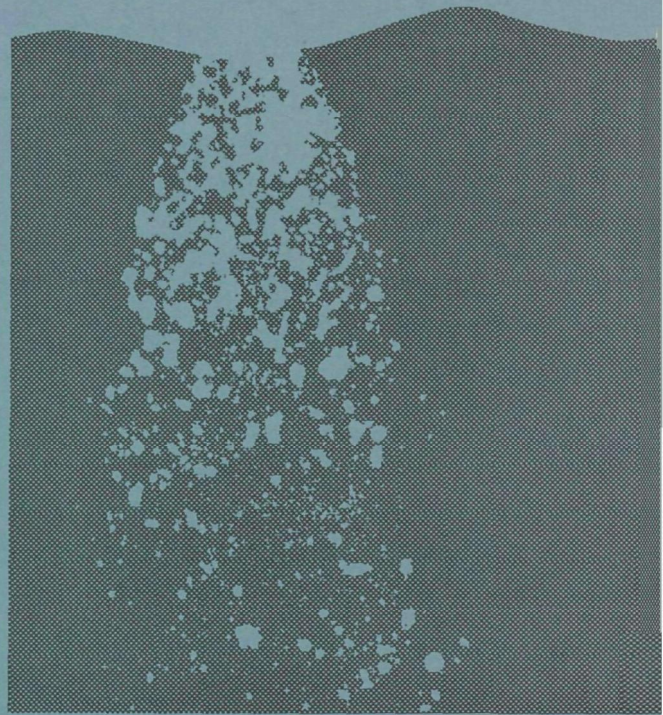


OCEAN DUMPING

BRIEFING DOCUMENT

Prepared by the
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II
for



THE PRESIDENT'S WATER POLLUTION CONTROL ADVISORY BOARD

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O C E A N D U M P I N G

A Briefing Document for

THE PRESIDENT'S
WATER POLLUTION CONTROL
ADVISORY BOARD

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SECTION 1 - INTRODUCTION

This Briefing Document has been written for the use of the President's Water Pollution Control Advisory Board in connection with its meeting in New York City from September 26-29, 1972.

The topic of Ocean Disposal of Waste was covered authoritatively by the Council on Environmental Quality in its 1970 Report to the President entitled Ocean Dumping: A National Policy (1). Much has happened in this field in the intervening two years and, as a result, some of the specific information in that report is now out of date.

This Briefing Document has been assembled in an attempt to bring information in the Council's Report up to date. Although it has been written to be understandable by itself, it will be most meaningful if read in connection with the Council's Report.

Every attempt has been made to include salient information which the Advisory Board needs. This document should not, however, be considered an exhaustive treatment of the subject.

Particularly in the areas of research on the effects of ocean dumping and alternatives to ocean dumping, it is impossible to give complete coverage in a brief report. Presentations by experts during the first and second days with attendant questioning by the Board should plug gaps in the written information available.

In the seven sections which follow, the material is organized in the following way: Current Practices are reviewed in Section 2 and followed by the Environmental Effects of these practices in Section 3 and Alternatives to these practices in Section 4. The Present National Policy is outlined in Section 5, the status of new Federal Ocean Dumping Legislation is discussed in Section 6, and State Legislation and Activity is reviewed in Section 7. Section 8 describes current International Activity to regulate and control ocean disposal of waste.

SECTION 2 - CURRENT OCEAN DISPOSAL PRACTICES

In its 1970 Report to the President, the Council on Environmental Quality reviewed ocean dumping practices for six materials (1, p. iv).

Dredge Spoil - The solid material removed from the bottom of water bodies generally for the purpose of improving navigation: sand, silt, clay, rock, and pollutants that have been deposited from municipal and industrial discharges.

Sewage Sludge - The solid material remaining after municipal waste water treatment: residual human wastes and other organic and inorganic wastes.

Solid Waste - More commonly called refuse, garbage, or trash. The material generated by residences; commercial, agricultural, and other establishments; hospitals and other institutions and municipal operations. Chiefly paper, food wastes, garden wastes, steel and glass containers, and other miscellaneous materials.

Industrial Wastes - Acids; refinery, pesticide, and paper mill waste; and assorted liquid wastes.

Construction and Demolition Debris - Masonry, tile, stone, plastic, wiring, piping, shingles, glass, cinderblock, tar, tarpaper, plaster, vegetation, and excavation dirt.

Radioactive Wastes - The liquid and solid wastes that result from processing of irradiated fuel elements, nuclear reactor operations, medical use of radioactive isotopes, and research activities and from equipment and containment vessels which become radioactive by induction.

This section will present more recent data on quantities of materials disposed of, disposal sites, and disposal costs.

Estimates of the quantities of dumped material were presented by the Council in its Report to the President. These estimates were based on data supplied by the Dillingham Corporation for 1968 (2) and were later found to be incomplete (3). Verber's revisions of these estimates were used in the later Dillingham report (4) and are used as the 1968 figures here. Both the 1968 and the 1970 data presented here, like data used in the Council's Report to the President, do not include waste piped into the ocean but only that waste delivered by vessel.

Dredge Spoil

On a tonnage basis, dredge spoil is the largest waste category being disposed of in the sea. Because of the large number of dredge projects carried out all around the country at any one time,

it is extremely difficult to compile a comprehensive inventory of quantities disposed of. Estimates made by the Dillingham Corporation (2) and used by the Council on Environmental Quality in its 1970 Report to the President indicated that 38.4 million tons of dredge spoil were dumped in the ocean in 1968 (1, p. 3). However, Verber's careful review of the Dillingham data yielded the following quite different estimates, which have been used in a later Dillingham report (4).

Table A: Amount of Dredge Spoil Disposed of
in the Ocean during 1968

	<u>Annual Tonnage</u>
Atlantic Coast	30,880,000
Gulf Coast	13,000,000
Pacific Coast	<u>8,320,000</u>
Total	52,200,000

No estimates for later years have been as carefully or comprehensively assembled. However, some data are available for later periods and can be compared.

On a national basis, a significant portion of the polluted dredge spoil is disposed of at the New York Harbor dumping sites. During the five-year period from 1964 to 1968 (inclusive) an average of 7.5 million cubic yards of dredged material was disposed of in the Harbor (7). In the year June 1969 - June 1970 this figure was 6.6 million cubic yards (8) and in the calendar year 1971 the figure was 9.3 million cubic yards (5). Of this

latter 9.3 million cubic yards, however, 3.2 million is accounted for by two unusually large projects.

Industrial Waste

Industrial waste is a category which includes a wide variety of materials. Table B shows the percentage (by weight) breakdown of the industrial waste dumped into the ocean in 1968.

Table B: Types of Industrial Waste Disposed of
in the Ocean in 1968 (4, p. 22)

Waste Acid	58%
Refinery Wastes	12%
Pesticide Wastes	7%
Paper Mill Wastes	3%
Other	20%

By far the largest single contributor (on a weight basis) was waste acid.

Table C presents total amounts of dumped industrial waste for 1968.

Table C: Amount of Industrial Waste Disposed of
in the Ocean during 1968 (4, p. 21)

	<u>Annual Tonnage</u>
Atlantic Coast	3,013,000
Gulf Coast	696,000
Pacific Coast	<u>981,000</u>
Total	4,690,000

While it was not possible to compile complete data for later periods, a comparison of certain key source areas is possible. The New York City area is the single most important source of this industrial waste, accounting for over 55% of the tonnage in

1968 (4, pp. 21 and 22). Between 1968 and 1970 the amount from this area grew from 2.7 million tons (4, p. 22) to 3.4 million tons (5). Of this total, in each case approximately 90% was waste acid. Ocean dumped industrial waste from the Philadelphia area increased from 290,000 tons in 1968 (4, p. 22) to 733,000 tons in 1971 (5). Almost all of this material is waste acid.

Sewage Sludge

The ocean dumping of sewage sludge from barges is carried out at two Atlantic Coast sites only: in Lower New York Harbor and near the southern tip of New Jersey. As Table D indicates, the quantity of material being disposed of at these sites has increased significantly in the last three years, reflecting an increase in the amount of raw sewage being treated as well as the higher degree of treatment now occurring in some upgraded plants.

Table D: Amount of Sewage Sludge Disposed of in the Ocean

	<u>Annual Tonnage</u>	
	1968 (4)	1971 (5)
Atlantic Coast	4,477,000	5,721,000
Gulf Coast	0	0
Pacific Coast	0	0
Total	4,477,000	5,721,000

At the New Jersey Clean Water Council hearing on June 29, 1971, Morris Klegerman explained how much more sewage sludge is produced when a plant is upgraded by using the following example:

"A non-industrial community with primary sewage treatment now typically produces 4 1/2 to 5 tons of sludge daily on a dry solids basis for a population of 100,000 people. On a wet basis, that is, the quantity actually barged to sea (after concentration), it is between 45 to 50 tons per day per 100,000 of population. After secondary treatment, however, the corresponding figures will become about 9 tons per day on a dry solids basis and about 200 tons per day on a wet basis (i.e. in the condition barged to sea). So that even with zero population growth and zero industrial growth, the communities comprising the metropolitan New Jersey area, by reason of the increased degree of sewage treatment, will double their production of sludge on a dry solids basis and quadruple the volume on a wet basis."

Construction and Demolition Debris

The ocean disposal of construction and demolition debris is carried out almost exclusively at a site 15 miles south of New York City. The quantity of this material dumped at sea depends on how much construction and demolition occur in New York during the year and how much of this typically "clean" inert material is used for fill in projects around New York Harbor. As Table E shows, the quantity of debris was significantly less in 1971 than three years earlier.

Table E: Amount of Construction and Demolition Debris Disposed of in the Ocean

	Annual Tonnage	
	1968 (4)	1971 (5)
Atlantic Coast	574,000	348,000
Gulf Coast	0	0
Pacific Coast	0	0
Total	574,000	348,000

Solid Waste

The known ocean disposal sites for solid waste (refuse, garbage, etc.) are on the Pacific Coast. Only three sites were known to be operating in 1968, and by 1971 only two were still active (one 20 miles offshore of the City of Montara, California and the other 20 miles off Newport Beach, California). Table F shows that there was perhaps a slight reduction in the known quantity of solid waste disposed of in the sea between 1968 and 1971.

Table F: Amount of Solid Waste Disposed of in the Ocean

	Annual Tonnage	
	1968 (4)	1971 (5)
Atlantic Coast	0	0
Gulf Coast	0	0
Pacific Coast	<u>26,000</u>	<u>21,000</u>
Total	26,000	21,000

Radioactive Waste

For all practical purposes, the ocean disposal of radioactive wastes from the United States was almost nonexistent in 1968 and 1971 (4, p. 23; 6).

Cost of Disposal

A table of 1968 disposal costs and cost ranges is presented in the final Dillingham report (4) and is reprinted here as Table G.

Disposal Sites

The final Dillingham report (4) also contains the latest comprehensive mapping of disposal sites available (1968). This set of maps is reprinted here as Figures 1, 2, and 3.

Table G

**AVERAGE AND REPORTED RANGE OF COSTS PER TON FOR MARINE
DISPOSAL OF WASTES IN U.S. COASTAL WATERS
1968**

Type of Waste	Total U. S.		Pacific Coast		Atlantic Coast		Gulf Coast	
	Average cost/ton	Reported Range \$/ton	Average cost/ton	Reported Range \$/ton	Average cost/ton	Reported Range \$/ton	Average cost/ton	Reported Range \$/ton
Dredging spoils	\$0.40/ton	\$.20 - .55	\$0.43/ton	None	\$0.54/ton	\$.40 - .55	\$0.25/ton	\$0.20 - .25
Industrial wastes								
Bulk	\$1.70/ton	\$0.60-9.50	\$1.00/ton	\$0.60-9.50	\$1.80/ton	\$.60-7.00	\$2.30/ton	\$.75-3.50
Containerized	\$24/ton	\$5-130	\$53/ton	\$50 - \$130	\$7.73/ton	\$5 - \$17	\$28/ton	\$10 - \$40
Refuse and Garbage	\$15/ton	\$5 - \$60	\$15/ton	\$5-\$60				
Sewage sludge	\$1.00/ton	\$.80 - 1.20			\$1.00/ton	\$.80-1.20		
Construction and demolition debris	\$0.75/ton	\$.70 - 1.35			\$0.75/ton	\$.70 -1.35		
Explosives	\$15/ton	\$15 - \$90						
Miscellaneous	\$15/ton	\$5 - \$600	\$15/ton	\$5 - \$600				

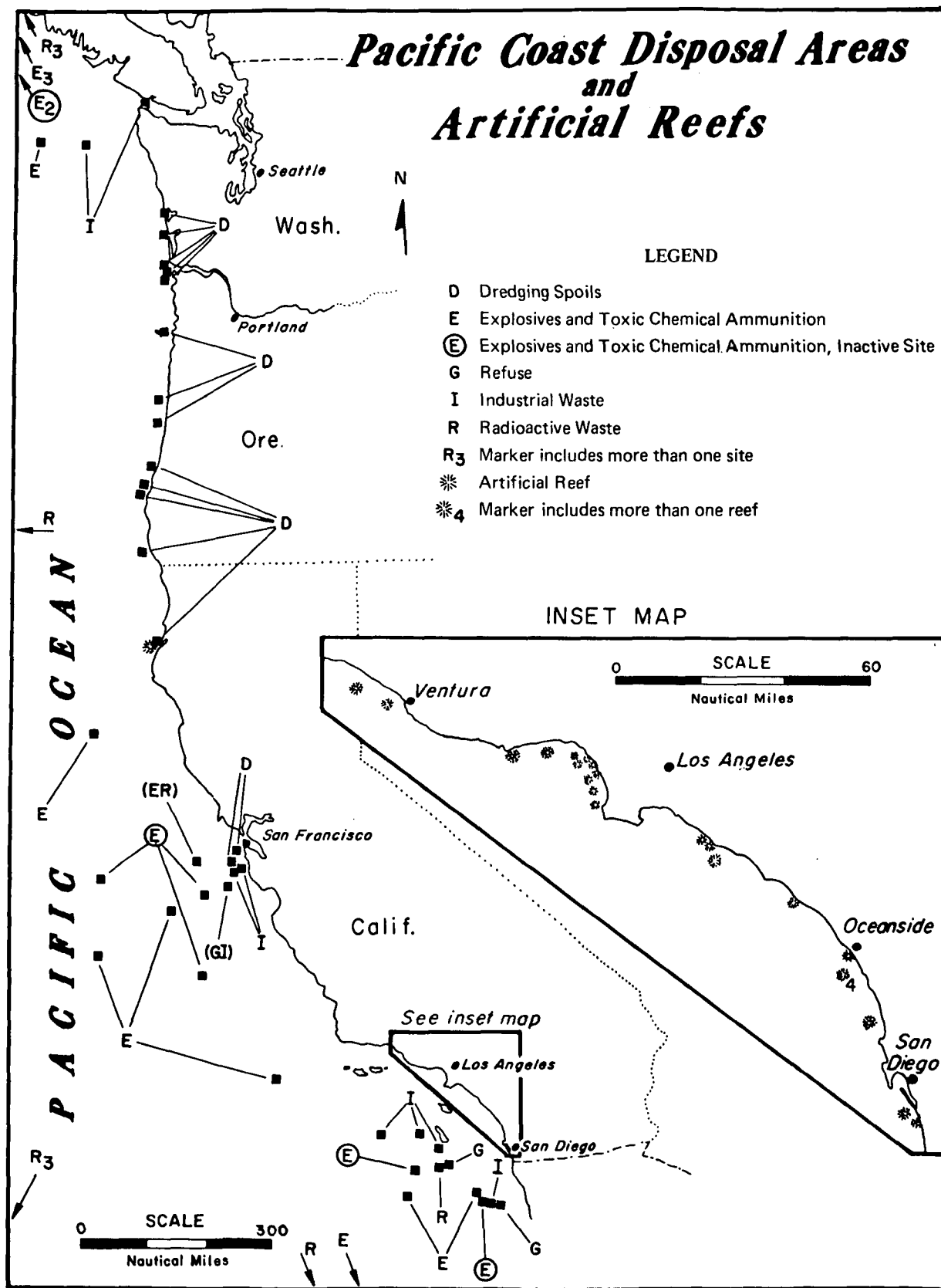


Figure 1. The Pacific Coast was the only U.S. coast where authorized refuse disposal sites were found.

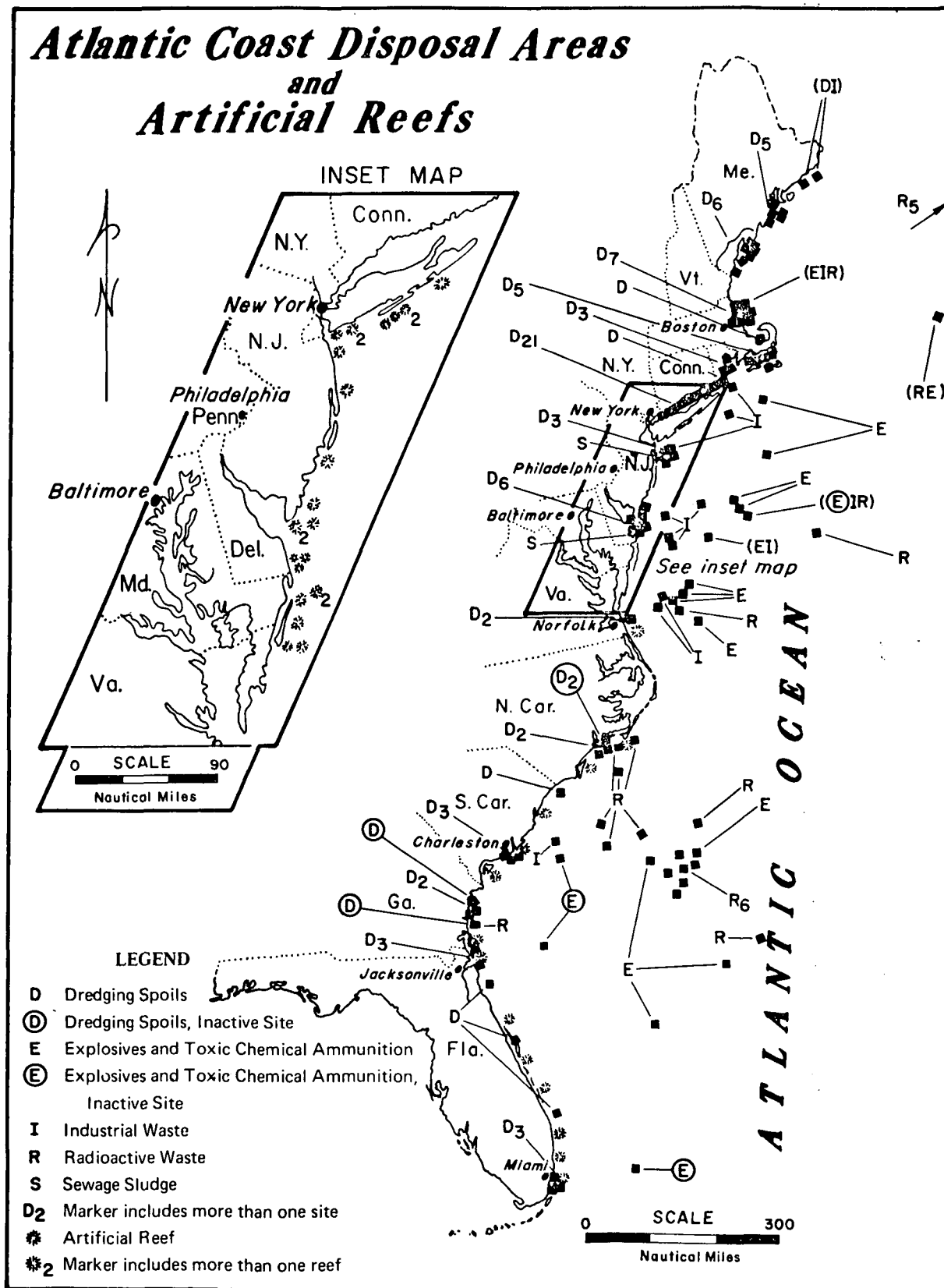
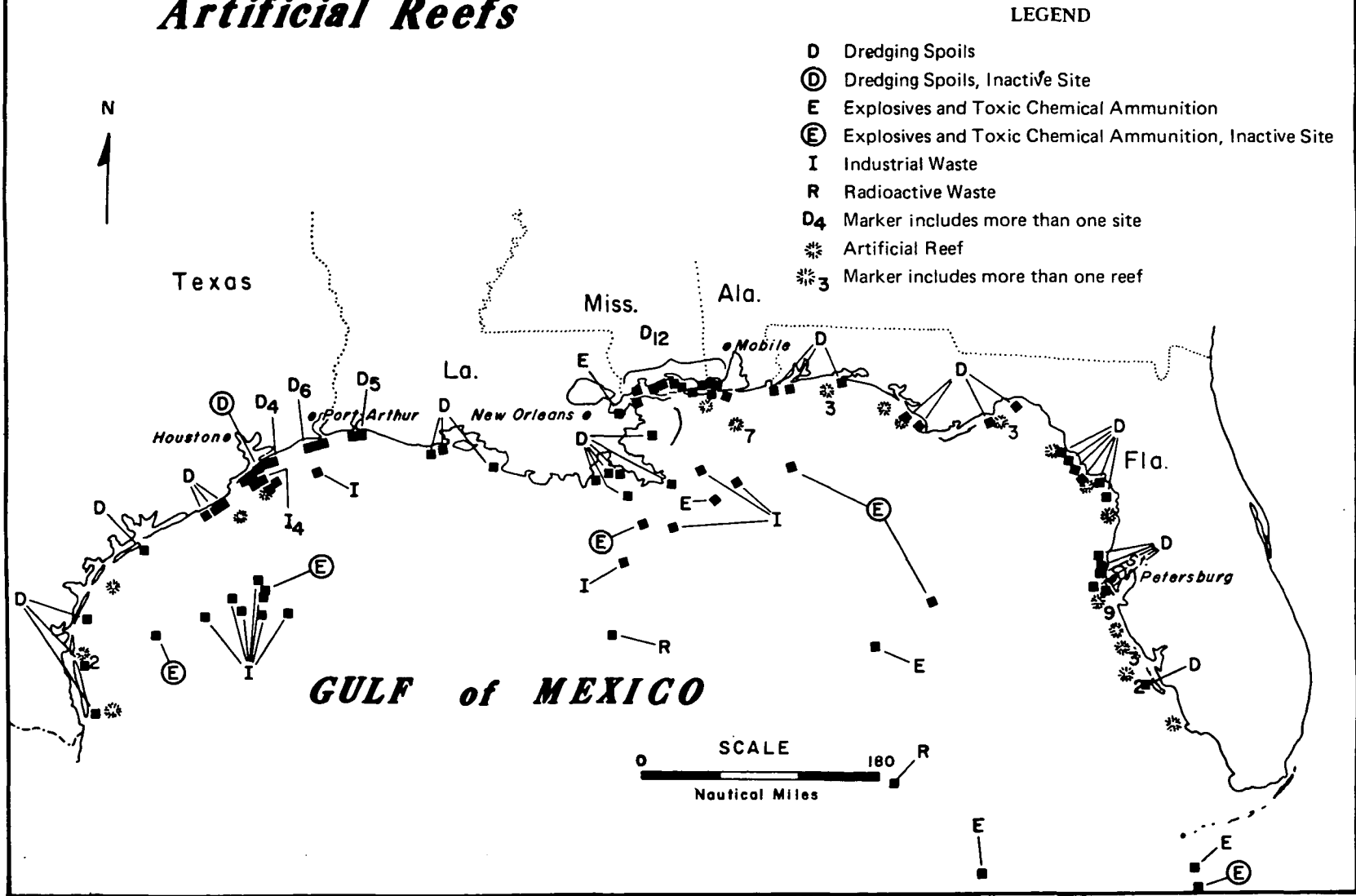


Figure 2. Sewage sludge disposal sites were only found on the Atlantic Coast, where most radioactive waste disposal sites were also located.

Gulf of Mexico Disposal Areas and Artificial Reefs

Figure 3. Most industrial waste disposal operations in the Gulf of Mexico are conducted beyond the 400-fathom line (2,400 feet), which off Galveston requires disposal about 125 miles off the coast.



SECTION 3 - EFFECTS OF OCEAN DISPOSAL

In its 1970 Report to the President, the Council on Environmental Quality reviewed the known effects of ocean pollution, caused in some cases by ocean dumping (1, Chap. II). In this section the material presented by the Council will be reviewed very briefly, and then the results of a few of the more important recent studies will be presented.

Summary of the Council's Report on Ocean Pollution

1. Biological concentration of pollutants may occur in the marine food chain. For example, phytoplankton, at the bottom of this chain, concentrate certain heavy metals, which are concentrated further within the food chain.

2. Effects of ocean pollution on marine life result from toxicity, oxygen depletion, biostimulation and habitat change.

A. Toxicity - Toxic wastes include such materials as pesticide waste, oil and refinery wastes, heavy metals, and paper mill wastes. Sublethal effects of toxic wastes on marine life include reduced vitality and growth, reproductive failure, and interference with sensory functions.

B. Oxygen Depletion -

"Oxygen supports marine and aquatic life and is necessary to the biological degradation of organic materials. Organic wastes [including sewage sludge] dumped or discharged into water bodies demand oxygen to decompose. If waste loads are too heavy, the oxygen levels become depleted and the diversity of marine organisms is altered . . . When all of the oxygen is depleted, organisms die and anaerobic bacteria produce hydrogen sulfide and methane gas which are malodorous" (1, p. 14).

C. Biostimulation -

"Some wastes, such as sewage sludge, are particularly rich in nutrients, such as phosphates and nitrates. These nutrients can cause biostimulation--the accelerated fertilization of plant life. When the plants die, oxygen necessary to support marine life is used in their decomposition. And when dead algae are carried to beaches, they rot and produce unpleasant odors. By creating excessive blooms of algae, biostimulation indirectly changes the nature of bottom sediments and thus whole communities of bottom organisms" (1, pp. 14 and 15). (It should be noted that nutrient poor areas of the ocean exist, which might benefit from detoxified sewage sludge.)

D. Habitat Changes - Changes in the kinds and quantities of sediments may change whole ecological systems.

3. The effects of ocean pollution on humans include public health, recreation, and economic losses.

A. Public Health - Toxic agents like mercury and pathogens like the hepatitis virus may find their way into the human food chain through seafood.

B. Recreation - Many beaches have been closed near large metropolitan areas. Floating material, such as solid waste and oil, as well as odors from rotting algae and anaerobic water, are unpleasant and damage amenity values.

C. Economic Loss - Ocean pollution has had a substantial, deleterious effect on the shellfish industry and on other seafood industries. (New methods are being developed which may make it possible to clean shellfish from contaminated beds.) Cleaning up and rehabilitating polluted beaches is another cost.

Some Important Recent Studies

In a recently published study of the New York Harbor disposal areas, the National Marine Fisheries Service has concluded that the "disposal of dredging spoils and sewage sludges has had a significant and often deleterious effect on the living resources of the New York Bight" (9, p. 7-1). Some of the most important findings of the study are:

1. Heavy metals were found to have accumulated in sediments directly receiving sludge and spoil, and are spreading out from the designated points of disposal.

2. "Many large crustaceans such as crabs and lobsters collected inside the disposal areas were diseased." Also found in the disposal area were some, but not a large portion, of diseased finfish (9, p. 7-2).

3. "The central portions of the disposal areas contained almost no normal benthic [i.e. bottom dwelling] macrofauna [like lobsters]."

4. No prolonged effect on the zooplankton or benthic organisms could be attributed to ocean disposal of industrial acid wastes. (As Section 2 shows, large quantities of acid waste are disposed of in the New York disposal areas.)

In this same report, other similar studies were reviewed.

1. A report by Grigg and Kiwala (10) "indicated a reduction in species diversity and numbers of individuals at sewage outfalls along, the southern California coastline." Such reductions indicate ecological stress.

2. Shelton (11), however, "was unable to detect a significant effect of ocean disposal of sludge on benthic organisms" of the Thames Estuary, perhaps because of strong currents.

A significant study by Jannasch et al. (12) recently reported that they found very little microbial degradation of organic materials, including fruit, bread, and meat, over a three-month period at a depth of 1,500 meters. These results have prompted the following statement from the National Marine Fisheries Service:

"Present disposal practices have 1) degraded the benthic communities of the New York Bight, 2) produced large amounts of floatable materials, and 3) resulted in generally deteriorated waters and marine sediments. We believe, however, that it would be imprudent to shift ocean dumping further offshore unless it is done with considerable caution and supervision. [Jannasch's results suggest] the possibility of damage to benthic nonmicrobial fauna if extensive deep-sea dumping were to occur" (9, pp. 7-10 and 7-11).

SECTION 4 - ALTERNATIVES TO OCEAN DUMPING

The 1970 Report to the President by the Council on Environmental Quality discusses various alternatives to ocean dumping (1). This section will review these alternatives, in some cases with additional comments based on new studies.

Dredge Spoil - The Council recommended continued ocean disposal of unpolluted dredge spoil, but conceded that "for polluted dredge spoils, current disposal practices are not adequate" (1, p. 24). The National Marine Fisheries Service agrees, concluding recently that "a high priority should be given to developing new modes of disposal of contaminated dredging spoils" (9, p. 7-11). Interim methods of disposal, suggested by the Council, include disposing of the polluted material farther from shore or isolating the material in diked areas. Jannasch's findings (Section 3) have led many to oppose disposal of polluted dredge spoil in the deep sea (Section 6). On the other hand, the idea of diking has

recently gained renewed attention. The Army Corps of Engineers has proposed a diked disposal area south of Staten Island (the Hoffman-Swinburne Project). The polluted water from inside this specially lined and diked basin would be decanted through a treatment facility as rain or new spoil material raised its level. A feasibility study for this project has been endorsed by the Environmental Protection Agency.

Longer-range alternatives include high temperature incineration of polluted spoil and pre-treatment to remove toxic wastes so that the spoil can be used for soil improvement. Suggestions to reduce the quantity of polluted spoil which must be handled include better erosion control and higher levels of waste treatment.

Sewage Sludge - According to the Council, the alternatives for disposing of sewage sludge, both interim and long-term, are to use it as a soil conditioner and fertilizer, to incinerate it, or to use it in landfill and reclamation projects. In the New York metropolitan area, where 90% of the sewage sludge barged to sea originates, it has been difficult to implement these alternatives quickly. By almost any method of returning sludge to the land, the total quantity of sludge generated in New York would require large areas of disposal land. And incineration would require large capital expenditures and might worsen the area's existing air pollution problems (Section 5). In a recent study it was found that small but measurable quantities of specific metals which are known to accumulate in the human system, and which are known

to be toxic at certain levels, were found in the input sludge, stack emissions, scrubber water, and residue of those incinerators tested. Also small, but measurable quantities of specific organic chemical compounds including various pesticides and polychlorinated biphenyls, which are known to accumulate in the human system, were found in all sludge samples analyzed. It should be expected that, under conditions of poor combustion, such compounds could be emitted from the stacks of sewage sludge incinerators and perhaps thence to human lungs (13). Although it is not possible to establish that health effects are associated with sewage sludge incineration, these findings are a source of concern nonetheless.

Solid Waste - As was indicated in Section 2, the ocean disposal of solid waste is not at present practiced widely. However, the Council believes that there will be growing pressure in the future to dispose of solid waste at sea because of "increasing population; increasing per capita rates of solid waste generation; and the declining capacity, increasing costs, and lack of nearby land disposal sites" (1). The Council sees sanitary landfill and incineration as possible interim alternatives. In connection with landfill, rail haul is mentioned, perhaps to help reclaim strip mines. Incineration at offshore facilities is a possibility. Long-term alternatives cited by the Council include recycling and generating electric power with fluidized bed reactors fueled by solid waste.

Industrial Waste - A wide variety of materials are included in this category and so it is impossible to give specific alternatives which apply across the board. However, in terms of general types of interim solutions, the Council cites incineration and treatment followed by land disposal. A long-term alternative might be to change production processes, perhaps by recycling the material. The Council suggests that regional disposal, treatment, and control facilities might be established.

Construction and Demolition Debris - This material is usually "clean" and inert, and the Council, therefore, sees no need to seek alternatives to supervised ocean disposal.

SECTION 5 - NATIONAL POLICY ON OCEAN DISPOSAL OF WASTE

In 1970 the Council on Environmental Quality recommended a comprehensive national policy on ocean disposal of wastes to the President. This policy would "ban unregulated ocean dumping of all materials and strictly limit ocean disposal of any materials harmful to the marine environment" (1). The following details of the Council's policy recommendations are taken from Ocean Dumping - A National Policy (1, pp. v-viii).

"The Council recommended new legislation which would:

- (1) Require a permit from the the Administrator of the Environmental Protection Agency for the transportation or dumping of all materials in the oceans, estuaries, and the Great Lakes.
- (2) Authorize the Administrator to ban ocean dumping of specific materials and to designate safe sites.
- (3) Establish panalties for violation of regulations.
- (4) Provide for enforcement by the Coast Guard.

"The Administrator of the Environmental Protection Agency would be guided by the following principles in exerting his authority:

- (1) Ocean dumping of materials clearly identified as harmful to the marine environment or man should be stopped.
- (2) When existing information on the effects of ocean dumping are inconclusive, yet the best indicators are that the materials could create adverse conditions if dumped, such dumping should be phased out. When further information conclusively proves that such dumping does not damage the environment, including cumulative and long-term damage, ocean dumping could be conducted under regulation.
- (3) The criteria for setting standards for disposing of materials in the ocean and for determining the urgency of terminating disposal operations should include:
 - (i) Present and future impact on the marine environment, human health, welfare, and amenities.
 - (ii) Irreversibility of the impact of dumping.
 - (iii) Volume and concentration of materials involved.
 - (iv) Location of disposal, i.e., depth and potential impact of one location relative to others.
- (4) High priority should be given to protecting those portions of the marine environment which are biologically most active, namely the estuaries and the shallow, nearshore areas in which many marine organisms breed on spawn. These biologically critical areas should be delineated and protected."

The Council recommended "the following policies relating to specific types of wastes currently being dumped . . .

- (1) Ocean dumping of undigested sewage sludge should be stopped as soon as possible and no new sources allowed.
- (2) Ocean dumping of digested or other stabilized sludge should be phased out and no new sources allowed. In

cases in which substantial facilities and/or significant commitments exist, continued ocean dumping may be necessary until alternatives can be developed and implemented. But continued dumping should be considered an interim measure.

- (3) Ocean dumping of existing sources of solid waste should be stopped as soon as possible. No new sources should be allowed, i.e., dumping by any municipality that currently does not do so, nor any increase in the volume by existing municipalities.
- (4) Ocean dumping of polluted dredge spoils should be phased out as soon as alternatives can be employed. In the interim, dumping should minimize ecological damage. The current policy of the Corps of Engineers on dredging highly polluted areas only when absolutely necessary should be continued, and even then, navigational benefits should be weighed carefully against damages.
- (5) The current policy of prohibiting ocean dumping of high-level radioactive wastes should be continued. Low-level liquid discharges to the ocean from vessels and land-based nuclear facilities are, and should continue to be, controlled by Federal regulations and international standards. The adequacy of such standards should be continually reviewed. Ocean dumping of other radioactive wastes should be prohibited. In a very few cases, there may be no alternative offering less harm to man or the environment. In these cases ocean disposal should be allowed only when the lack of alternatives has been demonstrated. Planning of activities which will result in production of radioactive wastes should include provisions to avoid ocean disposal.
- (6) No ocean dumping of chemical warfare materials should be permitted. Biological warfare materials have not been disposed of at sea and should not be in the future. Ocean disposal of explosive munitions should be terminated as soon as possible.
- (7) Ocean dumping of industrial wastes should be stopped as soon as possible. Ocean dumping of toxic industrial wastes should be terminated immediately, except in those cases in which no alternative offers less harm to man or the environment.

- (8) Ocean dumping of unpolluted dredge spoils, construction and demolition debris, and similar wastes which are inert and non-toxic should be regulated to prevent damage to estuarine and coastal areas.
- (9) Use of waste materials to rehabilitate or enhance the marine environment, as opposed to activities primarily aimed at waste disposal, should be conducted under controlled conditions. Such operations should be regulated, requiring proof by the applicant of no adverse effects on the marine environment, human health, safety, welfare and amenities."

On October 7, 1970, President Nixon endorsed the Council's recommendations (14) and shortly thereafter recommended Federal legislation for implementing this national policy. Legislation on this subject is (as of August 15, 1972) under consideration by Congress.

Until a new law is passed the Environmental Protection Agency is using the Report of the Council on Environmental Quality to guide its actions and policies as they relate to ocean dumping practices (15, p. 2). In the specific case of the Federal Construction Grants Program for the construction of municipal waste treatment plants, an interim policy was established by E.P.A. on October 31, 1971 (16). This interim policy provides that:

- (1) Federal grant funds may not be used for the construction of new treatment plants when sludge is to be disposed of in the ocean.

- (2) Federal grant funds may not be used for the expansion or improvement of existing facilities which dispose of sludge to the ocean, unless concurrently with the expansion or improvement, conversion to other means of disposal is planned.

(3) Under certain circumstances, the second requirement may be waived on an interim basis. In this case, other requirements apply.

(4) The cost of facilities and equipment for disposal of sludge in ocean waters is not considered an eligible construction cost for purposes of a grant.

The implementation of this policy has created problems in the New York City area, where approximately 13 million people depend upon ocean disposal of sludge. Alternatives to ocean dumping in the New York metropolitan area would require substantial investments. Sludge incineration on the scale necessary to implement the interim policy might lead to an air pollution problem less desirable than the results of the current sludge dumping practice (15). And land disposal of all sludge produced by existing plants and those under construction would require by one estimate 165 square miles per year at a 2 inches depth (17).

Because of this situation E.P.A. has under review a revised interim policy which would permit the continuation of ocean disposal of sludge from facilities in the New York metropolitan area. If adopted, this policy would only apply for those areas where the environmental alternative to ocean disposal is now unacceptable and would be an interim solution only (15, p. 3).

Specifically, this special interim policy for the New Jersey-New York metropolitan area would include the following

provisions (15, pp. 3 and 4):

(1) Approval of construction grants with continued ocean disposal of sludge provided:

(a) Sludge is adequately treated.

(b) Industrial waste ordinances regulate the discharge of heavy metals or other toxic materials into the municipal system. This industrial waste pre-treatment policy must be adopted by E.P.A. and the States to assure specific minimum concentrations of objectionable materials in the waste treatment plants' influent and effluent as well as the resultant sludge.

(c) Ocean dumping from the New Jersey-New York metropolitan area has to be abandoned when a more effective environmental alternative is available through the efforts and requirements of the States, E.P.A., and regional sludge management authorities.

(2) It is recognized that ocean disposal of sludge will have an effect upon the marine environment. E.P.A. would assume its responsibilities in an assessment of these effects by establishing new dumping sites, controls over dumping practices, and evaluating and monitoring the marine environment prior to and during the interim ocean disposal of sludge. This program of monitoring and analysis should permit E.P.A. in cooperation with the National Oceanic and Atmospheric Administration to expand its knowledge of the effects of ocean disposal of treated and detoxified municipal sludge.

(3) E.P.A. would support the formation and operation of regional intrastate or interstate solid waste disposal authorities. It is recommended that this interest be in the form of financial resources and/or technical assistance. These authorities would be responsible for the development of acceptable long-term alternatives for the management of the sludge problem. The same authorities would implement the most effective alternatives to permit eventual abandonment of ocean disposal.

No final action has been taken on this proposed revised interim policy for the New York metropolitan area.

SECTION 6 - FEDERAL OCEAN DUMPING LEGISLATION

One of the principal recommendations of the Council on Environmental Quality in its 1970 Report to the President was for Federal legislation on the ocean disposal of waste (1). A draft of such a bill was sent to Congress as part of the President's 1971 Environmental Program. Although Congress has not yet taken final action on the ocean disposal bill (as of August 15, 1972), passage may come at any time.

On July 27, 1972, a House-Senate Conference Committee announced that it had reached agreement on H.R. 9727 (19). This agreement cleared the way for House and Senate action on the ocean dumping law. As it now stands, the two-year measure provides \$39.1 million for the regulation of dumping, \$20 million for the establishment of marine sanctuaries, and \$12 million for research. Specific provisions of the bill include (18):

1. an absolute ban on the transportation and dumping of radiological, chemical, or biological warfare agents, and high level radioactive wastes.

2. a prohibition on the transportation and dumping of all other waste material unless authorized by permit.

The following description of the bill is largely quoted from an EPA release (18):

The Administrator of EPA will issue a permit after notice and an opportunity for a public hearing when he determines that the proposed activity will not degrade or endanger human health, welfare, or the marine environment, ecological systems or the economic potentialities.

When reviewing a permit application, the Administrator must consider appropriate alternative locations and methods of disposal or recycling as well as the need and the effects of the proposed dumping. A permit may not be issued where the material to be dumped will violate applicable water quality standards.

In addition, the Administrator is authorized to designate sites and/or times within which certain materials may not be dumped.

The Corps (of Engineers) may issue permits for dumping of dredge spoil. In each case the Corps must make an independent determination based upon the potential effects of a permit denial on navigation, economic and industrial development, and foreign and domestic commerce in addition to the possible methods of disposal and appropriate locations for dumping.

The Corps cannot issue a permit which does not comply with the criteria relating to the effects or with the sites or times of the dumping. The Administrator will determine whether the Corps is in compliance with such restrictions and the determination of the Administrator is final.

If the Corps determines that there is no economically feasible method or site available, it must so certify and request a waiver from the Administrator of EPA. The waiver is automatically approved thirty days after receipt unless the Administrator finds the dumping will result in an unacceptably adverse impact on municipal water supplies, shellfish beds, wildlife, fisheries, or recreational areas.

Penalties of up to \$50,000 and one year imprisonment are provided for those who knowingly violate the Act. As far as citizen suits are concerned, any person has standing in Federal courts and may seek to enjoin violations of the Act or of an issued permit. The Coast Guard is given responsibility to enforce the provision having to do with unlawful transportation of material for dumping.

The Secretary of Commerce, in conjunction with the Coast Guard and EPA, is to develop a comprehensive research and monitoring program as to the effects of dumping. The Secretary of Commerce is also authorized to initiate a comprehensive and continuing program of research with respect to the long-range effects of pollution. In addition, the Secretary of Commerce is directed to conduct research, investigations, experiments, training demonstrations, surveys and studies to determine the means of ending all ocean dumping.

Finally, the Secretary of Commerce is authorized to designate as marine sanctuaries areas of the oceans, estuaries, and Great Lakes where he determines that such action is necessary to preserve them for their conservation, recreational, ecological or aesthetic values. No license or permit can be issued to conduct activity within a designated

marine sanctuary.

The Environmental Protection Agency is now in the process of developing plans to implement this law. If it is passed, the implementation plan would be published shortly thereafter (20).

SECTION 7 - STATE LEGISLATION AND CONTROL ACTIVITIES

In 1970 the Council on Environmental Quality concluded that "State regulation has not established a basis for an extensive and comprehensive method of controlling ocean dumping. Besides general lack of authority and programs, State jurisdiction would generally be limited to the 3-mile territorial sea" (1, p. 30). Since 1970, activity has varied considerably from State to State.

In Maryland, a House Joint Resolution was adopted on May 17, 1971, calling on:

"The Congress of the United States and the Federal Department of Health, Education, and Welfare [to] take immediate action to halt the pollution of our ocean waters being caused by the dumping of untreated wastes into the waters of the Atlantic Ocean" (21).

Florida passed a law in 1971 requiring secondary treatment "or other treatment deemed necessary" on new ocean outfalls and by January 1, 1973 on all industrial waste discharged through ocean outfalls (22). And Maine approved a law authorizing its Wetlands Control Board to adopt "orders regulating, restricting, or prohibiting dredging, filling, removing or otherwise altering any coastal wetland, or draining or depositing sanitary sewage into or on any coastal

wetland, or otherwise polluting the same" (23).

Perhaps the broadest State ocean disposal control regulation yet proposed is the one currently under consideration in New Jersey (24). The New Jersey Department of Environmental Protection gives the following description of the specific provisions of this regulation (25):

Section 1 of the proposed regulations defines the legal and technical terms used in the regulations.

Section 2 of the regulations prohibits, outright, the handling or loading on vessels for ocean disposal of certain materials whose adverse impact on the marine environment is so great that even disposal far from shore would be unwise. These materials include pesticides, petroleum products, mercury, and radioactive materials.

Section 3 of the proposed regulations restricts the handling or loading for ocean disposal of materials which are generated in such amounts that the onshore treatment which would be required by an outright prohibition of their loading for disposal at sea would not be immediately practical.

These materials are chemical wastes (which do not contain the four materials banned by Section 2 of the proposed regulations), sewage sludge, and polluted dredge spoil. The restriction is that handling or loading on vessels of such material shall be in violation of the regulation unless the material handled or loaded is disposed of in waters deeper than 2,000 meters as shown on the section of the U.S. Naval Oceanographic Chart Int. 108, N.O. 131 reproduced in the proposed regulation. Waters of this depth occur within 125 miles of the coast line of the State.

The restrictions on loading for ocean disposal of dredge spoil apply only to dredge spoil taken from highly polluted waterways. These are the Delaware River south of Camden, New Jersey, Raritan Bay, Raritan River, Newark Bay, Arthur Kill, Hackensack River, Passaic River, Hudson River, and Kill Van Kull.

Section 4 of the regulations requires that all those persons engaged in any phase of the ocean disposal of waste materials obtain a permit from the Department within thirty days of the effective date of the regulation or prior to the commencement of their ocean disposal activity, whichever occurs later.

Section 5 of the regulations requires that every person issued a "Permit to Handle or Load Materials for Ocean Disposal" shall report monthly to the Department on the details of his loading, handling, and disposal activities.

A public hearing was held on these proposed regulations on July 14, 1972. Testimony included a statement by Mr. Ralph F. Vaccaro and Dr. Peter H. Wiebe of the Woods Hole Oceanographic Institution, who cited evidence that biological decomposition of organic matter is relatively slow in the deep sea and that deep-sea dumping (as required in Section 3 of the proposed regulations) "is at best a hazardous pursuit and may be tantamount to storing the wastes indefinitely." They suggested "that use of the deep sea for waste disposal activities should be denied until such time as the possible dangers are proved invalid" (26).

The U. S. Environmental Protection Agency supports "the objectives of the proposed New Jersey ocean disposal control regulations." EPA stated, however, that "there has been a recommendation that materials should be discharged eastward of the 2,000 meter depth line. This practice should be avoided and minimized until its environmental impact can be assessed effectively and be demonstrated to be without significant harm" (15). Questions have also been raised about the geographical extent of New Jersey's jurisdiction.

As of August 15, 1972, the New Jersey Department of Environmental Protection was still reviewing testimony on the proposed regulations and had taken no final action (27).

SECTION 8 - INTERNATIONAL ACTIVITY

The focal point for recent international activity related to ocean disposal of waste has been the U.N. Conference on the Human Environment held in Stockholm, Sweden, from June 5-16, 1972.

The Preparatory Committee for this Conference recommended in February 1971 that an Inter-Governmental Working Group on Marine Pollution be established to prepare some of the action to be taken in Stockholm. The first session of this Group was held from June 14-16, 1971, in London. During these meetings the United States introduced draft articles of a convention on the regulation of transportation for ocean dumping (28). The Group continued consideration of the draft articles at its second session in Ottawa from November 8-12, 1971. As a result of these sessions and subsequent exchanges between the interested Governments, an Inter-governmental Meeting on Ocean Dumping was held at Reykjavik, Iceland from April 10-15, 1972. At this meeting, the text of draft articles of a Convention for the Prevention of Marine Pollution by Dumping was produced. The meeting also passed a resolution to forward these draft articles to the United Nations Conference on the Human Environment for further con-

sideration and appropriate action (30).

These draft articles include provisions for the following actions by the states parties to the convention (30):

1. Prohibition of dumping of specific materials, including organohalogens (such as DDT), mercury and its compounds, cadmium and its compounds, persistent plastics, persistent synthetic materials which float, various oils, high level radioactive waste, and agents of chemical and biological warfare.
2. Establishment of a system of permits for the dumping of all other materials. Special permits would be required for materials containing significant amounts of arsenic, lead, copper, zinc, and their compounds, as well as organosilicon compounds, cyanides, fluorides, and pesticides not specifically prohibited. Included also would be acids and alkalies containing significant amounts of beryllium, chromium, nickel, and vanadium, as well as bulky wastes which might present a serious obstacle to fishing or navigation.

The U.N. Conference on the Human Environment referred this draft ocean dumping convention to the U.N. Seabeds Committee for its comments and to a conference to be held in the United Kingdom for final consideration, if possible, before the end of 1972. The State Department says that, "The U.S. strongly supported . . . this recommendation as offering the best possible opportunity for prompt conclusion of the work on the ocean dumping convention first proposed by U.S. in June 1971" (31, p. 37).

The U.N. Conference on the Human Environment also recommended that the participating governments (31):

1. Accept and implement available instruments on the control of maritime sources of marine pollution.
2. Ensure that the provisions of such instruments are complied with by ships flying their flags and by ships operating in areas under their jurisdiction.

3. Control ocean dumping and continue work on ocean dumping conventions.
4. Participate in the approaching Law of the Sea Conference and the 1973 IMCO Marine Pollution Conference with objective of bringing all significant sources of pollution in marine environment, including radioactive pollution from nuclear vessels, under appropriate control and eliminating completely by middle of present decade all intentional discharge of oil from ships.
5. Strengthen national controls over land-based sources of marine pollution.

Of these recommendations the U.S. State Department said the following (31):

The U.S. supported the entire recommendation as it urges states to take legal measures nationally, regionally, and internationally to bring major sources of marine pollution under control. The U.S. has misgivings about carte-blanc endorsement of all available instruments and believes case-by-case review is necessary, especially of non-binding instruments in form of resolutions, etc., of international organizations. The U.S. does not accept that references in paragraphs (2) and (3) constitute endorsement of jurisdiction other than that widely accepted in international law. The U.S. interprets the reference to appropriate controls of radioactive pollution from nuclear vessels to mean that each government will establish and enforce controls over its own nuclear powered naval vessels and that these governments will take into account generally recognized international radiation standards.

Following on the recommendation of the Conference, a meeting has been tentatively scheduled for October 23 through November 3, 1972, in the United Kingdom for final consideration of the Convention for the Prevention of Marine Pollution by Dumping (32).

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