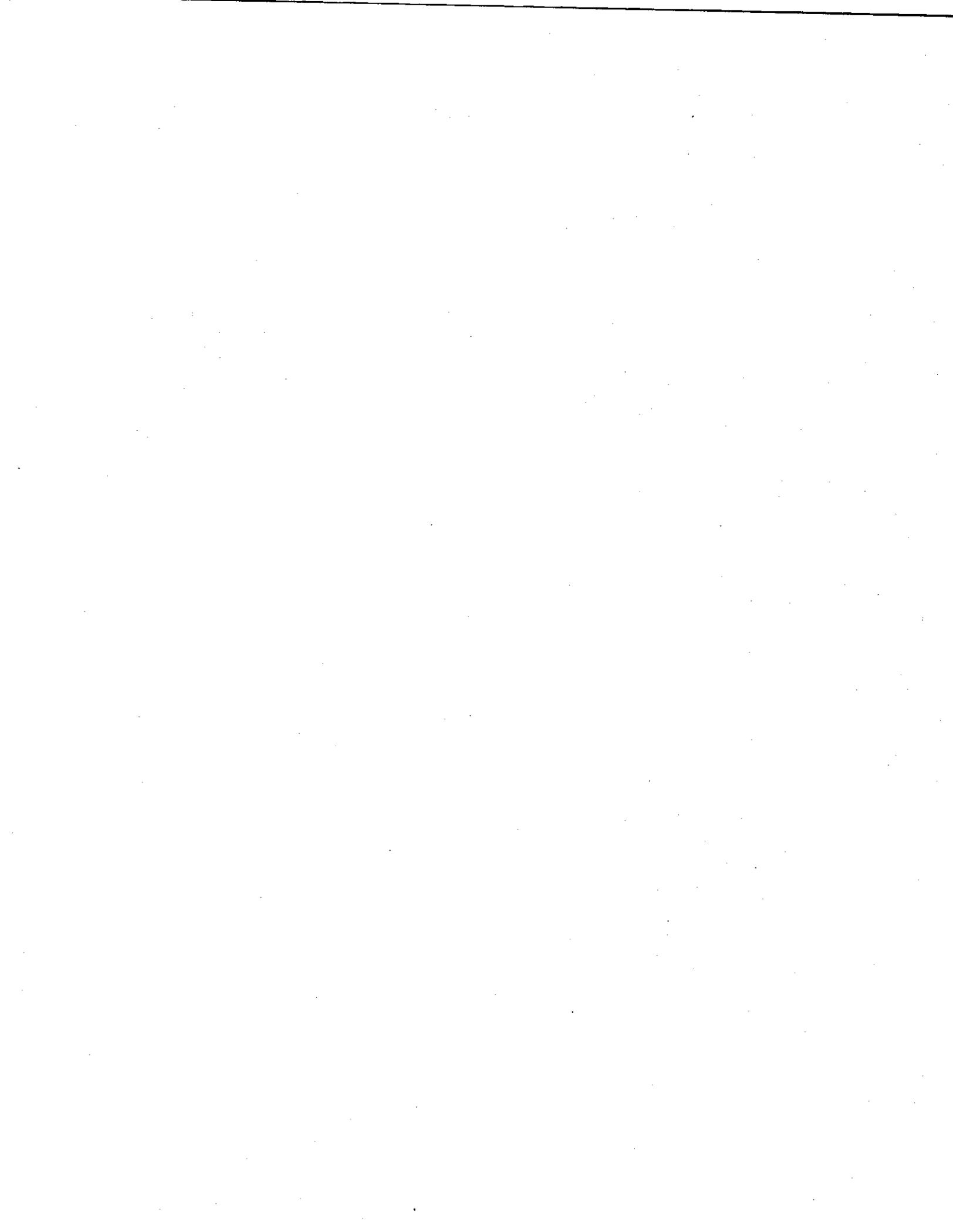
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INTRODUCTION

This is the U.S. Environmental Protection Agency's (EPA) ninth annual report to the Congress on the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended. The report covers the Agency's authorities and responsibilities under the Act in carrying out the ocean dumping permit program activities conducted within EPA Headquarters and Regions during calendar year 1980.

The U.S. Army Corps of Engineers (COE), the U.S. Coast Guard (USCG), and the National Oceanic and Atmospheric Administration (NOAA) also have responsibilities under the Act, and will submit separate reports on their activities in implementing the Act. Consequently, this report does not contain a discussion of their activities, except as they impact the responsibility of EPA.



MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT
OF 1972, AS AMENDED (P.L. 92-532)

Program Authorized Under Title I

The purpose of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) is to regulate transportation for ocean dumping, and to prevent the ocean dumping of any material which would unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. To implement this purpose and to control dumping in ocean waters, Title I of the Act establishes a permit system and assigns its administration to the EPA and COE.

Transportation from the United States of any radiological, chemical, or biological warfare agent or high-level radioactive wastes for dumping in ocean waters, the territorial seas, or the contiguous zone is prohibited. Transportation of other materials (except dredged materials) for the purpose of dumping is prohibited except when authorized under a permit issued by the Administrator of EPA. Based upon criteria outlined in Section 102 of the Act, the Administrator is required to establish and apply criteria for reviewing and evaluating permit applications. Such permits may be issued after determining that the dumping involved will not unreasonably degrade or endanger human health or the marine environment. Before a permit is issued, EPA must also give notice and opportunity for a public hearing. Dumping of dredged material is regulated under permits issued by the COE in accordance with the EPA criteria.

In addition, the Administrator is authorized to designate areas where ocean dumping may be permitted and any critical areas where dumping may be prohibited. EPA has authority to revoke or modify permits or to assess civil penalties for violation of permit conditions. In addition, the Attorney General may initiate criminal action against persons who knowingly violate the Act.

Also under Title I, the USCG is given the responsibility to conduct surveillance and other appropriate enforcement activities to prevent unlawful ocean dumping. More specifically, the USCG ensures that the dumping occurs under a valid permit and at the location and in the manner specified within the permit.

Title II requires NOAA to conduct a comprehensive program of research and monitoring regarding the effects of the dumping of material into ocean waters. Title III gives NOAA the authority to establish marine sanctuaries.

A 1977 amendment to the MPRSA requires that ocean dumping of "sewage sludge" cease as soon as possible and in any event no later than December 31, 1981. For the purposes of this amendment, the term "sewage sludge" is defined to mean "any solid or liquid waste generated by a municipal wastewater treatment plant the ocean dumping of which may unreasonably degrade or endanger human health, welfare, amenities, or the marine environment, ecological system, or economic potentialities."

On December 22, 1980, an amendment of significance was signed by the President. This amendment puts harmful industrial wastes under a similar ban which applies to harmful sewage sludge, i.e., that by December 31, 1981, all harmful industrial wastes can no longer be transported for dumping into ocean waters. However, this amendment, unlike that for sewage sludge, allows dumping of small quantities of these types of materials under a research permit for the purpose of determining whether unreasonable damage to the marine environment will result from dumping these materials and after consultation with the Department of Commerce that the potential benefits of this research will outweigh any adverse environmental impacts on the marine environment.

This same amendment also includes an addition which is of particular concern to those involved in dredging and disposal of dredged material into waters of Long Island Sound. Long Island Sound lies inside the baseline from which the territorial sea is measured and by definition under the MPRSA is excluded from regulations under the MPRSA. However, this amendment indicates that while Long Island Sound is not included under the MPRSA, but remains under Section 404 of the Clean Water Act of 1977, any disposal of more than 25,000 cubic yards of dredged material into Long Island Sound must be done in accordance with criteria developed for dumping under the MPRSA. This means that the dredged material must be evaluated according to the bioassay and bioaccumulation tests required for ocean dumping of dredged material.

During 1980 the Agency began considering the desirability of making the ocean dumping regulations more flexible based on new scientific knowledge and experience obtained since the 1977 regulations were published. EPA's policies regarding the ocean dumping of sewage sludge are in a state of flux as a result of Judge Sofaer's decision of August 28, 1981 in City of New York v. EPA, No. 80 Civ. 1677 ADS (S.D.N.Y.). EPA's policies will be more fully developed after EPA has had an opportunity to fully evaluate the ramifications of the final order in that case.

THE PERMIT PROGRAM

The Ocean Dumping Regulations and Criteria (40 CFR Parts 220-229) published January 11, 1977, permits the issuance of general permits for dumping small quantities of material having a minimal adverse environmental impact when dumped under prescribed conditions. Burial at sea of human remains or ashes, the transport of vessels by the U.S. Navy with the intent of sinking vessels during ordnance testing, the transport and disposal of derelict vessels that pose a threat to navigational operation are a few examples.

Special permits are issued for dumping materials which satisfy the criteria, but only for a maximum duration of three years for each permit. Fifteen special permits were issued in Region II during 1980.

Interim permits may be issued for a period not exceeding one year. Until the December 31, 1981 termination date, interim permits cover those materials that do not comply with the ocean dumping criteria for which there are no feasible land based disposal alternatives at present. Twenty-two interim permits were issued during 1980, all in Region II.

Emergency permits maybe issued for the disposal of materials that pose adverse effects to human health. No emergency permits were issued during 1980.

Under the regulations in effect during 1980, research permits are issued for dumping material into the ocean when the determination is made that scientific merit outweighs the potential environmental damage that may result from dumping. Two research permits were issued during calendar year 1980.

Incineration at sea permits are issued in a similar manner as the research permits; however, a special permit is issued in cases where studies on the waste, the incineration method, the vessel, and the disposal site have already been conducted and the site designated.

Five special permits were issued in Region II during 1980 for the burning of wood pilings, including driftwood, derelict vessels, piling, etc. resulting from the cleanup of port facilities in New York Harbor.

Table I lists permittees on implementation plans to phase out ocean dumping during 1980. Table II lists permits issued or in effect, the materials and amounts dumped during 1980 by EPA permitting authority (Region or Headquarters). Table III summarizes the total amount of dumping during 1980 by coastal area and presents a comparison with the amounts dumped under EPA permit during preceding years.

During 1980, eight permittees were phased out in Region II, and one in Region III (Philadelphia) of ocean dumping, increasing the number of permits denied, phased out or withdrawn since the inception of the program. Table IV lists permits phased out, denied, or withdrawn during calendar year 1980.

TABLE I
 PERMITTEES ON IMPLEMENTATION
 PLANS TO PHASE OUT OCEAN DUMPING

| <u>Region</u> | <u>Company/ Municipality</u> | <u>Location</u> | <u>Dump Site</u> | <u>Phase Out Date</u> |
|---------------|---|-----------------|----------------------|---------------------------|
| II | ** Bergen Co. Util. Authority | NJ | SS | 1981 |
| | City of Glen Cove | NY | SS | 1981 |
| | ** Joint Mtg. of Essex & Union Cos. | NJ | SS | 1981 |
| | ** Linden-Roselle & Rahway Valley S.A. | NJ | SS | 1981 |
| | ** Middlesex Co. Util. Authority | NJ | SS | 1981 |
| | Middletown Twp. Sew. Authority | NJ | SS | 1981 |
| | ** Nassau Co. Dept. of Public Works | NY | SS | 1981 |
| | ** New York City Dept. of Water Resources | NY | SS | 1981 |
| | ** Passaic Valley Sew. Comm. | NJ | SS | 1981 |
| | *** Westchester Co. | NY | SS | 1984 |
| | NE Monmouth | NJ | SS | 1981 |
| | * West New York | NJ | SS | 1981 |
| | * American Cyanamid Company | NJ | 106 | 1981 |
| | * Bristol Alpha, Inc. | PR | PR | 1981 |
| | * Cyanamid Agri. de PR | PR | PR | 1981 |
| | DuPont-Edge Moor | DE | 106 | 1983 |
| | * Merck, Sharpe & Dohme | PR | PR | 1981 |

| | | | | |
|----|---------------------|----|----|------|
| II | NL Industries, Inc. | NJ | AC | 1989 |
| | * Pfizer | PR | PR | 1981 |
| | * Schering Corp. | PR | PR | 1981 |
| | * Upjohns Mfg. Co. | PR | PR | 1981 |

SS = Sewage Sludge
 106= Chemical wastes
 PR = Chemical wastes
 AC = Acid

* Ceased ocean dumping as of date indicated.
 ** Renewal permit denied; administrative/judicial review underway.
 *** Under court order.

TABLE II
 PERMIT ACTIVITY - CY 1980

| <u>Permittee</u> | <u>Material Dumped</u> | <u>Actual Quant. Dumped (thousand wet tons)</u> |
|----------------------------------|------------------------|---|
| Bergen Co. Util. Auth. | sewage sludge | 273 |
| Glen Cove | sewage sludge | 6 |
| Joint Meeting | sewage sludge | 416 |
| Linden Roselle/ Rahway Valley | sewage sludge | 347 |
| Middlesex Co. Sew. Auth. | sewage sludge | 1227 |
| Middletown Twp. Sew. Auth. | sewage sludge | 19 |
| Nassau Co. DPW (1) | sewage sludge | 465 |
| NJ Municipalities | sewage sludge | 97 |
| New York City DEP | sewage sludge | 3255 |
| Passaic Valley Sew. Comm. | sewage sludge | 654 |
| Westchester Co. DEF | sewage sludge | 425 |
| City of Philadelphia | sewage sludge | 125 |
| Allied Chemical Corp. | acid wastes | 40 |
| NL Industries, Inc. | acid wastes | 1907 |
| Moran Towing Corp.(2) | construction debris | 89 |
| American Cyanamid Co. | industrial waste | 68 |

| | | |
|-----------------------|-------------------------------|-----|
| Con Edison | industrial waste (fly ash) | 2 |
| Digestor Cleanout | sewage sludge | 52 |
| DuPont - Edge Moor | acid waste | 238 |
| DuPont - Grasselli | industrial waste | 237 |
| Modern Trans. Co. | industrial waste | 23 |
| PCI International | industrial waste | 361 |
| Corps of Engineers(2) | wood incineration | 5.6 |
| New York City(2) | wood incineration | 3.1 |
| Ocean Burning(2) | wood incineration | 0.8 |
| Weeks(2) | wood incineration | 1.0 |

(1) Includes Long Beach/W. Long Beach
(2) Quantities in thousand dry tons

TABLE III
 TYPES AND AMOUNTS OF OCEAN DISPOSAL BY GEOGRAPHIC/COASTAL AREA
 (IN APPROX. THOUSAND TONS)
 1973 - 1980

| ATLANTIC(A) | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|------|
| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
| Industrial Waste | 3643 | 3642 | 3322 | 2633 | 1784 | 2548 | 2577 | 2928 |
| Sewage Sludge | 4898 | 5010 | 5040 | 5271 | 5134 | 5535 | 6442 | 7309 |
| Const. Debris | 974 | 770 | 396 | 315 | 379 | 241 | 107 | 89 |
| Solid Waste | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Explosives | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood Incin. | 11 | 16 | 6 | 9 | 15 | 18 | 45 | 10.5 |
| Incin. Chemicals | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GULF OF MEXICO(B) | | | | | | | | |
| Industrial Waste | 1408 | 938 | 120 | 100 | 60 | .173 | 0 | 0 |
| Sewage Sludge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Const. Debris | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Solid Waste | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Explosives | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood Incin. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Incin. Chemicals | 0 | 12.3 | 4.1 | 0 | 17.6 | 0 | 0 | 0 |

PACIFIC(C)

| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|------------------|------|------|------|------|------|------|------|------|
| Industrial Waste | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sewage Sludge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Const. Debris | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Solid Waste | 240 | 200 | 0 | 0 | 0 | 0 | 998 | 0 |
| Explosives | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood Incin. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Incin. Chemicals | 0 | 0 | 0 | 0 | 12.1 | 0 | 0 | 0 |

TOTALS OF A, B, AND C (IN APPROX. THOUSAND TONS)

| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|------------------|------|------|------|------|------|----------|------|------|
| Industrial Waste | 5051 | 4580 | 3442 | 2733 | 1844 | 2548.173 | 2577 | 2928 |
| Sewage Sludge | 4898 | 5010 | 5040 | 5271 | 5134 | 5535 | 6442 | 7309 |
| Const. Debris | 974 | 770 | 396 | 315 | 379 | 241 | 107 | 89 |
| Solid Waste | 240 | 200 | 0 | 0 | 0 | 0 | 998 | 0 |
| Explosives | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood Incin. | 11 | 16 | 6 | 9 | 15 | 18 | 45 | 10.5 |
| Incin. Chemicals | 0 | 12.3 | 4.1 | 0 | 29.7 | 0 | 0 | 0 |

TABLE IV
SUMMARY OF OCEAN DUMPING PERMITTEES/APPLICANTS
DENIED OR PHASED OUT FROM 1973 TO 1980

| | REGION | | | | | | | Totals |
|--|--------|-----|-----|----|----|----|----|--------|
| | I | II | III | IV | VI | IX | X | |
| Action prior to April 1973 phased out | -- | 44 | -- | -- | -- | -- | -- | 44 |
| During the remainder of 1973 | | | | | | | | |
| withdrew | -- | 4 | -- | -- | -- | -- | -- | 4 |
| phased out | -- | 1 | -- | -- | 1 | -- | -- | 2 |
| denied | -- | -- | -- | -- | 1 | -- | -- | 1 |
| During 1974 | | | | | | | | |
| withdrew | -- | 2 | -- | -- | -- | 1 | -- | 3 |
| phased out | -- | 21 | -- | -- | 1 | -- | -- | 22 |
| denied | -- | 1 | 1 | -- | 1 | 1 | -- | 4 |
| During 1975 | | | | | | | | |
| withdrew | -- | 6 | -- | -- | -- | -- | -- | 6 |
| phased out | 1 | 10 | 1 | -- | 2 | -- | -- | 14 |
| denied | -- | -- | -- | -- | -- | -- | -- | -- |
| During 1976 | | | | | | | | |
| withdrew | -- | 2 | -- | -- | -- | -- | -- | 2 |
| phased out | -- | 17 | -- | -- | -- | -- | -- | 17 |
| denied | -- | 130 | -- | -- | 1 | -- | -- | 131 |
| During 1977 | | | | | | | | |
| withdrew | -- | 2 | -- | -- | -- | -- | -- | 2 |
| phased out | 1 | 16 | -- | -- | 1 | -- | -- | 18 |
| denied | -- | -- | -- | -- | -- | -- | -- | -- |
| During 1978 | | | | | | | | |
| withdrew | -- | 1 | -- | -- | -- | -- | -- | 1 |
| phased out | -- | 31 | -- | -- | 1 | -- | -- | 32 |
| denied | -- | 1 | -- | -- | -- | -- | -- | 1 |
| During 1979 | | | | | | | | |
| withdrew | -- | 4 | -- | -- | -- | -- | -- | 4 |
| phased out | -- | 8 | -- | -- | -- | -- | -- | 8 |
| denied | -- | 1 | -- | -- | -- | 1 | -- | 2 |
| During 1980 | | | | | | | | |
| withdrew | -- | -- | -- | -- | -- | -- | -- | -- |
| phased out | 1 | 8 | 1 | -- | -- | 1 | -- | 11 |
| denied | -- | -- | -- | -- | -- | 1 | -- | 1 |
| Totals | 3 | 310 | 3 | -- | 9 | 5 | -- | 332 |

TABLE V
 OCEAN DUMPING PERMITS PHASED OUT
 BY REGION II DURING 1980

| <u>Permittee</u> | <u>Location</u> | <u>Date</u> |
|-----------------------|-----------------|---------------|
| Cedar Grove | New Jersey | February 1980 |
| Morris | New Jersey | August 1980 |
| Totowa | New Jersey | July 1980 |
| Wanaque | New Jersey | February 1980 |
| Washington-Morris Co. | New Jersey | January 1980 |
| West Paterson | New Jersey | July 1980 |
| Merck & Co. (Rahway) | New Jersey | December 1980 |
| Squibb Mfg., Inc. | Puerto Rico | April 1980 |

LONDON DUMPING CONVENTION

The Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention) was negotiated in London in November 1972 and came into force on August 30, 1975, following receipt of the required 15 ratifications or accessions. The Inter-Governmental Maritime Consultative Organization (IMCO), as the designated Secretariat, handles the administrative functions of the Convention.

The Convention is an international treaty requiring the Contracting Parties (member nations) to establish national systems to control substances leaving their shores for the purpose of being dumped at sea.

Annex I of the Convention contains a "black list" of substances whose dumping is prohibited unless they are only "trace contaminants" or would be rapidly rendered harmless. The substances on this list are mercury and cadmium and their compounds, organohalogen compounds such as DDT and PCB's, persistent plastics, and oil. Dumping of high level radioactive wastes, and chemical and biological warfare agents is completely prohibited. Annex II lists substances requiring special permits as well as special care in each dumping. These substances include: heavy metals, cyanides and fluorides, waste containers which could present a serious obstacle to fishing or navigation, and medium and low level radioactive wastes. Substances not listed in Annex I and II require a "general permit" and all dumping must be carried out with full consideration given to a list of technical considerations contained in Annex III. The Annexes are shown in the Appendix to this report.

The Convention provides that each party will take appropriate steps to ensure that the terms of the Convention apply to its flagships and aircraft and to any vessel or aircraft loading at its ports for the purpose of dumping. Full continuous use is to be made of the best available technical knowledge in implementation which, together with periodic meetings and planned participation by appropriate international technical bodies, is designed to keep the contents of the Annexes up to date and realistic in meeting the ocean pollution control needs stemming from ocean dumping.

As the U.S. authority for implementing the international requirements for control of ocean dumping, the MPRSA was amended in 1974 and also in 1980 to bring the Act into conformance with the Convention.

TABLE VI
CONTRACTING PARTIES TO THE LONDON DUMPING CONVENTION

Afghanistan
Argentina
Canada
Cape Verde
Chile
Cuba
Denmark
Dominican Republic
Federal Republic of Germany
Finland
France
German Democratic Republic
Guatemala
Haiti
Honduras
Hungary
Iceland
Japan
Jordan
Kenya
Libyan Arab Jamahiriya
Mexico
Monaco
Morocco
Netherlands
New Zealand
Nigeria
Norway
Panama
Papua New Guinea
Philippines
Poland
Portugal
South Africa
Spain
Surinam
Sweden
Switzerland
Tunisia
Ukranian SSR
United Arab Emirates
United Kingdom
United States
USSR
Yugoslavia
Zaire

Byelorussian SSR

SITE DESIGNATIONS

In 1980, EPA revised its ocean dumping regulations to extend the interim designation of some ocean dumping sites pending completion of the Environmental Impact Statements (EISs) and formal rulemaking procedures, and to cancel the designation of some sites and extend other sites, mainly those for dredged material disposal, until the completion of site designation studies and formal designation. The Ocean Dumping Regulations and Criteria published by EPA in January of 1977 contained a list of approved interim ocean dumping sites. The interim designation of these sites was effective for a maximum of three years. This extension was necessary to assure that maintenance dredging of harbors and essential waste disposal into the oceans could be continued until necessary site designation studies were completed.

Two new sites were designated in 1980. One site, located in the San Nicolas Basin on the Southern California Outer Continental Shelf, was designated for the disposal of small amounts of formation cuttings, waste drilling mud and non-perishable solid waste from exploratory drilling wells on Tanner Bank. The other site, is located in the Pacific Ocean 2.9 nautical miles offshore of Tutuila Island, American Samoa, was designated for the disposal of fish cannery wastes which can no longer be accommodated on land.

EPA released four EIS's during the calendar year 1980. These EIS's include the New York Bight Acid Waste Disposal Site (Final); Hawaii Dredged Material Disposal Site (Final); 106-Mile Ocean Waste Disposal Site (Final-published in 1979); and the San Francisco Channel Bar Dredged Material Disposal Site (Draft only).

INCINERATION AT SEA

The EPA completed a Draft EIS for the designation of a North Atlantic Incineration Site. The site will be used for the incineration of toxic organic wastes, principally organohalogenes, generated in the Mid-Atlantic states. The purpose of the action is to provide an environmentally acceptable area for the thermal destruction of the wastes, in compliance with EPA Ocean Dumping Regulations. In January 1981, the EPA released a draft Environmental Impact Statement (EIS) on this site, located in the North Atlantic 140 n mi east of Delaware Bay. This site is 2400 to 2900 meters deep. Until final designation of the North Atlantic Incineration Site, wastes generated in the U.S. will be incinerated at the Gulf Incineration Site.

In February 1980, an Interagency Ad Hoc Work Group for the Chemical Waste Incinerator Ship Program was established to study at-sea incineration technology. The Work Group was directed to examine alternatives available to the Federal government leading to the design, construction, and operation of one or more incinerator ships. The "Report of the Interagency Ad Hoc Work Group for Chemical Waste Incinerator Ship Program" was completed in September 1980. This report focuses on the development of ocean incineration capabilities in the United States.

The significant action items in the report are: (a) Ad Hoc Work Group was expanded and redesignated the Interagency Review Board (IRB); (b) Maritime Administration (MARAD) and EPA were directed to pursue legislative amendments which would permit U.S. flag chemical incinerator ships; alternatives should be considered if viable applications for Federal assistance are not received from private operators within 12 months of authorization; (c) EPA is to seek Federal funds for conducting research to advance the state-of-the-art of incineration at sea; and (d) EPA, MARAD, and other Federal agencies are to develop a program to encourage State and local authorities in developing waterfront facilities and to promote construction of privately owned U.S. flag incinerator ships.

The IRB held two meetings during the autumn of 1980. The first meeting was held to consider the action items contained in the Ad Hoc Work Group's report. The purpose of the second meeting was to obtain comments and recommendations on how to pursue its objectives.

The motor tanker (M/T) Vulcanus, the only vessel presently available for use in the U.S., was converted in 1972 to a chemical tanker equipped with two large incinerators located at the stern. She is over 300 feet long and has a cruising speed from

10 to 13 knots. Her crew of 18 includes 12 to operate the vessel, six to operate the incinerators. Her tank capacity is 3,503 cubic meters and the maximum waste feed rate to the incinerators is 12.5 m³/hour.

The M/T Vulcanus meets requirements of IMCO concerning transport of dangerous cargo and is presently the only commercially available ship which meets the destruction efficiency regulations for incineration at sea under the London Dumping Convention.

In 1974 EPA determined that the Marine Protection, Research, and Sanctuaries Act applied to incineration at sea and that permitting would occur under the Act. The first U.S.-sanctioned incineration at sea took place on the M/T Vulcanus in October 1974 at an EPA designated site in the Gulf of Mexico; the most recent were conducted at the site in the Pacific Ocean during May-September 1977.

Since that time, the M/T Vulcanus has been operating out of LeHavre and Antwerp incinerating wastes from sources in several European countries, including the Netherlands, Belgium and France. All of the incineration occurs at a site in the North Sea.

RADIOACTIVE WASTES

During 1980, EPA's Office of Radiation Programs presented testimony at two congressional hearings concerned with past ocean dumping of radioactive waste. In response to these hearings and considerable public interest, EPA summarized available information in a "Fact Sheet on Ocean Dumping of Radioactive Waste Materials." This fact sheet includes a history of dumping operations, an inventory of dumpsites, types and quantities of materials dumped, and summaries of EPA dumpsite surveys and contractor reports.

Table VII shows the preliminary inventory compiled by EPA from records of U.S. dumping of radioactive materials. EPA is now verifying this inventory by a detailed review of records obtained from other Federal agencies, including the Nuclear Regulatory Commission, the Department of Energy, the Department of Defense and the Coast Guard. This review is scheduled to be completed in late FY 1981.

Based on results of its surveys, EPA concludes that past ocean dumping of radioactive wastes by the U.S. is not causing harm to either man or the marine environment.

Notes of explanation to Table VII are shown on page 23.

TABLE VII
TABLE OF U.S. OCEAN DUMPING OF RADIOACTIVE MATERIALS

| PACIFIC OCEAN SITES | | | | | | | | | |
|---|----------------|----------------------------------|---------------------------------|-----------------------|-----------------------|-------------------------|-----------------------|------------|-------------|
| Nuclear Site Designation(s) ^{1, 2} | Depth (meters) | Central Coordinates ² | Relation to Land ³ | Material ⁴ | Activity ⁵ | Containers ⁶ | Agents ⁷ | Years Used | EPA Reports |
| P1 Farallon Islands (8) | 690 - 1700 | 47°38'N 123°08'W | 25 - 60 miles WSW San Francisco | B, S, SNM | 14,500 | 47,500 | NEC, OTC NRDL, CR AEC | 1946-70 | YES |
| P2 Hawaiian Islands (1) | 3500 | 21°28'N 157°25'W | 20 miles NE Honolulu * | B | 0.09 | 39 | UH | 1959-60 | NO |
| P3 Midway Islands (2) | 5490 | 34°58'N 174°52'W | 300 miles N Midway Islands * | B | 14 | 7 | MSTL | 1959-1960 | NO |
| P4 Santa Cruz (3) | 1830 - 1540 | 33°40'N 119°35'W | 35 miles SW Port Hueneme | B, S | 108 | 3,114 | PN, AEC | 1946-1962 | NO 11 |
| P5 (1) | 3294 | 42°12'N 129°31'W | 230 miles W OR/CA border | B | 0.95 | 26 | CR | 1955-1958 | NO |
| P6 (1) | 2926 | 43°52'N 127°44'W | 190 miles NW OR/CA border * | B | 0.08 | 4 | CR | 1960 | NO |
| P7 (1) | 4099 | 42°04'N 125°01'W | 35 miles W OR/CA border * | B | 0.08 | 4 | CR | 1960 | NO |
| P8 Los Angeles (2) | 3660 - 4570 | 30°43'N 139°05'W | 1000 miles WSW Los Angeles * | B | 0.95 | 26 | CR | 1955-1958 | NO |
| P9 (1) | 3477 | 28°47'N 135°00'W | 600 miles SW San Francisco * | B | 1.1 | 29 | CR | 1955-1960 | NO |
| P10 San Diego (1) | 2210 - 3660 | 32°00'N 121°30'W | 225 miles SW San Diego | B, S, SNM | 34 | 4,415 | CMDC, ISC | 1959-1962 | NO |
| P11 Cape Mendocino (1) | 1830 - 1590 | 40°07'N 135°24'W | 800 miles WSW San Francisco * | B, S | 0.22 | 29 | AML | 1960 | NO |
| P12 Cape Scott 1 (1) | 3294 | 50°56'N 136°03'W | 350 miles NW Cape Flattery * | B, S | 96 | 197 | AML10 | 1958-1966 | NO |
| P13 Cape Scott 2 (1) | 3294 | 52°25'N 140°12'W | 350 miles NW Cape Flattery * | B, S | 28 | 163 | AML10 | 1962-1969 | NO |
| North Pacific (1) | | 51°30'N 136°31'W | | | 0.54 | 38 | | 1946-1962 | NO |
| North Pacific (1) | | 62°05'N 140°00'W | | | 0.54 | 41 | | 1946-1962 | NO |
| North Pacific (Un-) | | 47°00'N 138°54'W | | | 97.4 | 361 | | 1946-1962 | NO |
| (1) | 1630 | | | | 1.2 | 37 | | 1946-1962 | NO |
| (1) | | | | | 96.5 | 231 | | 1963-1966 | NO |

Subtotals, Pacific Ocean 14980.46 Curies
56261. Containers

TABLE OF U.S. OCEAN DUMPING OF RADIOACTIVE MATERIALS

| ATLANTIC OCEAN DISPOSAL SITES | | | | | | | | | |
|--|-----------------------|---|--------------------------------------|------------------------------|------------------------------|--------------------------------|----------------------------|-------------------|--------------------|
| <u>Reference Site Identification(s)</u> ¹ | <u>Depth (meters)</u> | <u>Central Coordinates</u> ² | <u>Relation to Land</u> ³ | <u>Material</u> ⁴ | <u>Activity</u> ⁵ | <u>Containers</u> ⁶ | <u>Agents</u> ⁷ | <u>Years Used</u> | <u>EPA Reports</u> |
| MA Massachusetts Bay (1) | 92 | 42°25'N 70°35'W | Massachusetts Bay | B 5 | 2,440 | 4 008 | CMOS | 1952-1959 | NO |
| AC Cape Henry (2) | 1830 - 1967 | 36°56'N 74°23'W | 80 miles E Cape Henry * | B | 87 | 843 | RIH | 1949-1967 | NO |
| AD Sandy Hook 1 (1) | 1830 - 2800 | 38°30'N 72°06'W | 140 miles SE Sandy Hook * | B | 74,400 | 14 301 | AEC | 1959-1962 | YES |
| AE Sandy Hook 2 (1) | 1830 - 3800 | 37°50'N 70°35'W | 220 miles SE Sandy Hook * | B | 2,100 | 14 500 | AEC | 1957-1959 | YES |
| AF Charleston (1a) | 915 - 3000 | 31°32'N 76°30'W | 220 miles E Charleston * | B | 0.66 | 119 | SNO ARC | 1955-1962 | NO |
| AG Morehead City (1) | 18 | 34°32'N 76°40'W | 15 miles S of Morehead City * | B | 0.3 | unpackaged | FWS | 1955-1961 | NO |
| AJ - All Central Atlantic (7) | 3000 - 9200 | 36°20'N - 45°45'N 45°00'W | | B | 480 | 432 | MSTS | 1959-1960 | NO |
| AK Sapele Islands (1) | 11 | | Off coast of Sapele Islands | | 0.005 | liquid | UG | 1955-1960 | NO |

Subtotals Atlantic Ocean 79507.965 Curies
34203 Containers

| GULF OF MEXICO DISPOSAL SITES | | | | | | | | | |
|--|-----------------------|---|--------------------------------------|------------------------------|------------------------------|--------------------------------|----------------------------|-------------------|--------------------|
| <u>Reference Site Identification(s)</u> ¹ | <u>Depth (meters)</u> | <u>Central Coordinates</u> ² | <u>Relation to Land</u> ³ | <u>Material</u> ⁴ | <u>Activity</u> ⁵ | <u>Containers</u> ⁶ | <u>Agents</u> ⁷ | <u>Years Used</u> | <u>EPA Reports</u> |
| GA | 1930 | 27°14'N 89°33'W | 170 miles S New Orleans * | B | 10 | 1 | HP | 1958 | NO |
| GB | 3111 | 25°40'N 85°17'W | 250 miles SE Appalachicola FL * | B | 0.002 | 78 | SNO | 1955-1957 | NO |

Subtotals Gulf of Mexico 10.002 Curies,
79 Containers

Totals All Sites 94498.27 Curies
90543 Containers

Notes to Table VII

1 In contracting and licensing the ocean dumping of radioactive wastes, the AEC designated general areas for approved dumping. In some instances these areas were identified by single coordinates and the wastes were concentrated in relatively specific areas, while in other instances the AEC designated much broader areas and allowed those dumping to proceed according to general guidelines. Dumping under these designations resulted in much less concentrated dumping activities and a multitude of individual "dumpsites". The number of such individual dumpsites under a particular heading in this column is indicated in parentheses. The designations A1 through A12, GM1 and GM2, and P1 through P13 refer to the NRC site numbering system.

2 Central coordinates designate dumping areas thought to have received concentrations of waste materials. Actual coordinates may have varied over wider distances.

3 Approximations for land references: an asterick means that EPA has not plotted the coordinates on nautical charts to confirm the stated distance from land; blanks mean we haven't found the information yet.

4 Three types of materials were dumped under AEC licenses or by AEC contractors: by-product materials (B), Source materials (S), and special nuclear materials (SNM). By-product materials refer to a wide variety of substances which were exposed to incidental radiation. Source materials include uranium and thorium. Special nuclear materials include plutonium, uranium-233, enriched uranium 233 or 235, and any other materials which the AEC may have determined to be special nuclear materials.

5 Radioactivity is given in estimate curies at the time of packaging.

6 Waste materials were generally packaged in either special containers which were then placed in concrete-filled steel drums, or mixed directly in concrete which was in turn placed in steel drums.

| | | |
|---|------|--|
| 7 | AEC | U.S. Atomic Energy Commission |
| | AML | American Mail Lines |
| | ARC | Atlantic Refining Company |
| | CMDC | Crossroads Marine Disposal Corpoartion |
| | CR | Chevron Research |
| | FWS | U.S. Fish and Wildlife Service |
| | ISC | Isotope Specialty Company |
| | MP | Magnolia Petroleum |
| | MSTS | Military Sea Transport Service |
| | NEC | Nuclear Engineering Company |
| | NIH | U.S. National Institute of Health |
| | NRDL | U.S. Naval Radiological Defense Laboratory |
| | OTC | Ocean Transport Company |

| | |
|-----|-----------------------|
| PN | Pneumodynamics |
| SMO | Socony-Mobil Oil |
| UG | University of Georgia |
| UH | University of Hawaii |

8 There were some AEC approved ocean dumping sites for which EPA has no records of dumping activities. They are as follows:

| <u>Pacific Ocean</u> | | <u>Atlantic Ocean</u> | |
|-----------------------|-----------------------|-------------------------|-------------------------|
| <u>Latitude</u> | <u>Longitude</u> | <u>Latitude</u> | <u>Longitude</u> |
| 39 ⁰ 30'N | 125 ⁰ 40'W | 41 ⁰ 33'N | 65 ⁰ 30'W |
| 37 ⁰ 40'N | 124 ⁰ 50'W | 41 ⁰ 33'N | 65 ⁰ 33'W |
| 36 ⁰ 00'N | 124 ⁰ 00'W | 41 ⁰ 28-38'N | 65 ⁰ 28-45'W |
| 34 ⁰ 030'N | 122 ⁰ 50'W | 38 ⁰ 30'N | 72 ⁰ 00'W |
| | | 36 ⁰ 30'N | 74 ⁰ 13'W |
| | | 36 ⁰ 15'N | 76 ⁰ 35'W |
| | | 34 ⁰ 15'N | 76 ⁰ 35'W |

9 Based on NRC memorandum of 8/14/80 additional dumpings appear to have taken place in the 1960's and are being characterized in ongoing records research.

10 Under the terms of the AML license AML was authorized to dump along the path of its shipping route beyond depths of 1,000 fathoms (1830 meters).

11 Report published by NOAA in April 1973 "Submersible Inspection of Deep Ocean Waste Disposal Sites Off Southern California" describes survey of Santa Cruz Basin.

* See footnote number³ above.

OSV ANTELOPE

The OSV ANTELOPE is EPA's ocean survey vessel, working in support of ocean dumping site investigations. Under the MPRSA, EPA received responsibility for regulating ocean dumping, designating and managing dumping sites, and assessing the consequences of ocean dumping.

The ANTELOPE was a Navy patrol gunboat prior to her conversion to a scientific platform for EPA. She carries both over-the-side deck sampling gear and laboratory instruments for analysis on-site.

The ANTELOPE's work represents EPA's first and most comprehensive effort to collect a broad base of ocean pollution data for regulatory programs. EPA will use the data gathered by the ANTELOPE to prepare EIS's on the sites and to guide EPA's future management of them. Figure 1 shows ocean disposal sites sampled in 1980.

EPA's ocean survey vessel ANTELOPE has completed her second season surveying ocean disposal sites off the U.S.

In 1980, ANTELOPE traveled 23,104 miles to accomplish 16 surveys, totaling 23 separate EISs. The field survey program has concentrated on those sites receiving large amounts of material and those at which dumping has occurred for many years. These surveys also provide a baseline for future assessments of the environmental impacts of continued use of these sites.

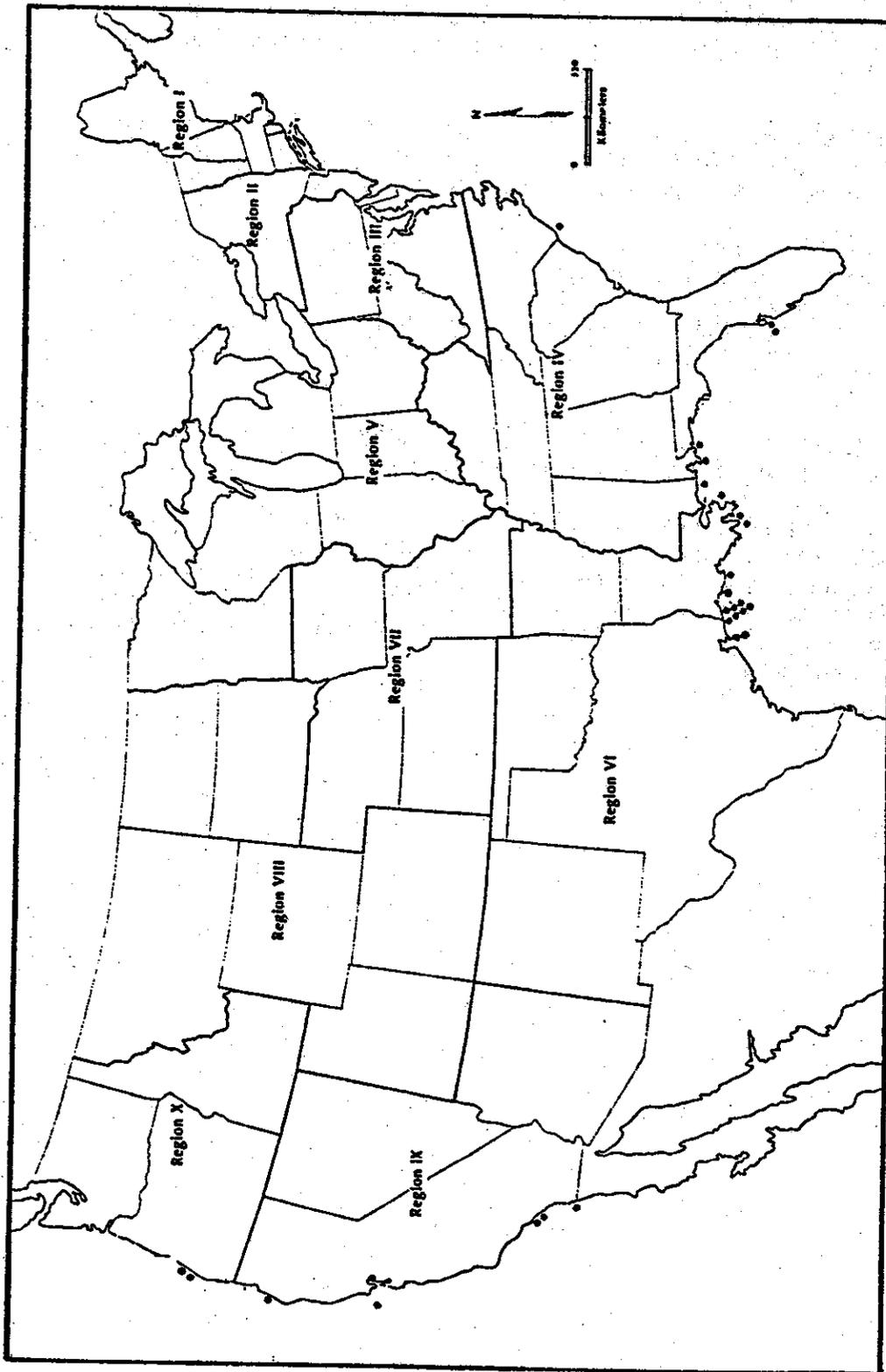


FIGURE 1
OCEAN DISPOSAL SITES SAMPLED IN 1980

ENFORCEMENT

The U.S. Coast Guard has responsibility for surveillance activities to prevent unlawful dumping or transportation of materials for dumping and to assure compliance with ocean dumping permit conditions.

Vessel and aircraft patrols, shipriders on board dumping vessels, in-port boardings and inspections, and Vessel Traffic Services (VTS) radar are several methods used by the Coast Guard for surveillance of ocean dumping operations. The scheduling of surveillance resources is aided by a permit condition which requires permittees to give authorities advance notification prior to commencing any dumping operations.

Statistics on ocean dumping surveillance activities are reported by field units on a quarterly basis. This information provides an accurate assessment of the impact of the program on Coast Guard resources and also enables the Coast Guard to report on its operations to interested parties.

In calendar year 1980, 4,642 dumps were reported to the Coast Guard. A total of 602 surveillance missions were conducted over these activities, 198 for industrial wastes and 404 for other wastes. In some cases, more than one dump vessel would be observed on a particular surveillance mission.

Of the total 602 missions conducted, 15 were performed by vessels, 306 by aircraft, and 281 by shipriders. There were 78 vessel hours and 533 aircraft hours utilized to conduct these missions. In addition to the extensive number of manhours these figures represent, 10,984 shiprider hours were required.

Violations are detected and a deterrent against action is provided. Pursuant to Section 107(c) of the MPRSA and the regulations promulgated there under (40 CFR 223), information concerning violations of the Act and of ocean dumping permit conditions is forwarded to the EPA Regional Administrator for appropriate action when civil penalties are indicated or to the Attorney General for criminal cases. Suspected violations are documented by the Coast Guard to the maximum extent practicable. Evidentiary material may include witness statements, photos, samples, message traffic, and log excerpts.

During calendar year 1980, cases were forwarded to EPA consisting of six alleged violations. These alleged violations ranged from dumping or incinerating outside the authorized area to dumping plastic floatables and improper departure notification. Table VIII gives a breakdown of the violations, the Coast Guard district they occurred in, date of violation, and date referred to EPA for disposition. Also included are several cases for which action had been pending from a previous year and final disposition occurred in 1980. There were no cases referred to the Attorney General by the Coast Guard or EPA in the calendar year 1980.

TABLE VIII
ENFORCEMENT ACTIONS

Region II

| | |
|--------------------|---|
| Order No: | 78-21 |
| Respondent's Name: | Squibb Mfg., Inc. |
| Referral From: | EPA |
| Type of Violation: | Permit condition, Compliance schedule |
| Complaint Issued: | Waived |
| Disposition: | Final Order-12/28/78; \$12,000 penalty payment. Revision of schedule |
| Disposal Site: | Chemical wastes P.R. |
| Order No: | 79-1 |
| Respondent's Name: | City of Asbury Park |
| Referral From: | EPA |
| Type of Violation: | Permit condition, Compliance schedule |
| Complaint Issued: | 07/17/79 |
| Disposition: | Final Order-11/08/79; Cease dumping end of 1979 |
| Disposal Site: | Sewage Sludge |
| Order No: | 79-2 |
| Respondent's Name: | American Cyanamid |
| Referral From: | EPA |
| Type of Violation: | Permit condition, Compliance schedule |
| Complaint Issued: | 07/27/79 |
| Disposition: | Final Order-12/21/79; \$5,000 penalty payment and revision of schedule |
| Disposal Site: | Chemical wastes |
| Order No: | 80-2 |
| Respondent's Name: | W. New York |
| Referral From: | EPA |
| Type of Violation: | Permit condition, Compliance schedule |
| Complaint Issued: | Waived |
| Disposition: | Final Order-6/24/80; \$10,000 penalty payment and cease dumping by 3/2/81 |
| Disposal Site: | Sewage sludge |
| Order No: | 80-3 |
| Respondent's Name: | DuPont-Edge Moor |
| Referral From: | EPA |
| Type of Violation: | Permit condition, Compliance schedule |
| Complaint Issued: | 10/24/80 |
| Disposition: | Final Order-12/19/80; Revision of schedule |
| Disposal Site: | Chemical wastes |

Order No: 81-1
Respondent's Name: Weeks Stevedore Co.
Referral From: USCG
Type of Violation: Burning in other than authorized site
Complaint Issued: 2/27/81
Disposition: Pending
Disposal Site: Wood incineration

APPENDIX

ANNEXES TO THE LONDON DUMPING CONVENTION

ANNEXES TO THE LONDON DUMPING CONVENTION

ANNEX I

1. Organohalogen compounds.
2. Mercury and mercury compounds.
3. Cadmium and cadmium compounds.
4. Persistent plastics and other persistent synthetic materials; for example, netting and ropes, which may float or may remain in suspension in the sea in such a manner as to interfere materially with fishing, navigation or other legitimate uses of the sea.
5. Crude oil and its wastes, refined petroleum products, petroleum distillate residues, and any mixtures containing any of these, taken on board for the purpose of dumping. ^{1/}
6. High-level radioactive wastes or other high-level radioactive matter, defined on public health, biological or other grounds, by the competent international body in this field, at present the International Atomic Energy Agency, as unsuitable for dumping at sea.
7. Materials in whatever form (e.g. solids, liquids, semi-liquids, gases or in a living state) produced for biological and chemical warfare.
8. The preceding paragraphs of this Annex do not apply to substances which are rapidly rendered harmless by physical, chemical or biological processes in the sea provided they do not:
 - (i) make edible marine organisms unpalatable, or
 - (ii) endanger human health or that of domestic animals.

The consultative procedure provided for under Article XIV should be followed by a Party if there is doubt about the harmlessness of the substance.

9. This Annex does not apply to wastes or other materials (e.g. sewage sludges and dredged spoils) containing the matters referred to in paragraphs 1-5 above as trace contaminants. Such wastes shall be subject to the provisions of Annexes II and III as appropriate.

10. Paragraphs 1 and 5 of this Annex do not apply to the disposal of wastes or other matter referred to in these paragraphs by means of incineration at sea. Incineration of such wastes or other matter at sea requires a prior special permit. In the issue of special permits for incineration the Contracting Parties shall apply the Regulations for the Control of Incineration of Wastes and Other Matter at Sea set forth in the Addendum to this Annex (which shall constitute an integral part of this Annex) and take full account of the Technical Guidelines on the Control of Incineration of Wastes and Other Matter at Sea adopted by the Contracting Parties in consultation. ^{2/}

^{1/} Originally stated: "Crude oil, fuel oil, heavy diesel oil, and lubricating fluids, hydraulic fluids, and any mixtures containing any of these, taken on board for the purpose of dumping."
Amendments adopted by Contracting Parties September 1980; accepted by the United States

^{2/} Added by amendment adopted by Contracting Parties October 1978; accepted by the United States.

ANNEX II

The following substances and materials requiring special care are listed for the purposes of Article VI(1)(a).

A. Wastes containing significant amounts of the matters listed below:

arsenic)
lead) and their compounds
copper)
zinc)
organosilicon
cyanides
fluorides
pesticides and their by-products not covered in Annex I.

B. In the issue of permits for the dumping of large quantities of acids and alkalis, consideration shall be given to the possible presence in such wastes of the substances listed in paragraph A and to the following additional substances:

beryllium)
chromium) and their compounds
nickel)
vanadium)

C. Containers, scrap metal and other bulky wastes liable to sink to the sea bottom which may present a serious obstacle to fishing or navigation.

D. Radioactive wastes or other radioactive matter not included in Annex I. In the issue of permits for the dumping of this matter, the Contracting Parties should take full account of the recommendations of the competent international body in this field, at present the International Atomic Energy Agency.

E. In the issue of special permits for the incineration of substances and materials listed in this Annex, the Contracting Parties shall apply the Regulations for the Control of Incineration of Wastes and Other Matter at Sea set forth in the Addendum to Annex I and take full account of the Technical Guidelines on the Control of Incineration of Wastes and Other Matter at Sea adopted by Contracting Parties in consultation, to the extent specified in these Regulations and Guidelines.^{3/}

F. Substances which, though a non-toxic nature, may become harmful due to the quantities in which they are dumped, or which are liable to seriously reduce amenities.^{4/}

^{3/} See footnote 2.

^{4/} Added by amendment. See footnote 1.

ANNEX III

Provisions to be considered in establishing criteria governing the issue of permits for the dumping of matter at sea, taking into account Article IV(2), include:

- A. Characteristics and composition of the matter
 - 1. Total amount and average composition of matter dumped (e.g. per year).
 - 2. Form, e.g. solid, sludge, liquid, or gaseous.
 - 3. Properties: physical (e.g. solubility and density), chemical and biochemical (e.g. oxygen demand, nutrients) and biological (e.g. presence of viruses, bacteria, yeasts, parasites).
 - 4. Toxicity.
 - 5. Persistence: physical, chemical and biological.
 - 6. Accumulation and biotransformation in biological materials or sediments.
 - 7. Susceptibility to physical, chemical and biochemical changes and interaction in the aquatic environment with other dissolved organic and inorganic materials.
 - 8. Probability of production of taints or other changes reducing marketability of resources (fish, shellfish, etc.).

- B. Characteristics of dumping site and method of deposit
 - 1. Location (e.g. co-ordinates of the dumping area, depth and distance from the cast), location in relation to other areas (e.g. amenity areas, spawning, nursery and fishing areas and exploitable resources).
 - 2. Rate of disposal per specific period (e.g. quantity per day, per week, per month).
 - 3. Methods of packaging and containment, if any.
 - 4. Initial dilution achieved by proposed method of release.
 - 5. Dispersal characteristics (e.g. effects of currents, tides and wind on horizontal transport and vertical mixing).
 - 6. Water characteristics (e.g. temperature, pH, salinity, stratification, oxygen indices of pollution--dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD)--nitrogen present in organic and mineral form including ammonia, suspended matter, other nutrients and productivity).
 - 7. Bottom characteristics (e.g. topography, geochemical and geological characteristics and biological productivity).
 - 8. Existence and effects of other dumpings which have been made in the dumping area (e.g. heavy metal background reading and organic carbon content).
 - 9. In issuing a permit for dumping, Contracting parties should consider whether an adequate scientific basis exists for assessing the consequences of such dumping, as outlined in this Annex, taking into account seasonal variations.

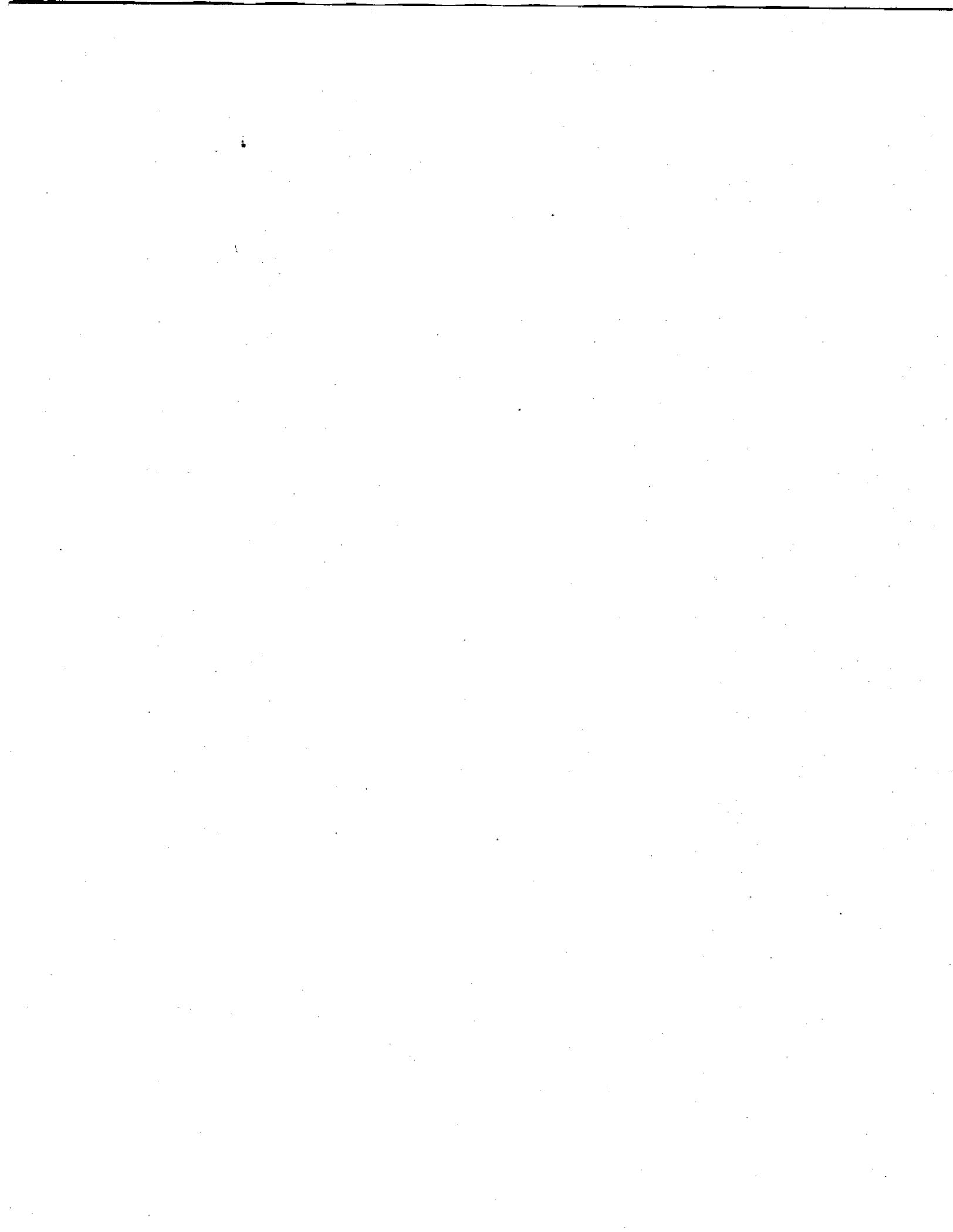
C. General consideration and conditions

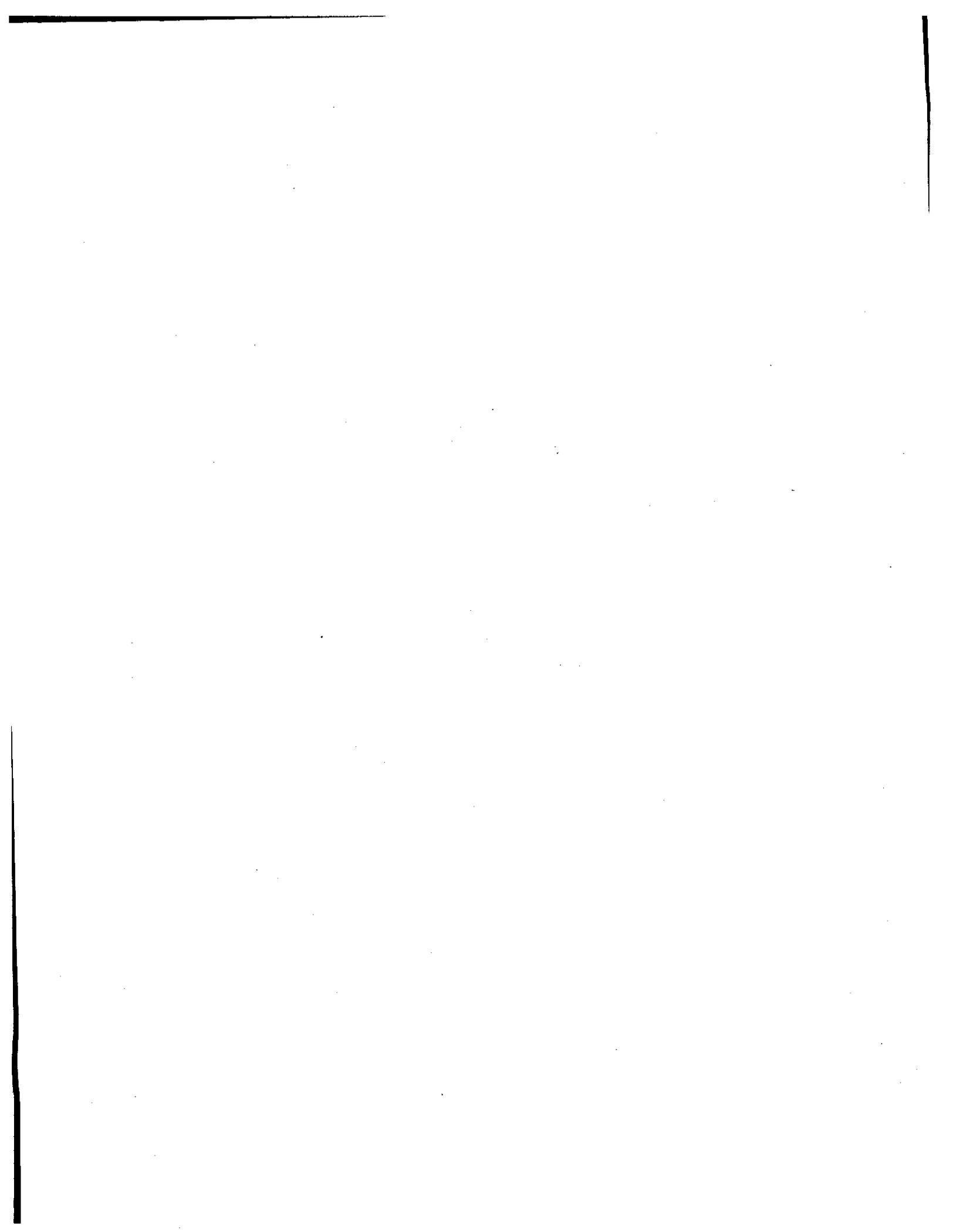
1. Possible effects on amenities (e.g. presence of floating or stranded material, turbidity, objectionable odour, discolouration and foaming).

2. Possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture.

3. Possible effects on other uses of the sea (e.g. impairment of water quality for industrial use, underwater corrosion of structures, interference with ship operations from floating materials, interference with fishing or navigation through deposit of waste or solid objects on the sea floor and protection of areas of special importance for scientific or conservation purposes).

4. The practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the matter less harmful for dumping at sea.





United States
Environmental Protection
Agency

Official Business
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\$300

Washington DC 20460