ENVIRONMENTAL IMPACT STATEMENT

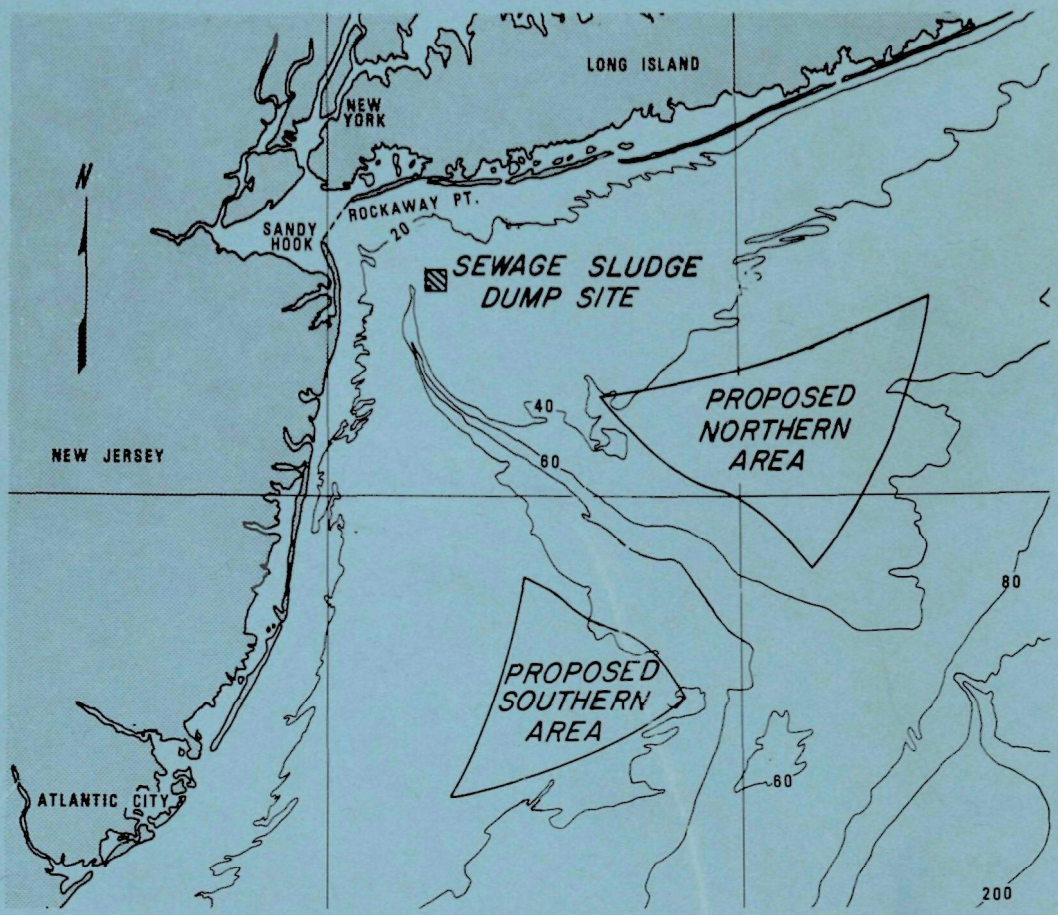
ON THE

OCEAN DUMPING OF SEWAGE SLUDGE

IN THE NEW YORK BIGHT

FINAL

SEPTEMBER 1978



U.S. ENVIRONMENTAL PROTECTION AGENCY

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EPA

September 29, 1978

To All Interested Government Agencies, Public Groups, and Citizens:

Enclosed for your review is the final Environmental Impact Statement on Ocean Dumping of Sewage Sludge in the New York Bight.

Ocean dumping of sewage sludge has been the subject of much discussion in recent years, especially in the New York-New Jersey metropolitan area. Continuing public concern about the environmental effects of sludge dumping, and about the feasibility of implementing land-based disposal methods in the metropolitan area by the end of 1981, led EPA to reexamine its recommendation in the draft environmental impact statement (EIS) that use of the existing dump site continue on an interim basis.

The results of this reexamination are set forth in detail in the final EIS. Basically, they confirm EPA's finding in the draft EIS that the existing site is not a threat to public health or water quality, and can reasonably continue in use provided that it is closely monitored and that an alternate site is available should monitoring ever indicate the need for relocation. Since there is no present need for relocation, immediate use of an alternate site would result in the unnecessary contamination of still another area of the New York Bight. In addition to reexamining the present situation, the final EIS explains the steps that EPA is taking to insure that sludge dumping is phased out by December 31, 1981, a deadline that has progressed from a matter of EPA policy to a legal requirement under the Marine Protection, Research, and Sanctuaries Act.

The thirty-day review period for final EISs begins the day you receive this EIS. If you have any comments, please send them to the attention of Michael P. Bonchonsky, Acting Chief, Environmental Impacts Branch.

At your service,

Eckardt C. Beck
Regional Administrator

Enclosure

FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON THE OCEAN DUMPING OF SEWAGE SLUDGE
IN THE NEW YORK BIGHT

SEPTEMBER 1978

Prepared by: U.S. Environmental Protection Agency
Region II
New York, New York 10007

Approved by: Eckardt C. Beck 9/26/78

Eckardt C. Beck — Date
Regional Administrator

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON THE OCEAN DUMPING OF SEWAGE SLUDGE
IN THE NEW YORK BIGHT

CHAPTER I

SUMMARY

DATE: September 1978.
TYPE OF STATEMENT: Final.
RESPONSIBLE FEDERAL AGENCY: U.S. Environmental Protection Agency - Region II.
TYPE OF ACTION: Administrative.

OVERVIEW

Since the early 1900s, sewage sludge generated at municipal wastewater treatment plants in the New York-New Jersey metropolitan area has been disposed of by ocean dumping. Some of the older plants in the metropolitan area provide only primary wastewater treatment; they must be upgraded in the next few years to provide at least secondary treatment in compliance with the Federal Water Pollution Control Act (also known as the Clean Water Act). This will mean an increase in the volume of sludge that must be disposed of.

The existing sewage sludge dump site is located in that section of the Atlantic Ocean known as the New York Bight. About 4.0 million cu m (5.3 million cu yd) of sewage sludge were dumped here in 1977. The volume will steadily increase as treatment plants are upgraded; by 1981 it is expected to be about one and a half times greater than the 1977 volume.

Concern over the possible effects of dumping increasing volumes of sludge at the existing dump site led the U.S. Environmental Protection Agency (EPA)* to consider designating a new dump site farther out in the Atlantic. Although EPA had already stated its intention to completely phase out ocean dumping of sewage sludge by 1981, provided that acceptable land-based disposal methods could be substituted, it was not known whether the existing site could accommodate the sludge to be dumped in the interim. In 1974, therefore, EPA proposed that a new ocean dump site be designated for use until sludge dumping could be replaced by environmentally, technically, and economically feasible land-based disposal methods.

The EPA took this step as a precaution against any possible dangers to public health that might result from overtaxing the existing dump site. The next step was to determine whether such a precaution was necessary and, if so, whether the proposed action was the best means of both protecting the public health and preventing degradation of coastal water quality. In compliance with the National Environmental Policy Act and with EPA's own environmental impact assessment guidelines, an in-depth evaluation was conducted of the proposed action and its alternatives. The conclusion was that EPA's proposed action was unnecessary and potentially more damaging to the environment than taking no action whatsoever. This conclusion was reported in the draft environmental impact statement (EIS) issued by EPA in February 1976.

Based on the information reported in the draft EIS, EPA decided not to proceed with the proposed action. Instead, EPA recommended: 1) continued use of the existing dump site, 2) implementation of a comprehensive monitoring program for the existing dump site, and 3) designation of an alternate dump site that could be available for immediate use if the monitoring program at any time indicated that the existing site could not safely accommodate any more sewage sludge.

*Please note that *EPA* is a general reference to the U.S. Environmental Protection Agency. Where it is necessary to differentiate between the Headquarters office and the Region II office of the agency, the appropriate designation is made.

The draft EIS was distributed for review and comment on February 27, 1976, and public hearings were held in New York City, on March 24 and 25; in Toms River, New Jersey, on March 29; and in Mineola, Long Island, on April 1. Preparation of the final EIS was nearly complete when two incidents occurred that raised questions about EPA's recommendation to continue using the existing dump site. Those incidents, both of which occurred during the summer of 1976, were the extensive fish kill off the coast of New Jersey and the washup of foreign matter on Long Island's beaches. As discussed at length in Chapter II, the results of the many studies undertaken in response to those incidents showed that both were brought on by atypical atmospheric and hydrographic conditions in Bight waters. Although conditions were aggravated by pollutants, primarily pollutants from inland sources, sludge dumping was found to be at most a minor contributing factor.

At the time of the incidents, however, some observers theorized that sewage sludge dumping was directly responsible, prompting demands that sludge dumping be moved as far from shore as possible. The chemical wastes site (also known as the 106-mile site) is located off the edge of the continental shelf; this was the site most often suggested as an alternative to the existing sewage sludge dump site.

Public concern about the possible connection between sewage sludge dumping and the incidents that occurred during the summer of 1976 was one of several reasons for the decision of the EPA-Headquarters office to hold a public hearing in Toms River, New Jersey, on May 31, and June 1, 1977. The hearing concerned the effects of sludge dumping operations in EPA-Regions II and III and various proposals for shifting those operations to other sites.

With respect to Region II, both the hearing officer's report issued on September 22, 1977, and the EPA-Headquarters' decision report issued on March 1, 1978, upheld the findings and recommendations of the draft EIS (see Appendices C and D). The EPA, therefore, intends to carry out the recommendations made in the draft EIS regarding continued use of the existing sewage sludge dump site and designation of an alternate site that can be available for immediate use if the existing site is ever found to be unable to accommodate any more sewage sludge. The comprehensive monitoring program recommended in the draft EIS has already been implemented.

Issues raised in comments on the draft EIS are addressed in Chapter XI; the comments themselves are reprinted in Appendix K. Because of the unusually long time that has elapsed since publication of the draft EIS, substantial differences will be apparent between the draft and final EISs. The final EIS contains updated information on permittees, sludge volumes, applicable regulations, and so on, as well as a discussion of the fish kill and beach closure incidents and a report on recent developments in land-based sludge disposal. More information has been gathered on the environmental, economic, and logistical ramifications of using the chemical wastes site for sewage sludge disposal. In addition, the reports issued pursuant to the public hearing in Toms River, New Jersey, on May 31, and June 1, 1977, are reproduced in their entirety in Appendices C and D). Two changes are particularly important. First, the final EIS specifies the criteria that have been developed to regularly check conditions at the existing dump site in order to determine whether moving to the alternate site is warranted (Appendix E). Second, the final EIS enumerates the steps that EPA will take to insure that ocean dumping of sewage sludge is phased out by December 31, 1981 (Appendix F).

One note on terminology is in order. Although EPA no longer supports its original proposal (designation and immediate use of a new dump site), that proposal is referred to throughout the EIS as "the proposed action". The reason for this is that all of the reports and studies connected with this EIS took as their starting point EPA support for immediate use of an alternate dump site. It was only after analyzing all of the data collected in connection with this EIS that EPA decided to withdraw its original proposal. (Under the proposed action, use of an alternate dump site would have commenced in July 1976 and continued until suitable land-based sludge disposal alternatives were implemented in the New York-New Jersey metropolitan area.)

DESCRIPTION OF THE PROPOSED ACTION

The EPA proposes to abandon the existing sewage sludge dump site in the Apex of the New York Bight and to designate an alternate dump site farther offshore. Depending on which of the two areas under consideration is chosen, the Northern Area or the Southern Area, the dump site will be located a minimum of 46 km (25 n mi) off the coast of either Long Island or New Jersey. Estimates of the total cost of implementing the proposed action range from $204 million to $253 million, a 323 to 400 percent increase over the cost associated with use of the existing dump site ($63 million) for the period 1978 through 1981.

ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The proposed action would have both general and site-specific effects. Among its general effects would be a significant adverse impact on the benthos (bottom-dwelling organisms) at and near an alternate dump site. In response to sludge dumping, the benthic community would probably increase in abundance, but decrease in diversity; the remaining species would eventually be representative of a polluted bottom environment, such as that at the existing dump site in the Bight Apex.

The sediments on and in which the benthic organisms dwell would be degraded. Sediment concentrations of heavy metals, organic matter, coliforms, chlorinated hydrocarbons, and possibly nutrients (nitrogen and phosphorous) would increase over background levels. Pollutant concentrations in the water column itself would vary according to the particular composition of each load of sludge, the degree of dispersion, and seasonal conditions.

Site-specific effects of the proposed action would be manifest if the alternate dump site were to be located in the Southern Area. Sludge dumping there might affect commercial shellfishing, particularly surf clam harvesting, off the New Jersey coast. Sludge dumping might also interfere with the potential development of mineral resources (oil and gas, sand and gravel) in and adjacent to the Southern Area; the most imminent conflict would be with oil and gas development on the outer continental shelf.

Designation of an alternate site in the Northern Area would result in fewer site-specific effects. Commercial shellfishing in the area is minimal and is likely to remain so. No developable mineral resources have been identified in or near the Northern Area.

The only significant irreversible and irretrievable commitment of resources necessary to implement the proposed action would involve the cost. Through 1981, it would cost 323 to 400 percent more to use an alternate dump site in the Northern or Southern Area than to continue using the existing dump site; the increased cost is directly attributable to the increased distance to an alternate dump site farther out in the New York Bight.

Sewage sludge is a potentially valuable resource, and its continued loss through ocean dumping could be considered an irreversible and irretrievable commitment. Until land-based disposal methods can be implemented in the metropolitan area, however, the beneficial use of sludge is impossible. The proposed action would thus be an unavoidable but insignificant commitment of this resource.

The environmental impacts of the proposed action are discussed in Chapter VII.

ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed action considered in this EIS fall into two categories: other ocean-dumping alternatives (short-term) and land-based sludge disposal alternatives (long-term).

Since implementation of land-based disposal methods in the metropolitan area is still some years off, a suitable interim ocean dumping alternative is needed. In addition to the proposed action, the ocean-dumping alternatives are:

- Continued use of the existing dump site (No Action or Phased Action),
- Use of an alternate dump site other than the Northern or Southern Area, including sites off the continental shelf, and
- Modification of dumping methods to mitigate potential marine and shoreward impacts.

The land-based sludge disposal alternatives are:

- Direct land application,
- Incineration,
- Pyrolysis, and
- Use as a soil conditioner.

These land-based alternatives have been studied by the Interstate Sanitation Commission (ISC) under a grant from EPA. The ISC sludge disposal management program was issued in October 1976. Since that time, EPA has awarded grants to most of the ocean dumping permittees for specific studies of land-based sludge management alternatives within their geographic areas. The EPA has also placed a condition on the ocean dumping permits issued in August 1976, requiring that ocean dumping be phased out by December 31, 1981. This phase-out date was legislatively mandated in November 1977, by amendment to the Marine Protection Research and Sanctuaries Act of 1972.

Alternatives to the proposed action are discussed in Chapter III.

RECOMMENDED ACTION

After carefully evaluating all available alternatives and the effects of ocean dumping, EPA recommends that use of the existing sewage sludge dump site in the Bight Apex continue on an interim basis. As a safeguard, EPA recommends: 1) that an alternate dump site in the Northern Area be immediately designated for future use, if necessary; 2) that the existing dump site be closely monitored for potential threats to public health or degradation of water quality; and 3) that upon confirmation of a possible threat, permittees be required to use the alternate dump site.

A thorough review of the most recent onsite data indicates that the proposed action (immediate designation and use of an alternate dump site) is unjustified. Continued use of the existing site is not a present threat either to public health or to water quality along the Long Island or New Jersey beaches. Moving present sludge dumping operations to an alternate site without adequate justification would result in the unnecessary contamination of a relatively clean area of the New York Bight. Moreover, contamination of the new area would not be balanced off by recovery of the old; the quality of the existing site and its surrounding area could not be expected to improve significantly even if sludge dumping were terminated, because the bottom is severely contaminated and pollutants from other sources will continue to flow into the Bight Apex.

GOVERNMENT AGENCIES AND OTHER INTERESTED PARTIES FROM WHOM COMMENTS HAVE BEEN REQUESTED:

Federal Agencies

Council on Environmental Quality
Washington, D.C.

Department of Agriculture
Washington, D.C.

- Soil Conservation Service
  Syracuse, N.Y.

Department of Commerce
Washington, D.C.

- National Marine Fisheries Service
  Gloucester, Mass.
  Sandy Hook, N.J.

- National Oceanic and Atmospheric Administration
  Boulder, Colo.
  Rockville, Md.
  Stony Brook, N.Y.

- National Weather Service
  Garden City, N.Y.

Department of Defense

- Army Corps of Engineers
  New York, N.Y.
  Vicksburg, Miss.

- Office of the Oceanographer of the Navy
  Alexandria, Va.

Department of Health, Education, and Welfare
New York, N.Y.

- Food and Drug Administration
  Brooklyn, N.Y.
  Davisville, R.I.

Department of Housing and Urban Development
New York, N.Y.
Newark, N.J.

Department of Interior
Washington, D.C.
Boston, Mass.

Gateway National Recreation Area
Brooklyn, N.Y.

Department of Transportation
Washington, D.C.

U.S. Coast Guard
New York, N.Y.

Department of Energy
Washington, D.C.

United States Environmental Protection Agency
Cleveland, Ohio
Corvallis, Oreg.
Narragansett, R.I.
Philadelphia, Pa.
Washington, D.C.

United States Senate

Honorable Joseph R. Biden, Jr.
Honorable Clifford P. Case
Honorable John H. Chafee
Honorable Jacob K. Javits
Honorable Charles McC. Mathias, Jr.
Honorable Daniel P. Moynihan
Honorable Claiborne Pell
Honorable Abraham A. Ribicoff
Honorable William V. Roth, Jr.
Honorable Paul S. Sarbanes
Honorable Lowell P. Weicker, Jr.
Honorable Harrison A. Williams

Senate Commerce Committee
Senate Subcommittee on Environmental Pollution
Senate Subcommittee on Oceans and the Atmosphere

United States House of Representatives

Honorable Joseph P. Addabbo
Honorable Jerome Ambro, Jr.
Honorable Mario Biaggi
Honorable Jonathan B. Bingham
Honorable Bruce F. Caputo
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House Committee on Merchant Marine and Fisheries
House Subcommittee on Fisheries and Wildlife
Conservation and the Environment
House Subcommittee on Oceanography
House Committee on Science and Technology

State and Local Agencies

Mayor, Village of Atlantic Beach
Atlantic Beach, N.Y.

Berkeley Township
Bayville, N.J.

Erie County Environmental Health Services
Buffalo, N.Y.

Hempstead Town Department of Conservation and Waterways
Point Lookout, N.Y.

Lacey Township
Forked River, N.J.

Mayor, Village of Lawrence
Lawrence, N.Y.

Long Island State Parks and Recreation Commission
Babylon, N.Y.

Manchester Township
Manchester, N.J.

Maryland Water Resources Administration
Annapolis, Md.

Middlesex County Planning Board
New Brunswick, N.J.

Monmouth County Planning Board
Freehold, N.J.

Nassau County Department of Health
Mineola, N.Y.

Nassau County Environmental Management Council
Mineola, N.Y.

Nassau County Planning Commission
Mineola, N.Y.

Nassau-Suffolk Regional Planning Board
Hauppauge, N.Y.

New Jersey Department of Environmental Protection
Trenton, N.J.

New Jersey Department of Health
Trenton, N.J.

New Jersey State Assembly and Senate
Trenton, N.J.

New York City Chamber of Commerce and Industry
New York, N.Y.

New York City Department of Health
New York, N.Y.

New York State Assembly and Senate
Albany, N.Y.

New York State Assembly
Committee on Environmental Conservation
Albany, N.Y.

New York State Atomic and Space Development Authority
New York, N.Y.

New York State Department of Commerce
Albany, N.Y.

New York State Department of Environmental Conservation
Albany, N.Y.
New York, N.Y.
Stony Brook, N.Y.
White Plains, N.Y.

New York State Department of Health
Albany, N.Y.

New York State Office of Parks and Recreation
Albany, N.Y.

New York State Sea Grant Program Office
Albany, N.Y.

Ocean County Board of Chosen Freeholders
Toms River, N.J.

Borough of Sea Bright
Sea Bright, N.J.

Suffolk County Department of Environmental Control
Hauppauge, N.Y.

Suffolk County Department of Health Services
Hauppauge, N.Y.

Suffolk County Executive Office
Hauppauge, N.Y.

Suffolk County Water Authority
Oakdale, N.Y.

Mayor, Borough of Surf City
Surf City, N.J.

Tennessee Valley Authority
Chattanooga, Tenn.

Toms River Chamber of Commerce
Toms River, N.J.

Tonawanda Town Environmental Commission
Kenmore, N.Y.

Department of Public Works
Yaphank, N.Y.

Interstate Agencies

Interstate Sanitation Commission
New York, N.Y.

Port Authority of New York and New Jersey
New York, N.Y.

Tri-State Regional Planning Commission
New York, N.Y.

Ocean Dumping Permittees

Bergen County Sewerage Authority
Little Ferry, N.J.

General Marine Transport Corp.
Bayonne, N.J.

City of Glen Cove
Glen Cove, N.Y.

Joint Meeting of Essex & Union Counties
Irvington, N.J.

Linden-Roselle & Rahway Valley Sewerage Authorities
Linden, N.J.

City of Long Beach
Long Beach, N.Y.

Middlesex County Sewerage Authority
Sayreville, N.J.

Middletown Sewerage Authority
Belford, N.J.

Modern Transportation Co.,
South Kearny, N.J.

Nassau County Department of Public Works
Mineola, N.Y.

New York City Environmental Protection Administration
Department of Water Resources
New York, N.Y.

Passaic Valley Sewerage Commissioners
Newark, N.J.

Westchester County
White Plains, N.Y.

Citizens Groups

American Littoral Society
Highlands, N.J.

Atlantic Beach Taxpayers Association
Long Beach, N.Y.

Citizens for Clean Environment
Sayville, N.Y.

Colts Neck Environmental Commission
Colts Neck, N.J.

Committee of Concerned Citizens of Wantagh
Wantagh, N.Y.

East End Council of Organizations
East Hampton, N.Y.

Environmental Defense Fund
East Setauket, N.Y.

Federated Conservationists of Westchester County
Tarrytown, N.Y.,

Friends of the Earth
New York, N.Y.

Greening of the Bronx
Bronx, N.Y.

Hudson River Sloop Restoration Association
Poughkeepsie, N.Y.

Long Beach Island Conservation Society
Barnegat Light, N.J.

Long Island Baymen's Association
Islip, N.Y.

Long Island Environmental Council
Port Washington, N.Y.

Long Island Fishermen's Association
Quoque, N.Y.

Malverne Environmental Council
Malverne, N.Y.

Marine Environmental Council of Long Island
North Babylon, N.Y.

National Advisory Committee on Oceans and Atmosphere
New York, N.Y.

National Boatmen's Alliance
Hauppauge, N.Y.

National Coalition for Marine Conservation
Boston, Mass.

National Wildlife Federation
Washington, D.C.

New Jersey Marine Science Consortium
Highlands, N.J.

New Jersey Public Interest Research Group
New York, N.Y.
Trenton, N.J.

New York League of Women Voters
Setauket, N.Y.

New York Water Pollution Control Association
Syracuse, N.Y.

Passaic River Coalition
Basking Ridge, N.J.

Regional Marine Resources Council
Hauppauge, N.Y.

Resources for the Future
Washington, D.C.

Rochester Committee for Scientific Information
Rochester, N.Y.

Sea Bright Conservation Committee
Sea Bright, N.J.

Scientists Committee for Public Information
New York, N.Y.

Shellfish Commission
Milford, Conn.

Shellfish Institute of North America
Point Lookout, N.Y.

Sierra Club
New York, N.Y.

South Branch Watershed Association
Clinton, N.J.

Academic/Research Institutions

American University
Department of Biology
Washington, D.C.

Associated Universities
Brookhaven National Laboratory

Upton, N.Y.

Department of Geology
Brooklyn College – City University of New York
Brooklyn, N.Y.

Environmental Society
CUNY Law School
New York, N.Y.

Franklin Institute
Philadelphia, Pa.

Lamont-Doherty Geological Observatory
Palisades, N.Y.

Marine Science Student Association
Long Island University
Greenvale, N.Y.

Marine Sciences Center
Rutgers University
New Brunswick, N.J.

Marine Sciences Research Center
Stony Brook, N.Y.

Marine Sciences Research Group
Brooklyn College – City University of New York
Brooklyn, N.Y.

National Academy of Sciences
Washington, D.C.

New York Ocean Science Laboratory
Montauk, N.Y.

New York State University
Agriculture and Technical College
Farmingdale, N.Y.

Rutgers University
Department of Environmental Sciences
New Brunswick, N.J.

University of Delaware
Newark, Del.

Woods Hole Oceanographic Institution
Woods Hole, Mass.

News Media

Atlantic City Press
Toms River, N.J.

Buffalo Evening News
Buffalo, N.Y.

CBS News
New York, N.Y.

Daily Observer
Toms River, N.J.

Herald News
Passaic, N.J.

Nautilus Press
Washington, D.C.

Newsday
Garden City, N.Y.

New York Times
New York, N.Y.

Staten Island Advance
Staten Island, N.Y.

Libraries

Atlantic City Free Public Library
Atlantic City, N.J.

Nassau Library System
Garden City, Long Island, N.Y.

New York Public Library
Fifth Avenue and 42nd Street
New York, N.Y.

Free Library of Philadelphia
Logan Square
Philadelphia, Pa.

Princeton Library
Princeton, N.J.

Rutgers Science/Medicine Library
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Suffolk Cooperative Library System
Bellport, Long Island, N.Y.

State University of New York Library
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Trenton Free Public Library
Trenton, N.J.

U.S. EPA Library
Edison, N.J.
New York, N.Y.

Others

Calabrese, Josephine
Toms River, N.J.

Carver Greenfield Corp.
East Hanover, N.J.

Donato, Michelle
Somerset, N.J.

Kramer, Morris H.
Atlantic Beach, N.J.

Lander, Paul
Lakewood, N.J.

Raytheon Co.
Portsmouth, R.I.

Stevenson, Richard C.
Angola, N.Y.

CHAPTER II

BACKGROUND

THE NEW YORK BIGHT

Geographic Description of the New York Bight

The New York Bight is that section of the Atlantic Ocean extending from Cape May, New Jersey, north and east to Montauk, Long Island. The Bight covers more than 39,000 sq km (11,350 sq n mi), an area about twice the size of New Jersey. The Bight extends approximately 150 to 180 km (81 to 97 n mi) off the Long Island and New Jersey coasts to the outer edge of the continental shelf (Figure 1). The coastline of the Bight is characterized by sandy beaches and by numerous bays and estuaries.

The Bight Apex, which covers about 2,000 sq km (584 sq n mi), extends from Atlantic Beach, New York, to Manasquan, New Jersey (latitude 73°30'W to 74°00'W and longitude 40°10'N to 40°35'N). It is immediately adjacent to the New York-New Jersey metropolitan area and is more or less centered on the apex of the Hudson Shelf Valley (Figure 1).

The New York Bight is distinguished from the estuarine waters of Outer New York Harbor by the Sandy Hook-Rockaway Point transect (Figure 2). The Outer Harbor, which comprises Lower Bay, Sandy Hook Bay, and the Raritan River, includes the waters south of Staten Island lying between the Narrows and the harbor entrance. It is commonly differentiated from the Inner Harbor, which is made up of the Hudson River, East River, Arthur Kill, Kill Van Kull, Passaic River, Harlem River, Hackensack River, Newark Bay, and Upper Bay.

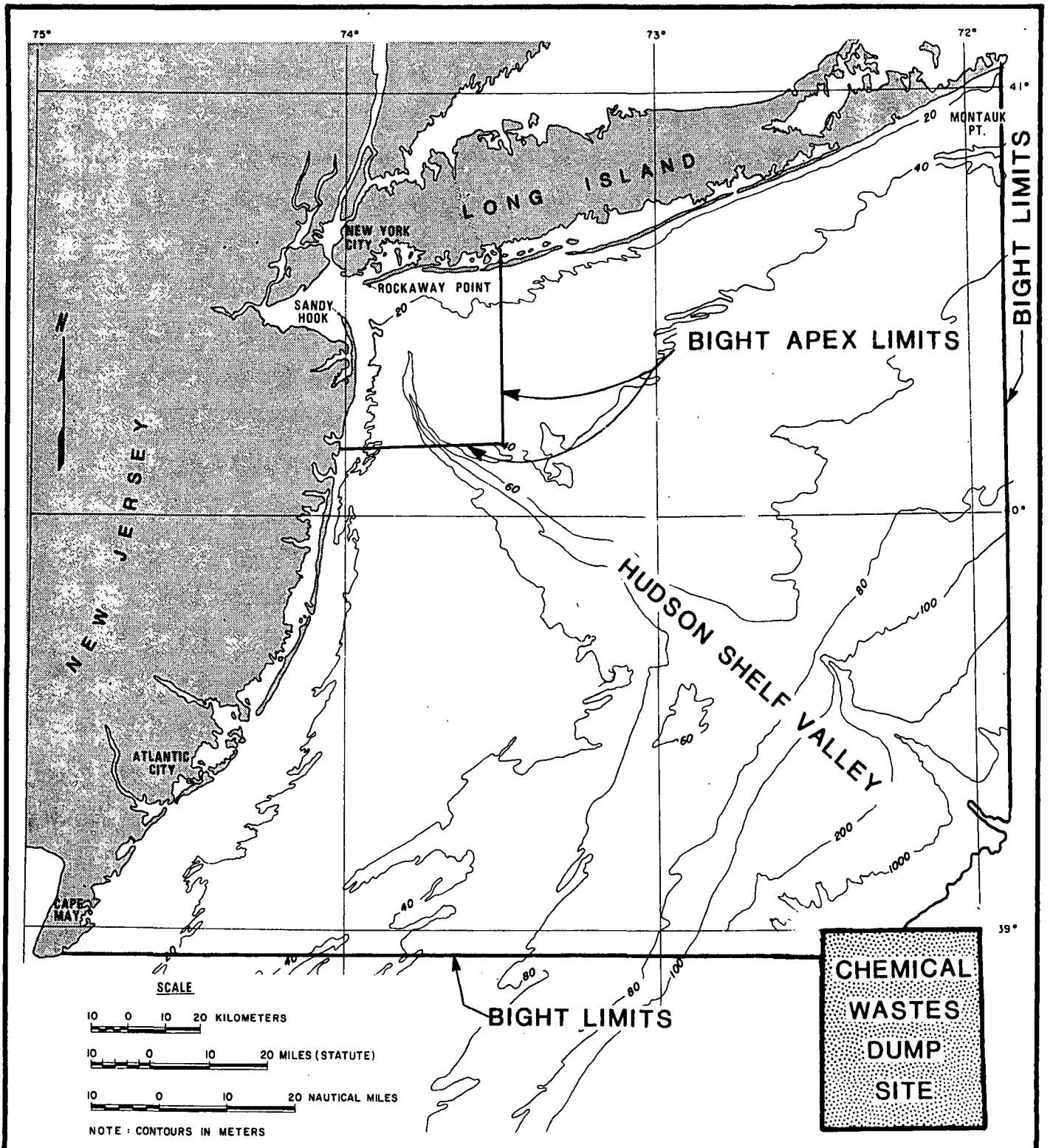
Existing Dump Sites

There are currently five dump sites (Figure 2) in the Bight Apex where the disposal of toxic and non-toxic wastes is permitted under the authority of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). They include the sewage sludge site, the dredged material (mud) site, the cellar dirt (rubble and debris) site, the acid wastes site, and the wreck (derelict vessel) site (Table 1). A sixth dump site, reserved for chemical wastes, is located just outside the New York Bight, approximately 196 km (106 n mi) from Ambrose Light, on the edge of the continental shelf (Figure 1 and Table 1). Currently, about 88 percent of the municipal wastes and 84 percent of the industrial wastes that are ocean dumped in the United States are dumped at these six sites.

OCEAN DUMPING OF SEWAGE SLUDGE IN THE NEW YORK BIGHT

The existing sewage sludge dump site in the Bight Apex is now used exclusively for the disposal of sewage sludge from large municipal wastewater treatment facilities in the New York-New Jersey metropolitan area. Prior to 1974, some industrial wastes were also dumped at this site, but from 1974 to 1976 only small quantities of sludge resulting from the biological treatment of industrial wastes were dumped here. Now, all industrial wastes are dumped at either the acid wastes or the chemical wastes site.

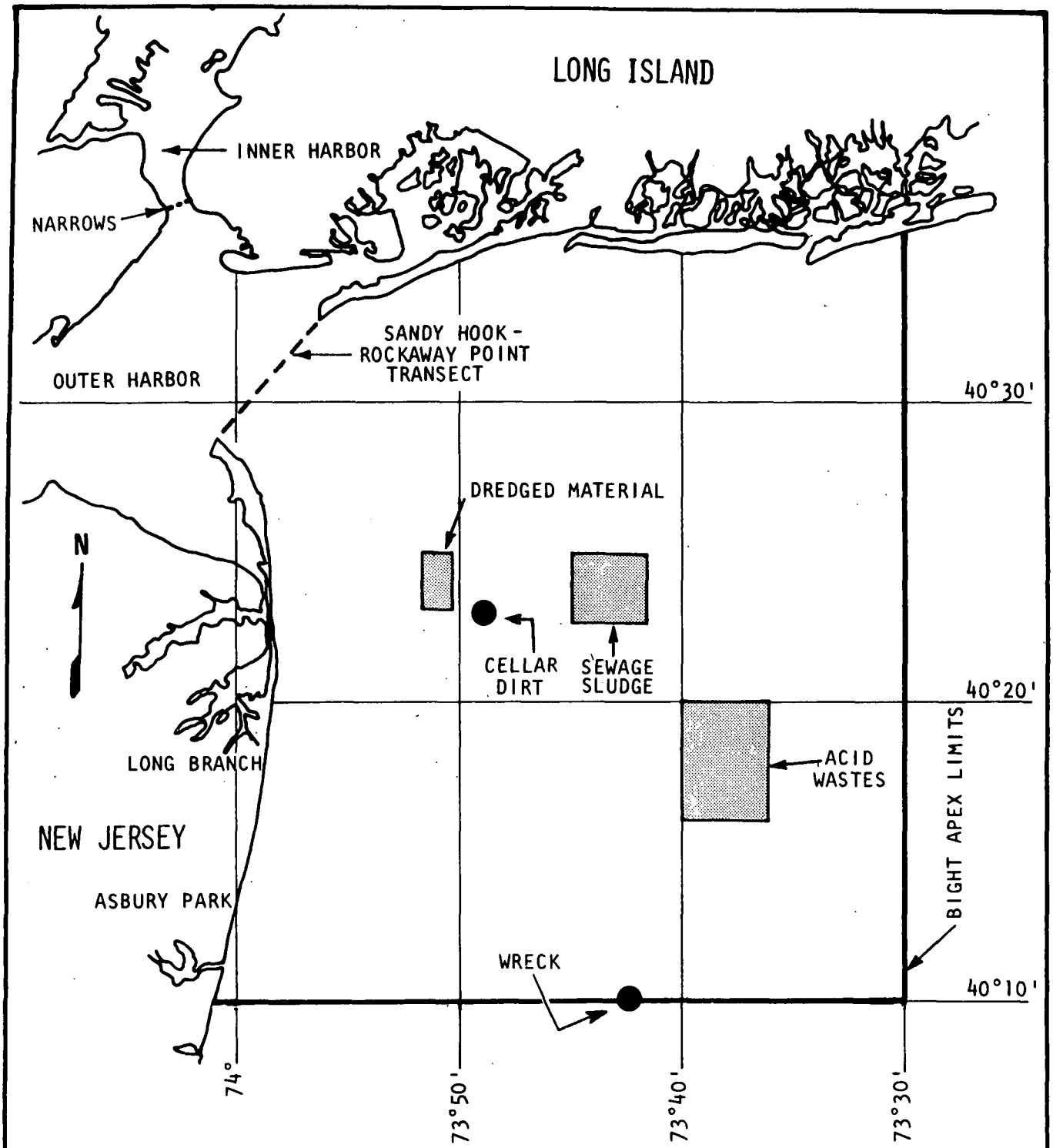
The present location of the sewage sludge site was selected by the states of New York and New Jersey in 1924, following a United States Supreme Court settlement of a suit brought by the City of New York against the Passaic Valley Sewerage Commissioners to prevent the discharge of sewage sludge into Upper New York Bay. The site was chosen to maintain the integrity (in terms of public health and aesthetics) of



THE NEW YORK BIGHT

SOURCE : USEPA, APRIL 1975.

FIGURE 1



BIGHT APEX AND EXISTING DUMP SITES

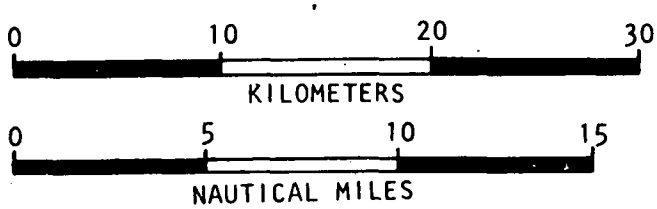


FIGURE 2

TABLE 1

EXISTING DUMP SITES IN AND NEAR THE NEW YORK BIGHT

Dump Site	Coordinates Latitude and Longitude	Area Sq. Kilometers (Sq. N Miles)	Depth Meters (Feet)	Approximate Distance Kilometers (N Miles)	
				L.I.	N.J.
Sewage Sludge	40°22'30"N to 40°25'00"N 73°41'30"W to 73°45'00"W	22.7 (6.6)	24 (80)	20 (11)	20 (11)
Dredged Material	40°21'48"N to 40°23'48"N 73°50'00"W to 73°51'28"W	6.9 (2.0)	27 (90)	20 (11)	9 (5)
Cellar Dirt	40°23'00"N, 73°49'00"W*	3.8 (1.1)	34 (110)	22 (12)	11 (6)
Acid Wastes	40°16'00"N to 40°20'00"N 73°36'00"W to 73°40'00"W	41.0 (12.0)	24 (80)	27 (15)	27 (15)
Wrecks	40°10'00"N, 73°42'00"W*	2.7 (0.8)	60 (200)	44 (24)	26 (14)
Chemical Wastes	38°40'00"N to 39°00'00"N 72°00'00"W to 72°30'00"W	1,550 (450.0)	1,800 (6,000)	–	–

*Center Coordinates of Circular Dump Site.
Source: USEPA, January 11, 1977.

Long Island and New Jersey beaches, as well as to avoid possible hazards to navigation within New York Harbor.

Wastewater Treatment and Sewage Sludge

Sewage sludge is a broad term used to describe the mixture of sewage and settled solids removed from municipal wastewater during treatment. Its characteristics depend mainly upon the type and degree of treatment provided. In general, sludges disposed of at the existing sewage sludge site come from the primary and secondary treatment of municipal wastewater and from domestic septic tanks.

Raw municipal wastewater is a combination of liquid and solids, with the liquid fraction predominating. Consequently, raw municipal wastewater entering a treatment plant generally has a very low suspended solids concentration (100 to 300 mg/1 or 0.01 to 0.03 percent solids by weight). Through treatment, most of the solids become concentrated in a small amount of liquid; this mixture is called sludge. Sludges resulting from combined primary and secondary treatment of municipal wastewaters have much higher solids concentrations (3 to 5 percent) than raw wastewater.

Primary treatment removes 50 to 60 percent of the suspended solids from the raw wastewater. Sludges withdrawn from primary sedimentation tanks are usually gray and slimy, and have an offensive odor.

Secondary treatment, which EPA is requiring all municipal facilities to implement in the near future, removes approximately 85 percent of the suspended solids. The activated sludge and trickling filter processes are the two secondary treatment methods most commonly used by municipal facilities in the New York-New Jersey metropolitan area. Sludges resulting from these processes generally have a brown, flocculent appearance and a relatively inoffensive odor. These sludges have a tendency to quickly become septic; when this occurs, the color becomes quite dark, and a disagreeable odor of putrefaction is apparent.

Sludges resulting from primary or secondary treatment are sometimes digested to anaerobically decompose the organic materials present. Sludges produced by this process are dark brown to black in color. When thoroughly digested, their odors are relatively faint and inoffensive.

Sludges from domestic septic tanks are black and, unless well-digested by long storage, have an offensive odor.

Additional information on wastewater treatment processes, solids, and sludge treatment can be found in the literature (USEPA, October 1971, October 1974; Metcalf & Eddy, 1972). Specific characteristics of sewage sludges dumped in the New York Bight are discussed below.

Current Sources

In February 1978, EPA issued thirteen Interim Permits for ocean dumping at the existing sewage sludge site. Of these, eleven were granted to municipalities or sewerage authorities in the New York-New Jersey metropolitan area. Only New York City and Westchester County own sludge transportation vessels. All of the other permittees use commercial vessels for sludge transportation and dumping.

The two remaining permits were issued to commercial haulers in New Jersey (Modern Transportation Company and General Marine Transport Corporation). These two companies transport both domestic septic tank wastes for local septic tank cleaner services and sewage sludge generated by twenty-two small municipal and sewerage authority treatment plants in New Jersey.

The wastewater and sludge treatment methods used by the permittees directly affect the type of sludge produced; the current treatment methods are listed in Table 2. A sample ocean dumping permit form is included in Appendix A to show what is required of a permittee by EPA.

Sludge Characteristics. Based upon weighted average 1973 data from the permittees (Table 3), the sludge dumped in the New York Bight contains 4.2 percent total solids (see Table 2 for the percentage of solids in the sludge dumped by each permittee) and 3.9 percent suspended solids. The sludge is also characterized by high concentrations of heavy metals (chromium, copper, lead, mercury, nickel, and zinc); repre-

TABLE 2

CURRENT TREATMENT PRACTICES OF OCEAN DUMPING PERMITTEES

Permit Number[1]	Permittee	Treatment Level	Sludge Treatment	Percent Solids
NJ002	Middletown Sewerage Authority	Secondary	Thickening, Digestion, Dewatering	3.2
NJ003	Passaic Valley Sewerage Commissioners	Primary	None	6.6
NY007	City of Long Beach	Secondary	Digestion, Heat Conditioning	2.3
NJ008	Middlesex County Sewerage Authority	Primary	Thickening	3.2
NY009	City of New York			
	Bowery Bay	Secondary	Thickening, Digestion	2.6
	Coney Island	Secondary	Thickening, Digestion	4.8
	Hunts Point	Secondary	Thickening, Digestion	1.9
	Jamaica	Secondary	Thickening, Digestion	7.2
	Owls Head	Secondary	Thickening, Digestion	2.1
	Newtown Creek	Secondary	Thickening, Digestion	3.2
	Port Richmond	Primary	Digestion	2.8
	Rockaway	Secondary	Thickening, Digestion	2.7
	Tallman Island	Secondary	Thickening, Digestion	3.7
	Wards Island	Secondary	Thickening	6.9
	26th Ward	Secondary	Thickening, Digestion	3.6
NJ017	Modern Transportation Co.	Mostly Primary	Partial Digestion	NA[2]
NJ019	Bergen County Sewerage Authority	Secondary	Thickening, Digestion	1.6
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	Secondary	Thickening	5.8
NJ022	Joint Meeting of Essex & Union Counties	Secondary	Digestion	8.8
NY028	Nassau County	Secondary	Thickening, Digestion	2.0
	Bay Park	Secondary	Digestion	3.0
	Belgrave	Secondary	Digestion	7.5
	Cedar Creek	Secondary	Thickening, Digestion	3.0
	Farmingdale	Secondary	NA	NA
	Freeport	Secondary	Digestion	7.5
	Inwood	Secondary	Digestion	4.0
	Meadowbrook	Secondary	NA	NA
	Roslyn	Secondary	None	2.0
	West Long Beach	Secondary	Digestion, Dewatering	7.5
NY029	Westchester County	Primary	Thickening, Digestion	3.6
NY068	City of Glen Cove	Secondary	Thickening	NA
NJ111	General Marine Transport Corp.	Mostly Primary	Partial Digestion	NA

[1] EPA-Region II permit number.
[2] NA = Not Available.

TABLE 3

CHARACTERISTICS OF OCEAN DUMPED SLUDGE

Average Characteristic[1]	Weighted Average Concentration (mg/l)[2]
Total Solids	45,000
Suspended Solids	39,000
Total Dissolved Solids	5,500
Alkalinity	2,700
Biochemical Oxygen Demand (five day)	17,000
Chemical Oxygen Demand	93,000
Total Organic Carbon	9,200
Oil and Grease	1,900
Ammonia	890
Total Kjeldahl Nitrogen	1,500
Nitrites and Nitrates	3.9
Total Nitrogen	1,500
Total Phosphorous	400
Cadmium	3.7
Chromium	63
Copper	60
Mercury	1.1
Lead	63
Zinc	160
Arsenic	120
Beryllium	0.02
Nickel	9.5
Selenium	100
Vanadium	0.75
Fecal coliform (organisms/100 ml)	310,000

[1] Sludge characteristics are based upon values from EPA-Region II ocean dumping permit files, May 1 through December 31, 1973.

[2] Weighted average. Heavy metals and oil and grease averages are based upon eight values for each source. Other parameters are based upon one to eight values for each source.

Source: Mueller *et al.*, 1976.

sentative concentrations are shown in Table 4. The high ratio of chemical oxygen demand (COD) to biochemical oxygen demand (BOD), or of COD to total organic carbon (TOC), is characteristic of sludges having a significant percentage of industrial wastewater.

Of the total solids present, approximately 20 percent is organic material, as reflected by TOC concentrations. (Most domestic sewage sludges contain between 25 and 50 percent organic material.) Total nitrogen and total phosphorous account for about 3 percent and 1 percent, respectively, of the total solids, which is within the normal range for domestic sludges. The concentration of oil and grease, approximately 4 percent, appears to be about right for a major metropolitan area, where combined sewers (carrying both sanitary wastes and urban runoff) commonly serve existing wastewater treatment facilities.

Volumes of Sludge Dumped. Although dumping at the existing sewage sludge site began in 1924, accurate records for years prior to 1960 are not available. Since 1960, the volume of sewage sludge dumped annually in the Bight has fluctuated between a low of 2.5 million cu m (3.3 million cu yd) and a high of 4.1 million cu m (5.4 million cu yd) (Figure 3, Tables 5 and 6). In 1977, the volume was 4.0 million cu m (5.3 million cu yd).

The eleven major municipal or sewerage authority permittees produce about 98 percent of the sludge dumped in the New York Bight. The largest source is New York City, which generates about 49 percent of the total. Five other municipal or sewerage authority permittees (Passaic Valley Sewerage Commissioners, Nassau County, Middlesex County Sewerage Authority, Bergen County Sewerage Authority, and Linden-Roselle & Rahway Valley Sewerage Authorities) account for approximately 42 percent. The remaining 9 percent is dumped by the other seven permittees.

Dumping Vessels

Sewage sludge is currently transported by barges and sludge tankers. A barge must be towed to the dump site, where the sludge is discharged by gravity through circular openings in the bottom of the barge. A sludge tanker, on the other hand, is a self-propelled vessel capable of pumping sludge through openings beneath the waterline.

At present, twelve vessels (six barges and six tankers) have EPA permits to transport sewage sludge to the existing site (Table 7). One other vessel (the barge *Liquid Waste No. 1*) is currently used for ocean dumping in Puerto Rico, but may be available in the future.

The carrying capacity of the current twelve-vessel fleet is about 42,800 cu m (56,000 cu yd) per trip. The City of New York owns and operates four self-propelled sludge tankers, whose combined carrying capacity accounts for 23 percent of the fleet's total carrying capacity. Modern Transportation Company and General Marine Transport Corporation together represent 74 percent of the carrying capacity in the metropolitan area. The barge operated by Westchester County accounts for the remaining 3 percent.

Future Sources

The two commercial and eleven municipal and sewerage authority permittees are expected to be the only significant sources, on a volumetric basis, of sewage sludge dumped in the New York Bight from 1978 through 1981. These sources have been directed by EPA to develop environmentally acceptable land-based methods of sludge disposal during this period.

Within the next few years, the four primary wastewater treatment facilities in the metropolitan area that currently dump sewage sludge in the New York Bight will be upgraded to provide secondary treatment (Tables 2 and 8). The commercial haulers will probably continue to provide sludge transportation and dumping services to septic tank cleaners until 1978 and to the small municipalities and sewerage authorities in New Jersey until the end of 1981.

Sludge Characteristics. The character of dumped sewage sludge will gradually change over the next four years as new and upgraded treatment plants are brought on-line in the metropolitan area. As stated, all

TABLE 4

HEAVY METAL CHARACTERISTICS OF OCEAN DUMPED SLUDGE

1975

1975 Permit Number[1]	Permittee	Heavy Metals (μg/l)										
		Mercury	Cadmium	Arsenic	Lead	Copper	Zinc	Selenium	Vanadium	Beryllium	Chromium	Nickel
NJ002	Middletown Sewerage Authority	136	268	<17	5,425	19,050	44,250	<59	<485	<260	8,200	5,704
NJ003	Passaic Valley Sewerage Commissioners	1,110	11,375	81	164,478	44,806	277,793	<9	<200	<20	99,628	13,814
NY007	City of Long Beach	380	410	<4,000	NA[2]	NA	NA	NA	NA	NA	NA	NA
NJ008	Middlesex County Sewerage Authority	170	2,621	46	97,950	52,953	233,998	<8	<560	<20	33,358	9,730
NY009	City of New York											
	Bowery Bay	465	1,230	2,400	56,000	119,000	143,000	9,900	1,800	40	64,000	17,000
	Coney Island	310	380	2,400	66,000	106,000	101,000	5,030	2,000	40	10,000	9,900
	Hunts Point	<50	338	2,000	26,000	38,000	48,000	6,800	1,500	33	7,400	3,200
	Jamaica	215	430	2,500	38,000	65,000	90,000	11,500	1,200	36	14,000	14,000
	Owls Head	260	600	9,500	34,000	103,000	118,000	8,500	2,200	45	30,000	8,500
	Newtown Creek	145	1,465	960	284,000	65,000	76,000	13,100	1,400	36	95,000	13,500
	Port Richmond	260	88	1,500	16,000	16,000	46,000	6,900	1,000	36	1,700	2,100
	Rockaway	315	435	1,400	64,000	173,000	134,000	6,300	2,600	54	14,500	6,000
	Tallman Island	630	240	5,700	84,000	108,000	120,000	20,000	1,700	37	40,000	84,000
	Wards Island	135	230	170	30,000	56,000	41,000	5,600	1,000	42	12,000	2,200
	26th Ward	—	—	—	—	—	—	6,500	2,800	46	34,000	7,200
NJ017	Modern Transportation Co.	143	7,151	<20	11,936	33,499	101,771	<59	<485	<260	8,200	5,704
NJ019	Bergen County Sewerage Authority	1,314	17,903	<30	42,336	73,375	106,711	28	<445	<20	194,883	15,168
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	290	3,757	<19	23,714	106,814	254,194	<680	<314	<23	42,829	9,143
NJ022	Joint Meeting of Essex & Union Counties	852	6,263	15	45,708	95,980	102,602	8	<550	<20	62,978	5,989
NY028	Nassau County	<5	130	<1	8,100	24,200	22,900	<65	480	<40	NA	2,240
NY029	Westchester County	1,674	5,981	4,000	33,000	53,000	74,000	<10	<80	<240	11,300	4,000
NY068	City of Glen Cove	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NJ111	General Marine Transport Corp.	15.3	4.1	30	15,300	2,300	30,800	140	<1,000	<20	710	1,000

[1] EPA—Region II permit number.

[2] NA = Not Available

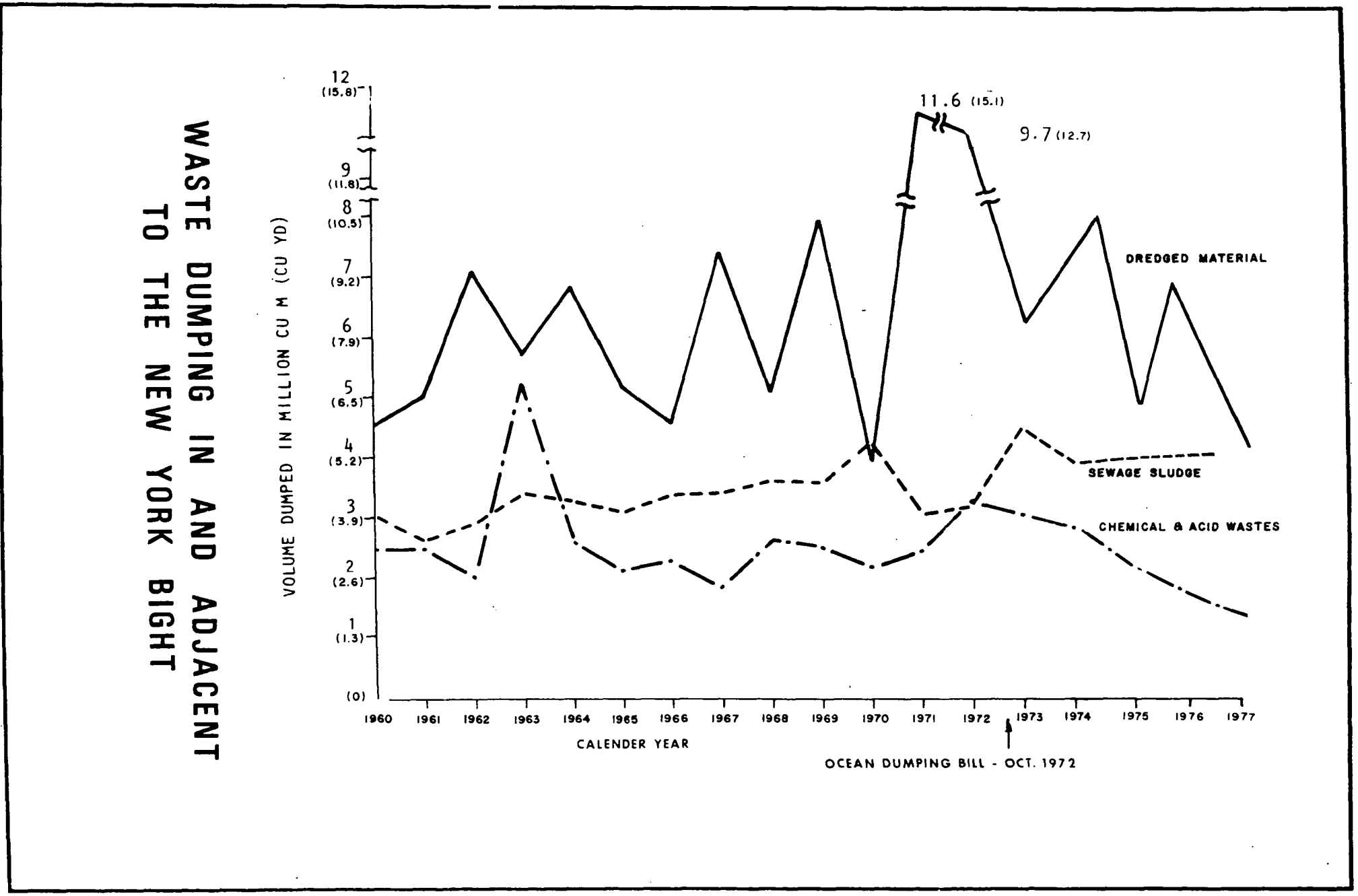

WASTE DUMPING IN AND ADJACENT TO THE NEW YORK BIGHT
VOLUME DUMPED IN MILLION CU M (CU YD)
12 (15.8)
9 (11.8)
8 (10.5)
7 (9.2)
6 (7.9)
5 (6.5)
4 (5.2)
3 (3.9)
2 (2.6)
1 (1.3)
(0)
11.6 (15.1)
9.7 (12.7)
DREDGED MATERIAL
SEWAGE SLUDGE
CHEMICAL & ACID WASTES
1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977
CALENDER YEAR
OCEAN DUMPING BILL - OCT. 1972

FIGURE 3.

TABLE 5

VOLUMES OF WASTE DUMPED AT SITES IN AND ADJACENT TO THE NEW YORK BIGHT

1960 to 1977

Types of Waste	Volume In Thousands of Cubic Meters (Cubic Yards)[1]								
	1960	1961	1962	1963	1964	1965	1966	1967	1968
Sewage Sludge	2,906 (3,824)	2,549 (3,354)	2,756 (3,626)	3,238 (4,259)	3,099 (4,078)	2,936 (3,863)	3,193 (4,201)	3,241 (4,265)	3,406 (4,481)
Dredged Material	4,290 (5,611)	4,770 (6,238)	6,741 (8,816)	5,494 (7,186)	6,530 (8,540)	4,955 (6,480)	4,348 (5,687)	7,045 (9,214)	4,864 (6,361)
Cellar Dirt	564 (738)	619 (810)	617 (807)	755 (988)	578 (756)	697 (912)	244 (319)	389 (509)	306 (400)
Acid Wastes	2,334 (3,071)	2,356 (3,100)	1,938 (2,551)	4,405 (5,797)	2,516 (3,310)	2,002 (2,634)	2,171 (2,857)	1,745 (2,297)	2,389 (3,143)
Wrecks[2]	–	–	–	–	–	–	–	1	–
Chemical Wastes	–	5 (7)	10 (13)	525 (690)	–	–	–	114 (150)	63 (83)
Total	10,094 (13,244)	10,299 (13,509)	12,062 (15,813)	14,417 (18,920)	12,723 (16,684)	10,590 (13,889)	9,956 (13,064)	12,535 (16,435)	11,028 (14,468)

TABLE 5 (Continued)

Types of Waste	Volume In Thousands of Cubic Meters (Cubic Yards)[1]								
	1969	1970	1971	1972	1973	1974	1975	1976	1977
Sewage Sludge	3,386 (4,455)	4,018 (5,287)	2,911 (3,830)	3,006 (3,955)	4,093 (5,386)	3,758 (4,945)	3,818 (5,023)	3,914 (5,149)	4,012 (5,279)
Dredged Material	7,554 (9,880)	3,750 (4,905)	11,516 (15,062)	9,775 (12,785)	6,216 (8,130)	8,410 (10,820)	4,893 (6,400)	6,981 (9,309)	4,047 (5,293)
Cellar Dirt	483 (632)	609 (796)	517 (676)	741 (969)	349 (455)	275 (360)	141 (185)	112 (147)	135 (177)
Acid Wastes	2,321 (3,054)	1,980 (2,605)	2,149 (2,828)	2,365 (3,112)	2,470 (3,249)	2,090 (2,750)	1,862 (2,450)	1,262 (1,661)	624 (821)
Wrecks[2]	–	–	3	3	1	–	–	–	–
Chemical Wastes	65 (86)	122 (160)	169 (222)	716 (942)	294 (387)	348 (458)	472 (621)	344 (453)	738 (970)
Total	13,809 (18,107)	10,479 (13,753)	17,345 (22,618)	16,606 (21,763)	13,423 (17,607)	14,881 (19,333)	11,186 (14,679)	12,613 (16,719)	9,556 (12,540)

[1] To obtain approximate volume in wet tons, multiply the number of cubic yards by 0.85.
[2] Number of derelict vessels/wrecks disposed of on-site.

TABLE 6

VOLUME OF SEWAGE SLUDGE DUMPED IN THE NEW YORK BIGHT

1973 to 1977

Permit Number[1]	Permittee	Volume In Thousands of Cubic Meters (Cubic Yards)[2]									
		1973		1974		1975		1976		1977	
NJ002	Middletown Sewerage Authority	9	(12)	10	(13)	18	(23)	16	(21)	13	(18)
NJ003	Passaic Valley Sewerage Commissioners	496	(653)	462	(608)	510	(671)	518	(681)	562	(858)
NY007	City of Long Beach	7	(9)	6	(8)	6	(8)	6	(8)	6	(8)
NJ008	Middlesex County Sewerage Authority	306	(402)	304	(400)	296	(389)	268	(353)	273	(359)
NY009	City of New York	2,271	(2,988)	1,833	(2,412)	1,824	(2,400)	1,924	(2,532)	1,978	(2,602)
NJ017	Modern Transportation Co.	200	(264)	276	(364)	190	(249)	147	(193)	80	(106)
NJ019	Bergen County Sewerage Authority	207	(272)	216	(285)	249	(327)	220	(289)	201	(265)
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	60	(79)	127	(167)	127	(167)	204	(268)	203	(267)
NJ022	Joint Meeting of Essex & Union Counties	115	(152)	112	(147)	104	(136)	79	(104)	77	(101)
NY028	Nassau County	317	(416)	300	(395)	312	(411)	359	(472)	338	(445)
NY029	Westchester County	66	(87)	72	(94)	100	(132)	123	(162)	140	(185)
NY031	West Long Beach Sewer District	0.4	(0.6)	0.9	(1)	0.5	(0.7)	0.9	(1)	0.5	(0.7)
NY068	City of Glen Cove	6	(8)	4	(5)	4	(5)	6	(8)	5	(7)
NJ111	General Marine Transport Corp.	32	(42)	35	(46)	79	(104)	43	(56)	44	(58)
	Total	4,092	(5,385)	3,758	(4,945)	3,820	(5,023)	3,914	(5,148)	3,921	(5,280)

[1] EPA-Region II permit number.

[2] To obtain approximate volume in wet tons, multiply the number of cubic yards by 0.85.

TABLE 7

SLUDGE DUMPING VESSELS PERMITTED FOR USE IN THE NEW YORK BIGHT

Permittee	Vessel Name	Type	Tonnage	Carrying Capacity	Age	Length	Beam	Loaded Draft	Propulsion
			Metric Tons (Tons)	Cubic Meters (Cubic Yards)	Years	Meters (Feet)	Meters (Feet)	Meters (Feet)	
Modern Transportation Company	*Forest*	Barge	7,300 (8,000)	7,193 (9,408)	16	83 (272)	21 (68)	5.6 (18.5)	Towed
	Lisa	Barge	7,300 (8,000)	7,193 (9,408)	16	83 (272)	21 (68)	5.6 (18.5)	Towed
	Maria	Barge	6,400 (7,000)	6,247 (8,170)	16	91 (300)	20 (64)	4.7 (15.5)	Towed
	Raritan	Barge	2,700 (3,000)	2,650 (3,466)	22	64 (211)	13 (43)	4.1 (13.5)	Towed
	Liquid Waste No. 1[1]	Barge	2,700 (3,000)	2,650 (3,466)	25	64 (211)	13 (43)	4.1 (13.5)	Towed
	Ocean Disposall No. 1	Barge	5,400 (6,000)	5,300 (6,932)	7	81 (266)	17 (56)	5.0 (16.5)	Towed
New York City	*North River*	Tanker	2,376 (2,617)	3,087 (4,037)	2	99 (324)	15 (50)	4.9 (16)	Self-Propelled
	Newtown Creek	Tanker	2,321 (2,557)	3,052 (3,992)	8	99 (324)	15 (50)	4.9 (16)	Self-Propelled
	Bowery Bay	Tanker	1,432 (1,578)	1,869 (2,444)	16	82 (268)	14 (45)	4.0 (13)	Self-Propelled
	Owls Head	Tanker	1,492 (1,643)	1,869 (2,444)	23	82 (268)	14 (45)	4.0 (13)	Self-Propelled
Westchester County	*Westco I*	Barge	728 (802)	1,415 (1,850)	15	61 (201)	11 (36)	3.0 (0)	Towed
General Marine Transport Corp.	*Susan Frank*	Tanker	1,297 (1,429)	1,457 (1,906)	NA[2]	76 (249)	13 (42)	3.7 (12)	Self-Propelled
	Rebecca K	Tanker	1,297 (1,429)	1,457 (1,906)	NA	76 (249)	13 (42)	3.7 (12)	Self-Propelled
Total or Mean	13 Vessels		42,743 (47,055)	45,439 (59,428)	16.6	80 (262)	15 (50)	4.4 (14.2)	

[1] *Liquid Waste No. 1* is now in use in Puerto Rico, but may become available in the future.
[2] NA = Not Available.

Sources: Pollution Control Industries, August 15, 1975; NYCEPA, July 28, 1975; Westchester County, July 7, 1975; General Marine Transport Corporation, July 6, 1975.

TABLE 8

FUTURE TREATMENT PRACTICES OF OCEAN DUMPING PERMITTEES

1981

Permit Number[1]	Permittee	Treatment Level	Sludge Treatment	Percent Solids
NJ002	Middletown Sewerage Authority	Secondary	Composting	3.6
NJ003	Passaic Valley Sewerage Commissioners	Secondary	Thickening, Digestion, Dewatering Pyrolysis/Incineration	10.0
NY007	City of Long Beach	Secondary	Digestion, Heat Conditioning	3.5
NJ008	Middlesex County Sewerage Authority	Secondary	Incineration	4.0
NY009	City of New York			
	Bowery Bay	Secondary	Thickening, Digestion	3.5
	Coney Island	Secondary	Thickening, Digestion	3.5
	Hunts Point	Secondary	Thickening, Digestion	3.5
	Jamaica	Secondary	Thickening, Digestion	2.8
	Owls Head	Secondary	Thickening, Digestion	5.0
	Newtown Creek	Secondary	Thickening, Digestion	3.5
	Port Richmond	Secondary	Digestion	4.7
	Rockaway	Secondary	Thickening, Digestion	3.5
	Tallman Island	Secondary	Thickening, Digestion	2.5
	Wards Island	Secondary	Thickening, Digestion	3.7
	26th Ward	Secondary	Thickening, Digestion	3.5
NJ017	Modern Transportation Co.	NA[2]	NA	NA
NJ019	Bergen County Sewerage Authority	Secondary	Thickening, Digestion	6.0
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	Secondary	Thickening, Digestion	4.9
NJ022	Joint Meeting of Essex & Union Counties	Secondary	Thickening, Digestion	3.5
NY028	Nassau County	Secondary	Thickening, Digestion	—
	Bay Park	Secondary	Digestion	NA
	Belgrave	Secondary	Digestion	NA
	Cedar Creek	Secondary	Thickening, Digestion	NA
	Farmingdale	Secondary	NA	NA
	Freeport[3]	Secondary	Digestion	NA
	Inwood	Secondary	Digestion	NA
	Meadowbrook	Secondary	NA	NA
	Roslyn[3]	Secondary	None	NA
	West Long Beach	Secondary	Digestion, Dewatering	NA
NY029	Westchester County	Secondary	Dewatering, Composting	3.5
NY068	City of Glen Cove	—	Incineration	—
NJ103	Caldwell Trucking Co.	NA	NA	NA
NJ111	General Marine Transport Corp.	NA	NA	NA

[1] EPA-Region II permit number.
[2] NA = Not Available.
[3] May be abandoned before 1981.

plants will be practicing secondary wastewater treatment by 1981 and will probably have some method of sludge treatment as well, most likely thickening and digestion (Table 8). The resulting sludge will generally be more concentrated than present sludge, especially in terms of total solids, heavy metals, and toxic substances.

After 1981, the concentration of heavy metals and other toxic substances in sludge should decrease significantly, as pretreatment of industrial wastewater becomes effective. General pretreatment regulations were published by EPA on June 26, 1978. Specific pretreatment standards for different types of industries must now be promulgated by EPA. Once specific standards are promulgated for a given industrial category, industries within that category will have three years to comply with the standards. Because of the timeframe, pretreatment standards will have a negligible impact on sludge dumping. However, they will make land-based disposal of sewage sludge more environmentally acceptable.

Volumes of Sludge to be Dumped. Projections are that by 1981, the volume of sewage sludge dumped in the New York Bight will be about one and a half times greater than the 1977 volume (Table 9). In 1981, a total of 9.9 million cu m (13.0 million cu yd) of sewage sludge is expected to be dumped in the New York Bight.

The City of New York, Westchester County, Middlesex County, Passaic Valley, Linden-Roselle & Rahway Valley, and Joint Meeting are expected to remain the largest generators of sludge volumes in 1981 (Table 9), with the greatest growth in volume, a fivefold increase, projected for Westchester County. New York City will continue to be the largest sludge generator in New York State, and Passaic Valley and Middlesex County the largest in New Jersey.

OCEAN DUMPING AT OTHER SITES IN AND NEAR THE NEW YORK BIGHT

Besides the sewage sludge dump site, the other existing dump sites in the New York Bight are the dredged material, cellar dirt, acid wastes, and wreck sites (Figure 2 and Table 1). The chemical wastes site, which lies outside the Bight, (Figure 1 and Table 1) will also be discussed in this section. For the most part, ocean dumping at these five sites will continue after 1981.

Dredged Material Site

The principal wastes dumped at this site are materials dredged from navigable waterways (including channels, harbors, anchorage grounds, and vessel berths) in the New York-New Jersey metropolitan area. The dredged material currently dumped here results from maintenance dredging operations, although until 1973 ash residues from fossil-fueled power plants were also dumped at this site. Hopper dredges owned by the U.S. Army Corps of Engineers (COE) and privately owned bottom-dump scows both use this site.

Past Activities. The original dredged material dump site was established in 1888 inside New York Harbor. As the designated area decreased noticeably in depth, its location was changed several times; the existing dredged material site was designated for use in 1940. Dredged material has generally been the major source of wastes dumped in the New York Bight, based upon annual volumes.

From 1960 to 1977, approximately 112 million cu m (146 million cu yd) of dredged material were dumped at the existing site (Figure 3 and Table 5). The peak annual volume for this period was 11.5 million cu m (15.0 million cu yd) in 1971. The average annual volume for the period was approximately 6 million cu m (8 million cu yd).

Present Waste Characteristics. Dredged material dumped at the existing site consists primarily of particulate solids (Table 10), characterized by high concentrations of heavy metals (especially cadmium, chromium, copper, lead, and zinc). Based on total volumes dumped, dredged material apparently exerts the same BOD as sewage sludge, but nearly twice the COD and almost five times the TOC. The mass loading of oil and grease in the dredged material is extremely high. The total Kjeldahl nitrogen (TKN) level in dredged

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	Coney Island	Secondary	Thickening, Digestion	3.5
	Hunts Point	Secondary	Thickening, Digestion	3.5
	Jamaica	Secondary	Thickening, Digestion	2.8
	Owls Head	Secondary	Thickening, Digestion	5.0
	Newtown Creek	Secondary	Thickening, Digestion	3.5
	Port Richmond	Secondary	Digestion	4.7
	Rockaway	Secondary	Thickening, Digestion	3.5
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NJ017	Modern Transportation Co.	NA[2]	NA	NA
NJ019	Bergen County Sewerage Authority	Secondary	Thickening, Digestion	6.0
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	Secondary	Thickening, Digestion	4.9
NJ022	Joint Meeting of Essex & Union Counties	Secondary	Thickening, Digestion	3.5
NY028	Nassau County	Secondary	Thickening, Digestion	—
	Bay Park	Secondary	Digestion	NA
	Belgrave	Secondary	Digestion	NA
	Cedar Creek	Secondary	Thickening, Digestion	NA
	Farmingdale	Secondary	NA	NA
	Freeport[3]	Secondary	Digestion	NA
	Inwood	Secondary	Digestion	NA
	Meadowbrook	Secondary	NA	NA
	Roslyn[3]	Secondary	None	NA
	West Long Beach	Secondary	Digestion, Dewatering	NA
NY029	Westchester County	Secondary	Dewatering, Composting	3.5
NY068	City of Glen Cove	—	Incineration	—
NJ103	Caldwell Trucking Co.	NA	NA	NA
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TABLE 9

ESTIMATED VOLUMES OF SEWAGE SLUDGE TO BE DUMPED IN THE NEW YORK BIGHT

1978 to 1981

Permit Number[1]	Permittee	Volume In Thousands of Cubic Meters (Cubic Yards)[2]							
		1978		1979		1980		1981	
NJ002	Middletown Sewerage Authority	17	(22)	36	(47)	42	(55)	48	(63)
NJ003	Passaic Valley Sewerage Commissioners	626	(824)	760	(1,000)	998	(1,300)	998	(1,300)
NY007	City of Long Beach	8	(11)	9	(12)	9	(12)	9	(12)
NJ008	Middlesex County Sewerage Authority	536	(706)	760	(1,000)	907	(1,193)	918	(1,208)
NY009	City of New York	3,545	(4,665)	4,325	(5,690)	4,593	(6,044)	5,851	(7,699)
NJ017	Modern Transportation Co.	170	(244)	107	(141)	89	(118)	72	(94)
NJ019	Bergen County Sewerage Authority	217	(286)	228	(300)	232	(306)	237	(312)
NJ021	Linden-Roselle & Rahway Valley Sewerage Authorities	247	(325)	250	(329)	259	(341)	268	(353)
NJ022	Joint Meeting of Essex & Union Counties	179	(235)	331	(435)	331	(435)	331	(435)
NY028	Nassau County	379	(499)	414	(545)	431	(567)	449	(590)
NY029	Westchester County	340	(447)	528	(694)	677	(891)	697	(916)
NY068	City of Glen Clove	12	(15)	13	(18)	13	(18)	13	(18)
NJ111	General Marine Transport Corp.	34	(45)	11	(14)	9	(12)	4	(6)
	Total	6,310	(8,324)	7,772	(10,225)	8,590	(11,292)	9,895	(13,006)

[1] EPA-Region II permit number.

[2] To obtain approximate volume in wet tons, multiply the number of cubic yards by 0.85.

Sources: USEPA, permit files, unpub.; Bergen County Sew. Auth., October 12, 1975; Joint Meeting, September 10, 1975; Middlesex County Sew. Auth., September 18, 1975; Passaic Valley Sew. Comm., September 24, 1975; Nassau County, September 18, 1975; Westchester County, September 15, 1975; New York City Environmental Protection Administration, October 28, 1975.

TABLE 10

COMPARATIVE POLLUTANT LOADINGS FROM OCEAN DUMPING ACTIVITIES

1975

Parameter	Load	Percentage				
	metric tons/day*	Dredged Material	Sewage Sludge	Acid Wastes	Chemical Wastes	Cellar Dirt
Volume (10^6 cu yd/yr)	21.7	53	26	15	3	3
Suspended Solids	15,000	86	3	0.7	0.05	11
Biological Oxygen Demand (five day)	430	49	46	–	5	–
Chemical Oxygen Demand	3,200	65	34	0.1	1	–
Total Organic Carbon	660	82	17	–	1	–
Oil and Grease	330	92	7	0.04	6	–
Ammonia	50	74	20	–	6	–
Organic Nitrogen	35	74	20	–	6	–
Total Kjeldahl Nitrogen	85	74	20	–	6	–
Nitrite and Nitrate	0.086	–	53	–	47	–
Total Nitrogen	85	74	20	–	6	–
Ortho-Phosphorous	–	–	–	–	–	–
Total Phosphorous	69	92	7	0.3	0.8	–
Cadmium	2.0	98	2	0.1	0.06	–
Chromium	2.5	93	3	4	0.1	–
Copper	7.1	89	10	0.7	0.07	–
Iron	180	–	–	–	–	–
Mercury	0.026	50	50	0.04	0.7	–
Lead	5.6	85	13	3	0.03	–
Zinc	9.3	78	19	2	0.7	–

*metric ton = 1.10 tons.

Source: Mueller *et al.*, 1976.

material appears to be nearly four times as high as that in sludge, and the total phosphorous level more than thirteen times as high.

Future Activities. Based on historical permit data, the COE expects a future annual increment of 46 to 54 thousand cu m (60 to 70 thousand cu yd) of dredged material. In 1976, 7.0 million cu m (9.3 million cu yd) of material were dumped at the site. Using the projected increment, the 1981 volume would be about 7.1 million cu m (9.4 million cu yd); however, a few large dredging projects could significantly change the projection.

In October 1974, EPA requested that the COE-New York District submit a plan for phasing out the existing dredged material dump site by 1976, and for possibly using an alternate dump site within the Northern or Southern Area (described in Chapter IV). The plan was also to consider alternatives to ocean dumping, potential hazards to navigation, and economic impacts, and was to include an implementation schedule. The request was made because of the significant volume of dredged material being dumped annually, its high pollutant loading, and EPA's preliminary decision to move the sewage sludge dump site farther offshore (USEPA, October 9, 1974).

The COE-New York District maintains that relocating the dredged material dump site is not currently justified in terms of its potential effects on water quality, shellfish beds or fisheries resources, wildlife, or recreational areas. In addition, the COE indicates that transporting dredged material to an alternate dump site in either the Northern or Southern Area will significantly increase the cost of waterways dredging and port development in the metropolitan area. However, the COE is now studying alternative sites and methods of dredged material disposal and has indicated a willingness to relocate the dump site if studies show that the existing site presents a hazard to navigation or public health (USACOE, December 12, 1974).

Monitoring studies conducted under the National Oceanic and Atmospheric Administration – Marine Ecosystems Analysis (NOAA-MESA) program indicate that the "great bulk" of dredged material already dumped at the site has not been transported any significant distance from the release point (NOAA, March 14, 1975). In February 1976, NOAA-MESA stated that use of the existing dredged material and sewage sludge dump sites had resulted in significant adverse environmental impacts over a localized area of several hundred square meters. Nevertheless, NOAA does not recommend moving the existing dump site unless it presents a hazard to navigation or public health (NOAA, October 6, 1975).

The EPA is currently evaluating the need for relocating the dredged material dump site.

Cellar Dirt Site

Cellar dirt (Table 10) is composed mainly of construction rubble, broken concrete, excavated earth and rock, and other non-floatable material, the bulk of which comes from construction activities in Manhattan. The cellar dirt is ocean dumped because there are few land disposal sites remaining in this area.

Past Activities. Cellar dirt has been dumped in the New York Bight since 1908, when the original dump site was established. Since then, the site has been moved several times to prevent accumulation of the material from posing a hazard to navigation. The existing site was designated in 1940. From 1960 through 1977, this dump site received over 8.0 million cu m (10.6 million cu yd) of material (Table 5) for an average annual contribution of over 450 thousand cu m (590 thousand cu yd). In 1977, however, only 135 thousand cu m (177 thousand cu yd) of cellar dirt material were dumped at the site. This reduction in volume is due to decreased construction activity in Manhattan.

Future Activities. The volume of material dumped at the cellar dirt site varies according to economic conditions in the construction industry and cannot be reliably forecast.

Acid Wastes Site

Currently, the acid wastes dump site is used by only two industries, NL Industries and Allied Chemical, both of which are located in New Jersey. Prior to 1974, DuPont dumped caustic wastes at the site, but these

wastes are now dumped at the chemical wastes site. Acid wastes, which consist of by-product (process) acid solutions (Table 10), are generally transported to the site aboard rubber-lined tank barges. They are then released below water level while the barges are underway; this assures maximum dispersion and dilution.

Past Activities. The existing acid wastes dump site in the Bight Apex was established in 1948. Before that, acid wastes were dumped at the sewage sludge dump site. Between 1960 and 1977, almost 39 million cu m (51 million cu yd) of acid wastes were dumped (Figure 3 and Table 5), for an average annual contribution of 2.2 million cu m (2.8 million cu yd).

Future Activities. The volume of acid wastes dumped in the New York Bight is not expected to increase between now and 1981. The two industries currently using the site are under an implementation schedule to meet ocean dumping criteria or phase out ocean dumping by 1981.

Wreck Site

Under a General Permit from EPA, derelict vessels and wrecks are disposed of at this dump site.

Past Activities. The wreck site has been used very sparingly in recent years. Only eight vessels were dumped at the site between 1960 and 1977 (Table 5).

Future Activities. In 1975 the U.S. Coast Guard (USCG) and the COE proposed that the existing wreck site be relocated outside of present navigational lanes. In early 1977, a new site, as listed in Table 1, was designated for interim use.

Chemical Wastes Site

The chemical wastes dump site was established as an alternative to the inland discharge or land disposal of those industrial chemical wastes that might contaminate potable water supplies.

Past Activities. From 1967 to 1977, less than 3.5 million cu m (4.5 million cu yd) of chemical wastes were dumped here (Figure 3 and Table 5), for an average annual contribution of slightly over 313 thousand cu m (412 thousand cu yd). During the period from 1964 to 1966, there was apparently no dumping of chemical wastes at this site. Prior to 1974, some chemical wastes were dumped at the sewage sludge and acid wastes sites.

In March 1977, EPA-Region II granted the request of DuPont of Edge Moor, Delaware, that it be allowed to move its dumping activities from a site 65 km (35 n mi) due east of the Maryland-Delaware border to the chemical wastes dump site.

Pursuant to a court order, the City of Camden, New Jersey, began dumping its sewage sludge at the chemical wastes site in January 1977. Camden's use of this site terminated in June 1978, when the city switched to a land-based disposal method (see Chapter III).

Future Activities. At present, six industrial waste generators are permitted to use this site. Of these, five are under an implementation schedule to phase out ocean dumping by 1981, while the sixth industry, DuPont's Grasselli Plant in Linden, New Jersey, has met the ocean dumping criteria.

OVERVIEW OF POLLUTANT LOADING IN THE NEW YORK BIGHT

The present pollutant loading in the New York Bight can be attributed not only to ocean dumping but to non-dumping contaminant sources as well. The non-dumped loading comes from three major sources: atmospheric fallout, municipal and industrial wastewater discharges through ocean outfalls, and surface (gaged and urban) and groundwater runoff (Table 11 and Figure 4).

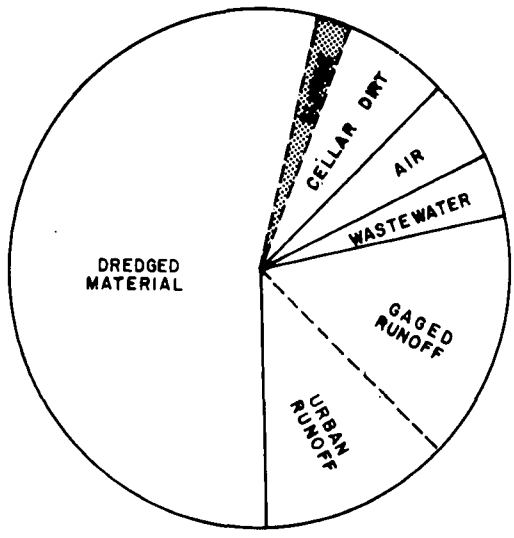
TABLE 11

POLLUTANT LOADINGS TO THE NEW YORK BIGHT BY SOURCE

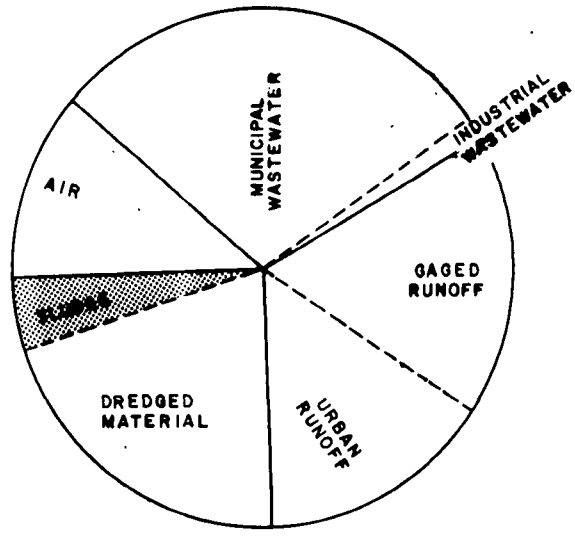
Parameter	Percentage Contribution						
	Direct Bight		Coastal Zone				
			Wastewater		Runoff		
	Barge*	Atmospheric	Municipal	Industrial	Gaged	Urban	Groundwater
Flow	0.02	59	5	0.4	33	2	0.4
Suspended Solids	63	5	4	0.2	16	12	Nil
Biochemical Oxygen Demand (five day)	21	9	48	2	11	9	0.01
Chemical Oxygen Demand	32	10	35	1	13	9	0.01
Total Organic Carbon	25	12	29	1	18	15	0.02
Oil & Grease	38	–	22	0.7	16	23	–
Ammonia	24	4	55	3	10	4	0.04
Organic Nitrogen	19	9	45	2	21	5	0.02
Total Kjeldahl Nitrogen	21	6	51	2	15	5	0.02
Nitrite & Nitrate	0.07	33	6	0.3	60	0.6	0.7
Total Nitrogen	16	13	40	2	25	4	0.2
Ortho-Phosphorous	–	1	72	–	18	9	Nil
Total Phosphorous	50	0.7	35	1	9	4	Nil
Cadmium	82	2	5	0.6	5	5	0.001
Chromium	50	1	22	0.8	10	16	Nil
Copper	51	3	11	9	10	16	0.006
Iron	79	3	5	0.5	6	6	0.01
Mercury	9	–	71	2	13	5	–
Lead	44	9	19	3	6	19	0.004
Zinc	29	18	8	2	21	22	0.009
Fecal Coliforms							
winter	<0.01	Nil	87	0.2	0.01	13	Nil
summer	<0.01	Nil	85	0.2	0.01	15	Nil
Total Coliforms							
winter	<0.01	Nil	91	0.1	0.05	9	Nil
summer	<0.01	Nil	84	0.2	0.1	16	Nil

*Barging includes the dumping of dredged material, sewage sludge, acid wastes, chemical wastes, and cellar dirt.

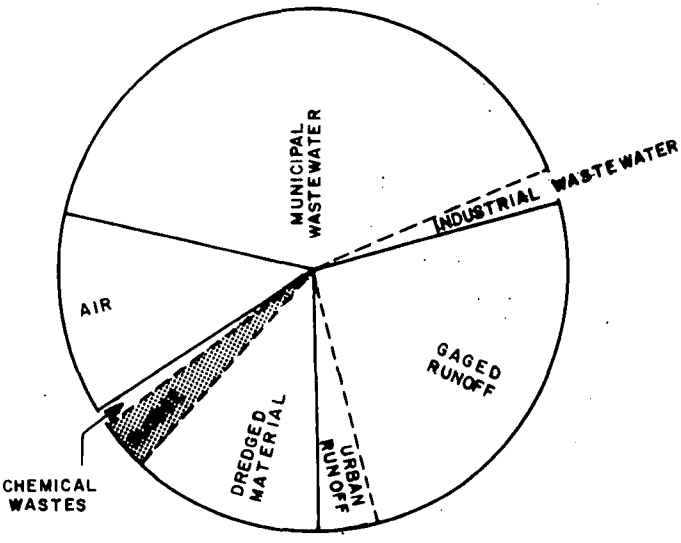
Source: Mueller *et al.*, 1976.



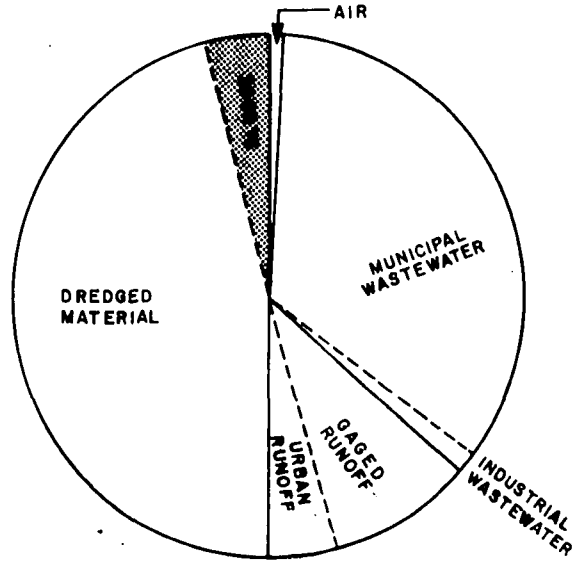
SUSPENDED SOLIDS



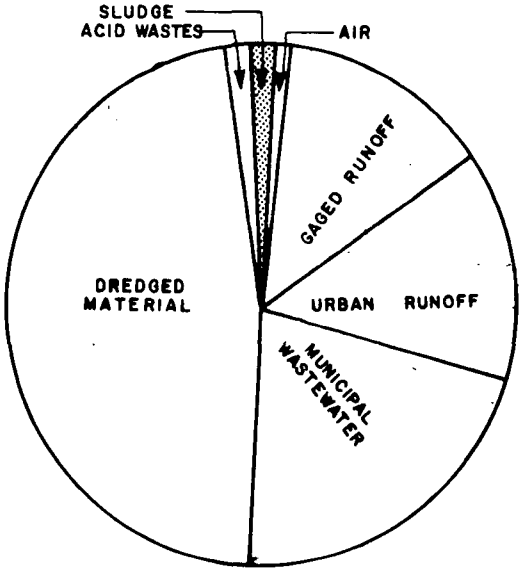
ORGANIC CARBON



NITROGEN



PHOSPHORUS



CHROMIUM

SOURCES OF POLLUTANTS IN THE NEW YORK BIGHT

SOURCE: MUELLER et. al., 1976.

FIGURE 4

A report prepared by Mueller *et al.* (1976) provides the best current estimate of non-dumped pollutant loading in the New York Bight. Admittedly, the report contains data gaps and relies heavily on unverified discharge information, but on the whole, it gives a good general description of the present situation.

The actual contaminant input to the waters of the New York Bight cannot be precisely quantified because it is difficult to identify reductions that occur in the pollutant load before it reaches the Bight. For the most part, contaminants are identified by Mueller *et al.* (1976) as coming from three separate zones: the Sandy Hook-Rockaway Point transect zone, the New Jersey coastal zone, and the Long Island coastal zone.

Barging sources, as defined by Mueller *et al.* (1976), include dredged material, sewage sludge, acid wastes, chemical wastes, and cellar dirt dumped directly into the waters of the Bight (Table 10). The pollutant loading from wreck dumping is considered insignificant. In terms of absolute volumes, dredged material constitutes the major source of pollutants dumped in the Bight.

Mueller *et al.* (1976) conclude that the greatest pollutant input to the New York Bight originates in the Sandy Hook-Rockaway Point transect zone. Inputs from the New Jersey and Long Island coastal zones are small, contributing less than 6 percent of the total pollutant loading.

Suspended Solids

The major input (63 percent) of suspended solids to the waters of the New York Bight comes from barged sources, principally dredged material (86 percent of the barged volume). Atmospheric fallout contributes approximately 5 percent of the total, while runoff contributes about 28 percent. Wastewater discharges contribute the remaining 4 percent.

Carbonaceous Materials

Municipal wastewater discharges are the source of about half (48 percent) of the BOD load reaching the Bight. Barging (21 percent), runoff (20 percent), and atmospheric fallout (9 percent) account for most of the remaining load.

Barging and municipal wastewater discharge loadings account for approximately 67 percent of the COD and 54 percent of the TOC loading in the New York Bight. The COD and TOC loadings from atmospheric fallout are approximately 11 percent and 15 percent, respectively; the loadings from runoff are also approximately 11 percent COD and 15 percent TOC.

Heavy Metals

Barging appears to be the major source of heavy metals in the New York Bight, with the exception of mercury (the major source of mercury is municipal wastewater discharges). Runoff and municipal wastewater discharges are the second and third largest sources of heavy metals. Almost all of the barge-related heavy metal loadings result from dredged material dumping; sewage sludge accounts for less than 6 percent (Table 10).

Nitrogen and Phosphorous

Approximately 40 percent of the total nitrogen in the New York Bight appears to come from municipal wastewater discharges. Runoff (29 percent), barging (16 percent), and atmospheric fallout (13 percent) account for most of the remaining amount (Table 11).

Barging, primarily of dredged material (92 percent of the barged volume), accounts for 50 percent of the total phosphorous loading in the Bight (Tables 10 and 11). Municipal wastewater discharges (35 percent) are the second largest source.

Microbial Contamination

Municipal wastewater discharges appear to be the major source (84 to 91 percent) of microbial contamination (fecal and total coliform) in the Bight. The remaining coliform loading comes from urban runoff. Barging is an insignificant source of fecal contamination in the New York Bight.

FEDERAL LEGISLATION AND CONTROL PROGRAMS

The Marine Protection, Research, and Sanctuaries Act

The Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) regulates the dumping of waste materials in United States ocean waters (PL 92–532). It forbids the dumping of radiological, chemical, or biological warfare agents or high-level radioactive wastes. The act includes mechanisms for designating dump sites, for issuing dumping permits, and for carrying out associated surveillance and enforcement activities. It also provides for establishing marine sanctuaries and for researching the causes and effects of marine pollution. In November 1977, the MPRSA was amended to prohibit the ocean dumping of sewage sludge after December 31, 1981 (PL 95–153).

Responsibilities of federal agencies under the MPRSA are discussed below.

The EPA issues permits for the transportation and dumping of all materials, except dredged material, into ocean waters; establishes criteria for review of permit applications; designates ocean dump sites; assesses environmental impacts of ocean dumping; and provides for enforcement of ocean dumping permits.

The COE issues permits for the dumping of dredged material, in accordance with EPA criteria and subject to EPA review.

The USCG conducts surveillance and other appropriate enforcement activities to prevent unlawful transportation of material for dumping.

The Department of Commerce (through NOAA) conducts comprehensive monitoring and research programs to determine the effects of ocean dumping, including possible long-range effects of pollution, overfishing, and man-induced changes on ocean ecosystems; designates marine sanctuaries, after consultation with other affected federal agencies; and regulates all activities within such sanctuaries.

The Department of State protects the marine environment by negotiating international agreements that further the goals of the MPRSA.

The U.S. Attorney General initiates civil and criminal actions at EPA's direction "for such relief as may be appropriate", including injunctions to cease ocean dumping.

Related Legislation

The New York Harbor Act of 1888, the Rivers and Harbors Act of 1899 (otherwise known as the Refuse Act), and the Rivers and Harbors Act of 1905 were the first federal laws that attempted to regulate the dumping of refuse and dredged material into the navigable waters of the United States, including coastal waters. The MPRSA has superseded these acts and other related legislation with regard to ocean dumping of waste materials.

The Federal Water Pollution Control Act (FWPCA), which is also known as the Clean Water Act, provided EPA with the authority to regulate the discharge of treated wastewater (effluent) into United States waters, including wastewater discharged through ocean outfalls. Both the MPRSA and the FWPCA provide for the establishment of criteria to control the dumping and discharge of wastes in ocean waters.

The Fish and Wildlife Coordination Act of 1965 and the National Environmental Policy Act of 1969 (NEPA) indirectly relate to ocean dumping in that they require the conservation of marine resources and the assessment of environmental impacts, respectively, where federal actions are concerned. Prior to the passage of the MPRSA, these laws were frequently used to halt or regulate ocean dumping (Pararas-Carayannis, 1973).

EPA Ocean Dumping Permit Program

Under the terms of the MPRSA, EPA is authorized to establish a permit program for regulating the transportation and dumping of all wastes except dredged material in ocean waters. Region II of EPA has been delegated the responsibility for regulating ocean dumping in the waters off New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands.

Existing Regulations. On January 11, 1977, EPA-Headquarters published Subchapter H, Ocean Dumping, Final Revision of Regulations and Criteria (40 CFR, Parts 220 to 229), as authorized by the MPRSA, which established guidelines for the review, evaluation, and issuance of ocean dumping permits. On November 28, 1977, EPA-Headquarters published further revisions, in interim final form, of two sections of the regulations (Parts 223 and 226) dealing with procedural matters. Together, the January and November regulations, which replace those issued on October 15, 1973, reflect the latest ocean dumping technology, facilitate the permit review process, and bring the regulatory process into line with the MPRSA, the FWPCA, and the International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. Copies of the regulations can be found in Appendix B.

Part 220 of these regulations describes five types of permits that may be issued: General, Special, Emergency, Research, and Interim. The EPA has, with few exceptions, issued only Interim Permits. These permits have a term of one year or less; they are issued when the material to be dumped does not meet established criteria (Part 227). Under the revised regulations, Interim Permits cannot be issued to new applicants, that is, to applicants who have not previously received ocean dumping permits. Furthermore, an Interim Permit cannot be issued to a present permit holder unless "the permittee has exercised his best efforts to comply with all requirements of a special permit by April 23, 1978, and has an implementation schedule adequate to allow phasing out of ocean dumping or compliance with all requirements necessary to receive a special permit by December 31, 1981, at the latest." The EPA's policy has been to grant all requests for public hearings on the issuance of ocean dumping permits. (A sample permit form is contained in Appendix A.)

In EPA-Region II only four Special Permits are now in effect: one permit is held by the Moran Towing Corporation for use of the cellar dirt dump site; the other three are held by DuPont's Grasselli Plant of Linden, New Jersey, DuPont of Edge Moor, Delaware, and the Crompton and Knowles Corporation of Reading, Pennsylvania, for use of the chemical wastes site. Special Permits have a term of three years or less and are issued only if the material to be dumped meets the criteria set forth in Part 227 of the regulations.

Parts 221 through 226 describe information required for permit application, processing fees, action on application, contents of permits, records, COE permits, and enforcement procedures for the regulation of ocean dumping.

Part 227 contains the technical criteria used by EPA in evaluating the wastes proposed for ocean dumping, including applicable maximum concentrations of specified toxic substances. These criteria set prohibitions, limits, and conditions on ocean dumping based on a wide range of specific environmental impacts. Part 227 also prescribes the procedures for establishing the need for ocean dumping; and for evaluating ocean dumping's impact on aesthetic, recreational, and economic resources, and on other uses of the ocean.

Part 228 establishes criteria for the initial selection and management of ocean dump sites. It also provides criteria for monitoring and evaluating the overall environmental impact of dumping at a given site and for managing a site to prevent "unreasonable degradation". It contains guidelines for standardizing the planning and implementation of baseline and trend assessment surveys at the dump sites.

Part 229 describes the three General Permits that EPA has issued: one for burial-at-sea, another for the transport and sinking of target vessels by the U.S. Navy, and a third for the dumping of wrecks (derelict vessels).

One Research Permit has been issued to the JBF Scientific Corporation of Wilmington, Massachusetts, to conduct oil spill control research during the fall of 1978. No Emergency Permits, which are usually issued by EPA-Headquarters, have been granted for the New York Bight area to date.

Enforcement Actions. Since the MPRSA became effective, EPA-Region II has initiated twenty-four enforcement actions on alleged ocean dumping permit violations in the New York Bight (Table 12). Most of these actions were based upon referrals from the USCG, NASA, and EPA's own staff. Thirteen of these orders were issued for alleged misuse of the existing sewage sludge site. The remaining orders were for alleged violations at the dredged material, chemical wastes, and acid wastes sites.

Over 150 USCG referrals to EPA have been for the permittee's "failure to notify" the USCG prior to leaving port. The facts did not warrant initiation of administrative action, although in most cases, a letter of reprimand was sent to the permittee.

COE Dredged Material Permit Program

The COE is authorized to issue permits for the dumping of dredged material into navigable waters (under the FWPCA) and into ocean waters (under the MPRSA). Passage of these two acts relieved the COE of all responsibility for the regulation of waste discharges, either as effluent or as solid waste materials.

The COE has published interim final regulations (33 CFR Part 209) containing guidelines for the regulation of dredging operations and for the issuance of permits for the transport of dredged material for dumping. The criteria to be used by the COE in evaluating applications for ocean dumping of dredged material are those promulgated under the aforementioned ocean dumping regulations (40 CFR Parts 227 and 228).

USCG Surveillance Responsibilities

The USCG has responsibility under the MPRSA for conducting "surveillance and other appropriate enforcement activity to prevent unlawful transportation of material for dumping, or unlawful dumping." The USCG is also charged with supplying "to the EPA Administrator and the U.S. Attorney General, as appropriate, such information of enforcement as they may require in carrying out their duties relative to penalty assessment (fines), criminal prosecutions, or other actions involving litigation." The USCG is also authorized to issue regulations to carry out "the responsibilities and authority conferred."

Existing Program. As of August 1978, the USCG had not promulgated any regulations under the MPRSA. For the present, the USCG has defined its surveillance responsibilities in an internal order (Commandant Instruction 5992.9A), which can be briefly summarized as follows:

- Spot checks will be conducted on dumping vessels for valid permits.
- Surveillance will be concentrated on the dumping of toxic material, EPA requests for vessel/dump monitoring, and 10 percent of other disposal activities.
- Surveillance will be accomplished by using a USCG vessel to intercept and/or escort the permittee vessel, by aircraft overflight of the assigned dump site during dumping activity, by stationing shipriders (USCG personnel) on permittee vessels, and by radar coverage.
- Random surveillance missions will be conducted in designated and non-designated areas to discourage illegal dumping.

TABLE 12

OCEAN DUMPING ORDERS IN THE NEW YORK BIGHT

Order No.	Respondent	Referral From	Type of Violation	Administrative Order	Disposition	Dump Site
73-1	General Marine Transport Corp.	EPA-Region II	Permit condition violation and dumping without permit	Final Order 5/15/74	Hearing officer upheld GMTC on both counts	Sewage Sludge
74-1	Moran Towing & Transportation Co.	USCG	Dumped outside authorized dump site	Final Order 5/27/75	$25,000 civil penality; U.S. District Court reduced penalty to $5,000	Acid Wastes
74-2	Modern Transportation Company	USCG	Dumped outside authorized dump site	Final Order 1/22/75	Charges withdrawn	Sewage Sludge
74-4	Spentonbush Transport Service, Inc.	USCG	Dumped outside authorized dump site	Final Order 12/23/75	Charges withdrawn	Chemical Wastes
75-2	Modern Transportation Company	EPA-Region II	Higher concentration of several parameters than reported in the permit application	Final Order 3/21/77	Charges withdrawn	Chemical Wastes
75-3	Chemical Recovery Corp. EPL Industries, Inc.	EPA-Region II	Higher concentration of several parameters than reported in the permit application	Final Order 3/16/77	$25,000 civil penalty assessed	Chemical Wastes
75-4	Nassau County	EPA-Region II	Failure to segregate industrial waste	Final Order 6/16/75	No penalty; ordered to terminate dumping of industrial wastes	Sewage Sludge
75-5	Moran Towing & Transportation Co.	NASA & EPA-Region II	Dumped outside authorized dump site	Notice of Violation 8/14/75	Pending	Acid Wastes
76-2	Fritzche Dodge & Olcott	EPA-Region II	Failure to meet permit reporting requirement	Final Order 9/1/76	$500 civil penalty	Chemical Wastes
76-3	Whippany Paperboard Co., Inc.	EPA-Region II	Failure to meet permit reporting requirement	Notice of Violation 7/22/76	Pending	Sewage Sludge
76-4	S.B. Thomas, Inc.	EPA-Region II	Failure to meet permit reporting requirement	Final Order 9/9/76	$500 civil penalty	Sewage Sludge
76-5	International Wire Products, Inc.	EPA-Region II	Failure to meet permit reporting requirement	Final Order 9/20/76	$1,000 civil penalty	Chemical Wastes

TABLE 12 (Continued)

Order No.	Respondent	Referral From	Type of Violation	Administrative Order	Disposition	Dump Site
76-6	Spentonbush Transport Service, Inc.	USCG	No permit aboard towing vessel	Final Order 9/30/76	$200 civil penalty	Chemical Wastes
76-7	General Marine Transport Corp.	USCG	Failure to notify USCG of sailing	Final Order 7/5/77	Hearing officer upheld GMTC	Chemical Wastes
76-8	Whippany Paperboard Co., Inc.	EPA-Region II	Failure to file new application	Final Order 10/18/76	$3,500 civil penalty	Sewage Sludge
76-9	Gates Construction Corp.; C & H Towing Co.	Corps of Engineers	Dumped outside authorized dump site, dumping floatables, transporting floatables for purpose of dumping	Notice of Violation 10/21/76	Pending	Dredged Material
76-10	Allied Chemical Corporation	USCG	Dumped outside authorized dump site	Final Order 11/12/76	Charges Withdrawn	Acid Wastes
76-11	The City of New York	USCG	Dumped outside authorized dump site	Final Order 2/14/78	Charges Withdrawn	Sewage Sludge
77-1	General Marine Transport Corp.	USCG	No permit aboard vessel	Final Order 1/31/78	Charges Withdrawn	Sewage Sludge
77-2	Middletown Sewerage Authority	EPA-Region II	Failure to meet permit reporting requirement	Notice of Violation 3/8/77	Pending	Sewage Sludge
77-5/11	General Marine Transport Corp.	USCG	Dumping at a faster rate and over a shorter distance than authorized	Final Order 6/23/78	Charges Withdrawn	Sewage Sludge
77-13	New York City Department of Water Resources	USCG	Failure to maintain facilities in good working order	Notice of Violation 8/17/77	Pending	Sewage Sludge
77-14	Westchester Co. and McAllister Bros.	USCG	Dumping outside authorized dump site	Final Order 1/30/78	Charges Withdrawn	Sewage Sludge
77-15	A&S Transport Company, Ocean Disposal Company and McAllister Bros.	USCG	Dumping outside authorized dump site	Final Order 1/31/78	Charges Withdrawn	Sewage Sludge

— For purposes of enforcement, the USCG will report violations of the ocean dumping permit conditions to EPA.
— The USCG will review both EPA and COE draft ocean dumping permits so that specific surveillance conditions may be made part of the final permit.

The USCG-Third District, which has jurisdiction over coastal waters from Connecticut to Delaware, is responsible for the surveillance of ocean dumping in the New York Bight. Within the Bight Apex, patrol vessels conduct surveillance of the existing dump sites and record vessel sitings, activities, and positions. Daily helicopter patrols are conducted over the five existing dump sites in the Bight Apex, weather conditions permitting.

The use of shipriders is an effective method of surveillance, but requires a significant commitment of manpower. Therefore, shipriders are used only for surveillance at the chemical wastes dump site. Interception by aircraft or ship is not routinely attempted because of the inaccuracy in estimating the dumping vessel's time of arrival and because of the relatively short endurance time of the patrol helicopters (USCG, July 8, 1975).

Proposed Program. The USCG is conducting research on a positive location recording system that is based on electronic navigation. The prototype, tested in the summer of 1975, is based on LORAN C (Long Range Aid to Navigation). The sealed device records the trackline of the dump vessel, providing a permanent indication of whether the vessel reached the designated site. Although the prototype does not have a dump sensor, such a sensor is electronically possible. The legal aspects of placing this equipment aboard private vessels are also being researched (USCG, July 8, 1975).

FDA Responsibilities

Operating under the Food, Drug, and Cosmetics Act and the Public Health Service Act, the Food and Drug Administration (FDA) administers the National Shellfish Sanitation Program. This program gives FDA the responsibility for assuring that bivalve shellfish (clams, oysters, etc.) shipped in interstate commerce are of a safe and wholesome nature. The FDA is responsible for classifying the waters beyond the 3-mile (5.6 km) limit.* Since 1970, FDA has also monitored waters beyond the 12-mile (22.2 km) limit. (USEPA, November 21, 1975).

In the metropolitan area, FDA has prohibited shellfishing within an 11.1 km (6.0 n mi) radius and shoreward of the existing sewage sludge dump site. The closure includes both the polluted area and a safety or buffer zone. The USCG monitors this closed area and notifies FDA of vessels seen harvesting shellfish. Although FDA is empowered to seize the cargo, it usually asks state officials to take appropriate action. This may include seizure of the cargo, fines, and/or license suspension.

INTERNATIONAL CONSIDERATIONS

An alternate sewage sludge dump site in either the Northern or Southern Area in the New York Bight would lie outside currently recognized United States waters. International guidelines on ocean dumping are somewhat vague, despite the proceedings of the Third United Nations Law of the Sea Conference (UNLOS III). The United States has enacted legislation that extends economic control to the 200-mile (371 km) limit.

* All limits in ocean waters are expressed in nautical miles (n mi): e.g., 3-, 12-, and 200-mile limits.

United States Laws

The United States has recognized a territorial limit (territorial sea) of 3 nautical miles (5.5 km) since 1783. The waters, air space, seabed, and subsoil within this limit are subject to United States sovereignty. The coastal states also have jurisdiction over the waters within the 3-mile (5.6 km) limit.

In 1945, a presidential proclamation (Proc. No. 2668) extended United States jurisdiction over the subsoil and seabed resources beyond the 3-mile (5.6 km) limit, to the edge of the continental shelf. This proclamation also established United States claims to oil and gas deposits beneath the shelf. The Outer Continental Shelf (OCS) Lands Act of 1953 reinforced the proclamation and gave the federal government sole jurisdiction over submerged lands from the 3-mile (5.6 km) limit to the edge of the continental shelf. A companion bill, the Continental Shelf Submerged Lands Act of 1953, gave the coastal states jurisdiction over seabed and subsoil resources within the territorial sea.

In 1966, the U.S. Congress passed the Territorial Fisheries Act, which extended exclusive fishing rights to the 12-mile (22.0 km) limit.

The MPRSA gave the United States control of ocean dumping in coastal ocean waters over which the United States has jurisdiction or may exercise control, under accepted principles of international law (Baxter *et al.*, 1974).

The slow progress of UNLOS III toward final agreements or treaties led United States lawmakers to pass legislation extending commercial fisheries and pollution control jurisdiction to the 200-mile (371 km) limit. The law was passed in June 1976, and went into effect in January 1977.

International Agreements

The Convention on the Territorial Sea and the Contiguous Zone defined the territorial sea as those waters extending 3 nautical miles (5.6 km) seaward of a defined baseline, as determined by the Department of State. The contiguous zone is that area between the baseline and the 12-mile (22.2 km) limit. Ocean waters include those waters of the open sea lying seaward of the baseline.

Under international law, a coastal nation has exclusive control over its internal waters (bays, estuaries, and other semienclosed areas) and its territorial sea. It also has authority to designate dump sites and enact pollution control legislation to protect public welfare and private property. A coastal nation has the further right to prevent pollution of its contiguous zone, based upon the potential for contamination of the territorial sea (*Marine Technology Society Journal*, July 1974).

In August 1973, the U.S. Senate ratified the International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. Annex II of the convention requires the issuance of a special permit for ocean dumping of wastes (especially sewage sludge or dredged material) that contain *significant amounts* of heavy metals, toxic compounds, organohalogens, pesticides, or high-level radioactive materials. The MPRSA initially implemented the provisions of this convention for U.S. controlled and adjacent waters.

OTHER ACTIVITIES IN THE NEW YORK BIGHT

Commercial Fisheries

Based on current annual dollar earnings, commercial fishing is probably the most important activity in the New York Bight. In 1976, a total of 80.6 million kg (184.3 million lb) of fish and 12.6 million kg (27.8 million lb) of shellfish, valued at $12.4 million and $35.5 million, respectively, were landed in the New York-New Jersey metropolitan area (Table 13). Most of this catch was taken in the Bight. However, signifi-

TABLE 13

COMMERCIAL FISHERIES LANDINGS IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA

1976

Location	Fish			Shellfish		
County, State	Kilograms in Thousands	(Pounds)	Dollars in Millions	Kilograms in Thousands	(Pounds)	Dollars in Millions
New York, N.Y.	11	(24)	0.009	231	(509)	0.820
Kings, N.Y.	996	(2,194)	0.445	116	(255)	0.087
Nassau, N.Y.	451	(993)	0.258	1,760	(3,877)	2.282
Suffolk, N.Y.	7,514	(16,551)	4.340	7,996	(17,611)	27.750
Monmouth, N.J.	66,795	(153,906)	4.838	335	(739)	0.573
Ocean, N.J.	4,850	(10,683)	2.523	2,169	(4,777)	3.956
Total	80,617	(184,351)	12.413	12,607	(27,768)	35.468

Sources: NOAA-NMFS, 1977a and 1977b.

cant quantities of commercial fish and shellfish, especially surf clams, were caught in waters off other states (Maryland, Delaware, and Virginia).

Nassau and Suffolk counties in New York, and Monmouth and Ocean counties in New Jersey, accounted for about 96 percent of the value of all commercial fish landed in the metropolitan area during 1976 (Table 13). The reported value of fish and shellfish landed in Suffolk County alone was 67 percent of the 1976 total; Suffolk County also accounted for 78 percent of all shellfish landed in the metropolitan area during 1976. In 1974, New York and New Jersey had 5,364 full-time and 2,942 part-time commercial fishermen (Bureau of Land Management, November 1975).

The commercial fish most often landed in the metropolitan area during 1976 were menhaden, whiting, flounder (blackback, fluke, and yellowtail), porgy, sea trout, red hake, butterfish, bluefish, striped bass, cod, and mackerel.

The most common species of commercial shellfish landed were hard clams, surf clams, and oysters (in that order). These species accounted for approximately 93 percent of the value of commercial shellfish landings in the metropolitan area during 1976 (Table 14). Scallops, crabs, and clams (other than hard clams and surf clams) do not appear to be economically important to the region's commercial fisheries at present; oysters are not currently harvested in the New York Bight, except in the local bays and estuaries.

The potential commercial fisheries development, especially shellfisheries, is discussed further in Chapter VII.

Recreation

Sport Fishing. About 5.3 million residents of the northeastern United States fished in the waters of New York and New Jersey during 1974, as a recreational activity, and about half of them actually fished in the New York Bight (NOAA-NMFS, 1975a). Most sport fishing off the New York and New Jersey shores is devoted to species which are also commercially exploited, such as sea bass, striped bass, bluefish, cod, scup, whiting, and flounder. Approximately 75 percent of these species spend part or all of their life cycles in coastal zone waters (Ketchum, 1972).

Beach Attendance. The shorelines of Long Island and northern New Jersey support an estimated $2-billion beach industry (Interstate Electronics Corporation, 1973). The popularity of these low, sandy beaches is due to their quality and accessibility. Beach property in the New York-New Jersey metropolitan area is owned by both public and private entities (Table 15). In the metropolitan area, the 1976 beach attendance at state and national parks alone was over 20 million (Table 16).

Navigation

The USCG is responsible for establishing navigational lanes or separation zones in the New York Bight. There are three traffic separation zones leading into Ambrose Channel and the Ports of New York and New Jersey (Figure 5); they are designated as the Barnegat, Hudson Canyon, and Nantucket navigational lanes. The circular area at the intersection of these three lanes, at the Bight Apex, is a precautionary zone that has a high level of ship traffic. The existing sewage sludge dump site is located within this area. The proposed Northern and Southern Areas are for the most part located outside these separation zones (Figure 5).

Potential Mineral Resources

Sand and Gravel. The distribution of sand and gravel in the New York Bight is shown in Figure 6 (Schlee and Platt, 1970). At present, most sand and gravel used in the metropolitan area is mined at inland sites; New York Harbor is also the site of a very large sand mining operation. However, as these sources

TABLE 14

COMMERCIAL SHELLFISH LANDINGS IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA

1976*

Shellfish	Kilograms (Pounds) in Thousands		Dollars in Millions
American Lobster	507	(1,117)	2.368
Hard Clams	4,573	(10,072)	19.396
Razor Clams	0.953	(2)	0.0008
Soft Clams	88	(195)	0.234
Surf Clams	4,310	(9,493)	3.299
Oysters	1,024	(2,256)	5.642
Sea Mussels	194	(427)	0.042
Bay Scallops	199	(438)	0.816
Sea Scallops	887	(1,953)	3.170
Squid	667	(1,469)	0.310
Conch	41	(91)	0.031
Blue Crabs	185	(407)	0.123
Red Crabs	321	(708)	0.00004
Rock Crabs	31	(67)	0.004
Total	13,028	(28,695)	35.436

*Total landings for New York, Kings, Nassau, and Suffolk counties in New York, and Monmouth and Ocean counties in New Jersey, are given in Table 13.

Sources: NOAA-NMFS, 1977a and 1977b.

TABLE 15

BEACH OWNERSHIP IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA

Location County, State	Shore Ownership Hectares (Acres)						Total Acreage Hectares (Acres)	
	Federal		State		Private			
Monmouth, N.J.	680	(1,678)	178	(440)	2	(5)	860	(2,123)
Richmond, N.Y.	51	(126)	9	(22)	–	–	60	(147)
Kings, N.Y.	32	(80)	84	(206)	–	–	116	(286)
Queens, N.Y.	122	(300)	–	–	–	–	122	(300)
Nassau, N.Y.[1]	–	–	721	(1,780)	2,398	(5,920)	3,119	(7,700)
Suffolk, N.Y.[2]	781	(1,929)	660	(1,630)	2,237	(5,523)	3,678	(9,082)
Total	1,787	(4,113)	1,635	(4,038)	4,636	(11,448)	7,954	(19,639)

[1] Includes Jones Beach, Captree State Park, and Long Beach Island.
[2] Includes Shinnecock Inlet to Moriches Inlet, Fire Island National Seashore, Smith Point Co. Park, and Robert Moses State Park.

Sources: National Park Service, 1978.
National Park Service, June 1978.
Scheinkman and Byrne, 1977.

TABLE 16

BEACH ATTENDANCE AT STATE AND NATIONAL PARKS IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA

1976

Park	Attendance
Island Beach State Park, N.J.[1]	194,223
Gateway National Recreation Area	
Breezy Point, N.Y. (Jacob Riis State Park)[2]	3,800,000
Sandy Hook, N.J.[2]	2,000,000
Staten Island, N.Y.[2]	1,240,000
Smith Point Co. Park, Fire Island, N.Y.[3]	735,256
Robert Moses State Park, Fire Island, N.Y.[3]	2,122,200
Captree State Park, Long Island, N.Y.[4]	500,000
Fire Island National Seashore, N.Y.[3]	702,194
Fire Island "Other," N.Y. (1973)[5]	2,301,000
Jones Beach State Park, N.Y.[4]	7,000,000
	20,594,883

Sources:

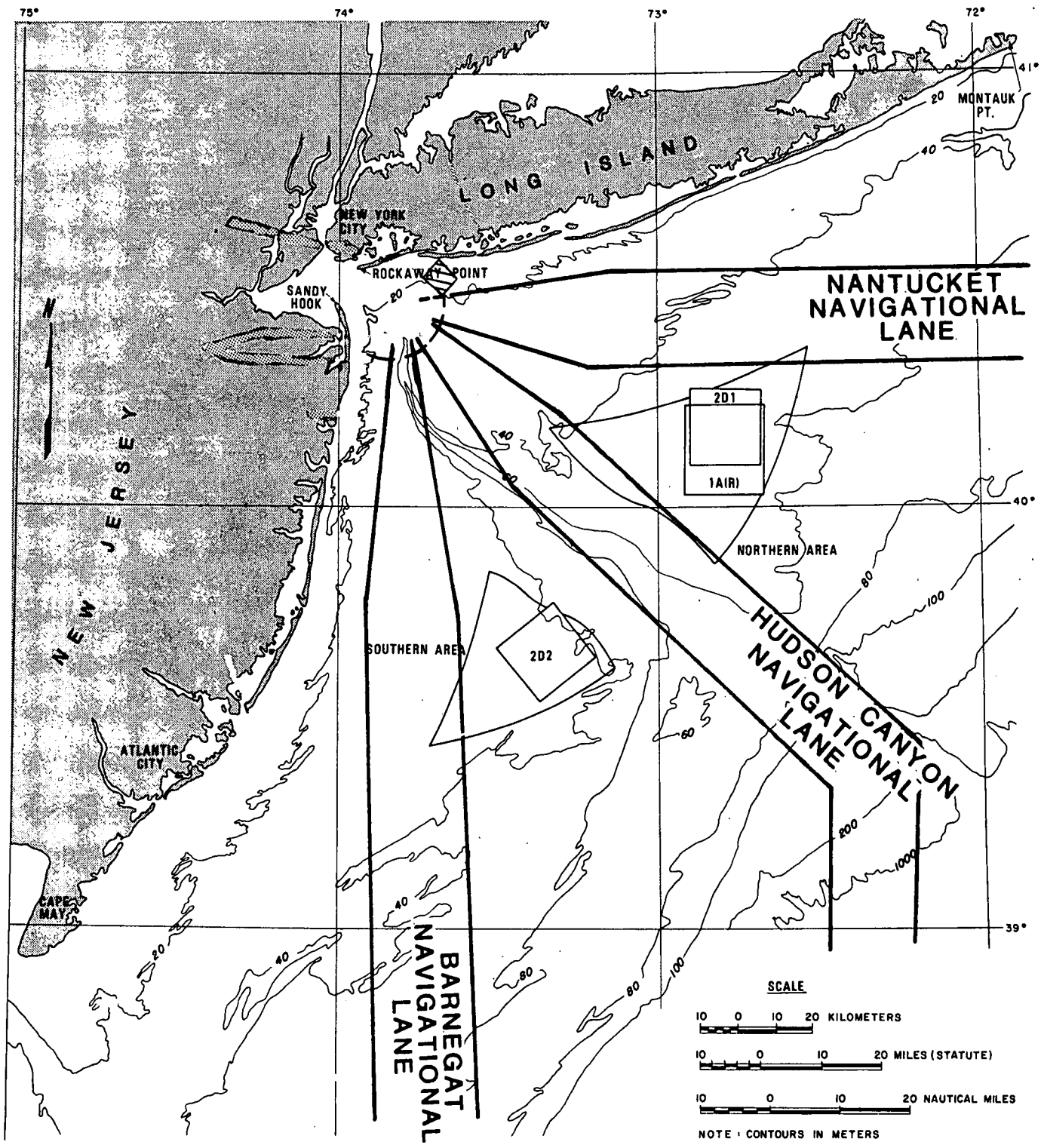
[1] New Jersey Department of Environmental Protection, Bureau of Parks, 1978.

[2] National Park Service, May 1978.

[3] Fire Island National Seashore Headquarters, 1978.

[4] Long Island State Parks and Recreation Commission Headquarters, June 1978.

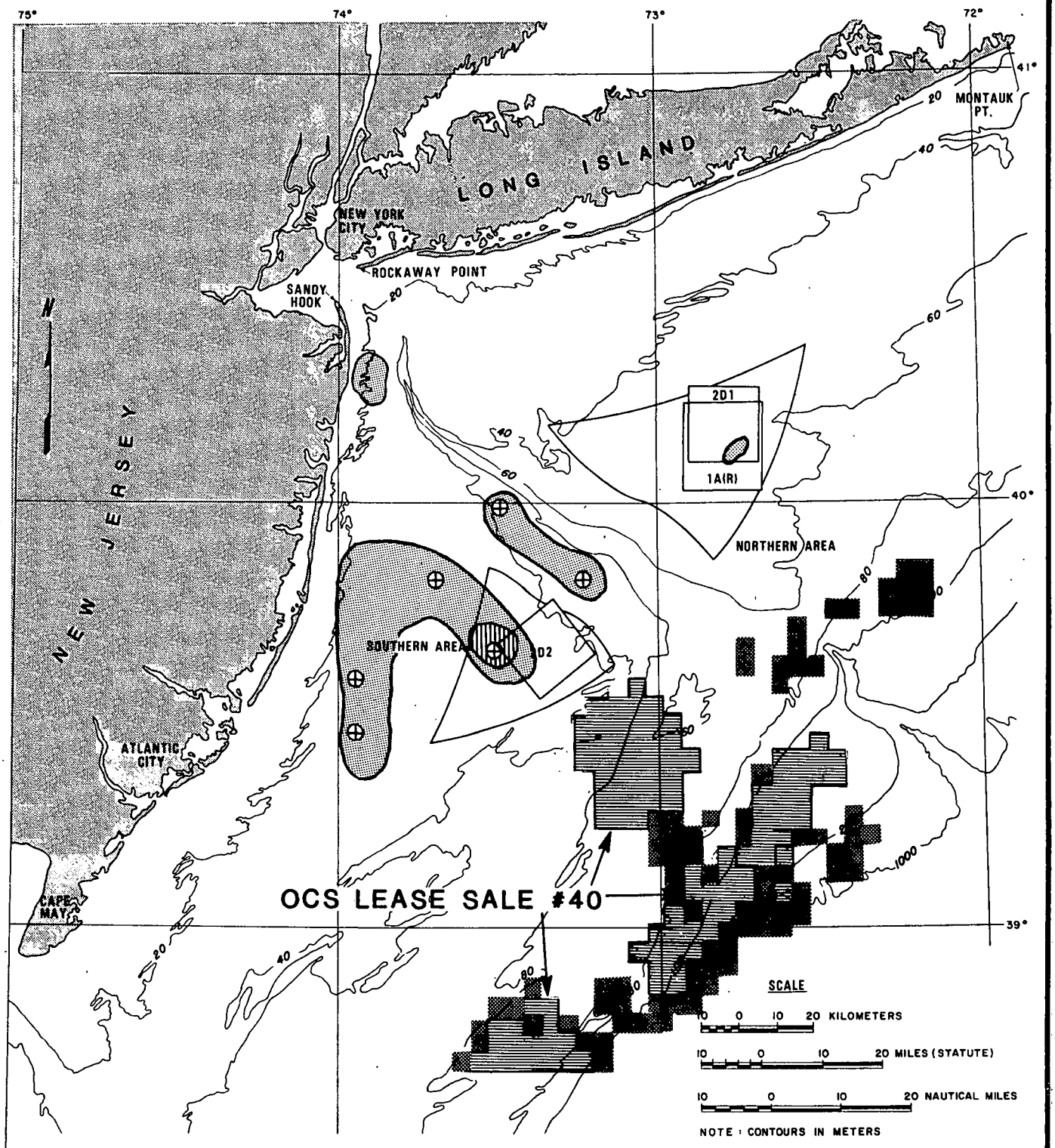
[5] National Park Service, 1975.



NAVIGATIONAL LANES IN THE NEW YORK BIGHT

SOURCES: INTERSTATE ELECTRONICS CORP., 1973; DAMES & MOORE 1975.

FIGURE 5



POTENTIAL MINERAL RESOURCES IN THE NEW YORK BIGHT

KEY :

- PROPOSED OCS LEASE SALE #49
- OCS LEASE SALE #40
- ⊕ SAMPLE LOCATIONS FOR SAND & GRAVEL

GRAVEL IN PERCENT

- > 50
- 25-50
- < 25

SOURCES: SCHLEE, 1975; BLM, 1978.

FIGURE 6

become depleted and others increasingly difficult to find, it is expected that economics will favor development of offshore sand and gravel resources.

Oil and Gas. The U.S. Department of the Interior's Bureau of Land Management (BLM) completed its first sale of oil and gas leases in the Mid-Atlantic Baltimore Canyon trough in August 1976 (Outer Continental Shelf (OCS) Sale No. 40). Exploratory drilling at six of the ninety-three tracts leased in OCS Sale No. 40 began in the spring and summer of 1978. On May 19, 1978, BLM published a draft EIS on the proposed OCS Sale No. 49, which includes 136 tracts totalling 313,344 hectares (774,273 acres) in the Baltimore Canyon trough. Sale No. 49 is tentatively scheduled for August 1979. The locations of Sale No. 40 and proposed Sale No. 49 are shown on Figure 6. A third sale (No. 59) is under consideration and is tentatively scheduled for August 1981. (BLM, 1978).

Potential Offshore Facilities

Over the years, numerous offshore facilities have been proposed, ranging from deepwater ports for supertankers to artificial islands for floating nuclear power plants and other types of commercial facilities (airports, refineries, and harbors). Various factors have indefinitely delayed such developments: unresolved safety problems associated with construction and operation of floating nuclear power plants; excessive construction costs in waters deeper than 22 m (70 ft); the continuing economic slump; and the lack of a national energy policy.

1976 FISH KILL AND BEACH CLOSURE INCIDENTS

Several months after the draft EIS was issued in February 1976, two incidents occurred that were in part related to the pollution problems in the New York Bight. First, during the summer of 1976, there was an extensive fish kill off the coast of New Jersey. Second, in mid-May and again in mid-to-late-June 1976, floatables and trash washed up on several Long Island beaches, causing temporary closures. Both incidents were the subject of intensive studies by federal, state, and local agencies. The conclusion reached was that ocean dumping of sewage sludge was not responsible for those incidents: that it was at most a minor contributing factor.

Since ocean dumping of sewage sludge is thought to have played such a small part in the fish kill and beach closure incidents, moving the sludge dumping activities to an alternate site would not prevent a recurrence. Indeed, the information gathered to date argues against relocation of the dump site. As additional information becomes available, particularly data from the expanded monitoring program for the New York Bight Apex, this conclusion will be reevaluated.

New York Bight Fish Kill

The first reports of the fish kill came in late June and early July 1976 from commercial fishermen and sport skin divers who had observed dead fish and invertebrates in the waters off the coast of New Jersey. Gradually, it became apparent that the fish kill was quite extensive. By the time the fish kill subsided in the fall of 1976, it had claimed large numbers of bottom-dwelling fish and shellfish. The greatest losses occurred among essentially non-motile shellfish species, such as lobster, jonah crabs, and surf clams. Substantial losses also occurred among bottom-dwelling finfish species, such as hake, fluke, ocean pout, cunner, and sea bass.

However, finfish species that normally inhabit the upper oceanic waters, such as bluefish, striped bass, and menhaden, do not seem to have been affected.

The immediate cause of the fish kill was the extremely low level of dissolved oxygen in the bottom waters of the New York Bight. Maintenance of most aquatic life forms requires a dissolved oxygen level of at least 4 mg/1; even higher levels are required for the survival of juvenile aquatic life forms. During the fish kill, dissolved oxygen levels over much of the New York Bight ranged from zero to 2 mg/1. Estimates of the total area affected range from 10,300 sq km (3,000 sq n mi) to 17,000 sq km (5,000 sq n mi) (see Figure 7).

The reasons for the oxygen depletion in the Bight waters were summarized by the National Science Foundation (NSF) in a report on a workshop held in October 1976:

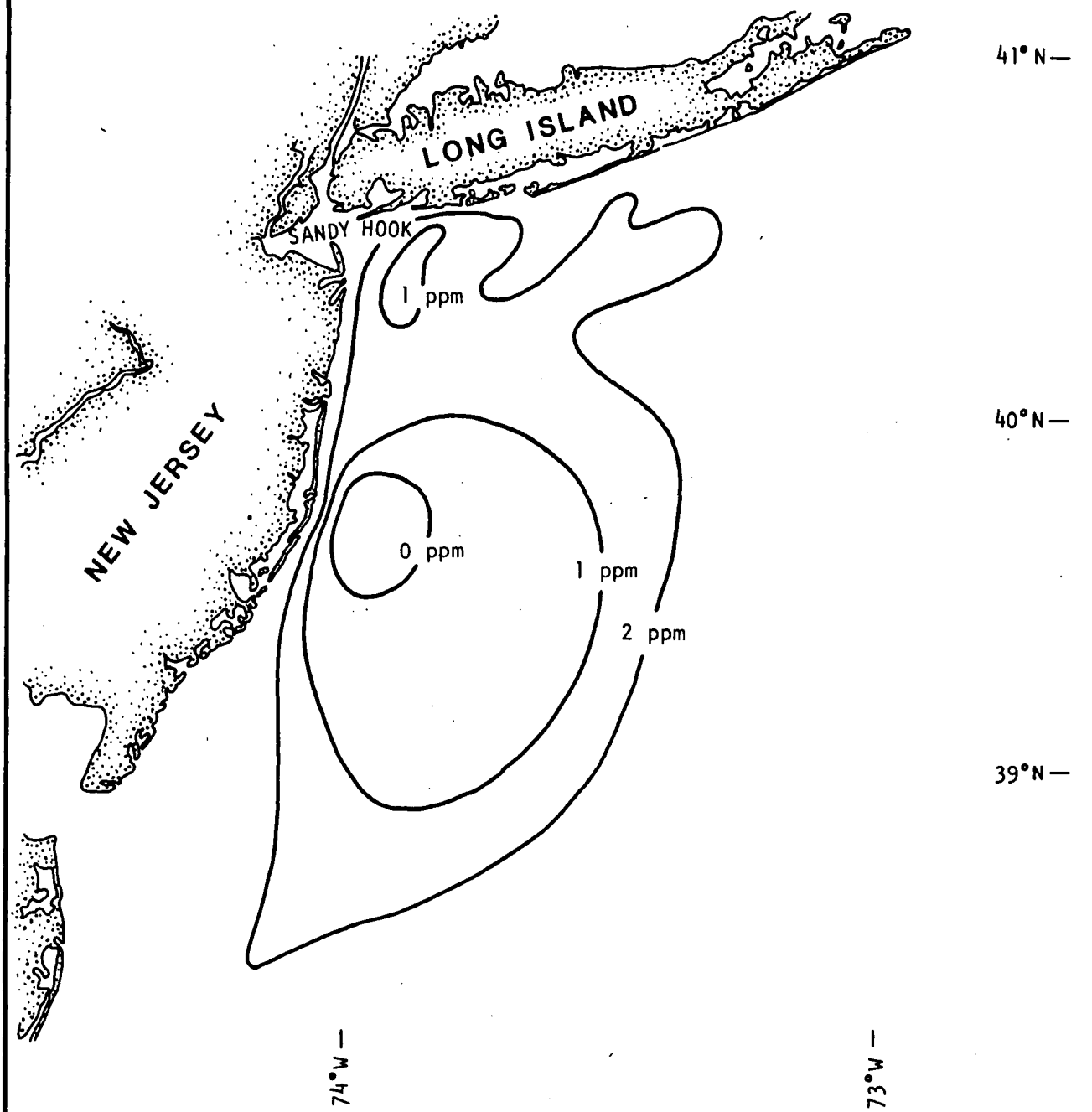
> [The] fifty university, state, and federal scientists [who] attended [the] workshop...agreed that the anoxic (low oxygen) condition that existed during the summer and fall of 1976 was the combined result of meteorological conditions, shelf water circulation, and the degradation of organic matter, including an extensive algal bloom. The anoxic region is located about 4 miles off the New Jersey coast and is, at its greatest extent, about 100 miles long and 40 miles wide. It has had a severe impact on the finfish and shellfish populations in the area.
>
> Scientific presentations focused on the data available from this region and the probable causes of the phenomenon. Specifically, an extensive algal bloom, dominated by the organism *Ceratium tripos*, developed in the early spring and extended into the fall of 1976. This could have contributed significantly to the organic matter on the shelf. However, its precise contribution to the anoxic condition remains uncertain. Probable contributing factors were a relative dearth of storm activity, anomalous surface wind conditions, and unusually warm sea surface temperatures over much of the Middle Atlantic Bight. It appears that the oxygen content of the water beneath the permanent thermocline in this area is in a state of very critical natural balance.
>
> The scientists agreed that the anoxic phenomenon was so large and complex that it would be necessary to enlist the efforts of all the scientific disciplines represented at the workshop to understand its causes and consequences. These disciplines included physical, chemical, and biological oceanography, meteorology, fisheries biology, and resource management. (NSF, 1976).

Government agencies at all levels responded to the fish kill, and several studies were undertaken. A steering committee, composed of EPA, NOAA, the New Jersey Department of Environmental Protection (NJDEP), the American Littoral Society, and the academic community, was formed to coordinate the fish kill studies. The steering committee held seven workshops during November and December 1976 to discuss the causes and consequences of the fish kill; the committee issued its report in February 1977.*

The fish kill studies were in general agreement that one highly significant contributing factor was the massive bloom of marine algae (phytoplankton) that developed in the early spring and continued into the fall of 1976. The bloom, which was dominated by *Ceratium tripos*, occurred in the upper oceanic waters of the Bight. The bloom was characterized by an extremely large growth of phytoplankton (a tiny aquatic plant commonly known as algae). As the algae died, they sank to the bottom of the Bight; investigators found a 1-cm (0.2 in.) thick layer of dead *Ceratium* and other debris on the sea bottom throughout the affected area (NSF, 1976). By themselves, these algae do not reduce dissolved oxygen levels. However, they do provide a food source for other, oxygen-consuming aquatic organisms. The abundance of algae in the Bight waters allowed a massive bloom of oxygen-consuming organisms, causing depletion of dissolved oxygen levels in surrounding bottom waters.

Algae blooms are usually the result of nutrient enrichment of a water body. Of the five major components needed for the formation of algal cells (carbon, oxygen, hydrogen, and the nutrients nitrogen and phosphorous), all but phosphorous are readily available in the water under most circumstances. Therefore, phosphorous is said to be the *limiting factor*. Other algal components, such as trace metals or vitamins, can sometimes be the limiting factor. Even physical conditions, such as insufficient sunlight, can act as the limiting factor. In general however, it is an overabundance of phosphorous that precipitates massive algal growth.

* Several other reports have also been issued: NJDEP, July 1976; NJDEP, August 1976; NOAA-NMFS, September 1976; NJDEP, October 1976; NSF, November 1976; NJDEP, January 1977



DISSOLVED OXYGEN CONCENTRATIONS IN THE NEW YORK BIGHT DURING THE 1976 FISH KILL

SOURCE: NSF, 1976.

FIGURE 7

As shown in Table 11, about half of the phosphorous loading to the New York Bight comes from ocean dumping: 49 percent from dredged material dumping and 4 percent from sludge dumping. The other significant sources are municipal wastewater discharges (35 percent) and stormwater runoff (13 percent). The NJDEP (January 1977) breaks down the phosphorous loading somewhat differently: dredged material dumping (50 percent), sludge dumping (4 percent), municipal and industrial wastes (42 percent), and miscellaneous sources, including runoff, atmospheric fallout, and chemical wastes dumping, (4 percent). These slight differences in the estimates of the phosphorous loadings from various sources are insignificant because over-fertilization itself is the problem. As the NJDEP explains:

> No *single* discrete source of plant nutrients can be indicated as the only cause of the fertilization (or "enrichment") of the offshore waters. Further, any analysis of the possibility of reducing the amount of nutrients released into the offshore waters must be directed at *all* known sources of these nutrients. At the extreme, the complete elimination of any *single* one of these sources of nutrients would not eliminate the basic over-fertilization of the ocean waters off New Jersey. (NJDEP, January 1977).

Algal blooms and associated fish kills are not uncommon in the New York Bight. They have occurred periodically over at least the last three decades, most notably in 1968, 1971, and 1974 (NJDEP, October 1976; NOAA-NMFS, September 1976). What made the 1976 bloom unique was its areal extent and its duration.

Unusual weather conditions also contributed to the oxygen depletion in the bottom waters of the Bight. Normally, solar heating causes a gradual rise in surface water temperatures beginning in the spring. A pronounced temperature difference between surface and deeper waters (a thermocline) generally does not appear until summer (see Chapter V). However, in 1976 an abnormally high number of sunny days rapidly raised the surface water temperature and kept it elevated for an extended period of time. An extremely strong thermocline developed in early spring and persisted into October.

The thermocline, which is essentially an *impenetrable* layer, separated the upper and lower oceanic waters and prevented their mixing. Consequently, reoxygenation of the bottom waters through mixing with the oxygen-rich upper waters was impossible.

The strength of the thermocline was reinforced by a lack of storm activity:

> Many hoped that Hurricane Belle on August 10 would have dissipated the algal mass and reoxygenated the lower water layer. Data taken prior to and immediately after the hurricane indicated that some transitory relief was achieved. Oxygen levels increased in the affected area, but unfortunately this lasted for only a short period. Depleted oxygen conditions again developed within five days. (NJDEP, October 1976).

Wind systems had no disruptive effect on the thermocline either. During the fish kill, there were steady winds out of the southwest; these tended to move surface waters, but were insufficient to generate mixing of the water layers. In fact, the southwest winds may have worsened conditions by moving near-shore contaminants outward over the Bight.

As dissolved oxygen levels in the bottom waters declined, hydrogen sulfide concentrations rose. Hydrogen sulfide seems to have been at least a secondary factor in
the fish kill, as the NJDEP reports:

> Results recently available from federal laboratories suggest that there was a second potential cause of death.... When bacteria of decay use up all the oxygen in the water, they can then use naturally occuring sulfur compounds in their metabolism instead of oxygen; a bacterial by-product is the release of hydrogen sulfide (the source of the "rotten egg" odor in decaying plant or animal life, some marshes, etc.). Unfortunately, most other organisms *cannot* use sulfur to replace oxygen in their life processes. In fact, hydrogen sulfide is extremely toxic to many higher organisms, including marine species. For example, surf clams can survive for many days with low levels of dissolved oxygen, but can be quickly killed by elevated levels of hydrogen sulfide. In at least certain areas, the ocean bottom had *both* low oxygen

levels *and* elevated hydrogen sulfide, resulting in a one-two punch to any marine organisms in such a zone. (NJDEP, January 1977).

Despite all of the data that have been gathered on the fish kill, a precise explanation of its causes and consequences remains impossible. The New York Bight's physical, chemical, geological, and biological characteristics and their interrelationships are extremely complex, and past studies, though useful, do not provide the range of background data that would be needed to draw unqualified conclusions about the fish kill. The situation is further complicated by artificial influences, such as municipal wastewater discharges and ocean dumping, whose relative importance in the fish kill incident can be only roughly estimated. The NJDEP addresses this problem in its latest report on the fish kill:

> While there is controversy over the exact role of each factor that contributed to the fishkill, there is a consensus that the *present* pollution control activities alone, while important, will do little to reduce the chances of another massive fishkill. The major question then becomes: What *additional* steps should be taken to reduce the chances of another fishkill? Unfortunately, due to insufficient basic research and field monitoring of the Atlantic coastal waters, the examination of potential additional steps must be done with inadequate and incomplete data. Thus the assumptions used to reach any conclusions should be carefully specified so that the assumptions can be reviewed as new information is acquired; in this report we have attempted to identify the assumptions we used. For example, it is still uncertain whether this year's algal bloom is due to reaching a critical level in the long-term build-up of plant nutrients, or instead is an abnormal biological response of algal growth in a region with relatively constant (though high) nutrient levels. (The latter would be possible, for example, if the bloom was basically attributable to unusual physical conditions, such as plentiful sunlight to stimulate rapid algal growth.) (NJDEP, January 1977).

Although no one can say with absolute certainty what factors in what combination caused the fish kill, two conclusions can be drawn within the bounds of available information:

1. The 1976 fish kill was brought on by atypical atmospheric and hydrographic conditions in the New York Bight. These atypical conditions included an early decline in northerly winds (winter winds out of the north usually continue until April or May, but in 1976 they declined in February and March); abnormally high sea surface temperatures during the first six months of 1976; and insufficient storm activity to generate mixing of ocean waters. As a result, a thermocline developed early in the year, became progressively stronger, and eventually led to anoxic conditions in the bottom waters of the New York Bight.
2. Although the fish kill was brought on by atypical atmospheric and and hydrographic conditions, artificial influences contributed to it by enriching the Bight waters with phosphorous, allowing a massive algal bloom. The major sources of the phosphorous loading to the Bight are dredged material dumping, municipal wastewater discharges, and stormwater runoff.

Long Island Beach Closures*

In mid-May of 1976, unusually large amounts of foreign matter began washing up on Long Island beaches. As an immediate response, EPA-Region II in close cooperation with NOAA-MESA, the USCG, and state and local agencies, began sampling and testing procedures to identify the material and assess its environmental impacts. Inspections were made of the beaches, and samples of the materials and surf water were

* This discussion has been extracted from the testimony of Gerald M. Hansler, P.E., the former Regional Administrator of EPA-Region II, before a hearing of the Subcommittee on Oceanography and the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the U.S. House of Representatives Committee on Merchant Marine and Fisheries at Hempstead, Long Island, on July 24, 1976. An interagency report, prepared by NOAA-MESA, EPA-Region II, and the USCG – Third District, on this phenomenon has been published (NOAA-MESA, February 1977).

collected and analyzed. These activities were well underway when the second incident occurred in mid-June.

The investigators found that the materials on the beaches were *floatables*. Those that washed up in May were predominantly *grease/tar balls*. Those that washed up on June 14, 1976 and in subsequent weeks were grease/tar balls, plastics, rubber, charred wood, and general trash (cigarette and cigar tips, paper, bread wrappers, soda cans, vegetables, chicken heads, orange peels, and similar materials). Representatives of more than twenty federal, state, and local environmental and health agencies met to discuss the problem on June 17, 1976. They confirmed the presence of floatables on the beaches, but concluded, contrary to several press reports, that there was no evidence of raw sewage (feces) on the beaches.

For many years, there have been reports of grease/tar balls along the beaches of Long Island and New Jersey. Grease/tar balls are generally a mixture of oil and grease from petroleum and kitchen oil sources mixed with other floatable organic material and plastics. In most cases, they contain artifacts-of-life (hair, plastic straws, plastic cigar tips) and bacteria. They are usually round, and they can be up to 10 cm (4 in) in diameter.

Why such materials appear from time to time along New Jersey and Long Island coastal areas and along many other beaches throughout the world has never been fully explained. Available data, both past and present, indicate that grease/tar balls can be found in raw and inadequately treated waste discharges and may, through some mechanism, form in coastal waters. The presence of artifacts-of-life and bacteria is probably due to the drifting of oil-grease slicks over the New York Bight, and the gradual agglomeration of these materials.

A 1959 American Petroleum Institute (API) study surveyed oil pollution problems along the beaches of the Atlantic coast of the United States. The report states, "in contrast to the small flatish pieces typical of most beach pollution observed elsewhere, oil here [on beaches along the New Jersey coast] was often in roundish pellets from marble to baseball-size" (Dennis, 1959). The heaviest concentration of oil was found northward of Atlantic City to Asbury Park, New Jersey, and the average amount of oil for this stretch of coastline was 1.9 kg per 100 m (1.3 lb per 100 ft). Commenting on southern Long Island beaches, the then Assistant Superintendent of Jones Beach State Park said that problems with oil pollution dated back to 1951, when oil along the beach was heavy enough to be considered a "nuisance requiring clean-up".

The API report further indicated that wind rather than currents was the primary factor affecting the amount and distribution of grease/tar balls. This corroborates EPA and NOAA's long-standing position that the grease/tar ball problem is neither new nor unique in this area.

Plastic and rubber debris found throughout the affected beach areas during the 1976 incidents consisted mainly of tampon insertion devices, condom rings, plastic straws, balloons, disposable diaper adhesives, and plastic milk cartons. The presence of such debris on beaches has been reported in the past, but never has the quantity approached that found on Long Island's beaches in the summer of 1976. The same type of debris has been observed in New York Harbor waters and along New Jersey beaches.

Charred wood, in amounts far in excess of what might be expected from beach fires, was also found. The most probable sources of this wood were the pier fires that occurred in New York Harbor in early June.

In addition, items commonly referred to as general trash were found. Several sources were probably responsible for this material, among them New York City's solid waste barging operations in the harbor, the discharge of garbage and similar materials from recreational and commercial vessels, and beach litter resulting from recreational use of the beaches and coastal waters.

When the beach pollution on Long Island was first reported, a federal task force, composed of EPA, NOAA, the USCG, and the National Park Service, was created to determine the sources of the pollution and the reasons why it had reached Long Island's beaches.

Available data show that the incident was caused by a combination of unusual weather conditions and pollution from various sources. During the incident, the affected area was subjected to relatively strong and persistent winds from the southwest. These winds transported floatables from the New York Bight to the Long Island beaches.

According to the information collected by EPA's investigators, the major sources of the floatables were raw sewage discharges, inadequately treated wastewater discharges, combined sewer overflows, urban

runoff, and solid waste barging operations in New York Harbor. Minor contributions were made by vessel discharges, ocean dumping of sludge and dredged materials, sanitary landfill operations, and beach litter. Dredged material and sewage sludge contain predominantly non-floatable solids. Some of the lighter flocculant materials are dispersed as a turbidity cloud throughout the water column, which is over 18 m (60 ft) deep at these dump sites. The quantity of surface floatables resulting from dumping activities (conservatively estimated at less than 5 percent) is minimal compared to the quantities from inland sources. While floatables can occasionally be seen during sewage sludge dumping, such materials are continually observed in the Hudson estuary.

New York City, for example, discharges approximately 949 thousand cu m/d (250 mgd) of raw sewage into the lower Hudson estuary: about 757 thousand cu m/d (200 mgd) from western Manhattan (North River) and about 190 thousand cu m/d (50 mgd) from the Red Hook section of Brooklyn. These discharges contribute a substantial portion of the floatables, oil and grease, and bacteria that eventually find their way into the New York Bight. Inadequately treated wastewater from primary treatment facilities, many of which are located in New Jersey, release floatables and oil and grease. These floatables combine with those from other sources and move about the New York Bight with the wind.

New York City's solid waste marine transfer operations employ a fleet of sixty-three barges to move 2.8 million metric tons (3.1 million tons) of refuse annually from collection points throughout the city to the Fresh Kills landfill on Staten Island. Both EPA and the COE have noted that trash, paper, and other debris are frequently blown from the barges into the water. The city has attempted to minimize these wind-blown losses by loading wet material atop other debris. At Fresh Kills, a specially built craft is used to retrieve refuse that falls into the water during unloading operations. A screen scoop attached to the bow of this craft skims the water surface and catches the floating debris.

The day-to-day discharge of pollutants into New York Harbor and the vicinity was aggravated by three incidents in particular. On May 26, 1976, the largest of several oil spills into New York Harbor and the contiguous coastal waters occurred; approximately 1.3 million liters (350 thousand gallons) of fuel oil spilled into the Hackensack River at Jersey City, New Jersey. The USCG, using a spill forecast model developed for the area, predicted that there was a high probability of oil from such spills or from sewage discharges in New York Harbor coming ashore on Long Island beaches under certain wind conditions.

The second incident involved two pier fires that occurred in New York Harbor: one in Weehawken on June 3–6, 1976 and the other in Manhattan on June 11, 1976. These fires produced a substantial amount of charred wood, which entered the Hudson estuary. The COE made every attempt to recover the debris from the harbor waters, but most of the smaller and some of the larger pieces of wood could not be recovered. Again, conditions suggest that this charred wood finally reached the beaches of Long Island.

The third incident occurred on June 2, 1976, when two sewage sludge storage tanks of the Bay Park Sewage Treatment Plant exploded at the Pearsalls Hassock in Nassau County. About 3.8 million liters (1.0 million gallons) of sludge entered the water through the East Rockaway Channel. Initial observations suggest that within hours of the explosion a mass of this material had moved into the Atlantic Ocean. This sludge mass probably contributed to the grease/tar ball problem and, to a lesser extent, was a source of the plastic and rubber materials found on the beaches.

The presence of these materials on the beaches raised concern that the waters were unsafe for recreational bathing. Both Nassau and Suffolk counties took the precaution of closing their beaches until they were cleaned up and water quality data showed that the surf was safe for swimming. It should be emphasized that the closings were precautionary and were done at the suggestion of local health officials, pending the results of laboratory analyses of the water samples. Data showing that water quality was acceptable were received from the laboratory approximately forty-eight hours after the closings.

The EPA, along with county and local health agencies, performed sampling surveys of the surf zone to determine whether bacterial levels contravened water quality standards (which allow no more than 2,400 total coliforms per 100 ml). The EPA data for surf samples collected during June 14–29, 1976 (the peak of beach contamination) showed that in all cases the total coliform levels were well within safe swimming standards. Fecal coliform levels were very low (in all cases less than 100 organisms per 100 ml, and in most cases less than 10 organisms per 100 ml). Data collected by other agencies gave similar results.

Samples of the grease/tar balls collected by EPA, the USCG, and state agency personnel were analyzed by EPA for chemical and microbiological parameters. Petroleum hydrocarbons in the samples ranged from 57 to 100 percent. The total coliform population ranged from 170 thousand to 22 million per 100 grams of sample, and fecal coliforms ranged from 4,900 to 790 thousand per 100 grams. Two of the samples were analyzed for the presence of *Salmonella* organisms, which are pathogenic (disease causing) bacteria. None were detected. Coliform populations in the grease/tar balls were extremely high and could have represented a potential health hazard if the material had entered a cut, wound, or some orifice in the body. However, the probability of such an occurrence was considered remote, and as noted, the coliform populations in surf water samples were well within the limits established for safe swimming waters.

There was no significant health hazard attached to the presence of the rubber, wood, and other floatables found on Long Island's beaches. These materials were more of an aesthetic problem than a health problem.

CHAPTER III

ALTERNATIVES TO THE PROPOSED ACTION

Generally, sewage sludge can be either dumped in the ocean or disposed of by land-based methods. The latter constitute the only legitimate long-range solution to the New York-New Jersey metropolitan area's sludge disposal problem, and they will have to be implemented as ocean dumping is phased out. The background studies for land-based sludge disposal management in the metropolitan area were completed by ISC in 1976. The testing and implementation phases have begun. Current predictions are that land-based sludge disposal methods can be implemented in time to meet the December 31, 1981 deadline for phasing out ocean dumping of sewage sludge.

Until this full-scale, land-based sludge disposal program can be implemented, however, ocean dumping will continue to be the only practical method of disposing of the volumes of sludge produced in the metropolitan area. Within the ocean-dumping alternative, options are available with regard to where the sludge is dumped and how it is dumped. The proposed action, immediate designation and use of an alternate dump site in either the Northern or Southern Area is described in detail in Chapter IV. Chapter III discusses the other ocean-dumping alternatives and summarizes the results of the ISC studies of land-based sludge disposal methods.

OCEAN-DUMPING ALTERNATIVES

In addition to the proposed action, the ocean-dumping alternatives considered in this EIS are: 1) continued use of the existing dump site (No Action and Phased Action), 2) use of an alternate dump site other than the Northern or Southern Area, and 3) modification of dumping methods to mitigate potential marine and shoreward impacts. The phasing out of ocean dumping by the end of 1981 would not be compromised under any of these alternatives.

Continued Use of the Existing Dump Site

The No Action alternative involves continued use of the existing dump site until land-based methods of sludge disposal can be implemented. Under this alternative, the existing dump site would have to accommodate in 1981 more than one and a half times the volume of sludge dumped in 1977; moreover, the site would have to accommodate the increased volume without endangering public health or the marine environment. The primary argument for the No Action alternative is that it limits environmental impacts to the existing site rather than spreading them to another area of the marine environment.

The original argument for moving the sewage sludge dump site was that greatly increased volumes of sludge might impair the recreational quality of Long Island and New Jersey's beaches. As discussed below, current studies tend to show that this argument is largely invalid, lending support to the No Action alternative.

A variation on the No Action alternative is the Phased Action alternative, under which sewage sludge would continue to be dumped at the existing site until a comprehensive monitoring program indicated an impending hazard to public health or damage to recreational water quality. Under the phased alternative, an alternate dump site would have to be designated and held in reserve for possible future use. Since this alternative would maximize use of the existing dump site, adverse impacts on an alternate dump site would be minimized, and sludge hauling costs would not be increased unnecessarily.

This was the alternative recommended in the draft EIS. However, when the fish kill and beach closure incidents discussed in Chapter II occurred, doubts were raised about the acceptability of continuing to use the existing dump site. Studies of the fish kill and beach closure incidents found that sludge dumping was at most a minor contributing factor. Those findings were reconfirmed at a public hearing held in Toms River, New Jersey, on May 31 and June 1, 1977, to consider possible relocation of the New York and Philadelphia sewage sludge dump sites. On the basis of the evidence presented, the hearing officer recommended that neither dump site be moved.

With specific reference to sludge dumping in the New York-New Jersey metropolitan area, the hearing officer also recommended: 1) strict enforcement of existing phase-out schedules and deadlines, 2) inclusion in the sludge dumping EIS being prepared by EPA-Region II of specific criteria for determining the need for relocation of the dump site, 3) intensified monitoring of the existing dump site, and 4) immediate designation of the alternate 60-mile site (this would be the site in the Northern Area recommended in the draft EIS). The report of the Toms River hearing officer, which was issued on September 22, 1977, is presented in Appendix C.

On March 1, 1978, the EPA's Assistant Administrator for Water and Hazardous Materials issued his decision on proposals to relocate the New York and Philadelphia sewage sludge dump sites. The decision report is presented in Appendix D. In all important respects, the Assistant Administrator's decision is in agreement with the findings, conclusions, and recommendations of the Toms River hearing officer:

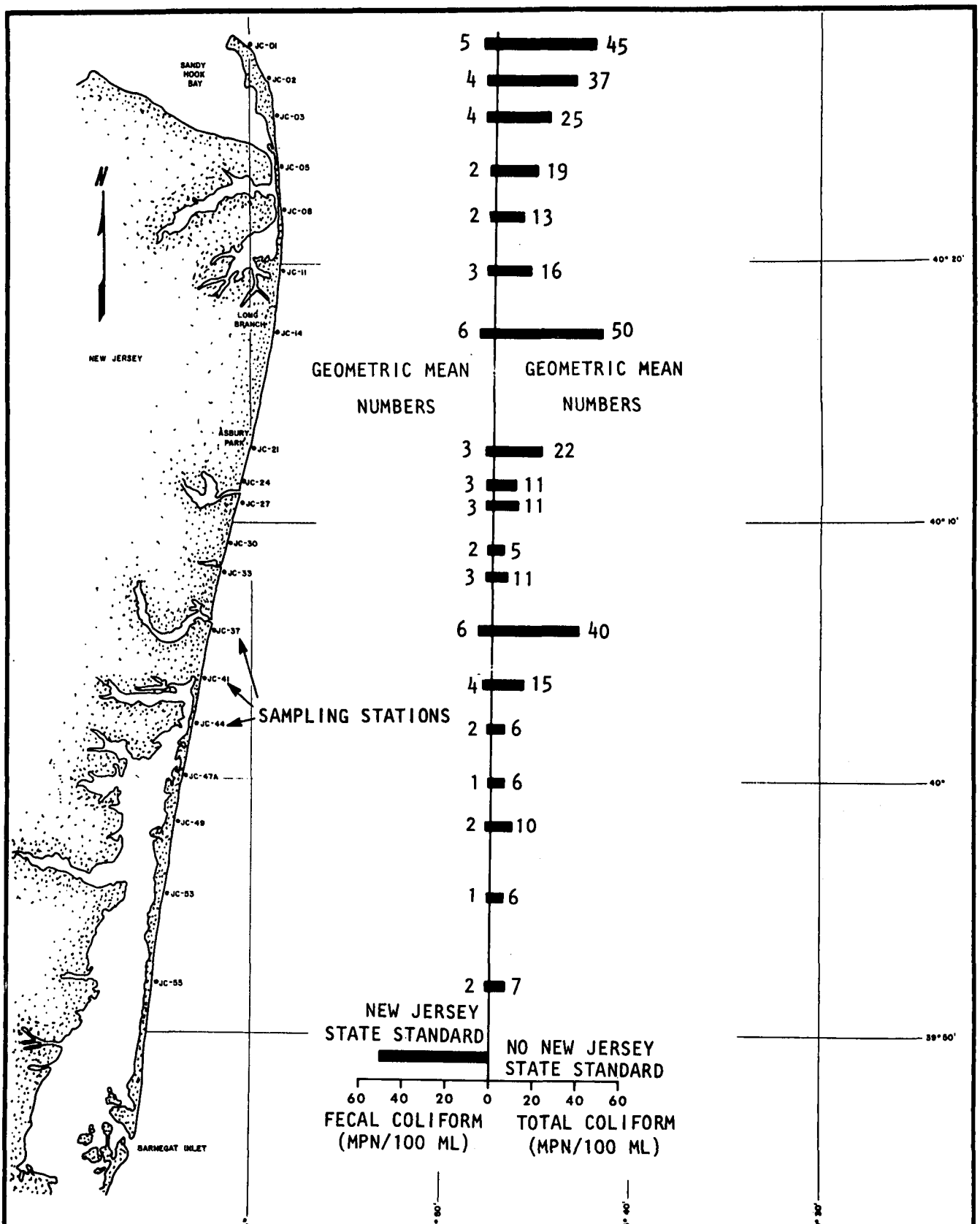
> It is my determination that sewage sludge dumping by these municipalities [in the New York-New Jersey metropolitan area] should not be relocated at the present time; however, efforts should begin immediately to designate the 60-mile site for the disposal of New York/New Jersey sewage sludge in the event such sludge cannot be dumped at the New York Bight site for public health reasons prior to December 31, 1981.

In accordance with this decision, EPA intends to designate the existing site for continued use, as well as the 60-mile site in the Northern Area for possible future use. An intensified monitoring program has already been implemented; it is described in detail in the Monitoring and Surveillance section of Chapter XI. Criteria that can be used to determine whether public health reasons require moving sludge dumping operations from the existing to the alternate site at any time between now and December 31, 1981 have been drawn up by EPA-Region II, and are presented in Appendix E. Finally, a Regional Enforcement Strategy, designed to insure that ocean dumping of sewage sludge is replaced by environmentally acceptable land-based disposal methods by the legislatively mandated deadline of December 31, 1981, has been developed by EPA-Region II, and is presented in Appendix F.

EPA Monitoring Studies. In April 1974, EPA initiated a program to investigate the quality of the water and bottom sediments in the New York Bight and along the Long Island and New Jersey beaches (USEPA, July 1974, April 1975). Data from the surf and near-shore waters indicate that water quality remains excellent in terms of total and fecal coliform density, and that it is acceptable for contact recreation (Figures 8 and 9). Although the data show a few random elevated coliform counts, no violation of state standards is indicated nor does there appear to be any systematic degradation of water quality. Sediment data indicate slightly elevated bacterial counts at certain near-shore sampling stations, but these can be attributed to inland runoff or to wastewater outfalls.

Sampling is continuing along transects between the existing dump site and the following points: the Long Island shore, the entrance to New York Harbor, and the New Jersey shore. Results to date indicate that a clean water and sediment zone, about 10 to 11 km (5.5 to 6 n mi) wide, separates the area affected by sludge from the Long Island coast. As a supplement to the sampling program, EPA has expanded the monitoring and review process to insure protection of public health and welfare and prevention of coastal water quality degradation (see the Monitoring and Surveillance section of Chapter XI).

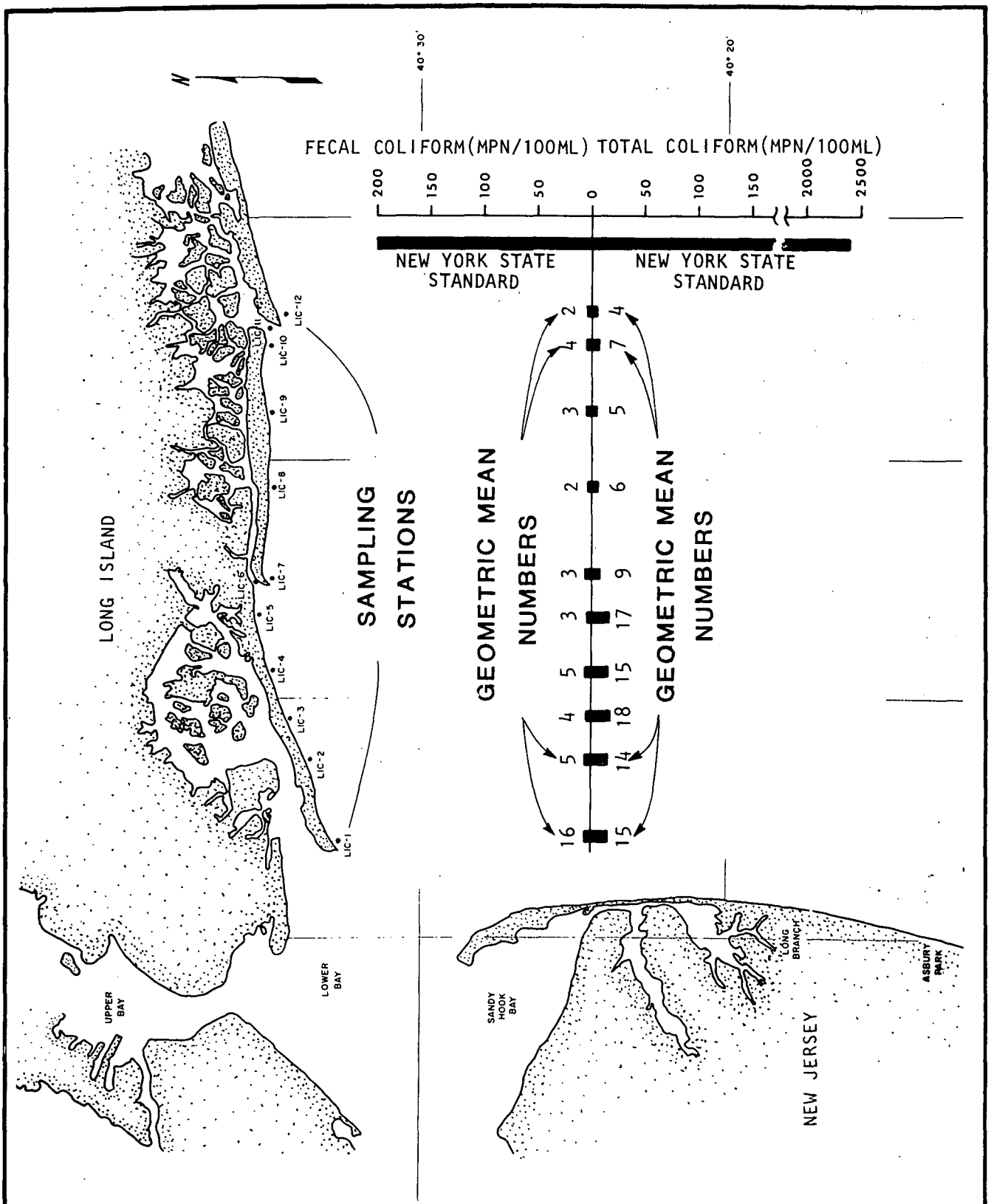
NOAA-MESA Studies. On the basis of two comprehensive reports prepared by NOAA-MESA (March 1975, February 1976), there seems to be no significant accumulation of sewage sludge at the existing dump site, although some sludge particles may be mixing with natural fines in the Christiansen Basin, northwest of



COLIFORMS IN NEW JERSEY COASTAL WATERS

SOURCE: USEPA, APRIL 1975.

FIGURE 8



COLIFORMS IN LONG ISLAND COASTAL WATERS

10 0 10 20 KILOMETERS

10 0 10 20 STATUTE MILES

10 0 10 20 NAUTICAL MILES

SOURCE: USEPA, APRIL 1975.

FIGURE 9

the site. Both reports also note that the general ecological effects of sewage sludge dumping are indistinguishable from those associated with other sources of pollutants in the Bight Apex (the dumping of dredged material and acid wastes, contaminants from the plume of the Hudson estuary, shore-zone pollutant contributions, and atmospheric fallout of contaminants).

However; sludge dumping does exert significant local effects. The catch of groundfish appears to be reduced in areas with high-carbon sediments, such as the area of the existing sludge dump site. Furthermore, it is apparent that very few surf clams reach commercial size within the area now impacted by sludge dumping. Although some fish in the Bight Apex are afflicted with fin rot, this disease is not thought to be attributable solely or even primarily to sludge dumping.

The NOAA-MESA reports do not indicate any shoreward movement of coliform contamination as a result of sludge dumping at the existing site, but they do note the apparent persistence of coliform bacteria in the vicinity, especially in bottom sediments. There is no evidence that under current FDA regulations the cessation of sewage sludge dumping at the existing site would permit reopening of the immediate area to shellfishing. The complete text of NOAA-MESA's conclusions and recommendations from the February 1976 report is presented in Appendix G.

At the Toms River hearing in 1977, NOAA concurred with EPA's recommendation of continued use of the existing dump site based on the fact that there is no demonstrated need for relocation (see Appendix C).

Related Studies. The most recent study of the area (Mueller *et al.*, 1976) indicates that sludge dumping accounts for 0.04 to 11 percent, at most, of the total pollutant loading in the Bight Apex; pollutant loadings from non-dumping sources (wastewater discharges, runoff, and atmospheric fallout) far outweigh those from all current ocean-dumping sources (sewage sludge, dredged material, acid wastes, and cellar dirt).

A study by the Town of Hempstead (1974) supports the conclusion that sewage sludge dumped at the existing site does not significantly affect the quality of the waters or beaches of Long Island.

Use of an Alternate Dump Site Other Than the Northern or Southern Area

Besides the Northern and Southern Areas, possible locations for an alternate sewage sludge dump site include: the other existing dump sites in the Bight Apex (the dredged material, acid wastes, cellar dirt, and wreck sites); other areas in the New York Bight; and areas off the continental shelf, notably the chemical wastes dump site. These locations are discussed below.

Other Existing Dump Sites in the Bight Apex. Dumping sewage sludge at one of the other existing sites in the Bight Apex (the dredged material, acid wastes, cellar dirt, or wreck site) would violate the original concept of segregating wastes by dump site. It would be extremely difficult to isolate the true cause of adverse environmental effects at a site where two or more types of wastes were dumped. The end result would probably be several seriously contaminated dump sites in the Bight Apex, instead of the two that now exist (the sewage sludge and dredged material sites). Use of the existing dredged material site for sludge dumping would be particularly ill-advised because the site is only about 9 km (5 n mi) from the New Jersey shore; the existing sludge dump site is about 20 km (11 n mi) offshore.

Other Areas in the New York Bight. Solely in terms of minimizing potential environmental impacts, a site located offshore, 148 to 158 km (80 to 85 n mi) from the Sandy Hook-Rockaway Point transect, and within the depression of the Long Island Shelf Valley, about 80 m (264 ft) deep, would be preferable. In this area, the tendency is towards bottom transport off the continental shelf, which would minimize the potential for sludge transport to adjacent biological resource areas, including the Hudson Shelf Valley and near-shore shellfisheries. In addition, the greater depth would provide maximum dilution and dispersion of the sludge, minimizing any adverse effects.

The one major drawback to use of this area is that it is beyond the maximum 120 km (65 n mi) range of the existing barge fleet. It would be difficult to justify the greatly increased costs of transportation and possible fleet capitalization in terms of concomitant benefits. Benefits to public health would not increase proportionally with distance. Both the Northern and Southern Areas appear to be far enough from the Long

Island and New Jersey coasts, and in deep enough water, to minimize potential impacts on public health and marine life.

Areas Off the Continental Shelf. In the draft EIS, the alternative of dumping sewage sludge in areas off the continental shelf, such as at the existing chemical wastes dump site, was quickly dismissed because of the prohibitive transportation costs and because of the unknown effects of dumping sewage sludge in those waters. Developments since that time, the 1976 fish kill and beach closure incidents (see Chapter II) and the 1977 public hearing on possible relocation of sludge dump sites (see Appendices C and D), have indicated the need for a more extensive evaluation of this alternative.

The decision report issued by EPA-Headquarters on proposals to relocate the New York and Philadelphia sewage sludge dump sites specifies six major factors that must be considered in determining the feasibility of using an off-the-shelf site for sewage sludge disposal: known environmental acceptability, ability to monitor impact, surveillance of dumping activities, economic burden, logistics, and the effect of utilizing such a site on the ability of dumpers to meet the December 31, 1981 deadline for the termination of harmful sewage sludge dumping (Appendix D). Briefly, the chemical wastes site does not appear favorable on any of these six counts. The environmental acceptability of dumping sewage sludge there is unknown, and scientific opinion by and large recommends against use of this site for sludge dumping. Monitoring and surveillance capabilities are substantially reduced, primarily because of the great distance to the chemical wastes site. Distance is also the primary factor in making the chemical wastes site economically and logistically disadvantageous. The prohibitive cost in turn diminishes the ability of dumpers to meet the 1981 deadline by diverting the available economic resources from the development of acceptable land-based disposal methods. Each of these factors is explored in more detail below.

Environmental Acceptability – Although the MPRSA recommends that the dumping of wastes be done in areas off the continental shelf, *wherever feasible*, the limited information available on this area suggests otherwise. At a 1971 ocean disposal conference, cosponsored by the Woods Hole Oceanographic Institution (WHOI) and the COE, the panel on biological effects stated:

> Disposal should not occur in the deep sea, i.e. beyond the continental shelf. A fundamental reason for this suggestion is the following. The deep sea is an area where biological decomposition rates are apparently very low in comparison with other ocean regions. It is an area of great constancy with respect to the physical-chemical environment and it is thought that the fauna living there is finely tuned to small environmental changes. Thus, the fauna may be quite susceptible to large environmental perturbations such as might be expected with the introduction of dredge spoils. If deleterious effects occur in the deep sea, the opportunities to alter the course of events is [sic] minimal. We therefore suggest that the deep sea should be off limits for disposal activities at least until other information is brought to bear which would render the possible dangers non-existent. (WHOI, 1971).

A similar view was expressed at a 1974 workshop at Woods Hole, sponsored by the National Academy of Sciences (NAS):

> Data for the evaluation of the deep sea as a disposal site are inadequate. This is due to: difficulties in conducting bioassays; slow rates of mixing and diffusion potentially resulting in anaerobic conditions; slow organic degradation; and narrow tolerance ranges for sensitive assemblages of organisms. Although the area is relatively stable in comparison to the shelf and nearshore, the much greater scientific uncertainty, and consequently increased risk associated with off-shelf disposal, dictate that any but the most innocuous use of the area should be approached with extreme caution. (NAS, 1976).

In 1974, NOAA, in cooperation with EPA and with several academic/research institutions, began gathering background information on conditions at the chemical wastes site. Three baseline survey cruises (1974, 1975, and 1976) and several field studies (February, June, August, and September 1976; July 1977; and February and April 1978) have been conducted. A report on the baseline survey cruises has been published (NOAA, June 1977); the Introduction and Summary from that report, which deals with the chemical wastes

site's physical, biological, and chemical characteristics and its contaminant inputs, are presented in Appendix H.

The chemical wastes site has been in use since 1965. Therefore, at the time of NOAA's first baseline survey cruise, the site had been in use for about nine years, making it impossible for NOAA to obtain a pure pre-dumping baseline. Most of the data gathered by NOAA concern chemical wastes dumping by American Cyanamid and by DuPont's Grasselli Plant since these two companies accounted for 80 percent of the total volume of material dumped at the chemical wastes site. The applicability of these data to an assessment of sewage sludge dumping at the chemical wastes site is limited because particulate sewage sludge bears little resemblance to dissolved chemical wastes.

After EPA authorized the dumping of sewage sludge from Camden, New Jersey, at the chemical wastes site in early 1977, NOAA began making plans to study the possible effects. That opportunity to study the possible effects of sewage sludge dumping at the chemical wastes site ended on June 12, 1978, when Camden terminated its ocean dumping operations, a few days short of the expiration of its permit. Camden now disposes of its sludge through a composting process that is described later in this chapter (see the section on Land-Based Alternatives).

While Camden was using the chemical wastes site, NOAA conducted a coliform test and a tracking study. Although data collection and analysis are in a preliminary stage, some information on sludge dumping at the chemical wastes site has been furnished by NOAA.

In June 1977, researchers from WHOI collected samples of seawater during, and for some time after, the release of primary sewage sludge from Camden, New Jersey. The samples were tested for the presence of total and fecal coliform bacteria:

> Positive results were limited to the first hour of surface sampling from within the plume area. Regarding total coliforms, 75 percent of the samples collected proved positive and gave a most probable number range of 1–240 total cells per 100 ml. Measurements on these same samples for fecal coliforms were positive at the 25 percent level and provided a range of 1–120 cells per 100 ml.
>
> No positive results from either test were obtained from any of the subsurface samples. Possibly these results might have differed given the opportunity for continuous sampling over the entire plume. However, the necessary gear was not available at this time and we had to rely on a stationary ship to acquire water samples from beneath the surface.
>
> There are strong indications that the bacterial population associated with sewage sludge is rapidly dispersed by the turbulence and sinking associated with sludge release. Most of the bacterial load appears to remain associated with solid material which rapidly descends to the deeper portions of the water column where a positive sampling becomes highly dubious. (Vaccaro and Dennet, 1977).

In July 1977, sewage sludge released at the chemical wastes site was acoustically monitored to determine its qualitative dispersion characteristics. Preliminary results of the tracking study show a slow, wide distribution of the waste material:

> A sharp thermal gradient (≥1°C/m) existed between 18 and 24 m. The waste field on either side of the dump axis was observed to be distributed through the first 18 m of the water column. On the dump axis, the waste was observed to penetrate to a depth of 60 m. The deeper penetration was of limited horizontal extent, conical in shape (apex at the point of deepest penetration), and was distributed continuously from near the surface to the 60 m depth. The heaviest particle concentration appeared to be in the first 40 m of the water column. A shear with a velocity maximum between 15 and 20 m advected the waste field in the horizontal. Thus, the waste was slowly distributed over an increasing area as material sank from the mixed layer to the seasonal thermocline. During the 32 hr experimental period, the particle field became distributed over the first 45 m of the water column. The distribution was not uniform. Heavy concentrations of backscattering, hence particles were found to be associated with one or two strong thermal gradients [sic]. The thickness of the heavy scattering areas ranged from 5 to 10 m. The layers were periodically displaced by as much as 15 m by the internal wave field. The horizontal distribution of the waste field will be determined as our data reduction progresses. The column of material which penetrated to 60 m was observed several hours after the dump. There appeared to be little change in its depth of penetration or size. (Orr, unpub.).

Although increased dilution and dispersion are generally considered to be positive aspects of dumping in deeper waters, there are serious drawbacks as well. In testimony at the Toms River hearing in 1977, Dr. Carol Litchfield, a marine microbiologist, cautioned that moving the dump site to deeper waters would significantly increase the time required for sludge decomposition:

> The very factor which is appealing to many people in moving and relocation of the dump site in the deeper waters is the very factor which is going to assure that there will be a longer residence time of the sludge and a greater accumulation of the material that is dumped.
>
> Another concern...is what happens to the organisms that are introduced along with the sewage sludge.
>
> Unfortunately, there is very little information on the survival of coliforms in deeper waters.
>
> It has been repeatedly shown, however, that decreased temperatures aid the survival of coliform bacteria in the increased salinities and slightly increased pressures that they would encounter at the deeper dump site, therefore, automatically assuming that deeper waters will "take care of" potential pathogens more efficiently than that which occurs at the present location, could lead to a very false sense of security.
>
> In summary, based solely upon the scientific data available through numerous other studies we know that only about ten percent of the problem would be relieved by moving of the dump site.
>
> This would probably have little positive effect on decreasing the survival of potentially pathogenic micro-organisms, and would definitely result in slower decomposition, and hence, greater accumulation of the dumped organic matters. (in USEPA, June 1, 1977; see also Appendix C).

Another point that must be considered is the unknown consequences of dumping sewage sludge and chemical wastes at the same site. As previously mentioned, combining different types of wastes at one dump site makes it extremely difficult to isolate the true cause of any adverse environmental effects. This would be an especially difficult problem at the chemical wastes site because the effects of chemical wastes dumping alone are not yet well understood:

> The chemical behavior of the substances discharged at DWD-106 [the chemical wastes site] and their impact on the marine environment are unknown. A research group consisting of investigators from Woods Hole Oceanographic Institution, University of Rhode Island, National Marine Fisheries Service, and the Smithsonian Institution have developed a multidisciplinary oceanographic study at DWD-106 to consider the physical, biological, and chemical factors associated with dumping of chemical wastes. The primary chemical questions to be considered in this program are:
>
> 1. Does the discharge of wastes at DWD-106 produce elevated concentrations of potentially toxic metals in the seawater?
> 2. What are the horizontal and vertical extents of chemical impact at the dumpsite?
> 3. What are the chemical forms of metals which may be toxic to marine organisms?
> 4. To what extent are the metals discharged at DWD-106 taken up by organisms, suspended particles, and seafloor sediments?
>
> Answers to these questions will provide a basis for evaluating the consequences of chemical waste disposal at DWD-106 and for designing a future monitoring program to assure that this ocean dumping does not materially degrade the quality of the marine environment. (Hausknecht and Kester, December 1976).

Despite the limited information available on the chemical wastes site, it has been suggested as an alternate sewage sludge dump site. The hope of avoiding a recurrence of the fish kill and beach closure incidents discussed in Chapter II is the reason most often cited for this suggested move. However, as reported in Chapter II, results of the studies of the fish kill and beach closures have shown that both incidents were basically the result of atypical atmospheric and hydrographic conditions, and that sludge dumping was at most a minor contributing factor. Therefore, moving the sludge dumping operations to the chemical wastes site would have no value as a preventive measure.

During its investigation of the fish kill and beach closures, EPA-Region II sought the opinion of other federal and state agencies about the relationship of sludge dumping to these incidents. Specifically, EPA-Region II asked NOAA, the USCG, FDA, ISC, the Fish and Wildlife Service, the New York State Department

of Environmental Conservation (NYSDEC), and NJDEP whether they thought sludge dumping was responsible for the incidents and whether they would recommend relocation of the dump site:

> In that during this past spring and summer, there have been several environmental episodes, mainly the wash-up of floatables and trash on Long Island and New Jersey beaches, an extensive kill of benthic organisms in the New York Bight, and considerable press and political pressure to associate dumping practices as a direct cause of these episodes, we would appreciate your comments regarding the following:
>
> 1. Does your Agency believe that dumping is the direct cause of these episodes? If so, do you have any technical evidence to support this claim?
> 2. Do you maintain, as you have indicated in the past, the position that sludge dumping at the existing site should be continued? If not, what would be your position on moving to either of the two sites studied by NOAA and located roughly 60 miles offshore? What would be your opinion of moving the dump site off the Continental Shelf to the present chemical wastes site? If you believe that the dump site, on the basis of the recent incidents, should be relocated, what environmental factors do you consider appropriate in that decision? (See Appendix I.)

In general, there was a lack of enthusiasm for any move from the existing dump site. Only one agency, NJDEP, favored relocation; it recommended a gradual shift to the chemical wastes dump site, but only after a thorough evaluation of the potential impacts in accordance with NEPA. Copies of the individual responses can be found in Appendix I.

At the Toms River hearing in 1977, NJDEP restated its recommendation for a gradual shift to the chemical wastes site after a thorough environmental assessment of the consequences. At the same time, NOAA slightly modified its position. In general, NOAA continues to strongly recommend against any move from the existing dump site based on the fact that there is no demonstrated need for such a move. Nevertheless, if an alternate site must be chosen, NOAA would prefer the chemical wastes site to a site in either the Northern or Southern Area. However, NOAA's acceptance of the chemical wastes site as an alternate sludge dump site is conditioned on the demonstration that "the net adverse environmental effects are (or are likely to be) less as a result of dumping the material at DWD-106 [the chemical wastes site] than at the original dump site." (in USEPA, May 31, 1977).

After reviewing all of the testimony submitted at the Toms River hearing in 1977, the hearing officer briefly recounted the reasons why sludge dumping at the chemical wastes site would be environmentally unacceptable:

> The preponderance of informed scientific opinion urges extreme caution in dumping wastes in the deep ocean, particularly wastes containing solid materials, because of the many unknowns about this part of the environment. There is a strong feeling among marine scientists that it would be possible to start long-range trends which would be undetectable until it was too late to take corrective measures.
>
> Specific concerns with the dumping of sewage sludge in the deep ocean are the possible persistence of pathogens for long periods of time, the accumulation of biodegradable materials which could ultimately float up undecayed to contaminate seas and beaches, the development of anaerobic deep sea environments, and the damage to deep sea organisms which are used to extremely stable conditions.
>
> Based on this informed scientific opinion, it is concluded that dumping of sewage sludge at the 106-mile site [the chemical wastes site] has a potential for irreversible, long-range, and therefore unreasonable degradation of the marine environment, and that the use of this site for this purpose would be contrary to the intent of the Act [the MPRSA] and the Convention [the International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter]. (See Appendix C.)

Monitoring and Surveillance – Although precise information is not available, indications are that both monitoring and surveillance of sewage sludge dumping at the chemical wastes site would be more difficult, far more expensive, and perhaps less reliable than at the existing site. As NOAA observed in its baseline

survey report on the chemical wastes site, monitoring is far more complicated at off-the-shelf sites:

> The environmental effects of disposal in deeper waters are...more difficult to measure and, hence, to predict. This is due to factors such as greater depths of water and distances from shore and also to the general paucity of environmental and biological information in off-the-shelf areas. In the case of DWD-106 [the chemical wastes site] this situation is further complicated by the interactions of major water masses, Shelf Water, Slope Water, and Gulf Stream eddies. The DWD-106 is a complex oceanographic area in which to assess natural environmental conditions and the impact of man's activities upon those conditions (NOAA, June 1977; see Appendix H).

In testimony at the Toms River hearing, Kenneth Kamlet, representing the National Wildlife Federation, expressed serious doubts about the feasibility of monitoring sludge dumping operations at the chemical wastes site:

> Relocation of sludge dumping to the 106-site [the chemical wastes site] would essentially deny the opportunity to monitor the situation and render it vitually impossible to alter the course of events should corrective action be necessary.
>
> This is a frequently cited concern. For example, at the EPA workshop on "Evaluation of Ocean Dumping Criteria" convened at Airlie House, August 31 – September 1, 1973, a group chaired by Dr. Edward D. Goldberg, and including among others, Drs. Dean F. Bumpus, Gilbert T. Rowe, and David Menzel, concluded that, although off-Shelf dumpsite locations "would be amenable to mixing of liquids, it is not possible to predict the effect and fate of solids at great depths and it would be difficult to monitor their effects." Dr. Holger Jannasch has pointed out that "the feasibility of short-term studies (on deep-sea biodegradation) is very limited," and that, for this and other reasons, "it will probably be difficult or impossible "to show" — not because there will be no harm..." (but because) (s)cientific evidence for or against such an effect will be very difficult to obtain" (in USEPA, May 31, 1977).

In connection with the Toms River hearing, NOAA was asked by the hearing officer to provide information on the feasibility of developing a program to monitor the effects of sludge dumping at the chemical wastes site. In reply, NOAA stated that such a program would be possible but also very expensive:

> The techniques required for a monitoring program are available. It is, however, more time-consuming and thus more expensive to monitor a site which is 100 miles from shore and 2,000 meters deep than one which is nearshore and shallow.
>
> An effective monitoring program would be built upon our existing knowledge. Initial work directed specifically at sewage sludge would be to define the volume of water through which the sludge settles, the area of the bottom accepting the waste, the rate of water renewal, and rates of deep-sea sludge oxidation. The effects of sludge on deep-sea biota would be addressed through field sampling and by application of specialized techniques for observation at low temperature and high pressure.
>
> It is estimated that such a program would require about $2.5 million for each of its first two years and, thereafter, about $1.0 million per annum (Martineau, October 11, 1977).

After evaluating all of the information presented at the Toms River hearing, the hearing Officer concluded that it would not be feasible to design an effective monitoring program for sewage sludge dumping at the chemical wastes site (see Appendix C).

Similar problems arise in terms of surveillance at the chemical wastes site. As previously reported, the USCG has responsibility under the MPRSA for surveillance and other appropriate enforcement activity with regard to ocean dumping, and the USCG – Third District is responsible for surveillance of ocean dumping in the New York Bight.

At the Toms River hearing, Commander Mullen, representing the Third Coast Guard District, testified about the difficulties of conducting a thorough surveillance program if sludge dumping is moved from the existing site to either the 60-mile site or the chemical wastes site:

Surveillance of sewage sludge disposal operations at the New York Bight Site (11-mile site) is conducted by four Coast Guard vessels which are of the 82 foot and 95 foot classes. These are relatively small vessels.

An average of four vessel patrols per week are conducted at this site. The patrols occur both daytime and nighttime and are intended primarily to detect and to deter dumping outside of the dumpsites, although other EPA requirements, affecting rate of discharge, discharge of floatables, and so forth are also monitored.

In addition, a daily schedule of multi-mission helicopter patrols by Coast Guard Air Station Brooklyn is also conducted which in part, monitor the same activities.... [The helicopters used in this program] are of the type HH-52A, with an operational limitation of approximately 25 miles from shore.

Surveillance at the Industrial Waste Site [the chemical wastes site] is conducted by shiprider.

Currently, five petty officers at New York and two at Philadelphia are involved. It should be noted at this point that the departure times of the vessels and barges are subject to substantial changes as a result of mechanical failures or weather and tidal conditions.

As a result, shipriders are often tied up for considerable periods of time awaiting departure for a particular disposal trip.

Considerable time is also involved in transporting the shiprider to the barge, which requires a vehicle and an additional man.

Coast Guard National Policy is to provide 75% surveillance of toxic chemical dumps which are disposed of at the Industrial Waste Site. With regard to surveillance of sewage sludge and other material ocean dumped, Coast Guard policy is to provide 10% surveillance.

Now let us consider the feasibility of surveillance at each of the alternative sewage sludge disposal sites.

As I mentioned earlier, surveillance at the 106-mile site [the chemical wastes site] is conducted entirely by shipriders. Disposal of all the area's sewage sludge at the 106-mile site would cause a dramatic increase in the number of dumps occurring there.

In order to provide the 10% level of surveillance presently maintained over sewage sludge, Coast Guard shipriders would have to be utilized for these additional missions.

This would require the allocation of new personnel at the Captain of the Port offices and extensive use of reserve petty officers.

The use of reserve petty officers as shipriders is a concept that has recently been tested by the Captain of the Port, Philadelphia. Some of the problems encountered included a lack of expertise with all types of navigational equipment.

The reservists generally have to be provided with refresher training in the use of Loran A, Omega, dead reckoning etc. Delays in vessel and barge departures due to weather and mechanical failure caused the reservist to spend considerable time in stand-by status.

This tends to be a serious problem in terms of manpower utilization due to the short active duty period of each reservist.

Helicopters would have the capacity to check vessels in transit to the 106-mile site, but surveillance at the dump site is beyond the capabilities of the shore based HH052A [sic].

In the near future, we hope to implement an automated ocean dumping surveillance system.

This system is presently being field tested. Such a system would greatly facilitate our ability to monitor dumps at any of the dump sites far offshore.

It is anticipated that regulations requiring installation of ODSS will be issued within six months.

Three modes of surveillance are being considered for the 60-mile site [in the Northern or Southern Area], should sludge dumping be moved there. Shipriders could be utilized as at the Industrial Waste Site and essentially the same problems would be encountered.

Although the time required to complete a mission would be less, the departure delays and time required to transport the shiprider to and from the vessel would still exist.

In considering use of the 95 and 82 foot patrol boats for surveillance at the 60-mile site, new problems arise that do not exist for surveillance at the present sludge dump.

The 82 and 95 foot class vessels are ill adapted to cruising during rough waters encountered on the high seas.

Larger class vessels have been committed to offshore fisheries patrol and are fully utilized while assigned to that program. While the possibility exists that the larger vessels used on fisheries patrol could occasionally pass in the vicinity of the 60-mile dump site, it is unlikely that the frequency of this happening could result in an effective surveillance program.

The proximity of the 11-mile site [the existing sewage sludge dump site] to Groups Sandy Hook and Rockaway allows for easy access to the site and keeps the 82 and 95 foot patrol boats "close to home" in an excellent position to respond to other missions most importantly search and rescue.

It is important to note, that the 82 and 95 foot patrol boats are the primary SAR [search and rescue] boats for Coast Guard Surveillance goal of 10% [sic].

As mentioned earlier, Coast Guard safety policy is to utilize the HH-52A helicopter up to 25 miles from shore.

The proposed 60-mile site is 33 miles from Long Island, 8 miles beyond the aircraft's normal range. In other words, the HH-52As could be used for occasional surveillance of barges and vessels in transit to the 60-mile site, but actual surveillance of disposal operations at the site would by necessity be limited.

The Automated Ocean Dumping Surveillance System (ODSS) once available, would provide an additional alternative to monitoring at the 60 mile site.

In conclusion, the resulting surveillance programs for sewage sludge dumped at either the 60 mile site or the 106 mile mile site would not be as effective as they are presently, unless sufficient lead time were available to acquire additional shipriders, or unless implementation of the automated ocean dumping surveillance system were to first take place.

In the interim period, while attempts are being made to obtain additional resources, it is recommended that a requirement be added to all permits issued for the 60 or 106 mile site for daytime and nighttime that the master of the ocean dumping vessel prepare at the time of occurrence a navigational overlay of the dumping vessel's trackline during the dumping operation, indicating the times and positions at entry and exit of dumpsite and beginning and end of dump.

It is our intention to make every effort to acquire the needed extra persons as soon as any decision is made to move the sludge site, but the extent of lead time needed to actually obtain the needed resources is not known at this time (in USEPA, May 31, 1977).

In summary, Commander Mullen's assessment was that there would be no insurmountable technological problems associated with providing the standard 10 percent surveillance of sewage sludge dumping, at the chemical wastes site. However, until the electronic surveillance device being tested by the USCG is approved and installed on vessels engaged in ocean dumping, an effective surveillance program would be economically and logistically burdensome, requiring substantial increases in equipment and personnel as well as the lead time to acquire the needed equipment and to adequately train Coast Guard reservists in its use.

In his report on the Toms River hearing, the hearing officer acknowledged the difficulties pointed out by Commander Mullen, but concluded, "there is no indication that surveillance of dumping at the 106-mile site [the chemical wastes site] would not be feasible" (see Appendix C).

Logistics and Economics – Even if there were enough data to determine the potential effects on the marine environment of dumping sewage sludge at the chemical wastes site, and even if those effects were found to be acceptable, the logistical and economic drawbacks associated with the distance to the chemical wastes site would probably preclude this alternative. At its closest point, the chemical wastes site is 210 km (115 n mi) from the Sandy Hook-Rockaway Point transect. The limitations of the existing fleet are such that a maximum distance of 120 km (65 n mi) was made one of the criteria for selecting an alternate sewage sludge dump site. Transporting sludge to the chemical wastes site or to some other area off the continental shelf would necessitate upgrading and expansion of the existing fleet.

As shown in Table 7, only twelve vessels are actually in use in the New York Bight, and one of those, the barge *Westco I*, is not seaworthy for use beyond the existing sludge dump site. This reduces the total fleet to eleven and the total carrying capacity to 41,374 cu m (54,112 cu yd) or about 91 percent of the carrying capacity of the full thirteen-vessel fleet.

At an average speed of 13 km/hr (7 knots), a tanker would take approximately 54 hours to make a round trip to the chemical wastes site (see Table 29). At an average speed of 9 km/hr (5 knots), a barge would take approximately 72 hours. These time estimates include 10 hours per trip for docking and loading and 5 hours per trip for discharging the sludge. The 5-hour discharge limitation was imposed by the USCG for safety reasons at the existing dump site. It is used here to facilitate time comparisons between the existing dump site and the chemical wastes site. If the chemical wastes site were actually to be used, the time required for discharge would be substantially greater because the USCG safety limit would not apply and the discharge rate would have to be established in accordance with section 227.8 of the current ocean dumping regulations (see Appendix B). Thus, the round trip time to the chemical wastes site would be 54 hours plus

for a tanker and 72 hours plus for a barge. A round trip to the existing sewage sludge dump site takes about 26 hours for a tanker and 30 hours for a barge.

Given the time constraints associated with the chemical wastes site and assuming that necessary overhauls would put each vessel out of service for about one month per year, the maximum number of annual trips to the site would be 147 for each tanker and 111 for each barge. It is most unlikely that the maximum number of trips could actually be made, however, because this would require that each vessel be in round-the-clock service for the other eleven months of the year.

Even if optimum conditions prevailed, the total volume of sludge that could be transported to the chemical wastes site by the available eleven-vessel fleet (six tankers and five barges) would be 5.0 million cu m (6.6 million cu yd) per year. Almost 4.0 million cu m (5.3 million cu yd) of sludge were dumped at the existing site in 1977, and over 6.0 million cu m (7.9 million cu yd) are projected to be dumped in 1978 (see Tables 6 and 9).

The situation could be improved somewhat by the addition of the *Liquid Waste No. 1*, which is now in use in Puerto Rico. This would bring the number of vessels to twelve (six tankers and six barges) and the total hauling capacity to about 5.3 million cu m (7.0 million cu yd) per year. However, since this volume will probably be surpassed in 1978, fleet augmentation cannot be avoided if a site off the continental shelf is chosen for sludge dumping.

The sludge dumping fleet could be enlarged either by hiring or by constructing the needed vessels. Both of these options would be prohibitively expensive, and the latter would also be infeasible considering the time required to construct the needed vessels and the scheduled phase out of ocean dumping in 1981.

Expanding the fleet of dumping vessels and increasing the travel time for each vessel in order to make use of the chemical wastes site would dramatically raise the cost of sludge dumping for those municipalities that now hold ocean dumping permits (see Table 6):

Dump Site	Cost per Wet Ton	Cost per cu m	Cost per cu yd
Existing	$1.25	$1.95	$1.47
Northern or Southern Area	4.00 to 5.00	6.30 to 7.80	4.70 to 5.90
Chemical Wastes	8.00 to 10.00	12.50 to 15.60	9.40 to 11.80

Thus, the cost of using the chemical wastes site would be twice the cost of using a dump site in the Northern or Southern Area, and six to eight times the cost of continuing to use the existing sewage sludge dump site. Had the chemical wastes site been used for sludge dumping in 1977, it would have cost the municipal permittees somewhere between $49.0 million and $61.0 million instead of the $7.6 million that it cost to use the existing site. By 1981, use of the chemical wastes site for sludge dumping would cost the municipal permittees somewhere between $124.0 million and $154.0 million. The cost to New York City alone could be as much as $64.0 million; currently, sewage sludge dumping at the existing site costs the city $2.2 million per year (Samowitz, June 14, 1977).

Other costs would rise as well, including the cost of monitoring the dump site and the cost of the USCG's surveillance operations.

Its dubious environmental acceptability and its extreme cost are the major but not the only drawbacks to dumping sewage sludge at the chemical wastes site. Greater navigation hazards would result from the dumping vessels' increased travel time on the open ocean. Short dumping, including emergency dumping, would almost certainly increase. Added to this is the fact that using the chemical wastes site for sludge dumping would be of negligible benefit to the water quality of the Bight Apex. Of all of the pollutant sources in the Bight Apex, sludge dumping is hardly the most significant, and its removal to the chemical wastes site could not by itself effect a substantial change in water quality.

Effect of Using the Chemical Wastes Site on the Ability of Dumpers to Meet the December 31, 1981 Deadline - The prohibitive cost associated with using the chemical wastes site for sewage sludge disposal would threaten the ultimate objective of terminating sludge dumping by December 31, 1981. The

economic resources of the communities involved are finite, and if they are spent on transporting sludge to the chemical wastes site, they will not be available for implementing land-based disposal methods. This particular aspect of using the chemical wastes site is a matter of concern not only to the communities that would have to bear the cost, but to federal agencies, to environmental groups, and to some of the Congressmen who were instrumental in amending the MPRSA to specify the 1981 deadline (see Appendices C and D).

Although NOAA would prefer that the chemical wastes site rather than a site in the Northern or Southern Area be used in an emergency between now and 1981, NOAA opposes summarily moving sludge dumping from the existing site to the chemical wastes site:

> NOAA is not in agreement with the proposal to move the sludge dump site which serves the New York-New Jersey metropolitan area from the Apex to the deep water site at 106 miles [the chemical wastes site].
>
> Our position is that no need has been established to require moving the existing dump site, and that all sewage sludge dumping should be halted by 1981.
>
> We are concerned that an open door policy of sewage sludge could ultimately lead to the situation in which most or substantial amounts of east coast municipal and industrial waste dumping is carried out at that site.
>
> *Such a policy would seriously undermine efforts to encourage ocean dumpers to seek land based alternatives to ocean dumping* [emphasis added] (in USEPA, May 31, 1977).

A similar view was expressed by Kenneth Kamlet, representing the National Wildlife Federation, at the Toms River hearing in 1977. In responding to the argument that the increased cost of using the chemical wastes site would make land-based disposal more cost-competitive with ocean dumping and therefore more attractive to the municipalities involved, Mr. Kamlet stated:

> In the first place, any significant increment between now and the end of 1981 (the deadline for completing the phase-out of sewage sludge ocean dumping) in the cost of sewage sludge disposal could as easily discourage as encourage the expedited phase-out of sludge dumping, *if it had the effect of diverting into continued ocean dumping limited funds which would otherwise be available to implement a dumping phase-out* [emphasis added].
>
> In the second place, if the cost increment for relocating the dumpsite were not substantial enough to jeopardize the implementation of land based alternatives, chances are they would also not be substantial enough to provide much if any incentive to accelerate a dumping phase-out (in USEPA, May 31, 1977).

Congressman Edwin Forsythe, the ranking minority member of the House Subcommittee on Oceanography, also testified against moving sludge dumping to an alternate site, particularly the chemical wastes site:

> A decision regarding the location of municipal sewage sludge dumping is a critical resource management problem. Since the environmental and fiscal resources at stake are extremely valuable, our decision-making must be based on rationality. Attempts to sensationalize the issue, and politically expedient pressure to move the problem "out of sight", "out of mind", must be resisted.
>
> The net effects at present of a dumpsite move would be the following: a new site would be contaminated, with little recovery of existing dumpsites.
>
> *Municipalities will exhaust their financial resources on increased transportation costs and ocean dumping barge construction while alternative treatment methods go unfunded* [emphasis added]. The government will investigate and monitor new dumpsites at the time when Congress has reaffirmed its unequivocal intent to end ocean dumping of sewage sludge by 1981.
>
> Finally, responsible parties seeking permanent solutions to the region's waste disposal problem will have their efforts diffused if a quick-fix, "out-of-sight", "out-of-mind" non-solution is adopted.
>
> I am particularly concerned about the possiblity of dumping sewage sludge at Deepwater dumpsite 106 [the chemical wastes site].
>
> The sensitivity of biota, the likely impact on fisheries, the difficulty of policing, the high probability of short dumps, and the impossible task of thoroughly monitoring adverse impacts at the site clearly indicate that dumping at the 106-site could be an environmental nightmare (in USEPA, May 31, 1977).

Congressman Forsythe and the Chairman of the House Subcommittee on Oceanography later reiterated these same concerns during EPA's 1978 ocean dumping authorization hearings (see Appendix D).

The estimated cost to municipalities of using the chemical wastes site for sludge dumping is shown in Table 30. An increase of 641 to 800 percent over the cost of using the existing dump site between 1978 and 1981 is projected. This large an increase would almost certainly detract from the search for alternative land-based disposal methods. As the hearing officer's report for the Toms River hearing concludes:

> None of the municipalities stated that they could not meet the added costs, but they did point out that there would be difficulties in funding, and that *these costs might have to come from funds presently allocated for implementing alternatives* [emphasis added]. (See Appendix C.)

Modification of Dumping Methods

Current sludge dumping procedures, as set forth in each ocean dumping permit, require that the sludge be discharged within the designated dump site, at a uniform rate of 15,500 gallons per n mi (27,441 liters per km) and a speed of at least 3 knots (5 km/hr). Vessel traverses must be at least 0.5 n mi (1 km) apart. These requirements have been stipulated by the USCG for safety reasons in this heavily trafficked area. They would not be applicable if sludge dumping were moved to a site outside the Bight Apex.

Methods of sludge release considered in this EIS include simple overboard dumping, jet discharge, and discharge in the vessel's wake (the present method).

Overboard Dumping. This method consists of simply releasing the sludge from the vessel; the material descends by its own momentum. Since its vertical motion is affected by buoyancy, the initial distribution is mainly within the surface water layers.

Jet Discharge. This method involves pumping the sludge from the vessel through an opening beneath the surface. It is effective in passing the material through the surface layers, but it results in a more confined initial distribution, usually at the depth of neutral buoyancy of the sludge.

Discharge in the Vessel's Wake (Present Method). This method results in high initial mixing and dilution, but the sludge's vertical motion is still dependent on density differences between it and the receiving waters.

Considering the 30 to 60 m (100 to 200 ft) depths and the flow patterns in the Northern and Southern Areas, the present dispersive method of sludge dumping should be continued at an alternate dump site for the following reasons:

- Sewage sludge dumped at or near the surface will settle over a wide area because of its low bulk density, 1.01 g/cu cm.
- Differences in the thermohaline (temperature and salinity) density structure of the ocean would probably slow the settling of sludge under stratified conditions and would negate the effectiveness of a pumped subsurface discharge.
- Dispersion at either the Northern or Southern Area is primarily a function of sea state, depth, and water mass movements. As such, it is not likely to be improved by altering the present dumping technique.
- Given the volumes of dumped sludge projected through 1981 and the limitations of the present fleet, use of sophisticated dumping techniques would probably be both technically impossible and economically prohibitive. Moreover, such techniques would be of little value in improving dispersion patterns.
- Monitoring of the dump site would be facilitated if dumping were limited to a specific surface area.

LAND-BASED ALTERNATIVES

Although an immediate changeover to land-based disposal of sewage sludge in the New York-New Jersey metropolitan area is not feasible, current predictions are that land-based methods can be implemented in time to meet the December 31, 1981 deadline for phasing out ocean dumping of sewage sludge.

In June 1975 and June 1976, ISC issued reports on Phases 1 and 2, respectively, of a three-phase sludge management study funded by EPA. In October 1976, the study was completed with the publication of ISC's sludge disposal management plan for the New York-New Jersey metropolitan area. The study's purpose was to describe the feasible land-based alternatives for sludge disposal and methods of implementing them. As the study progressed and more information was gathered, ISC modified its recommendations accordingly; the final report, published in October 1976, sets forth ISC's current position on the question of sludge management in the metropolitan area.

ISC Phase 1 Report

The Phase 1 report was primarily concerned with the following land-based methods of sewage sludge disposal: direct land application, incineration, pyrolysis, and use as a soil conditioner or fertilizer.

Direct Land Application. Sewage sludge in its liquid form can sometimes be applied to the land as a soil conditioner or fertilizer. Those characteristics of sludge that affect its suitability for direct land application include the organic matter content, the available nutrients (nitrogen, phosphorous, potassium, and trace elements), the quantities of heavy metals, and the toxic organics (especially chlorinated hydrocarbons). In general, three factors limit the immediate implementation of direct land application of metropolitan area sludge.

First, the sludge generated by metropolitan wastewater treatment facilities contains high concentrations of heavy metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc) and significant quantities of toxic organics (chlordane, dieldrin, endrin, heptachlor, lindane, and mirex). If these substances leached into the soils underlying a land-application site, they would be harmful to adjacent streams and groundwater aquifers.

Second, metropolitan area sludge is low in nutrients (as are most domestic sewage sludges) in comparison with commercial fertilizers.

Finally, land is not available in the metropolitan area for a large-scale land-application program. The cost of transporting large quantities of sludge to suitable sites outside the metropolitan area appears to be prohibitive.

Incineration. Sewage sludge incineration results in waste gases, particulates, and a relatively small quantity of sterile ash that retains most of the heavy metals originally present. Air pollution controls, such as wet scrubbers, are necessary to remove the particulates, odors, nitrogen oxides, sulfur oxides, volatile toxic organics, and airborne heavy metals (cadmium, lead, and mercury). Multiple-hearth incineration has the least potential for air pollution; it can burn without auxiliary fuel (gas, oil, or coal), and it is compatible with a phased change-over to pyrolysis. The ash, of course, which contains heavy metals, must ultimately be disposed of in an environmentally acceptable manner.

To burn without auxiliary fuel, sludge must generally be dewatered, that is, the liquid content must be reduced from its usual range of 93 to 97 percent to less than 65 percent.

Although the air pollution problems posed by this method of sludge disposal could be minimized by incinerating the material on ships or offshore platforms, the costs cannot be justified since other, more economical, methods of sludge disposal are available.

Pyrolysis. Destructive distillation, or pyrolysis, is the process of breaking down organic matter, such as sewage sludge, by heating it in the absence of oxygen. The resulting by-products are a number of gases, a carbon/ash char, and a liquid waste containing a wide variety of organic compounds. Pyrolysis is generally cheaper than incineration because it produces fewer particulates and thus requires less in the way of air pollution controls. The by-products, char and gases, can be used as fuels. To date, however, no large-scale pyrolysis tests have been conducted on sewage sludge alone, so prior to implementation of this alternative, a pilot demonstration plant would have to be built and successfully operated.

Use as a Soil Conditioner. Problems with the use of sewage sludge as a soil conditioner or fertilizer are much the same as those with direct land application: the high concentrations of heavy metals and toxic organic compounds must be removed or reduced. In addition, the sludge must be dried to 5 or 10 percent moisture content and fortified with nutrients before it can be used as a fertilizer. Finally, there is the problem of promoting consumer acceptance.

Conclusions and Recommendations. *The ISC Phase 1 report (1975) drew the following conclusions* regarding land-based sludge disposal methods for the metropolitan area and the eventual, phased implementation of those methods.

The most feasible alternative to ocean dumping would be pyrolysis (the sludge having been dewatered with filter presses). This conclusion was based on considerations of environmental impact, economic feasibility, and energy recovery. Pyrolysis has the least potential for negative impacts on water, air, or land resources. It could be implemented within ten years.

Multiple-hearth incineration could be implemented sooner than pyrolysis, and the incinerators could be converted to pyrolysis units once that process was demonstrated to be successful. Incinerators, however, would face more difficult siting problems because of their potential for air pollution and because of the possibility of local community resistance. The incinerators needed to handle the volumes of sludge projected for the year 2000 would cost on the order of $400 to $500 million (in 1975 dollars).

Direct land application could be implemented only in fringe areas (outside the metropolitan area), where population density is low and large tracts of land are available, and where agricultural enterprises would provide a market for sludge-based fertilizers and soil conditioners.

A small-scale pilot study should be undertaken immediately with the aid of an equipment manufacturer who is familiar with both pyrolysis technololgy and multiple-hearth furnace construction. The purpose would be to identify and define the required engineering parameters prior to full-scale demonstration plant construction.

The complete text of the Phase 1 report's conclusions and recommendations is presented as part of Appendix J.

ISC Phase 2 Report

The object of the Phase 2 report (ISC, 1976a) was to develop and recommend a specific, coordinated disposal program based on the technical findings of the Phase 1 report (ISC, 1975). In sum, the Phase 2 report recommends the construction of regional pyrolysis plants at six separate locations in the metropolitan area and only limited land application of sludge.

Incineration and Pyrolysis. To date, pyrolysis of sludge alone has been studied only in pilot-scale tests; large-scale demonstrations have utilized solid wastes. The ISC's Phase 1 report indicated that multiple-hearth furnaces could be built by 1981, initially operated as incinerators, and then converted to pyrolysis units as that technology developed. Between the publication of the Phase 1 and Phase 2 reports, it was learned that such furnaces could be designed and constructed as pyrolysis units directly during the same time span; incineration was therefore not considered further.

The ISC evaluated the retention of anaerobic digestion capabilities at individual plants because a number of operating wastewater treatment plants have, or plan to construct, these digesters. It was found that maintenance of existing anaerobic digesters was cost-effective, but that new digesters should not be built if sludge was to be pyrolyzed.

Land Application, Composting, and Landfilling. Land application and composting are feasible sludge disposal alternatives for outlying plants in the metropolitan area. These plants could form regional groups for direct land application or for sludge composting.

Landfilling of stabilized, dewatered sludge is cost-effective only for the smaller suburban wastewater treatment facilities, and only if landfill sites are available. Landfilling, however, should be considered a short-term solution, to be used while long-term direct land application or composting programs are instituted. In addition, landfilling was found not to be feasible for sludges produced by treatment plants in highly urbanized portions of the metropolitan area because of the larger quantities of sludge produced and the limited lifespans of available landfill sites.

Sludge Management. The plan recommended in ISC's Phase 2 report calls for pyrolysis of sludge produced in urban treatment plants and land application or composting of sludge produced in outlying plants. The recommended pyrolysis sites and areas to be served are:

1. Port Newark (New Jersey regional), serving Bergen, Hudson, and Union counties, and the Passaic Valley Sewerage Commissioners.
2. Sayreville, serving the Middlesex County Sewerage Authority.
3. Cedar Creek, serving Nassau County.
4. Twenty-Sixth Ward, serving Coney Island, Jamaica, Rockaway, and Twenty-Sixth Ward.
5. Hunts Point, serving Bowery Bay, Hunts Point, Tallmans Island, and Wards Island.
6. Fresh Kills (New York regional), serving Newtown Creek, North River, Owls Head, and Port Richmond.

Conclusions and Recommendations. Pyrolysis is favored as a particularly promising means of disposing of the large volume of municipal sewage sludge expected to be produced by the year 2000. The ISC Phase 2 report concludes that if future federal policies prohibit or significantly curtail the ocean dumping of sludge, pyrolysis is the best alternative for its disposal. The report also recommends the construction of six regional pyrolysis facilities (listed above). Only limited amounts of sludge are seen as suitable for direct land application.

The ISC concludes that direct land application of either treated or untreated sludge in quantities sufficient to dispose of the expected volumes would be dangerous because of the large heavy metal and toxic organic content, and the threat of surface and groundwater contamination. Pyrolysis is also preferred to incineration because units could be more easily decentralized. While pyrolysis equipment capable of reducing sludge is not yet in commercial operation, recent technological advances make it appear that the method could be in practical use by the early 1980s.

While the ISC acknowledges the urgent need for the cessation of ocean dumping, it considers EPA's phase-out date of December 31, 1981 to be somewhat optimistic.

The complete text of the Phase 2 report's summary chapter is presented as part of Appendix J.

ISC Sludge Disposal Management Program

The latest ISC report (1976b) presents ISC's plan for sewage sludge management in the New York-New Jersey metropolitan area. It combines the Phase 1 and Phase 2 reports with an examination of legal-institutional implementation problems.

In general, the sludge management plan currently recommended by ISC is very similar to the one recommended in the Phase 2 report. The major difference, is that ISC now places a greater emphasis on composting followed by land spreading. The sludges produced by several treatment plants in the metropolitan area are now suitable for composting and land spreading. Other sludges are still unsuitable, primarily because of their heavy metal and synthetic organics content. However, pretreatment of industrial wastewaters could resolve these problems.

Relative to pyrolysis, the ISC recommends five facility sites rather than the six given in the Phase 2 report:

1. Port Newark (New Jersey regional), serving Bergen, Hudson, and Union counties, and the Passaic Valley Sewerage Commissioners.
2. Sayreville, serving the Middlesex County Sewerage Authority.
3. Cedar Creek, serving Nassau County.
4. Twenty-Sixth Ward, serving Newtown Creek, Owls Head, Coney Island, Jamaica, Rockaway, and Twenty-Sixth Ward.
5. Hunts Point, serving Bowery Bay, Hunts Point, Tallmans Island, and Wards Island.

The ISC makes no recommendation relative to the North River or Red Hook treatment plants that are being constructed in New York City; both plants are scheduled to go into operation in the mid-1980's.

The complete text of the summary chapter of the October 1976 report is presented as part of Appendix J.

Testing and Implementation

As noted at the start of this chapter, the testing and implementation phases of the sludge disposal management program have begun. Since no large-scale pyrolysis test had been conducted on sewage sludge alone, ISC recommended, in its Phase 1 Report, that a pilot demonstration plant be built and successfully operated. In 1976, EPA funded such a pilot test. Nichols Engineering and Research Corporation was contracted to test sludge pyrolysis at its Belle Mead, New Jersey, research facility. Sludges from several treatment plants were chemically conditioned, dewatered, and pyrolyzed under various design conditions in a Nichols Herreshoff Multiple Hearth Furnace. Nichols has reported that pyrolysis can be used as a commercially feasible and cost effective thermal destruction method for sludge disposal without using fuel, including afterburning at 759°C (1400°F) (ISC, 1978).

In December 1976, a sludge composting project in Camden, New Jersey, was funded by EPA and NJDEP. This project uses a technique developed by the U.S. Department of Agriculture's experimental sludge composting station in Beltsville, Maryland. During the process, which takes a total of thirty days, dewatered sludge is mixed with a bulking agent, such as wood chips, corn cobs, or waste paper, and stacked in piles. The piles are blanketed with an inert material, and air is drawn through the piles. Aerobic biological degradation increases temperatures within the piles to 82°C (180°F), thus destroying most pathogenic bacteria.

The Camden composting facility, which was dedicated in June 1978, established several major environmental precedents. It is the largest composting operation of its type in the United States. It is also the first such municipal undertaking in the New York-New Jersey area. Most important, it is the first instance of cessation of ocean dumping by a large municipal sewage treatment plant (58,118 cu m or 76,471 cu yd per year).

All municipal permittees in EPA-Region II are required by permit condition to select and implement an environmentally acceptable alternative to ocean dumping on or before December 31, 1981. Each permittee has been given a final phase-out date based upon the individual permit implementation schedule. Each of the permittees is on a strict implementation schedule, and is closely monitored by EPA-Region II. All permittees are afforded the opportunity to comply with this condition using federal funds available through the FWPCA (the Clean Water Act), and most have chosen this path. Examples of the technologies being considered or currently being implemented are:

Camden	
Middletown Township	
Northeast Monmouth	Composting
Linden-Roselle	

Nassau County	
Bergen County	Composting of sludge and use as landfill cover as an interim solution; co-recovery with solid wastes as a long-term solution
Joint Meeting of Essex and Union Counties Rahway Valley Wayne Township Lincoln Park Pequannock Township Pompton Plains Oakland	Incineration
Middlesex County	Multiple hearth incineration or starved air combustion
Glen Cove	Co-incineration with solid wastes
New York City	Composting or landfilling of digested dewatered sludge as an interim solution; utilization of other technology (pyrolysis, co-recovery, etc.) or shipment out of the city area for composting as a long-term solution
Westchester County	Use of existing excess capacity in solid waste incinerators and composting of remainder

CHAPTER IV

DETAILED DESCRIPTION OF THE PROPOSED ACTION

The proposed action involves abandoning the existing sewage sludge dump site in the Bight Apex, and designating an alternate dump site in either the Northern or Southern Area of the New York Bight (Figure 10) for use until ocean dumping of sewage sludge is completely phased out at the end of 1981. The premise for the proposed action was a concern that the increasing volumes of sludge, generated as a result of upgrading municipal treatment plants in the metropolitan area, could not be dumped at the existing site through 1981 without adversely affecting the recreational quality of Long Island and New Jersey coastal waters (USEPA, January 17, 1975). The 1981 sludge volume is expected to be about one and a half times greater than the 1977 volume (Tables 5 and 9).

Studies by EPA, NOAA-MESA, FDA, and state and local agencies all indicate that while the benthic community at and near the existing dump site has been adversely impacted, continued use of the site poses no current health hazard to the near-shore waters of Long Island or New Jersey. However, concern about the potential effects of dumping increased volumes of sludge at the existing site led EPA to consider the proposed action.

This EIS assesses the effects of the proposed action and provides specific recommendations regarding the continued use of the existing dump site and the designation and use of an alternate site. The most acceptable dump site will be selected on the basis of environmental considerations and other factors. The EPA intends to designate an alternate dump site in 1978, after public review of, and comment on, this EIS.

HISTORY OF THE PROPOSED ACTION

Significant events affecting the proposed action are described below.

October 1972: Congress passed the MPRSA, which authorized EPA to regulate ocean dumping as of April 23, 1973.

April 1973: The EPA-Region II office issued Interim Permits to municipal and industrial waste generators who were dumping in the New York Bight under COE permits.

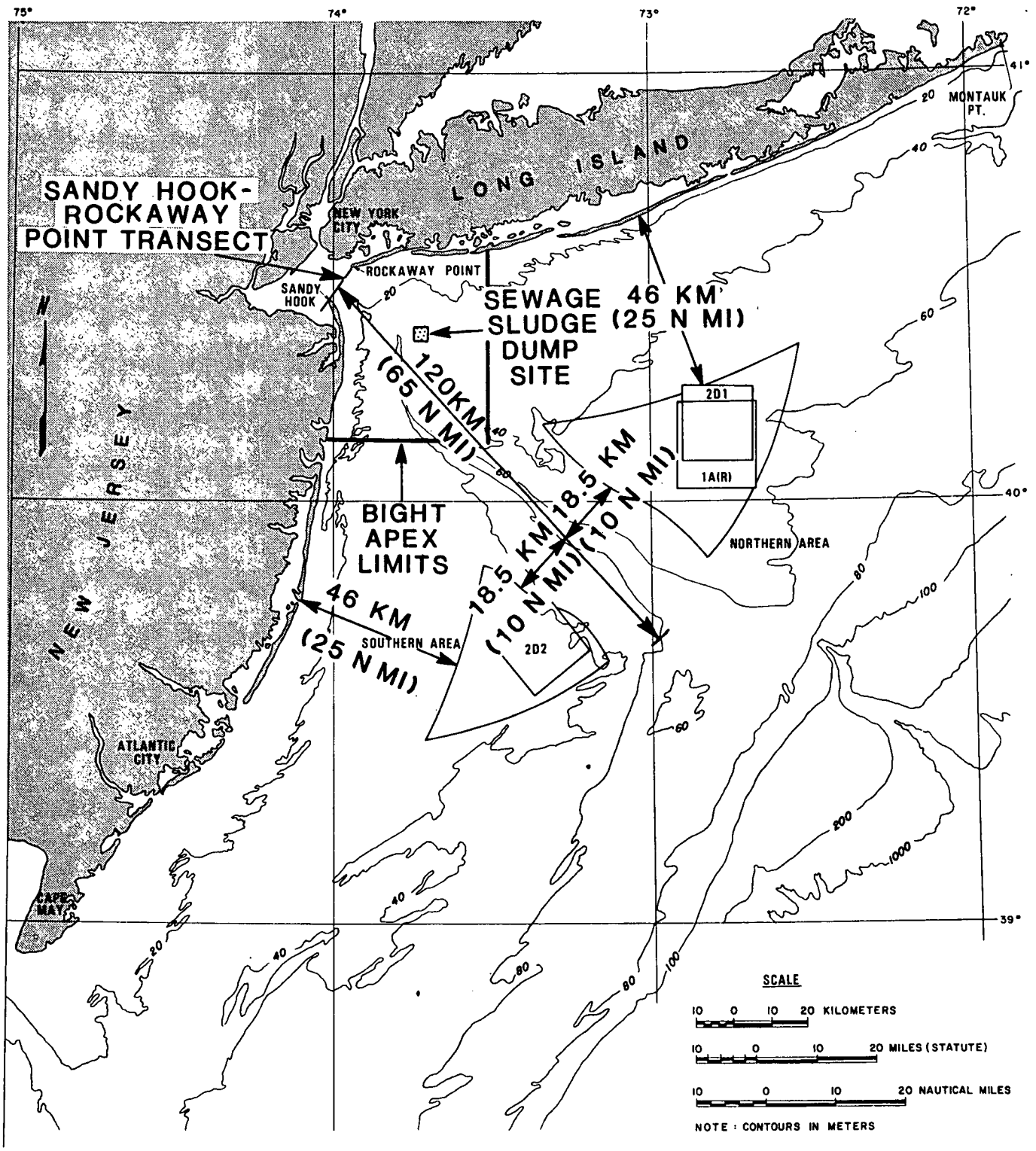
After EPA-Headquarters issued interim regulations covering the transportation and dumping of material in ocean waters, EPA-Region II ordered forty-seven permittees to cease dumping in the New York Bight because acceptable land-based alternatives were available.

July 1973: The EPA-Region II office issued Interim Permits under the regulations to those waste generators with no immediate alternative to ocean dumping.

October 1973: The EPA-Headquarters office issued final ocean dumping regulations (40 CFR, Parts 220 to 227). Subsequently, EPA-Region II consigned all liquid industrial wastes, except acid wastes, to the chemical wastes dump site (just outside the New York Bight); previously, most of these wastes were dumped at the existing sludge dump site (Figure 2).

The EPA-Region II office contacted NOAA-MESA about the possibility of designating an alternate dump site for use until environmentally acceptable land-based alternatives for the disposal of sewage sludge could be developed and implemented.

March 1974: The NOAA-MESA investigators tentatively recommended two study areas in the New York Bight at which an alternate dump site could be located, and EPA requested further evaluation of the areas (NOAA-MESA, March 8, 1974).



LOCATION OF EXISTING AND PROPOSED DUMP SITE AREAS IN THE NEW YORK BIGHT

SOURCE: NOAA, SEPTEMBER 17, 1974.

FIGURE 10

April 1974: The EPA-Region II office notified all users of the existing site that it intended to shift sludge dumping operations to an alternate site in July 1976, or earlier, depending on the results of an EPA onsite monitoring program. Municipal and sewerage authority permittees responded that they could not commit the necessary resources to effect such a move solely on the basis of an EPA "intention" (USEPA, July 15, 1975).

At the request of EPA, NOAA-MESA agreed to assist in evaluating the two preliminary study areas, and tentatively scheduled several seasonal sampling cruises for 1974 and 1975 (NOAA-MESA, April 11, 1974).

The EPA-Region II office held a public hearing on the issuance of twenty-four Interim Permits, under the final regulations, to users of the existing sludge dump site.

In addition, EPA initiated a comprehensive program to monitor water quality in the Bight Apex. With the concurrence of NOAA-MESA, EPA recommended continued use of the existing site, pending completion of a program for reducing volumes of wastes and/or finding an alternate site or methods of handling these wastes. To this end, EPA issued a grant to ISC for the study of land-based disposal alternatives in the metropolitan area.

May 1974: The NOAA-MESA investigators recommended two areas, the Northern Area and the Southern Area (Figure 10), as possible locations for an alternate dump site (NOAA-MESA, September 23, 1975). As previously requested by EPA, NOAA-MESA agreed to conduct several cruises to collect baseline data in these two areas of the New York Bight.

The EPA-Headquarters office contracted with the Raytheon Company to collect baseline data for a small portion of the Northern Area. Data from Raytheon's three cruises were intended to supplement NOAA-MESA cruise data.

September 1974: Due to constraints of time and resources, NOAA stated that it would concentrate its study efforts on two subareas, 2D1 in the Northern Area and 2D2 in the Southern Area. In addition, NOAA indicated that if the Northern and Southern Areas were both unacceptable for the dumping of sewage sludge, a site within "an equivalent distance" should be available (NOAA, September 17, 1974).

October 1974: The EPA-Region II office sent a second letter of notification to all users of the existing sludge dump site stating that its position was "firm", and that permits for continued use of the existing site would not be issued after July 1976 (USEPA, October 2, 1974).

December 1974: The EPA-Region II office contracted with Dames & Moore to prepare a draft EIS on the proposed action in accordance with the requirements of NEPA and EPA's own EIS regulations.

January 1975: The EPA issued an official "Notice of Intent" to prepare this EIS (USEPA, January 17, 1975).

April 1975: The EPA-Region II office held a public hearing on the issuance of fourteen Interim Permits for use of the existing sludge dump site (USEPA, April 1, 1975).

May 1975: The EPA-Region II office signed a formal Letter of Understanding with NOAA-MESA concerning baseline surveys and evaluations of the Northern and Southern Areas. In accordance with this agreement, NOAA-MESA provided a report of its findings (NOAA-MESA, February 1976) for use in this EIS.

July 1975: The EPA-Region II office held a public hearing on the issuance of four additional Interim Permits to industries for use of the existing sludge dump site.

February 1976: The draft EIS on the ocean dumping of sewage sludge in the New York Bight was released for public review and comment.

March, April 1976: The EPA-Region II office held public hearings on the draft EIS in New York City, in Toms River, New Jersey, and in Mineola, Long Island.

April 1976: The EPA-Region II office held a public hearing in New York City on the issuance of fourteen Interim Permits for use of the existing sludge dump site.

July, August 1976: Long Island beaches bordering the New York Bight were contaminated with sewage-like material and other wastes propelled onshore by unusual summer winds. In addition, waters off the New Jersey coast experienced a massive algal bloom and oxygen depletion of bottom waters which severely affected benthic marine organisms, especially surf clams.

January 1977: The EPA-Headquarters office issued final revisions of the ocean dumping regulations and criteria (40 CFR, Parts 220 to 229).

May 1977: The EPA-Region II office held a public hearing on the issuance of thirteen Interim Permits for use of the existing sludge dump site.

May, June 1977: The EPA-Headquarters office held a public hearing in Toms River, New Jersey, to consider the possibility of transferring sludge dumping operations from the existing dump site in the New York Bight and the existing dump site off the coast of Maryland (the Philadelphia dump site) to a site farther offshore, possibly the chemical wastes site.

July 1977: The EPA-Headquarters office awarded a 3-year contract to Interstate Electronics Corporation (IEC) to perform environmental assessments and prepare EISs for designation of ocean dump sites for different types of wastes. Although the contract covers all ocean dumping activities in the United States, the New York Bight dump sites have been assigned high priority.

September 1977: The hearing officer for the Toms River public hearing issued his report, recommending that neither the New York nor the Philadelphia sewage sludge dump site be moved (see Appendix C).

November 1977: Congress amended the MPRSA to require that ocean dumping of harmful sewage sludge be phased out by December 31, 1981.

March 1978: The EPA-Headquarters office issued its decision on the Toms River public hearing, stating that both the New York and Philadelphia dump sites should continue in use, pending the phase out of sewage sludge dumping in 1981. The decision also directed that IEC include in the EIS for the chemical wastes site an assessment of sewage sludge dumping there (see Appendix D).

PROPOSED NORTHERN AND SOUTHERN AREAS

Based on the information collected by NOAA, and on NOAA's recommendations, EPA has proposed that an alternate sewage sludge dump site be located within either the Northern or Southern Area (Figure 10). The Northern Area is located roughly 46 km (25 n mi) from the Long Island coast; it is about 1,650 sq km (490 sq n mi) in area, and lies in 40 to 60 m (132 to 198 ft) of water. The Southern Area is roughly 46 km (25 n mi) from the New Jersey coast; it is about 900 sq km (260 sq n mi) in area, and lies in 30 to 40 m (100 to 132 ft) of water. The distance from the Sandy Hook-Rockaway Point transect to the farthest point in either area is 120 km (65 n mi).

Designation of a portion of either area as a sewage sludge dump site may conflict with other present or potential uses. Although both areas are mostly outside existing navigational lanes (Figure 5), they contain commercially valuable shellfish resources. The Southern Area lies near potential oil and gas development areas and may contain valuable sand and gravel deposits as well. Detailed descriptions of both areas are given in Chapter V.

Selection of the Northern and Southern Areas for study was based on the following considerations:

- Although the MPRSA recommends that ocean dumping be confined to areas off the continental shelf where feasible, both EPA and NOAA scientists have agreed that without adequate oceanographic studies, "off-the-shelf" dumping of sewage sludge is an undue environmental risk.
- The alternate dump site must minimize the chances of sewage sludge reaching either the Long Island or New Jersey shoreline.
- The alternate dump site must minimize adverse impacts on the marine resources of the New York Bight. (For this reason, boundaries of the two areas were set at a minimum distance of 18.5 km (10.0 n mi) from the Hudson Shelf Valley, where bottom-dwelling and migratory marine species are abundant.)
- The maximum one-way distance from the Sandy Hook-Rockaway Point transect to the alternate dump site (Figure 10) should be no more than 120 km (65 n mi). (This constraint was based on the limited range of the existing fleet of dumping vessels and on the undue economic burden of hiring or constructing new, longer-range vessels.)

COST OF THE PROPOSED ACTION

Expansion of the existing fleet of sludge dumping vessels is considered unnecessary at present because available capacities are sufficient for the near future. However, because of the increased distance to an alternate dump site in either the Northern or Southern Area, expansion would eventually be required. Thus, the proposed action would increase sludge transportation costs by an estimated 323 to 400 percent (see Chapters III and VII).

The general consensus among permittees is that capital outlays for fleet modification or expansion are not cost-effective in light of the requirement to phase out ocean dumping in 1981.

The proposed action might result in reduced commercial shellfish catches, especially of surf clams, in the vicinity of either of the two areas. Commercial shellfisheries along the New Jersey coast and offshore toward the Southern Area appear most valuable in this respect.

Designation and use of an alternate dump site could also interfere with the potential development of identified mineral resources (sand and gravel, oil and gas) in the Southern Area and its immediate vicinity. No potential mineral resources have been identified in or near the Northern Area.

Dumping sewage sludge into the ocean results in the loss of a potentially valuable resource since it is now possible to convert sludge into soil conditioners and fertilizers. This value cannot be realized, however, until the land-based methods of sludge disposal discussed in Chapter III are implemented in the metropolitan area.

RELATIONSHIP TO OTHER ACTIVITIES IN THE NEW YORK BIGHT

The proposed action is not expected to interfere with other dumping activities in the New York Bight although EPA is also evaluating the need to relocate the existing dredged material site. The EPA specifically requested that the COE consider use of the alternate sludge dump site for dredged material; however, it now appears that such combined dumping activities could magnify the potential adverse impacts at the alternate dump site.

The proposed action is not expected to affect marine-related recreational activities (sport fishing, pleasure boating, or beach attendance) or population growth in the New York-New Jersey metropolitan area.

CHAPTER V

DESCRIPTION OF THE ENVIRONMENT

This chapter summarizes the oceanographic data (physical, biological, geological, and chemical) assessed in determining the impact of the proposed action. Appropriate data from previous studies were combined with data from NOAA-MESA and Raytheon studies conducted specifically for this assessment. These data were required in order to establish the nature of, and the temporal and spatial variations in, those environmental parameters needed to predict the fate of dumped sewage sludge and to assess the resulting impacts on the ecosystem at both the Northern and Southern Areas.

STUDY PROGRAM

Study Areas

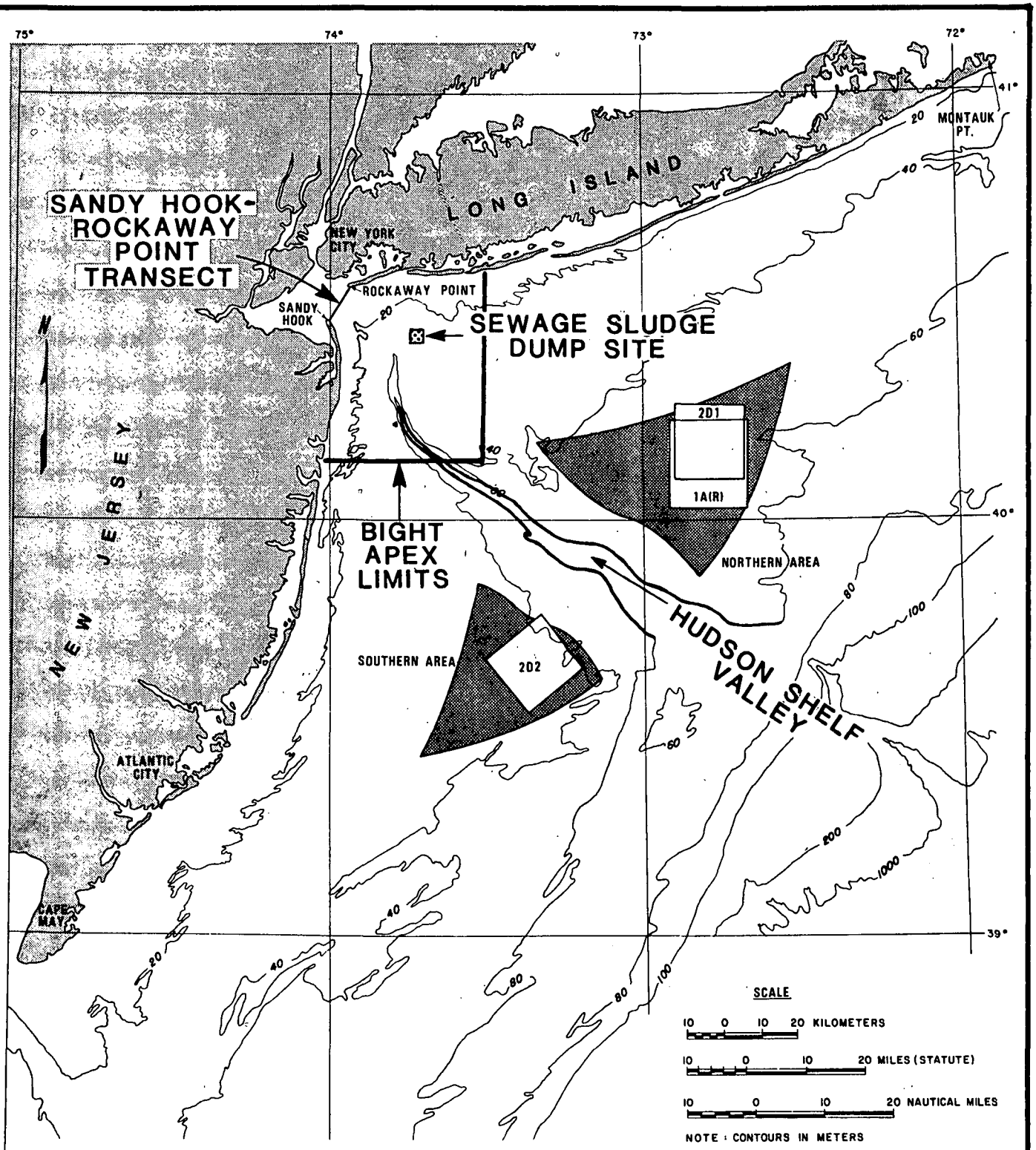
In May 1974, NOAA recommended that EPA study two large areas (Figure 11) in the New York Bight, identified as the Northern Area and the Southern Area, as possible locations for an alternate sewage sludge dump site. Because of the large areas involved and the short time before the July 1976 target date for designating an alternate dump site, NOAA further recommended that two subareas, one in the Northern Area and one in the Southern Area, be given study emphasis (NOAA, September 17, 1974). Descriptions of the areas and subareas follow.

The Northern Area is described by three boundaries (Figure 11). The northern boundary is a line roughly parallel to and 46 km (25 n mi) south of the Long Island coast and seaward of the 37 m (120 ft) depth contour; the southern boundary is a line roughly parallel to and 18.5 km (10.0 n mi) north of the axis of the Hudson Shelf Valley; and the eastern boundary is the arc of a circle with a radius of 120 km (65 n mi) from the midpoint of the Sandy Hook-Rockaway Point transect. The approximate area is 1,650 sq km (490 sq n mi).

Subarea 2D1 is a square measuring 22 km (12 n mi) on a side located within the Northern Area, adjacent to its northern and eastern boundaries, with center coordinates of 40°12.0'N and 72°46.5'W (Figure 11); the area is 484 sq km (144 sq n mi). The Raytheon Company studied a slightly different configuration of Subarea 2D1 in the Northern Area (Figure 11). Designated Subarea 1A(R), it is a square measuring 26 km (14 n mi) on a side; its center coordinates are only slightly removed from those of NOAA-MESA's Subarea 2D1. The area is 676 sq km (196 sq n mi).

The Southern Area is likewise described by three boundaries (Figure 11). The western boundary is a line roughly parallel to and 46 km (25 n mi) east of the New Jersey coast and seaward of the 37 m (120 ft) depth contour; the northern boundary is a line roughly parallel to and 18.5 km (10.0 n mi) south of the axis of the Hudson Shelf Valley; and the southern boundary is the arc of a circle with a radius of 120 km (65 n mi) from the midpoint of the Sandy Hook-Rockaway Point transect. The approximate area is 900 sq km (260 sq n mi).

Subarea 2D2 is a square measuring 22 km (12 n mi) on a side located within the Southern Area, adjacent to its eastern and southern boundaries, with center coordinates of 39°41'N and 73°18'W (Figure 11). The area is 484 sq km (144 sq n mi).



STUDY AREAS AND SUBAREAS

SOURCE: NOAA, SEPTEMBER 17, 1974.

FIGURE 11

Data Collection

In May 1974, EPA initiated a program of data collection to determine marine baseline conditions (physical, biological, geological, and chemical oceanography) in the Northern and Southern Areas. This program consisted of seasonal data gathering cruises conducted independently by NOAA-MESA and by the Raytheon Company from the summer of 1974 to the summer of 1975. The specific NOAA-MESA and Raytheon study activities are outlined below.

NOAA-MESA Activities. In order to collect the necessary baseline data, NOAA-MESA stepped up its regular marine sampling program in the New York Bight during the study period. Subareas 2D1 and 2D2 (Figure 11) were frequently and intensively sampled. A grid of twenty to thirty equidistant stations in each subarea was used to sample the water column and sediments. A detailed description of NOAA-MESA study activities in connection with the proposed action is contained in the May 1975 Letter of Understanding between NOAA-MESA and EPA (available from EPA-Region II). That effort (NOAA-MESA, February 1976) was the source of much key data for this EIS.

Raytheon Activities. In May 1974, EPA-Headquarters awarded a contract to the Raytheon Company of Portsmouth, Rhode Island, to perform three seasonal baseline data gathering cruises in Subarea 1A(R). These cruises were conducted from August through October 1974, from March through May 1975, and in July 1975 (Raytheon, 1975a, 1975b, and 1975c, respectively). Approximately fifteen stations were sampled for a combination of physical, biological, geological, and chemical parameters.

Reduction of data from the first two cruises was undertaken as part of this assessment, and the results have been incorporated into this EIS. A review of the data from the last cruise indicates general agreement with the previous results.

PHYSICAL OCEANOGRAPHY

This section provides descriptions of the hydrographic characteristics and currents in the New York Bight and at the Northern and Southern Areas.

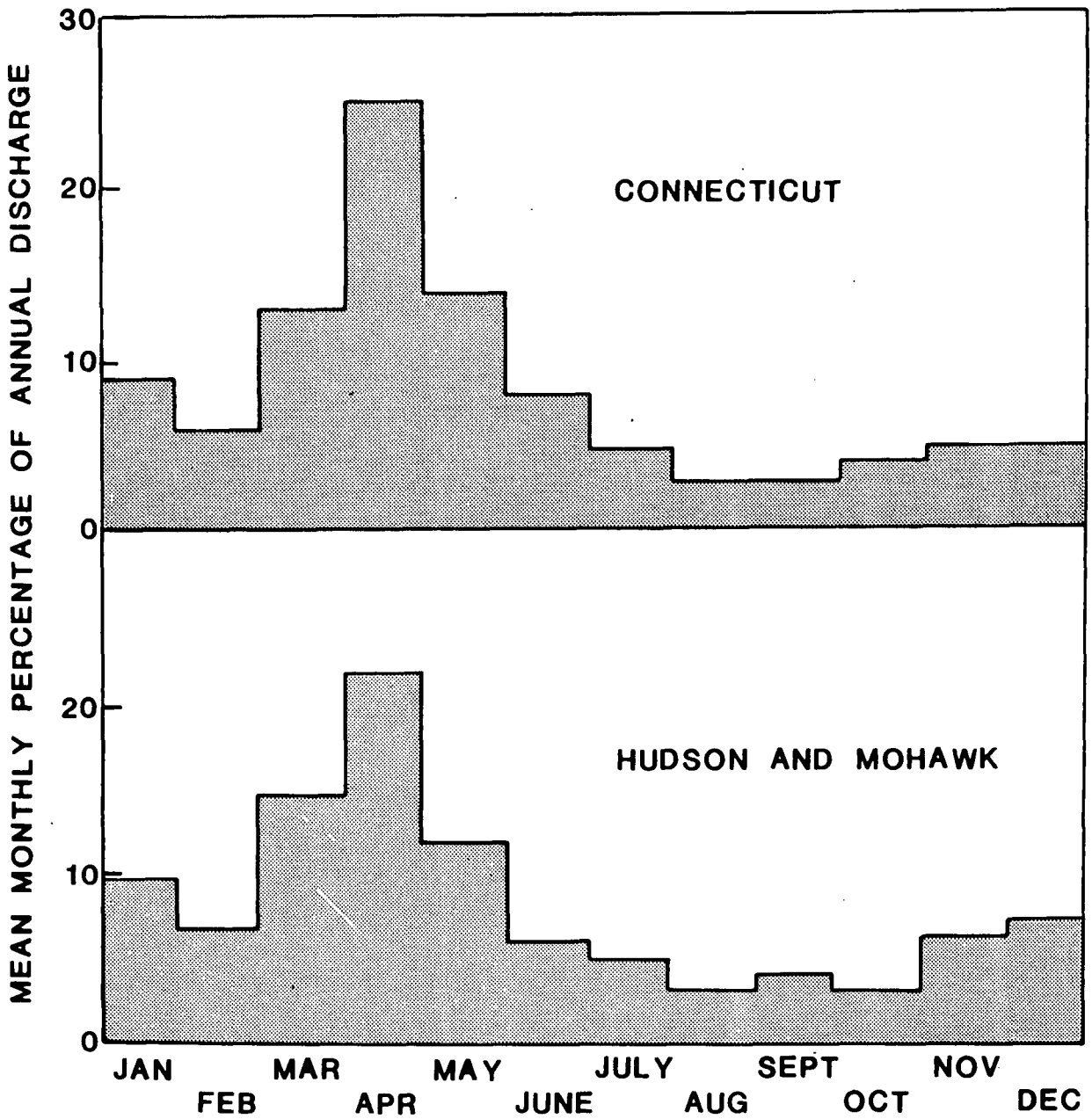
Hydrographic Characteristics

Water Masses. Most of the continental shelf, including the existing and proposed dump sites, is characterized by coastal or shelf water. The hydrographic characteristics of this water (its temperature and salinity) are controlled by seasonal sea-air exchange processes (such as precipitation, evaporation, and heat exchange), by the influx of fresh water, and by mixing of shelf water with more oceanic water (slope water) near the shelf edge. The major freshwater inputs to the New York Bight are the Hudson and Connecticut rivers (Figure 12).

The shelf water mass tends to exhibit a two-layer profile. The upper layer, surface shelf water, has a salinity range of 30 to 32.5 parts per thousand (ppt) and a temperature range of 20 to 27°C (68 to 81°F). The lower layer, bottom shelf water, has a somewhat higher salinity range, 32.5 to 34.5 ppt, and a lower temperature range, 5 to 11.5°C (41 to 53°F).

Seasonal Variations in Temperature and Salinity Patterns. The most extreme conditions in the New York Bight occur during the winter and summer seasons. In winter, the Bight is characterized by well-mixed conditions; in summer, it is characterized by heavily stratified conditions with a well defined boundary between the upper, low density layer and the lower, high density layer. Spring and fall are transitional periods. The following synopsis of seasonal conditions is from Bowman and Wunderlich (1975).

Winter Conditions (January and February): Because of low-volume river runoff and strong vertical mixing, water within the New York Bight is, for the most part, vertically homogeneous during winter. The cold-



MEAN MONTHLY PERCENTAGES OF ANNUAL DISCHARGE FOR THE HUDSON AND CONNECTICUT RIVERS

SOURCE: BIGELOW AND SEARS, 1936.

FIGURE 12

est temperatures occur near shore and increase steadily seaward; the temperature ranges from less than 5°C (41°F) near shore to 13°C (54.5°F) near the shelf edge. Similarly, maximum salinities of 33 ppt are found on the inner shelf with a small increase to 34 ppt on the edge of the shelf. Temperature-salinity measurements taken during late winter (Raytheon, 1975b) show the well-mixed conditions that prevail during the winter in the middle shelf (Figure 13).

Spring Progression (March through May): In March, April, and May, waters of the Bight are diluted by high-volume river runoff. This freshwater inflow causes a strong lateral variation in surface salinities.

In spring, the Hudson River discharge can be as high as 1,200 cu m/sec (43,000 cfs). It produces a low-salinity plume (26 to 30 ppt) which tends to follow the New Jersey coastline. Increased solar heating of Bight waters is reflected in a gradual surface temperature rise.

Summer Conditions (June through August): During the summer, waters of the New York Bight exhibit a strong thermocline, with surface temperatures reaching a maximum of 24°C (75°F). Although there is some warming of bottom water over winter conditions, it is relatively slight; bottom temperatures remain below 12°C (54°F) over most of the Bight.

The depth of the warm, mixed layer of water is about 10 to 15 m (33 to 49 ft), and the thermocline generally lies at depths of 15 to 30 m (49 to 98 ft). Summer salinities do not differ significantly from winter and spring values. Temperature-salinity measurements taken during the late summer (Raytheon, 1975a) show that vertical stratification persists into October (Figure 14).

Fall Progression (September and October): In September and October, surface cooling and wind-driven mixing begin to break down the summer thermocline. Surface temperatures decrease to approximately 16 to 18°C (61 to 65°F) in the inner Bight by the end of October. As this occurs, bottom temperatures increase toward 12°C (54°F) due to vertical mixing. Mixing also results in a more homogeneous salinity field and in an overall increase in salinity as more saline slope water is introduced.

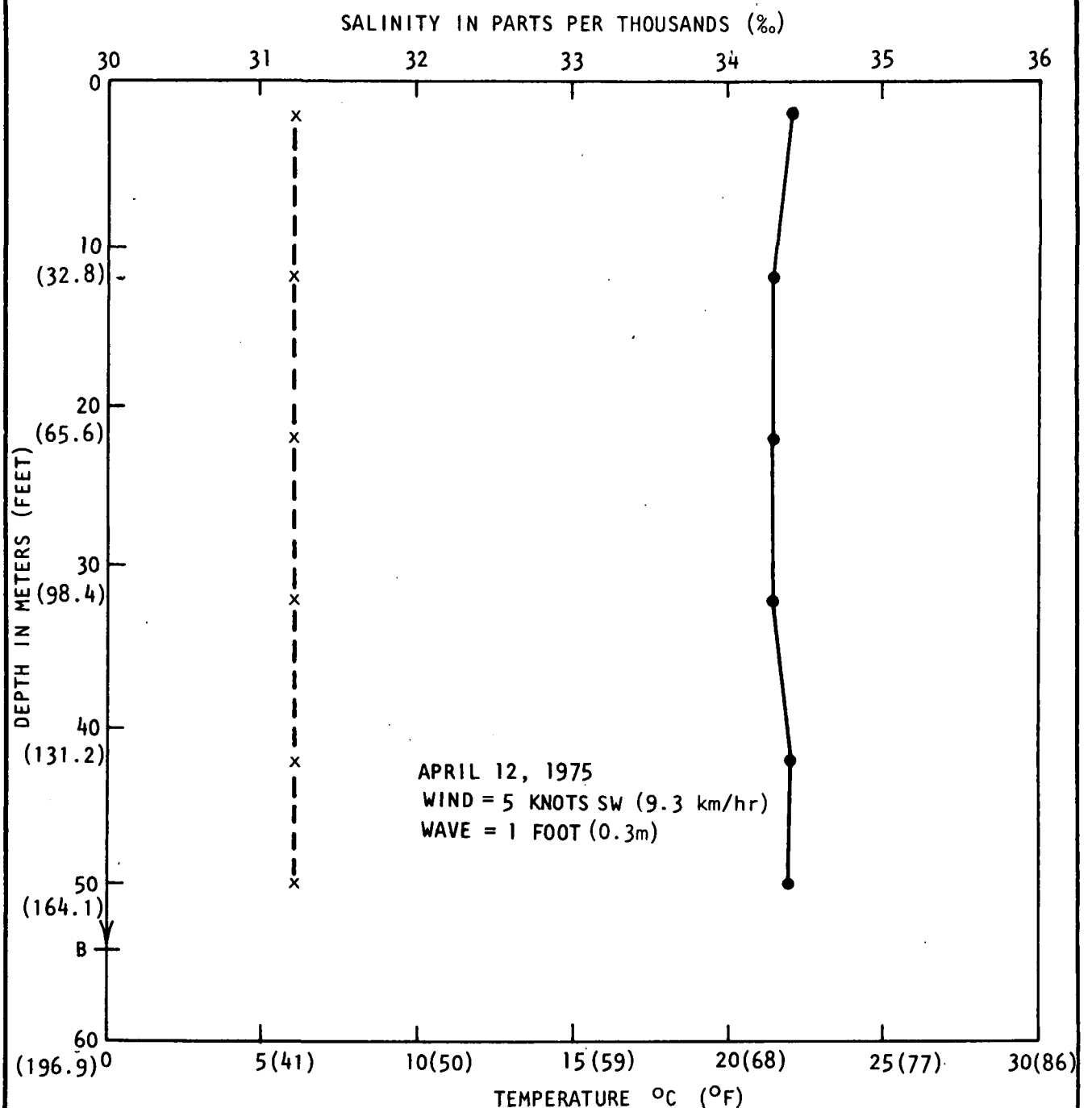
Early Winter Conditions (November and December): In November and December, strong vertical mixing continues to homogenize the water column in the Bight Apex. During November, the temperature gradient from the Bight Apex to the edge of the shelf is small, but as December progresses, cooler inshore temperatures develop. Vertical salinity values become uniform and the horizontal salinity gradient from the Bight Apex to the edge of the shelf is slight.

Currents

The circulation patterns of continental shelf currents are complex; they are subject to a number of forces which vary in time and space. Components of the general circulation pattern are described here to provide a setting for the later discussion of the fate of dumped sewage sludge (Chapter VI).

Tidal Currents. The direction of the tidal current in the middle shelf region of the New York Bight is clockwise. Estimates of these currents are given in Figure 15 (EG&G, 1975). The maximum value of hourly average tidal current measured near the Northern Area was reported to be 7.2 cm/sec (2.8 in/sec). Tidal current velocities in the Northern Area were calculated from harmonic analyses of data collected on the first two Raytheon cruises (Raytheon, 1975a, 1975b). The velocity of tidal currents shows a vertical and seasonal variation (Table 17); similar values could be expected in the Southern Area.

Tidal currents are important in the initial distribution (mixing and dispersion) of dumped materials on the bottom. They are also important as a source of energy for the resuspension of settled solids. Bottom tidal current velocities may be low, about 10 cm/sec (4 in/sec), but when coupled with wind-driven currents during storms, they can cause resuspension and subsequent redistribution of sediments.



LATE WINTER TEMPERATURE-SALINITY PROFILE AT SUBAREA 1A(R)

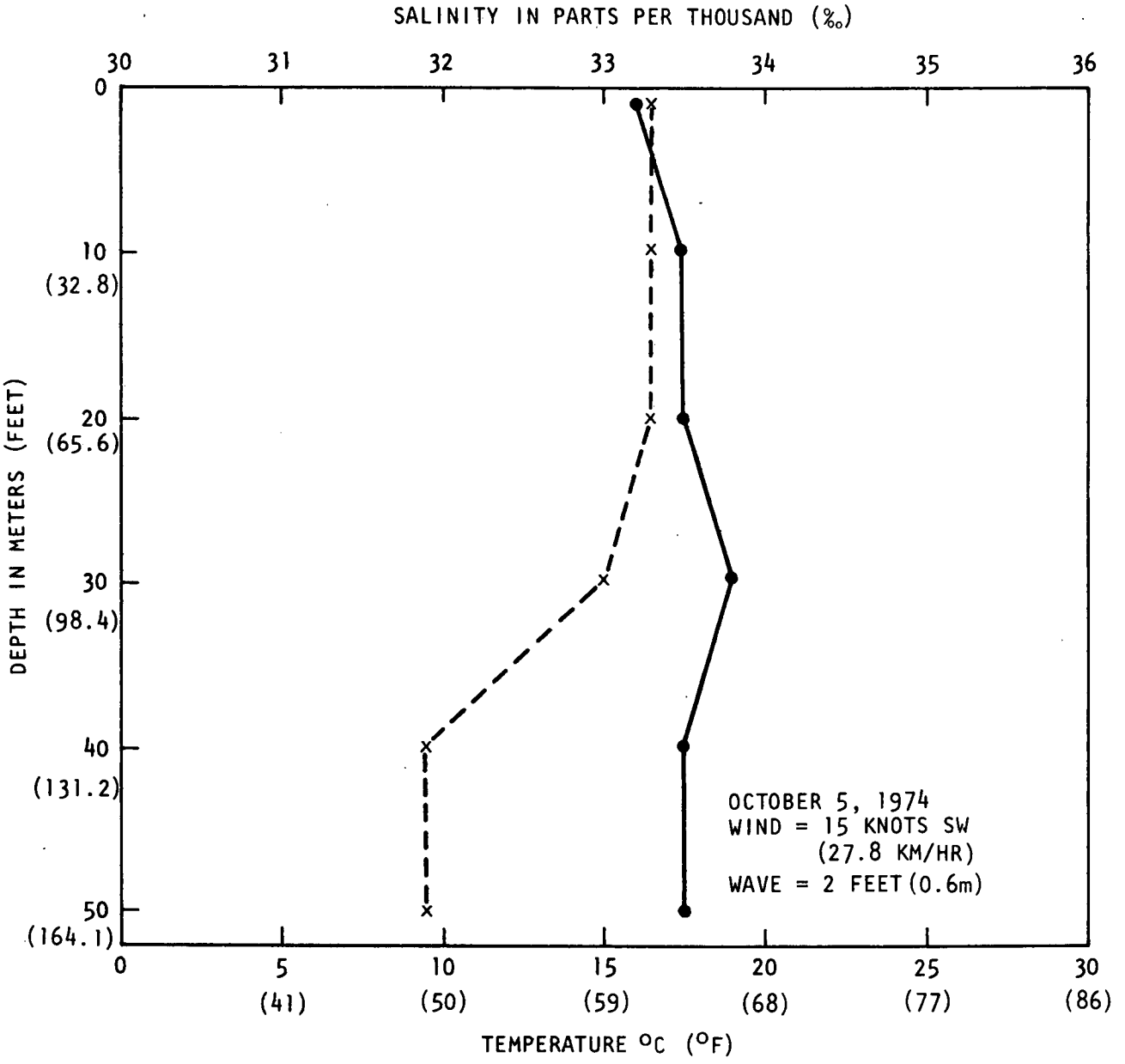
KEY:

● SALINITY

x TEMPERATURE

SOURCE: RAYTHEON, 1975b.

FIGURE 13



LATE SUMMER TEMPERATURE-SALINITY PROFILE AT SUBAREA IA(R)

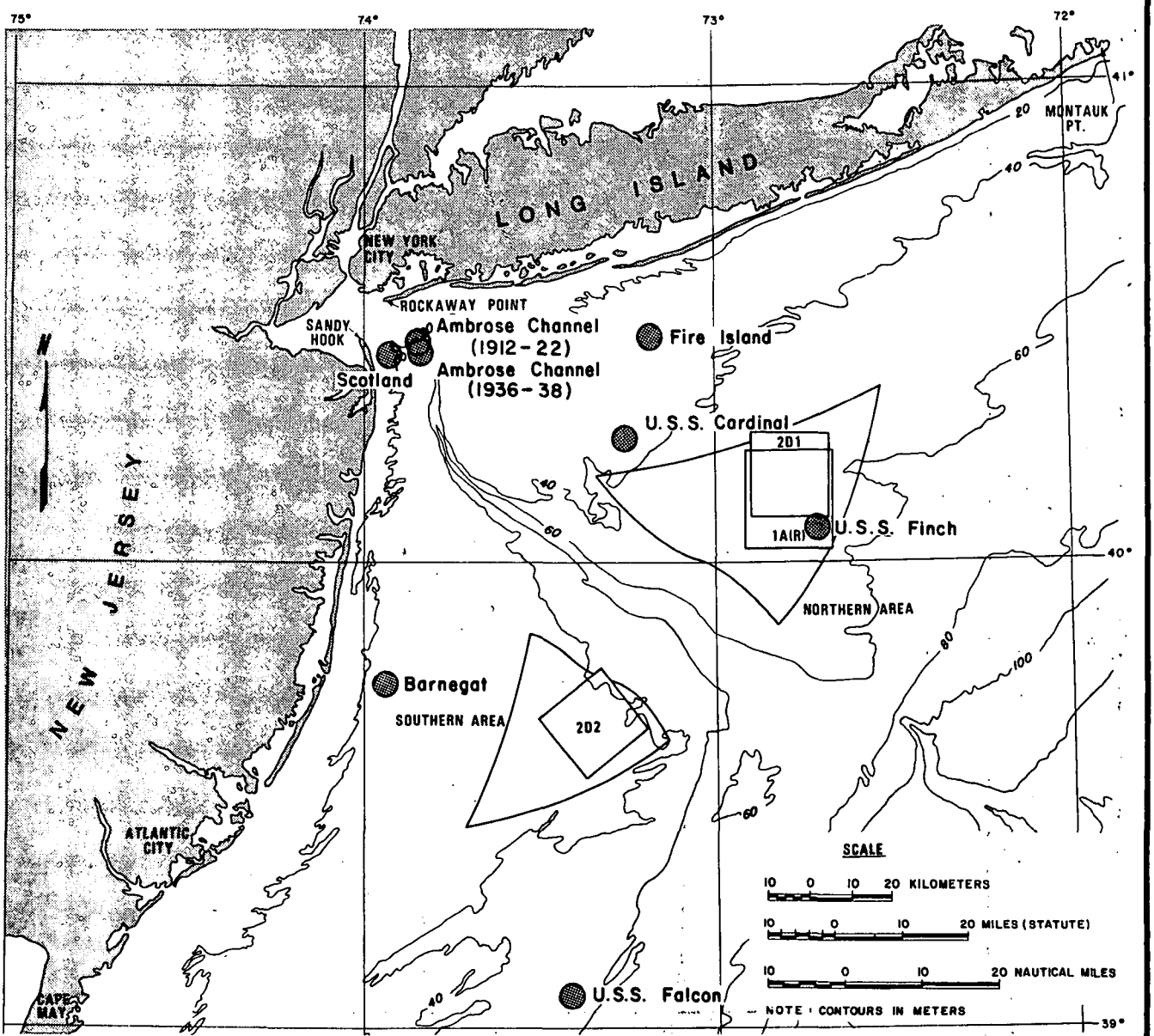
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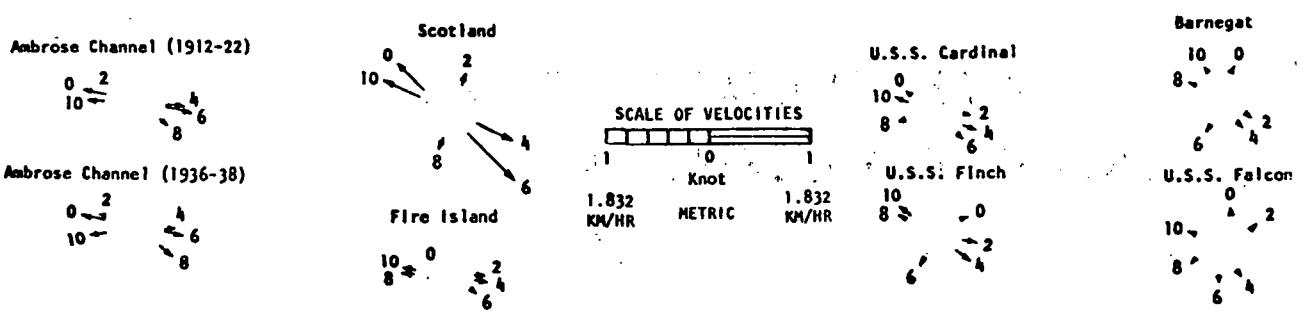
x TEMPERATURE

SOURCE: RAYTHEON, 1975a.

FIGURE 14



TIDAL CURRENTS AT LIGHTSHIP STATIONS, MONTAUK POINT TO BARNEGAT BAY



THE LOCATION OF EACH LIGHTSHIP STATION IS SHOWN BY A CIRCLE ACCOMPANIED BY THE NAME OF THE STATION.

THE DIRECTIONS AND VELOCITIES OF THE TIDAL CURRENTS FOR THE EVEN NUMBERED SOLAR HOURS FROM 0 TO 10 HOURS AFTER THE GREENWICH TRANSIT OF THE MOON ARE SHOWN BY ARROWS FOR A NUMBER OF STATIONS.

THE LENGTH OF THE ARROW REPRESENTS THE AVERAGE OBSERVED VELOCITY ON THE SCALE SHOWN ABOVE. THE FIGURES AT THE ARROW HEADS ARE THE HOURS AFTER THE GREENWICH TRANSIT. HOURS AT WHICH THE VELOCITY IS ZERO ARE PRINTED NEAR THE CENTER OF THE DIAGRAM WITHOUT ARROWS. ABOVE EACH DIAGRAM IS THE NAME OF THE LIGHTSHIP STATION TO WHICH IT APPLIES.

SOURCES: HAIGHT, 1942; EG&G, 1975.

FIGURE 15

TABLE 17

PREDICTED MAXIMUM AVERAGE VELOCITIES OF UPPER, MIDDLE, AND LOWER TIDAL CURRENTS IN THE NORTHERN AREA

Water Layer	Velocity In cm/sec (in./sec)	
	Winter	Summer
Upper	22.5 (8.7)	17.5 (6.9)
Middle	18.5 (7.3)	13.6 (5.4)
Lower	13.8 (5.4)	11.0 (4.3)

Sources: Raytheon, 1975a and 1975b.

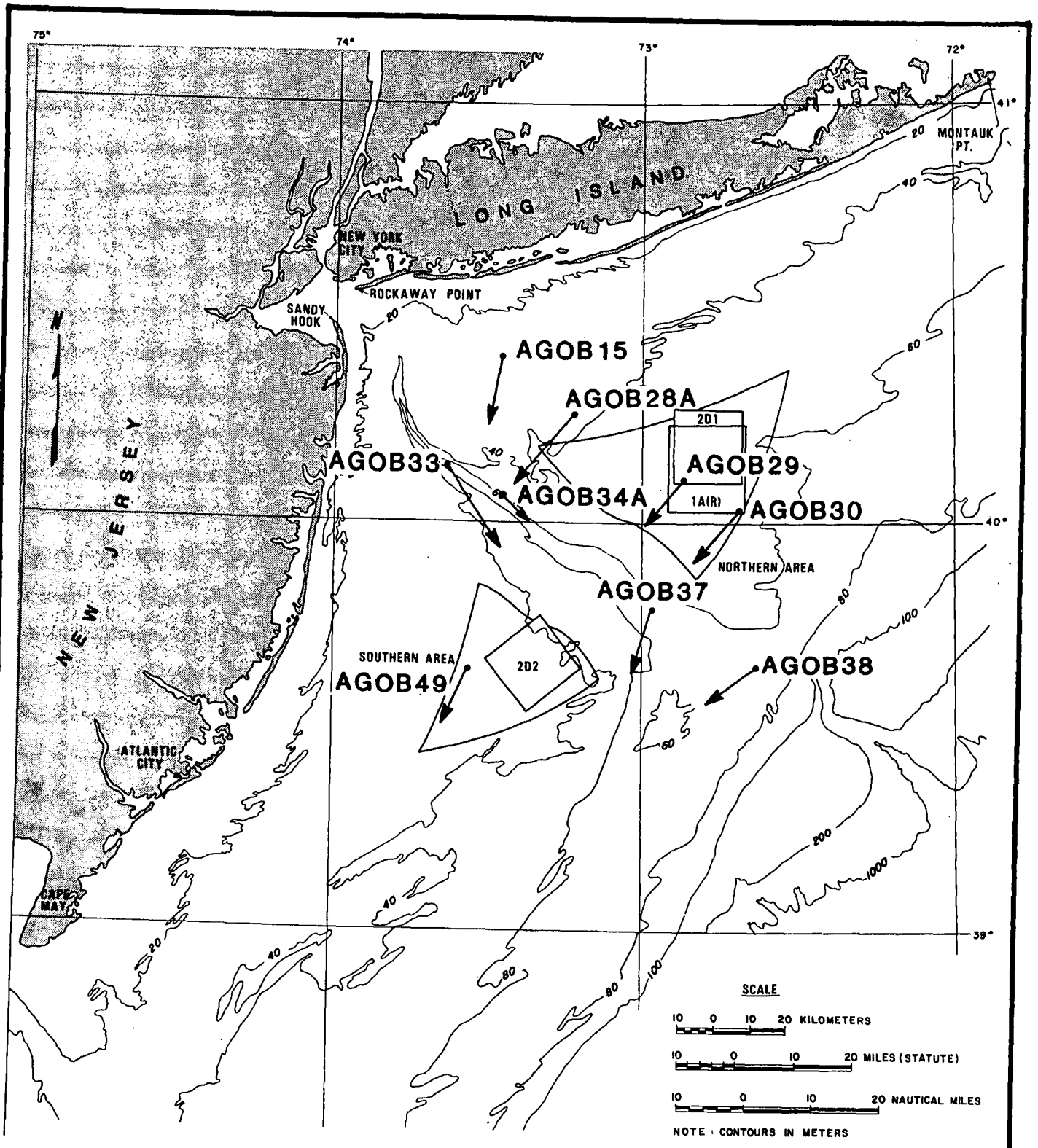
Surface Currents. Freshwater inflow to the New York Bight, primarily from the Hudson and Connecticut rivers, influences surface currents there. Fresh water is not as dense as salt water, and the presence of lighter water on the inner portion of the shelf causes the water surface to be slightly higher here than it is farther offshore. This condition generally prevails along the continental shelf and moves a density-driven coastal current toward the southwest. Occasionally in winter there is an intense cooling of inner shelf waters. This, combined with low freshwater runoff, results in denser waters nearer shore. As a result, the current flows toward the north (EG&G, 1975).

Superimposed on this general circulation pattern is the seasonally variable wind-driven current system. The resulting surface current is the vector sum of these two current systems.

Bumpus and Lauzier (1965) studied the seasonal nontidal surface drift on the Middle Atlantic continental shelf. Except for the Hudson Shelf Valley, the net surface drift in winter is toward the south, with an offshore component. Surface currents in summer more closely parallel the coast because wind effects are smaller and the density-driven coastal current becomes dominant.

Both NOAA-MESA (February 1976) and Raytheon (1975b) took current measurements in the proposed areas. In general, the data indicate that the mean surface current in winter is 6 cm/sec (2.4 in/sec) in a southerly direction, and that from late winter through early spring, it is 5 cm/sec (2 in/sec) in an alongshore direction. The springtime mean surface current in the Northern Area was not notably different from that in the Southern Area (Figure 16 and Table 18). Current observations made during the summer cruises are similar to previous cruise results, which show that the mean surface velocity is 7 cm/sec (2.6 in/sec) in a southwesterly direction.

Bottom Currents. Bottom currents have been studied through the use of seabed drifters (Bumpus, 1961; Lee *et al.*, 1965). Bumpus' results revealed a southwestward (alongshore) and shoreward movement of residual bottom drift on the inner continental shelf, with rates of drift between 0.2 and 1.8 cm/sec (0.08 to



MEAN SPRING SURFACE CURRENTS IN THE NEW YORK BIGHT

KEY:

CURRENT VECTOR SCALE

10cm/sec
(3.9in/sec)

SOURCE: NOAA-MESA, FEBRUARY 1976.

FIGURE 16

TABLE 18

NOAA-MESA CURRENT METER DEPLOYMENTS: WATER DEPTH AND LOCATION IN WATER COLUMN[1]

Station No.	Water Depth In meters (ft)		Distance from Bottom In meters (ft)	
Surface[2]				
AGOB-15	23	(76)	21	(70)
AGOB-28A	38	(126)	37	(120)
AGOB-29	48	(158)	38	(126)
AGOB-30	59	(194)	57	(188)
AGOB-33	59	(194)	51	(166)
AGOB-34A	77	(253)	70	(229)
AGOB-37	76	(249)	74	(243)
AGOB-38	35	(114)	33	(108)
AGOB-49	80	(262)	78	(256)
Bottom[3]				
AGOB-15	23	(76)	3	(10)
AGOB-20A	38	(126)	1	(3)
AGOB-29	48	(158)	8	(26)
AGOB-30	59	(194)	17	(56)
AGOB-33	59	(194)	1	(3)
AGOB-34A	80	(262)	1	(3)
AGOB-37	77	(253)	15	(49)
AGOB-38	76	(249)	1	(3)
AGOB-49	35	(114)	1	(3)
P31	47	(155)	5	(15)
P32	75	(245)	5	(15)
P12	62	(202)	5	(15)
P11	33	(109)	5	(15)
R9	55	(181)	5	(15)
R10	46	(151)	5	(15)
R11	37	(122)	5	(15)

[1] Periods of current meter deployment vary from station to station.

[2] Stations shown on Figure 16.

[3] Stations shown on Figure 18.

Source: NOAA-MESA, February 1976.

0.71 in/sec). Based on observations he made in 1961 and 1964, Bumpus (1965) drew the following conclusions:

- The residual drift is variable, not always in the same direction, and at times appears nearly reversed. In spite of these variations, a general tendency is indicated.
- Offshore from a line drawn about one-half to threequarters of the distance between the shore and the 91 m (300 ft) contour, at depths of 55 to 64 m (180 to 210 ft), the tendency is toward an offshore drift (Figure 17). Shoreward of this line, the tendency is for the flow to be westerly or southerly with a component toward the coast. The location of this line is not sharply defined; it moves on or offshore from time to time, probably on a seasonal basis (this line is called the Bumpus Line of Divergence).
- There is a definite residual drift towards the mouths of the estuaries.
- The rate of residual flow varies from 0.2 to 1.3 cm/sec (0.08 to 0.51 in/sec), but is frequently 0.4 to 0.9 cm/sec (0.15 to 0.35 in/sec).
- The residual current seems to be related to a shoreward flux of shelf bottom water.

Several drifter results obtained by Hardy *et al.* (1975) for the inner shelf south of Long Island tend to confirm Bumpus' findings; they indicate that near-bottom circulation has a strong onshore component within the 27 to 42 m (72 to 220 ft) depth contours. Both NOAA-MESA and Raytheon observed seasonal variations in mean bottom current velocities which also appear to verify Bumpus' general results.

During the spring, the mean bottom current in the Northern Area is small, 2 cm/sec (0.8 in/sec), and flows in a southwesterly direction (Figure 18). The NOAA-MESA current meter stations showed a systematic shoreward trend of near-bottom currents in the Northern Area. It appears that the currents are directed toward the Hudson Shelf Valley; this results in a net onshore drift.

During the winter, the mean bottom current in the Southern Area is directed downcoast at approximately 3 cm/sec (1.2 in/sec) with a strong onshore component. This appears to be in agreement with Bumpus' finding that there is a residual drift toward the mouths of estuaries.

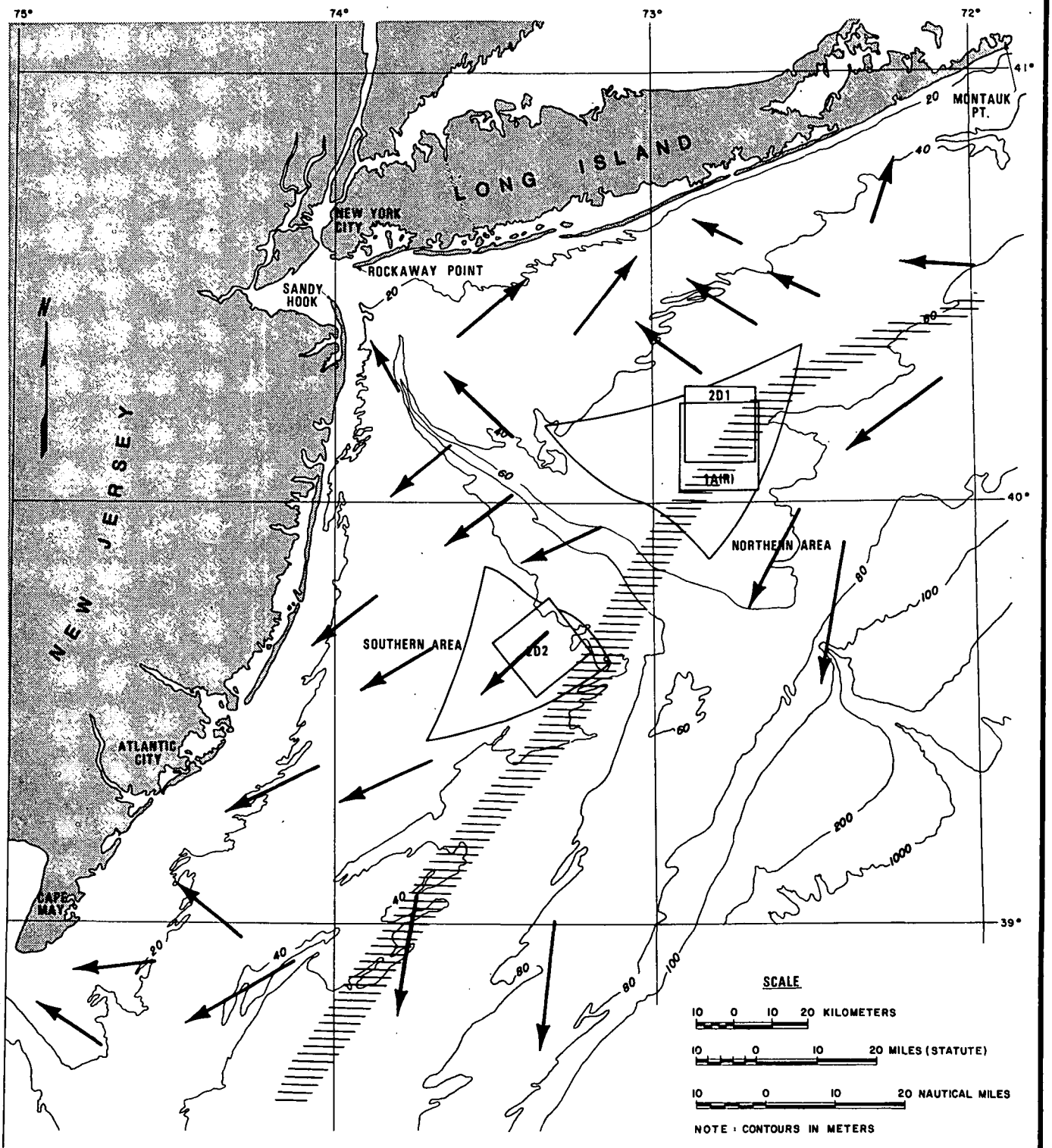
Current meter observations made during the summer, when stratified water conditions prevail, are similar to those made during the winter, when the water column is well mixed. In terms of magnitude and direction, summer bottom currents show the net drift to be around 2 cm/sec (0.8 in/sec), directed toward the southwest.

The Bumpus Line of Divergence is not evident from current meter data on the Long Island shelf (Figure 18). None of the net bottom currents for the Long Island shelf have offshore components; in fact, the two most seaward stations have net currents that are more coast-parallel than the inner station currents. All of the currents in and adjacent to the Hudson Shelf Valley have considerable onshore components, perhaps reflecting a unique flow system associated with this feature. (The Hudson Shelf Valley's flow system is discussed more fully in a subsequent section.)

The data from the New Jersey shelf region suggest that a line of divergence may exist near the 60 m (197 ft) depth contour, landward of Station P-12 (Figure 18), where the mean current has a slight offshore component. The station within the Southern Area has a considerable onshore component of net bottom flow.

Wind Drift Currents. Seasonal variations in wind conditions also influence current patterns. During the summer, the prevailing northerly winds have only a minor influence on waves and currents because of low wind velocities. However, summer storms passing north of the New York Bight tend to produce winds from the southwest, and these storms, althouth generally of lower intensity than winter storms, can influence water circulation in the Bight by adding a seaward component of drift paralleling the Long Island coast.

During the winter, air circulation over the Bight is marked by frequent, abrupt changes caused by storm centers which usually move from west to east, south of the Bight. Since winter storms are usually more intense than those in summer, their effects are generally more extensive. Such storm systems, called *Northeasters,* produce east to northeast winds on shore and can produce significant wind drift currents that move in a west-southwest direction.



GENERAL RESIDUAL CURRENT ALONG THE BOTTOM OF THE NEW YORK BIGHT

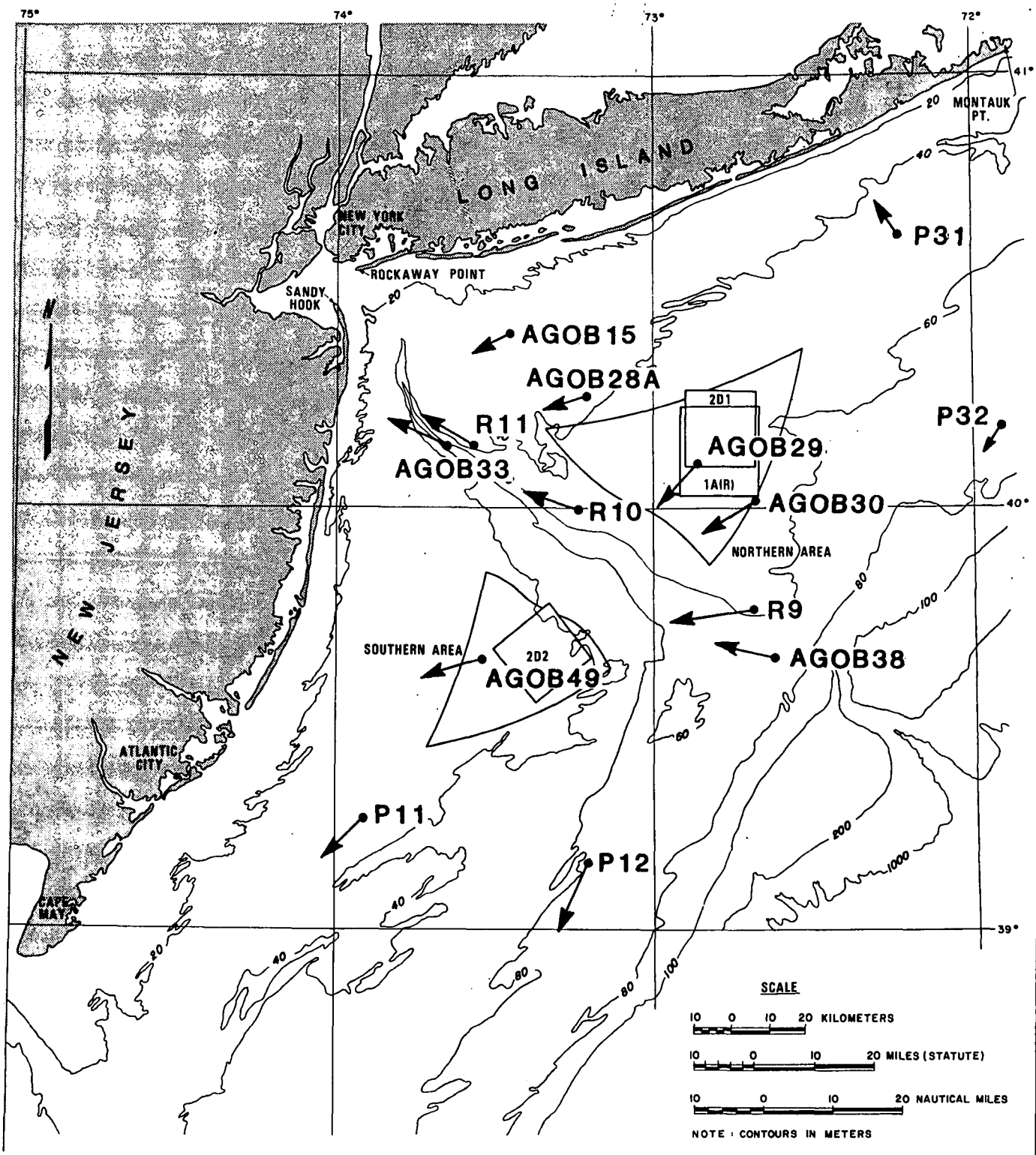
NOTE: MAGNITUDE IS NOT IMPLIED BY LENGTH OF ARROWS

KEY:

SHADED AREA INDICATES BUMPUS LINE OF DIVERGENCE OF ONSHORE AND OFFSHORE FLOW

SOURCES: BUMPUS, 1965; CHARLESWORTH, 1968.

FIGURE 17



MEAN SPRING BOTTOM CURRENTS IN THE NEW YORK BIGHT

KEY:

CURRENT VECTOR SCALE

10cm/sec
(3.9in/sec)

SOURCE: NOAA-MESA, FEBRUARY 1976.

FIGURE 18

The transfer of wind energy through the water column to bottom layers is a function of water column stratification. During the summer, bottom layers are less affected by wind stress because of the presence of the thermocline and because of the lower wind velocities. Conversely, the well-mixed condition of the water in winter enables wind energy to be transferred more easily.

During the second Raytheon cruise (Raytheon, 1975b), two storm systems were encountered which caused strong wind-induced currents. During March 19-20 and April 3-5, 1975, Northeasters were located off the New York Bight, exhibiting ENE winds at gusts up to 30 m/sec (65 mph).

The April Northeaster illustrates the behavior of currents in the water column when subjected to high wind stress during well-mixed conditions. The wind was westerly, and comparison of the vertical current structure in component form (N-S, E-W) shows the E-W current components to be large, with maximums of 34.0 cm/sec (13.4 in/sec), 33.2 cm/sec (13.1 in/sec), and 26.5 cm/sec (10.4 in/sec) for the surface, middle, and bottom currents, respectively (Dames & Moore, unpub.). The N-S components were not significantly affected.

Response of the water column to wind forces is rapid at the surface, but there is a time lag before the bottom current is impacted. Bottom currents are substantially slower than surface currents during wind-driven storms.

Hudson Shelf Valley. The summertime response of bottom currents in the axis of the inner Hudson Shelf Valley channel to surface winds has been studied by Lavelle *et al.* (1975). The direction of summertime nontidal flow in the channel axis appears to be influenced by surface wind: when the wind blew offshore (towards the southeast), the bottom currents were directed upchannel; conversely, onshore winds caused a net downchannel flow.

The data base was too limited to indicate long-term circulation patterns in the Hudson Shelf Valley, but the results do indicate that a possible upwelling/downwelling mechanism controlled by wind events is a contributing factor to circulation in the inner Hudson Shelf Valley.

Internal Waves. Internal waves on the continental shelf and in the Hudson Shelf Valley have been identified in satellite imagery studies (Apel *et al.*, 1974). Stratified water conditions must be present for the generation of internal waves. One theory is that internal waves are generated when a tidal wave propagates onto the shelf: the depth discontinuity causes tidal energy to be transformed into internal waves which then propagate onto the shelf until the bottom of the thermocline (density interface) intersects the bottom, where the waves break. Breaking internal waves can contribute to sediment resuspension and must be considered in evaluating bottom sediment transport.

BIOLOGICAL OCEANOGRAPHY

This section includes descriptions of the benthos, fisheries resources, plankton, and bacterial contamination in the New York Bight and the proposed areas.

Benthos

Included as benthos are marine species that burrow into bottom sediments, species that are attached to the bottom, and species that live and move about on the bottom. Due to their ubiquitous nature, limited mobility, and relatively long lifespan, benthic organisms are frequently used as indicators of water and sediment quality. In addition, they are often a source of food for fish and man.

Common Faunal Communities. The composition of benthic faunal communities is largely controlled by sediment type, although other parameters (such as temperature range, salinity, water quality, depth, and currents) are also important. The benthic communities of the New York Bight are characteristic of the Virgin-

ian zoogeographic zone, which extends from Cape Hatteras to Cape Cod. Sand fauna, silty-sand fauna, and silty-clay fauna are common to this zone (Figure 19).

The progression from sand fauna to silty-sand fauna to silty-clay fauna generally occurs in an offshore direction, but the transitions are subtle and the communities are not easily delineated. Differentiation is particularly difficult near the Hudson Shelf Valley, where all three faunal assemblages are found (Pratt, 1973).

Sand fauna can be found from the shore seaward to depths of 30 to 50 m (100 to 165 ft), where oxygen concentrations in the water and sediment are high and suspended food is abundant. These organisms are adapted either for movement or for holding on in sand and for recovery from burial. Among the important species of sand fauna are the surf clam and the rock crab (Pratt, 1973). Communities dominated by the surf clam may be among the most productive communities on the sea bottom (Thorson, 1957).

Silty-sand fauna can be found over large areas of the continental shelf. The distribution of the ocean quahog may be used as an indicator of silty-sand faunal assemblages. Compared with the sand fauna, the silty-sand fauna has a relatively stable environment. Deposit and suspension feeders occupy permanent tubes and burrows in the sediments. Tube-dwelling amphipods are abundant enough to be an important fish food and a useful indicator of long-term trends in environmental quality (Pearce, 1970).

Silty-clay fauna can be found in the fine sediments characteristic of protected estuaries and bays, and near the edge of the continental shelf. This faunal assemblage, which includes deposit-feeding starfish, worms, and bivalves (shellfish), is also found in the fine sediments distributed throughout the Hudson Shelf Valley. The present value of silty-clay fauna, in terms of fish food or direct yield to man, is low; this faunal assemblage, however, supports some groundfish as well as migrating continental-shelf-lobster.

Northern and Southern Areas. Examination of benthic samples from sixty stations in the Northern and Southern Areas indicates that the offshore region between 37 and 64 m (120 to 210 ft) is characterized by a relatively uniform distribution of mairofaunal assemblages (NOAA-NMFS, 1975b; Pearce, 1974b). In contrast, a heterogeneous distribution of mairofauna, in terms of abundance and composition, is found in the Bight Apex, near the existing dump sites.

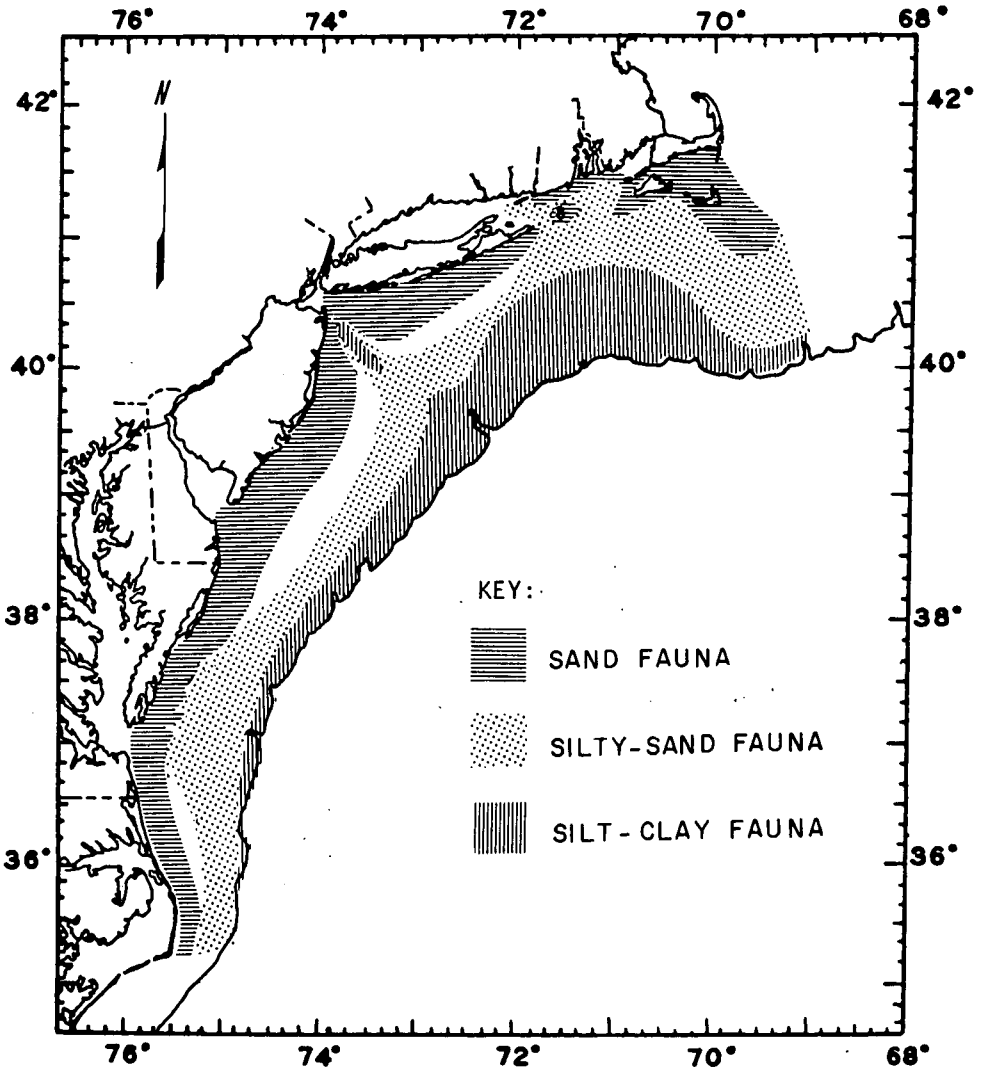
The Northern and Southern Areas have about the same species abundance and diversity as in the unpolluted or relatively unstressed portions of the Bight Apex. Surf clams were reported to be abundant in, and shoreward of, the Southern Area, and ocean quahogs were found to be numerous in both areas. The presence of these species may indicate that both areas are transitional between the highly productive sand fauna community, represented by the surf clam, and the silty-sand fauna, represented by the ocean quahog. Except for differences in shellfish abundance, both the Northern and Southern Areas seem to have equally productive benthic communities, at least in terms of fish food value and direct fisheries resource potential.

Fisheries Resources

The information presented in this subsection has been selected and organized to concentrate on those points relevant to impact evaluation and alternate site selection. For simplicity, common names are used in the text, but the taxonomic equivalents can be found in Table 19. Pelagic fish are those that live and feed in the water column; demersal fish are bottom dwellers.

This discussion also includes shellfish (which are usually categorized as benthic species) because of their large contribution to fisheries resources in the New York Bight. Shellfish include the bivalves (clams, scallops, and quahogs) and some crustaceans (lobster and crab).

New York Bight. The fish population of the New York Bight includes nonmigrating species, transitory species during migrations, and transitory species residing seasonally (New York Ocean Science Laboratory, 1973). The Bight is also an important spawning area for coastal fish. However, these fish do not spawn at specific local sites; the location and areal extent of the most intense spawning vary annually (NOAA-NMFS, 1975b), and are probably influenced by naturally occurring variables such as temperature and possibly larval food supply. As a result of extensive fish surveys in the New York Bight, NOAA-NMFS (1975b) concluded that only general spawning areas could be compared with any accuracy.



BENTHIC FAUNAL TYPES IN THE MID-ATLANTIC BIGHT

100 0 100 200 KILOMETERS

100 0 100 200 STATUTE MILES

100 0 100 200 NAUTICAL MILES

SOURCE: PRATT, 1973.

FIGURE 19

TABLE 19

THE COMMON FISHERIES RESOURCES OF THE NEW YORK BIGHT

Common Name	Scientific Name
Species Not Found in the Northern or Southern Area	
bay scallop	*Aequipecten irradians*
blue crab	*Callinectes sapidus*
blue marlin	*Makaira nigricans*
calico scallop	*Argopecten cibbus*
eastern osyter	*Crassostrea mercenaria*
hard clam	*Mercenaria mercenaria*
quahog	*Mercenaria campechiensis*
shad	*Alosa sapidissima*
soft shell clam	*Mya arenaria*
striped bass	*Roccus saxatilis*
swordfish	*Xiphias gladius*
weakfish	*Cynoscion regalis*
white marlin	*Makaira albida*
Species That Periodically Inhabit or Pass Through the Northern or Southern Area	
alewife	*Alosa pseudoharengus*
American lobster	*Homarus americanus*
Atlantic mackerel	*Scomber scombrus*
Atlantic menhaden	*Brevoortia tyrannus*
black sea bass	*Centropristes striatus*
bluefish	*Pomatomus saltatrix*
cod	*Gadus morhua*
goosefish	*Lophius americanus*
little skate	*Raja erinacea*
ocean pout	*Macrozoarces americanus*
red crab	*Geryon guincuidens*
red hake	*Urophycis chuss*
rock crab	*Cancer borsalis*
rock crab	*Cancer irroratus*
scup (porgy)	*Setnotomus chrysops*
silver hake	*Merluccius bilinearis*
squid	*Loligo pealei*
summer flounder	*Paralichthys dentatus*
winter flounder	*Pseudopleuronectes americanus*
yellow tail flounder	*Limanda ferruginea*
Species That Inhabit the Northern or Southern Area for Most or All of Their Life Cycle	
ocean quahog	*Arctica islandica*
sea scallop	*Placopecten maqelianicus*
surf clam	*Spisula solidissima*

Sources: Saila and Pratt, 1973; NOAA-NMFS, 1975b.

Northern and Southern Areas. The Northern and Southern Areas are within the spawning range of most coastal fish and are also in the migratory path of coastal (north-south) and inshore-offshore migrants. Population centers of year-round resident species, which include little skate, goosefish, silver and red hakes, ocean pout, yellow tail flounder, and squid (NOAA-MESA, February 1976), lie either in or near these areas.

Constituents of the major fisheries are discussed below according to their geographic and migratory distribution patterns. The proposed action would of course have the least effect on those fish that do not reside in the proposed areas. Conversely, it would have the greatest effect on those fish that spend most (or a vital part) of their life cycle in the proposed areas.

Information on life histories and habits of the major fish species in the Mid-Atlantic Bight was obtained from Saila and Pratt (1973), which also served as the basis for dividing the various species into the categories discussed below and shown in Table 19.

Species that are not found in the Northern or Southern Area include the eastern oyster, hard clam, calico scallop, soft shell clam, and bay scallop, all of which are bivalves. Because of their limited motility, they are not likely to be found migrating to or through these areas. The striped bass, American shad, swordfish, white and blue marlins, weakfish (all bony fish), and the blue crab (crustacean) are motile species not common to either area. However, because of their motility, the absence of these species from the proposed areas is not a certainty.

Species that periodically inhabit or pass through the Northern or Southern Area are numerous, as shown in Table 19. There is little in the way of site selection that can be done to mitigate the impacts of development on these species because they are so common throughout the New York Bight.

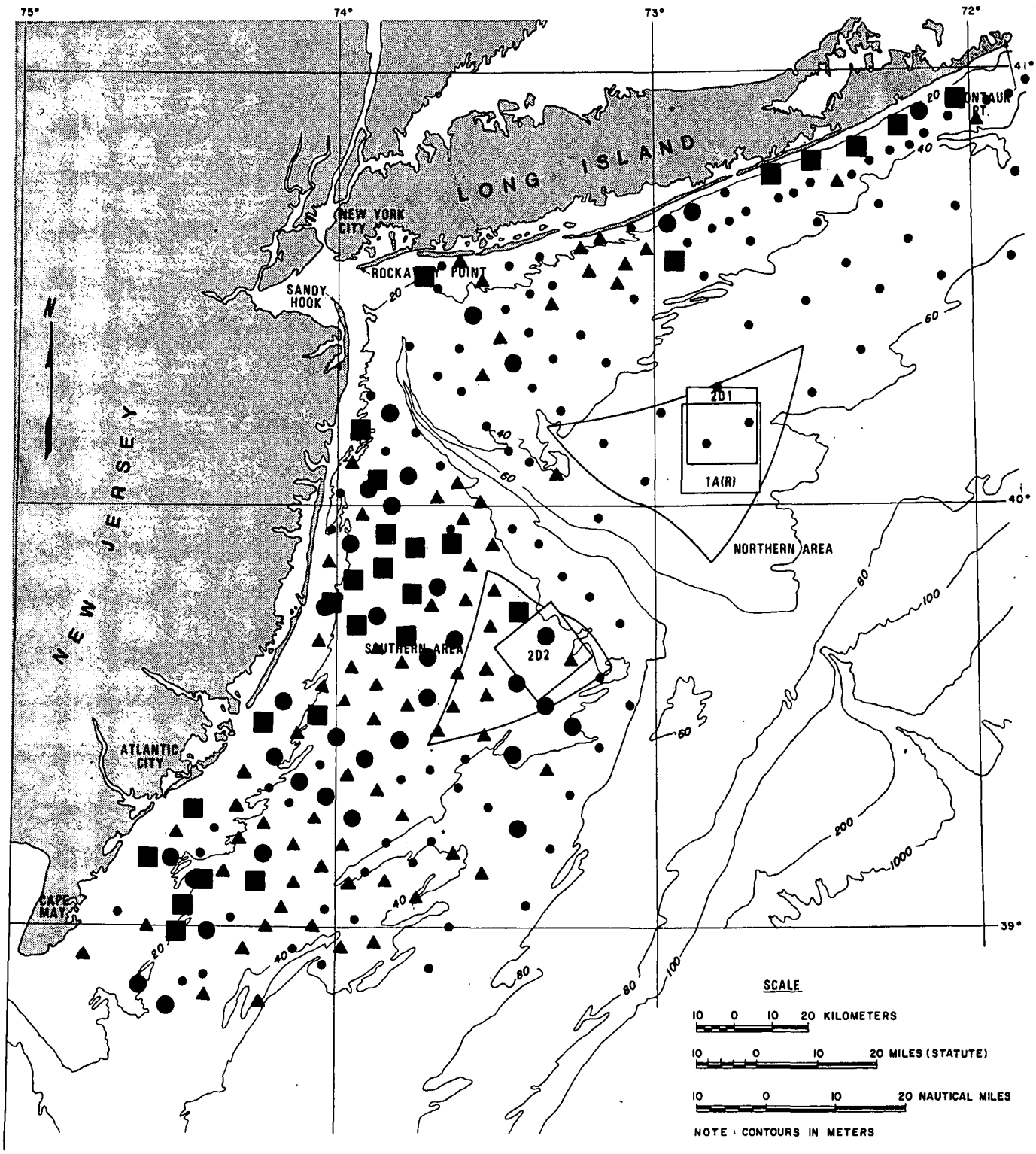
The red crab fishery is of unknown value, and remains essentially an untapped resource. The American lobster is found in waters from Labrador to North Carolina. The lack of both suitable substrate and sufficiently cold water temperatures tends to restrict lobster to the deeper waters south of Long Island. In the Bight, they are common to silty sands at depths of 27 m (90 ft) and are found in abundance around the numerous wrecks off the New Jersey coast. An inshore lobster fishery, which extends from Cape Cod to New Jersey, accounted for approximately one-fifth of the U.S. landings in 1968, but it is quite likely that this inshore fishery is currently over-exploited (Saila and Pratt, 1973). Both the red crab and American lobster are reported to be abundant in the outer portions of the Hudson Shelf Valley, with breeding zones reported in its inner reaches (Buelow *et al.*, 1968).

The rock crab is common in coastal waters from Labrador to South Carolina, but the present fishery is centered on the coastal waters of Maine and Massachusetts (Saila and Pratt, 1973). Monthly groundfish surveys by NOAA-NMFS (1975b) revealed that only limited numbers of rock crab are present in the Northern and Southern Areas.

Species that inhabit the Northern or Southern Area on a nonexclusive basis for most or all of their life cycles include the surf clam, sea scallop, and ocean quahog, as well as other ecologically important invertebrates. Surf clams and ocean quahogs are abundant over large areas on the continental shelf, from Long Island to Maryland (Saila and Pratt, 1973) (Figures 20 through 23). Sea scallops, in commercial quantities, are found in patchy distributions throughout the New York Bight (Figure 24).

Previous surf clam surveys (Figures 20 and 21) reported an abundance of this commercial bivalve in and shoreward of the Southern Area, but few were observed in or near the Northern Area. Information from the 1974 *Delaware II* cruise (Figure 22) indicates that the center of the surf clam fishery is no longer off the New Jersey coast but has moved farther south, off the Delmarva Peninsula. However, surf clams remain abundant near, and especially shoreward of, the Southern Area.

Ocean quahogs are generally found far offshore, at depths of 25 to 61 m (75 to 185 ft), while surf clams inhabit near-shore waters at depths of about 43 m (135 ft) (Merrill and Ropes, 1969). Because of this difference in distribution with depth, shellfish surveys specifically directed at surf clams would probably not sample the most appropriate ocean quahog habitats. Nevertheless, the 1974 *Delaware II* shellfish assessment cruise does provide data on ocean quahog distributions in the near-shore waters of the Mid-Atlantic Bight (Figure 23). The results indicate that although ocean quahogs are numerous in the Southern Area, they are found in greatest abundance and frequency just off Long Island (NOAA-NMFS, 1974). The Northern Area



SURF CLAM DISTRIBUTION IN THE NEW YORK BIGHT (1965)

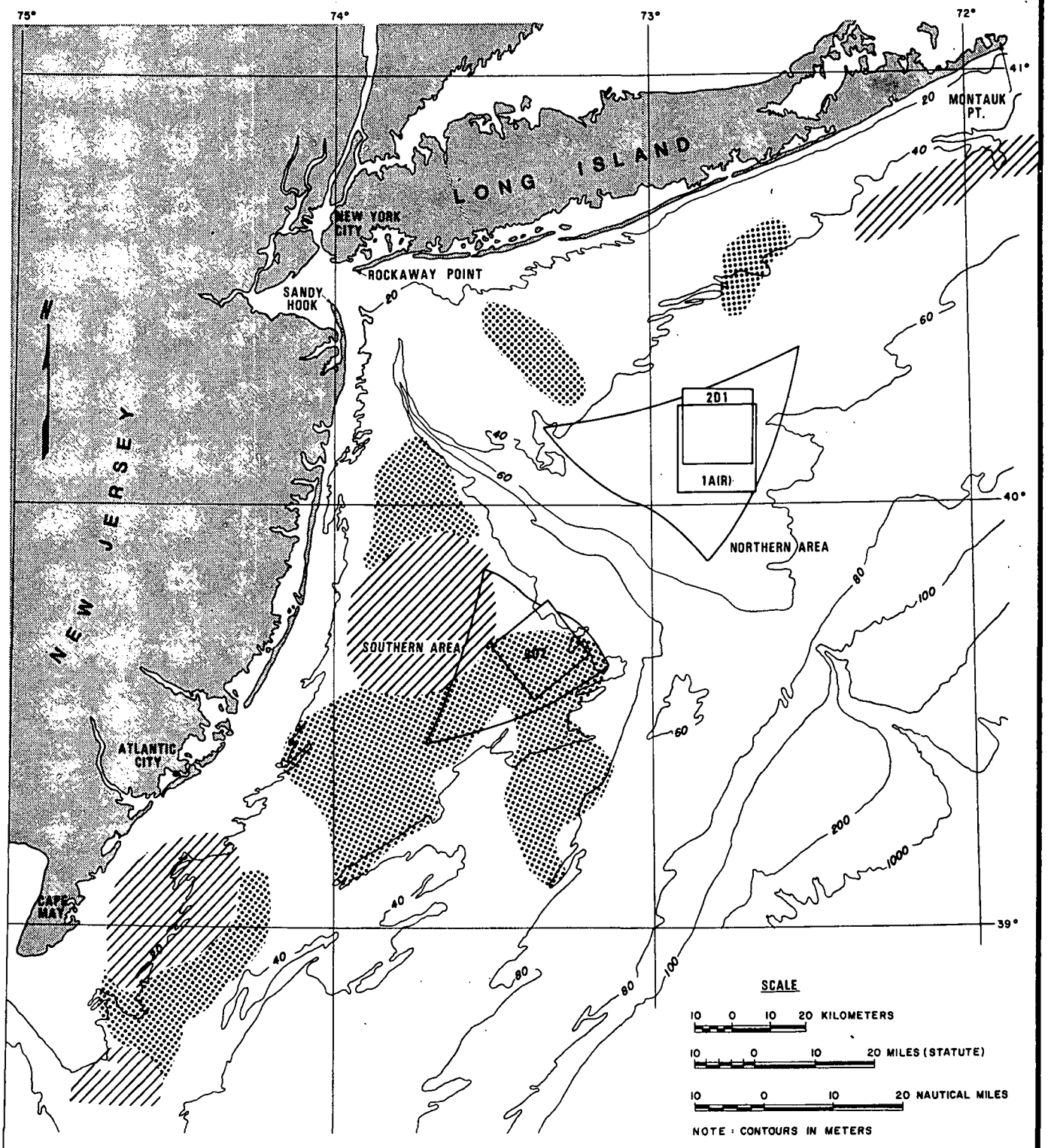
KEY:

- • NO SURF CLAMS
- ▲ UNDER ¼ BUSHEL
- ● ¼ TO 1 BUSHEL
- ■ 1 BUSHEL OR MORE

CATCH = 5 MINUTE TOW WITH 30 IN(0.8M) DREDGE

SOURCE: BUELOW ET AL., 1968.

FIGURE 20



SURF CLAM DISTRIBUTION IN THE NEW YORK BIGHT (1969)

KEY:

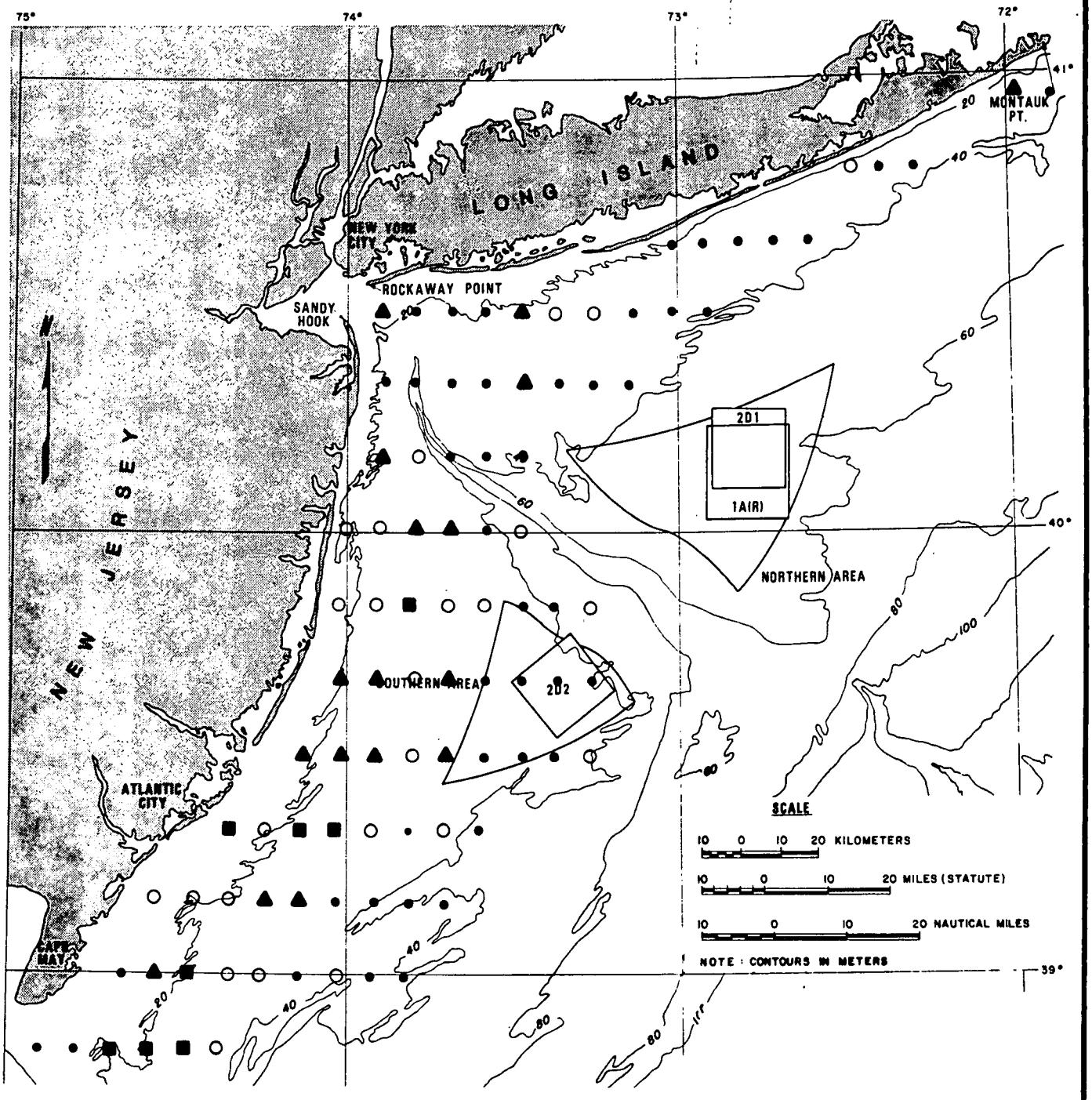
1 BUSHEL OR MORE

¼ TO 1 BUSHEL

CATCH = 5 MINUTE TOW WITH 30 IN (0.8M) DREDGE

SOURCE: PEARCE, 1974a (AFTER ROPES ET AL., 1969).

FIGURE 21



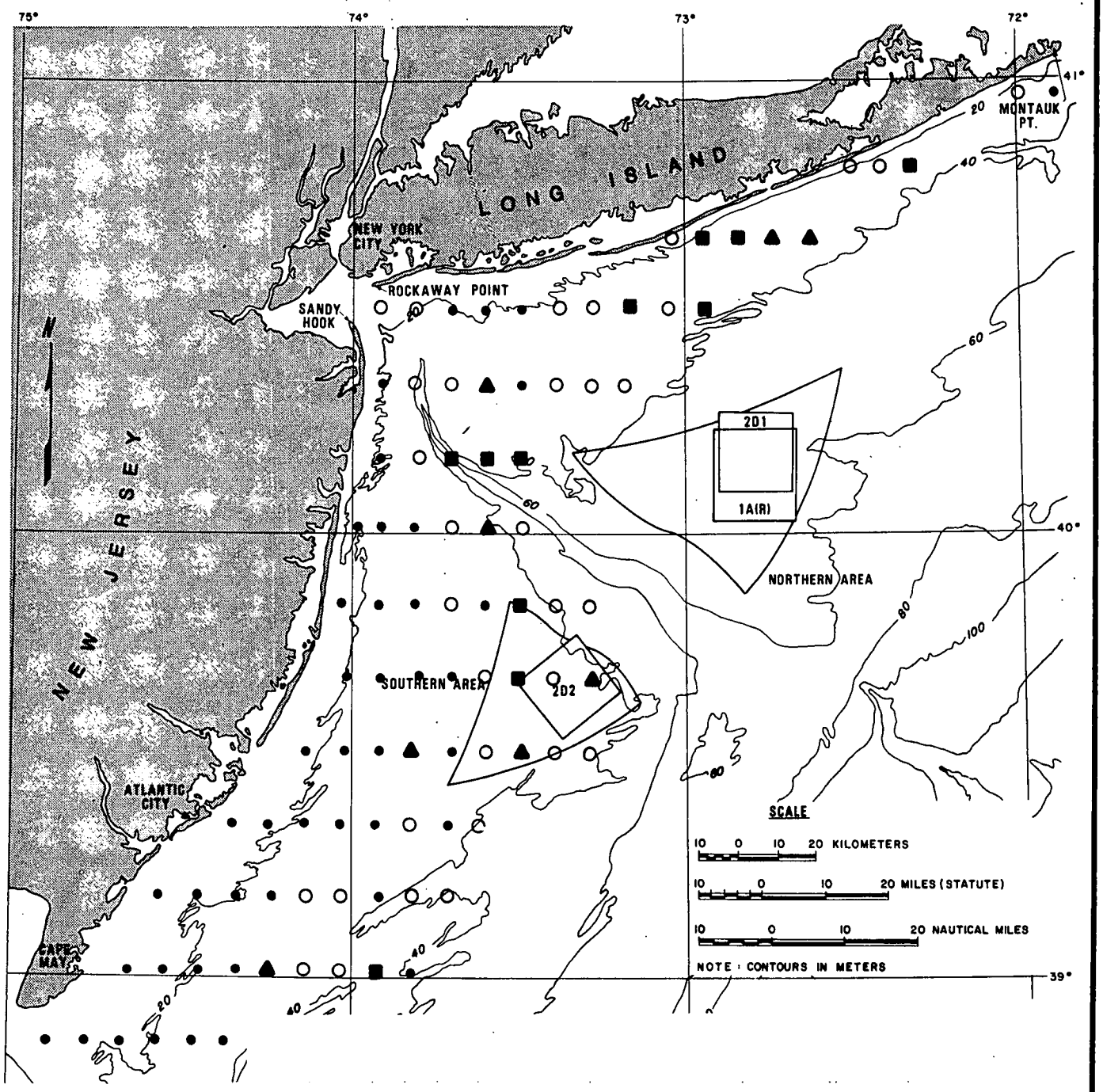
SURF CLAM DISTRIBUTION IN THE NEW YORK BIGHT (1974)

DELAWARE II SHELLFISH ASSESSMENT CRUISE JUNE 1974

AREA	PERCENTAGE OF SAMPLE WITH			
	1.0 BU OR MORE	<1.0 TO >1/4 BU.	1/4 BU. OR LESS	NONE
LONG ISLAND	0	14.3	10.7	75.0
NEW JERSEY	12.3	19.2	30.1	38.4
DELMARVA PENINSULA	11.6	27.9	25.6	34.9
VIRGINIA-N.CAROLINA	5.6	9.3	20.4	64.8
SYMBOLS	■	▲	O	•

SOURCE: NOAA-NMFS, 1974c.

FIGURE 22



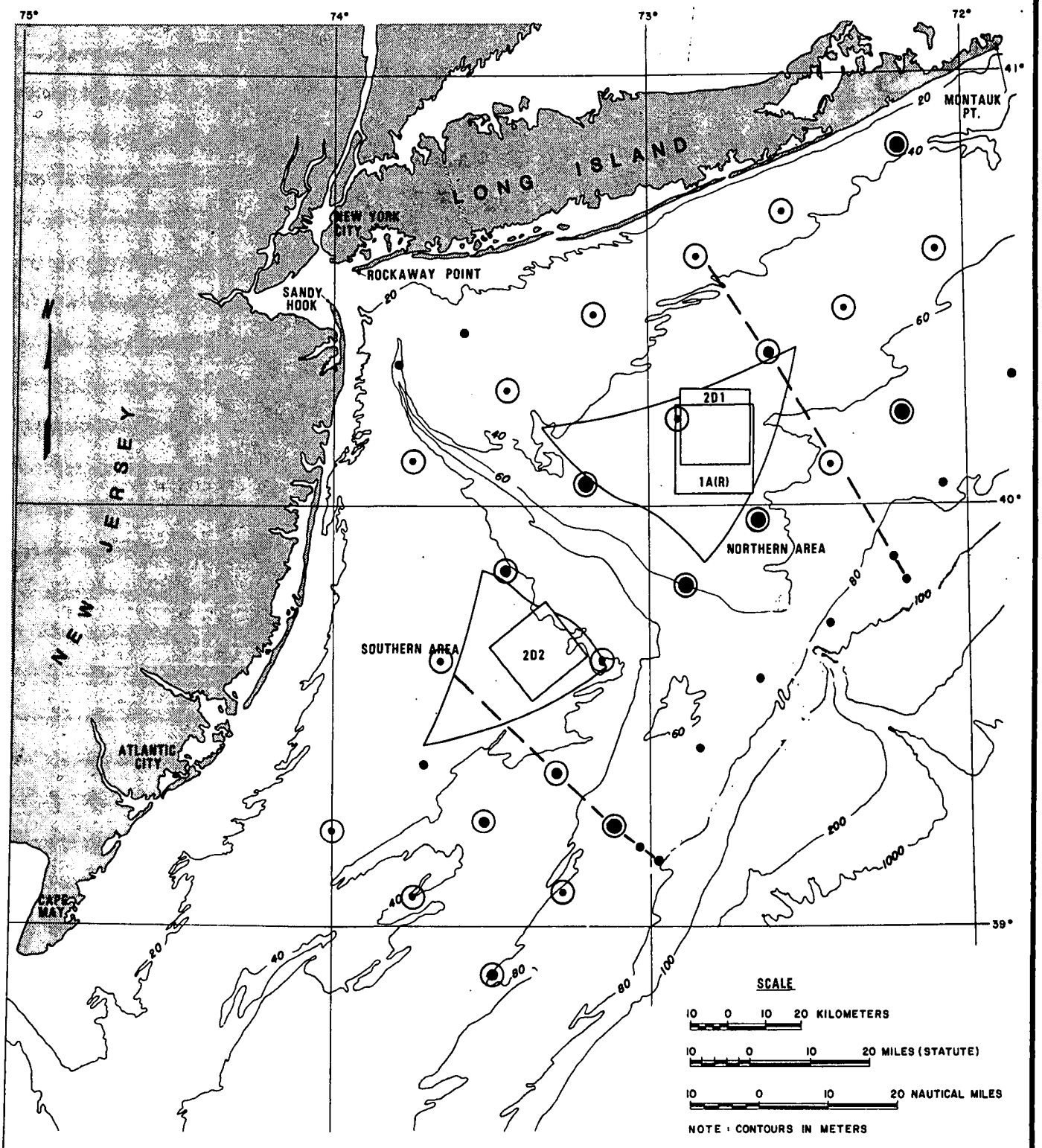
OCEAN QUAHOG DISTRIBUTION IN THE NEW YORK BIGHT (1974)

DELAWARE II SHELLFISH ASSESSMENT CRUISE JUNE 1974

AREA	PERCENTAGE OF SAMPLE WITH			
	1.0 BU OR MORE	<1.0 TO >1/4 BU.	1/4 BU. OR LESS	NONE
LONG ISLAND	25.0	10.7	46.4	17.9
NEW JERSEY	8.2	6.9	30.1	54.8
DELMARVA PENINSULA	1.2	0	17.4	81.4
VIRGINIA-N.CAROLINA	0	0	0	100.0
SYMBOLS	■	▲	○	•

SOURCE: NOAA-NMFS, 1974c.

FIGURE 23



SEA SCALLOP DISTRIBUTION IN THE NEW YORK BIGHT (1975)

SEA SCALLOP DISTRIBUTIONAL STUDY

R/V ALBATROSS IV CRUISE 75-8
AUGUST 7-16, 1975

KEY:

- • NO SCALLOPS
- ⊙ UNDER ¼ BUSHEL
- ◉ ¼ TO 1 BUSHEL
- ◉ 1 TO 2 BUSHELS

SOURCE: NOAA-NMFS, 1975c.

DASHED LINES INDICATE MAJOR TRANSECTS

FIGURE 24

was not sampled. More recent shellfish surveys of the proposed areas (NOAA-NMFS, 1975b) report ocean quahogs to be numerous in both areas.

At present, ocean quahogs constitute the largest underutilized clam resource in the Mid-Atlantic Bight (Saila and Pratt, 1973). Underutilization may be attributed to a number of factors: the rapid growth of the surf clam fishery to meet market demand; the larger yield of meat per bushel provided by the surf clam (Merrill and Ropes, 1969); the greater distance to ocean quahog areas; and the poor keeping properties and strong, variable flavor of ocean quahogs (Mendelsohn *et al.*, 1970; Medcof and Chandler, 1968). Nevertheless, the ocean quahog might become a future substitute for the surf clam (Mendelsohn *et al.*, 1970).

The major fishing area for sea scallops is near the Hudson Shelf Valley and off the Virginia Capes (Saila and Pratt, 1973). Sea scallops were found at or near both the Northern and Southern Areas (NOAA-NMFS, 1975c) (Figure 24). However, estimates of their abundance in these areas are lacking. Taking the Mid-Atlantic Bight as a whole, however, sea scallops were found at depths of 31 to 110 m (95 to 340 ft), with 71 percent of the catch occuring between 57 and 73 m (180 to 220 ft) and 21 percent occurring between 36 and 54 m (120 and 165 ft), (NOAA-NMFS, 1975c), (Figure 24).

Plankton

Plankton is the name given to the usually minute plants (phytoplankton) and animals (zooplankton) that float in the water column. Phytoplankton are the primary producers at the base of the food chain; zooplankton, for the most part, are herbivores that feed on the phytoplankton. The high degree of spatial and temporal variation inherent in plankton populations makes a study of their abundance, composition, and distribution extremely difficult.

Productivity in an area is a function of many environmental variables, especially the availability of nutrients. Malone (1975) prepared a review of plankton taxonomy and distribution in the New York Bight. He examined published and unpublished data spanning seventy-five years and determined that phytoplankton species composition in the Bight is influenced most strongly by estuarine processes. Conversely, zooplankton composition is influenced most strongly by oceanic processes. Although Malone's summarized data provide a baseline from which future changes can be projected, they are insufficient to define the effect of man's activities on plankton populations. Malone attributed this insufficiency to a lack of standardized methodology and to inadequate temporal and spatial sampling.

Ryther and Dunstan (1971) found nitrate-nitrogen to be the limiting factor in plankton productivity within coastal waters. However, this does not appear to be the case in the Bight Apex. A high nutrient input from the Hudson River estuary results in an estimated 2,000 metric tons (2,200 tons) per day of carbon fixed by phytoplankton in the Apex. The subsequent oxidation of this organic carbon contributes to the low oxygen concentrations observed in Bight Apex bottom waters. (NOAA-MESA, March 1975).

The New York Ocean Science Laboratory (1973) correlated physical and chemical characteristics of water in the New York Bight with zooplankton species and biomass. The results included the identification of four water masses:

- New York Harbor waters, with salinity values of less than 20 ppt, form a shallow tongue of surface water within the estuary (Ketchum *et al.*, 1951). This water mass supports a predominantly estuarine species population characterized by seasonal variations in composition and low biomass.
- New York Bight waters, with salinity values of 29 to 31 ppt, are found seaward of the harbor waters and down to the thermocline. Species diversity is greater than in harbor waters. A significant number of fish eggs from estuarine spawners, such as anchovy and menhaden, are found in this water mass. These phenomena were also observed by NOAA-MESA (February 1976).
- Atlantic Bight shelf waters, with salinity values of more than 31.25 ppt, usually occur below the thermocline except in areas of upwelling. The source of these waters is the continental shelf. Pelagic shelf plankton dominate.

— Mixed waters, with salinity values of 31 to 31.5 ppt, separate harbor, Bight, and shelf waters. The highest zooplankton biomass is found here. The greatest input of plankters is from shelf waters of the New York Bight while, unlike harbor and Bight waters, veliger larvae and barnacle cyprids are few, if present at all.

Bacterial Contamination, Antibiotic-Resistant Bacteria, and Diseases of Marine Organisms

Coliform Contamination. Traditionally, coliform bacteria have been used as an indicator of pollution from municipal wastewater discharges. Although coliforms themselves do not pose a threat to public health, their presence in large numbers indicates, with a high degree of probability, that pathogenic organisms are also present. Only recently has it become possible to directly monitor for pathogenic organisms *in situ*, so most available historic data are for the coliform group.

Since 1968, EPA and FDA have been monitoring the bottom sediments and water column in the Bight Apex, including the vicinity of the existing sewage sludge dump site, for indications of coliform contamination. This monitoring activity has resulted in the following observations and actions.

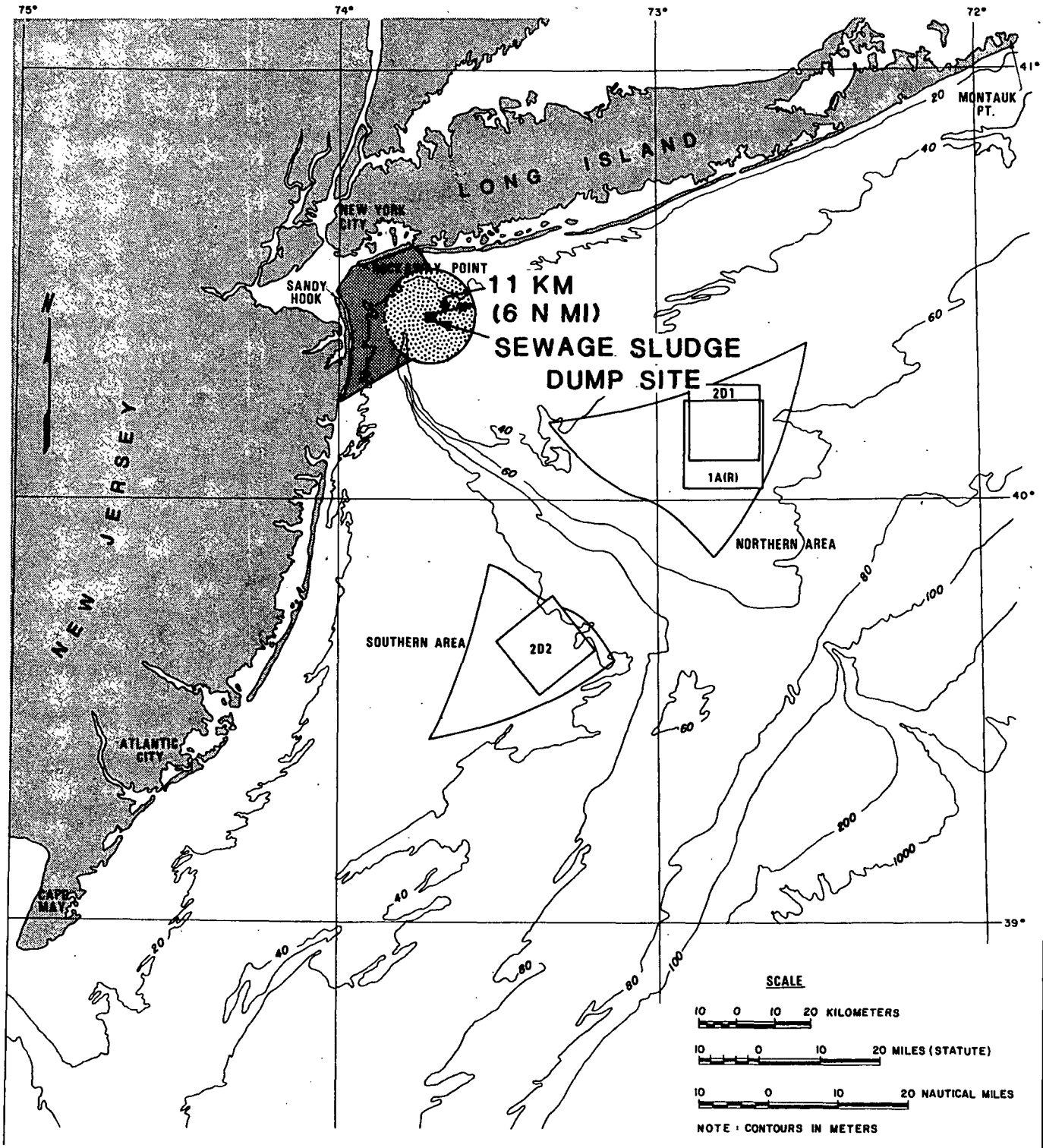
In 1970, FDA prohibited shellfishing within a radius of 11.1 km (6.0 n mi) of the existing sewage sludge dump site (Figure 25). This prohibition was based on high coliform counts in the water column and bottom sediments (Buelow *et al.*, 1968; McGraw, 1969) and on the potential threat of shellfish contamination. Adjacent areas, however, were found to be safe for shellfish harvesting. Coliforms contributed by sludge dumping were not accumulating, but were experiencing a relatively rapid die-off following their introduction into the Bight Apex (McGraw, 1969).

In 1972, FDA extended the prohibited shellfishing zone to the Long Island and New Jersey shorelines (Figure 25). Near-shore waters, out to the 3-mile (5.6 km) limit, had previously been closed to shellfishing because of potential coliform contamination from onshore sources (FDA, 1972). The decision to close the additional area was based solely upon the poor quality of surface water; bottom waters and sediments appeared to be of good quality. Coliform sampling data strongly suggest that contamination of shellfish waters beyond the 3-mile (5.6 km) limit is attributable to onshore sources (runoff, wastewater discharges, and estuarine inputs) rather than to sludge dumping; the incidence of coliforms in near-shore bottom sediments was found to be low and decreased significantly seaward.

The most recent FDA (1974a) and EPA (July 1974; April 1975; unpub.) studies of the waters between the sludge dump site and the Long Island and New Jersey beaches show no significant coliform contamination of the water column or sediments that can be attributed to sludge dumping at the existing site. The EPA monitoring program for the Bight Apex continues to show excellent surface and bottom water quality, with regard to coliform densities, along the beaches. The program includes tests for coliform bacterial groups in bottom sediments and the water column, for selected pathogenic bacterial groups in bottom sediments and, since late 1975, for viruses in the water column. However, FDA still finds the area unacceptable for shellfishing (FDA, December 18, 1975).

Antibiotic-Resistant Bacteria. The increased use of antibiotics has resulted in mutant bacteria that are resistant to a broad spectrum of antibiotics, and possibly even to heavy metals (Davies and Rownd, 1972; Summers and Silver, 1972). The focus of concern is a transfer resistance factor known as R-plasmid, which may be transmitted from one bacterium to another through normal reproduction processes (Davies and Rownd, 1972). Recently, antibiotic-resistant bacteria have been isolated in New York Bight waters from the vicinity of the existing sludge dump site (Koditschek and Guyre, 1974a). It has been suggested that the dump site is a potential "breeding ground" for such bacteria.

Antibiotic-resistant (R-plasmid) bacteria are not unique to sewage sludge nor to ocean dumping of sludge. They have been recovered from raw and treated sewage, from river water, from salt water in Mobile Bay, Alabama (Feary *et al.*, 1972), from the Whippany River, New Jersey (Koditschek and Guyre, 1974b), and from beach water at Sandy Hook, New Jersey (Koditschek and Guyre, 1975). Antibiotic-resistant bacteria are an indicator of wastewater contamination.



AREA CLOSED TO SHELLFISHING IN VICINITY OF SEWAGE DUMP SITE

KEY:
CLOSED TO SHELLFISHING

1970

1972

SOURCE: FDA, 1973.

FIGURE 25

Diseases of Marine Organisms. Several diseases have been observed in a variety of marine organisms in the Bight Apex. These diseases include fin rot, lobster die-offs, necrosis of crustacean exoskeletons, gill fouling, and protozoan parasites on gill tissues. To date, none of these conditions have been attributed directly or solely to sludge dumping, nor have the causative agents been isolated.

The occurrence of fin rot has been linked to "environmental stress" because laboratory researchers have been unable to induce the condition in test fish through innoculation with bacterial isolates (Mahoney *et al.*, 1973). Ziskowski and Murchelano (1975) found that fin rot was confined largely to bottom dwelling flat fish in Raritan Bay and the Bight Apex, with no occurrence among fish in the relatively pristine Great Bay on Long Island. Fin rot was also observed in pelagic species, such as weakfish, from the western end of Raritan Bay.

Fin rot in winter flounder, the most commonly affected species, was statistically greater in the Bight Apex than in seaward areas of the New York Bight. The percentage of occurrence was statistically greatest in areas containing sediments of high-carbon content. Also, no diseased fish were found in the vicinity of ocean outfalls (NOAA-MESA, February 1976). Preliminary results from ongoing experiments indicate that survival of caged fish in the Christiansen Basin, where organic material is accumulating, is low compared with fish survival in unpolluted areas (Murchelano and Ziskowski, 1975).

Pathological conditions of shells and gills have been observed in crustaceans, including rock crab, lobster, and shrimp (NOAA-NMFS, 1975b; Young and Pearce, 1975). Crabs with coated gills have been observed in the Bight Apex. This "black gill" disease was found to be prevalent except during the molting season. Necrosis of the exoskeleton and appendages of shrimp, lobster, and crab was also reported in the vicinity of the sludge and dredged material dump sites. It is postulated that the degraded conditions of the Bight Apex, together with the high concentrations of bacteria there, contribute to diseases of marine organisms.

GEOLOGICAL OCEANOGRAPHY

This section includes descriptions of the geomorphology, surficial sediments, and suspended particulate matter of the New York Bight and the proposed Northern and Southern Areas.

Geomorphology

The sea floor is not a smooth, featureless plain; it is characterized by forms and structures (known as geomorphologic features or bedforms) just as the land surface is characterized by features such as hills and valleys.

The continental shelf, including that portion underlying the New York Bight, exhibits a variety of geomorphologic features, such as relict drainage channels, scarps and terraces, systems of sand ridges, and smaller features (bedforms) (Figure 26). Reviews of the continental shelf's geomorphologic features and their origins can be found in Milliman *et al.* (1972) and Swift *et al.* (1973). In general, the geomorphology of the continental shelf reflects the cumulative processes of erosion and deposition by streams and near-shore currents.

Relict Drainage Channels. Relict drainage channels are simply the remains of drainage channels from earlier geologic periods. During glacial periods, when the sea level was low, much of the continental shelf was exposed. Streams associated with large drainage systems, such as the Hudson River, cut deep erosional valleys in the surface of the continental shelf. On the Long Island shelf, a trunk drainage system (Long Island Valley) has been inferred from analyses of Stearns' (1967) bathymetric charts (Garrison and McMaster, 1966; McKinney and Friedman, 1970).

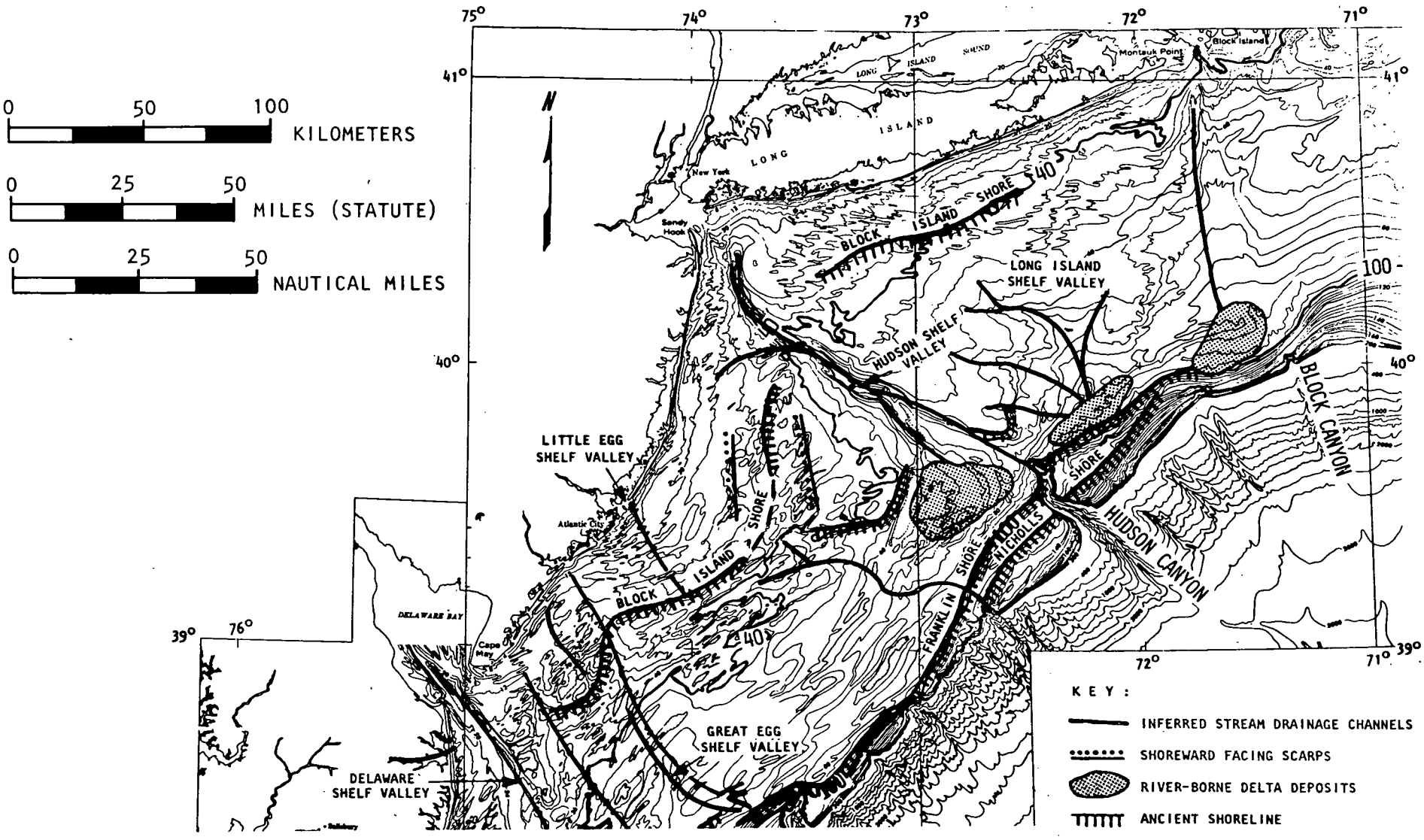


FIGURE 26

GEOMORPHIC ELEMENTS OF THE MID-ATLANTIC CONTINENTAL SHELF

SOURCES: MILLIMAN, ET AL., 1972; SWIFT, 1974;
GARRISON AND McMASTER, 1966; McKINNEY, 1975.

Scarps and Terraces. The shelf surface also displays a series of scarps and terraces formed by erosion and deposition during periods of constant sea level (Veatch and Smith, 1939; Emery and Uchupi, 1972; Garrison and McMaster, 1966; McClennen and McMaster, 1971; Swift *et al.*, 1972). The fact that much of the shelf still bears the patterns and features of earlier erosion suggests that there has been very little sediment deposition there since the last sea level rise.

Sand Ridges. These are the most conspicuous geomorphologic features of the continental shelf: they are 2 to 4 km (1.1 to 2.2 n mi) apart, up to 10 m (33 ft) high, and extend for tens of kilometers. Investigations show that these sand ridges rest on older lagoonal strata (Swift *et al.*, 1973; Stubblefield *et al.*, 1974; Stubblefield *et al.*, 1975; Stahl *et al.*, 1972). They appear to have been caused by storm action in near-shore areas during the last sea level rise; as the sea level rose, they became isolated remnants on the shelf surface (Swift *et al.*, 1973).

Smaller Bedforms. The effect of present hydraulic action on the shelf surface is evidenced by the formation of smaller beoforms, such as wave ripples and large-scale current lineations. The latter appear as elongate forms up to 1.5 m (4.9 ft) high, arranged in furrows, bands, patches, and ribbons of alternating sediment types. They are thought to be caused by bottom hydraulic flows associated with major storms (McKinney *et al.*, 1974; MacIntyre and Pilkey, 1969).

Surficial Sediments

Recent studies of surficial sediments on the eastern continental shelf of the United States reveal that, in general, the shelf surface is a vast sand plain (Emery and Schlee, 1963; Emery, 1966; Schlee, 1973; Milliman *et al.*, 1972). The sand generally accumulates in elongated ridges, which are especially well developed on the inner portions of the shelf. While sand is the most abundant textural component on the shelf, significant deposits of gravel, greater than 2.0 mm (0.08 in) in size, and mud (silt and clay), less than 62 microns (0.002 in) in size, are also present.

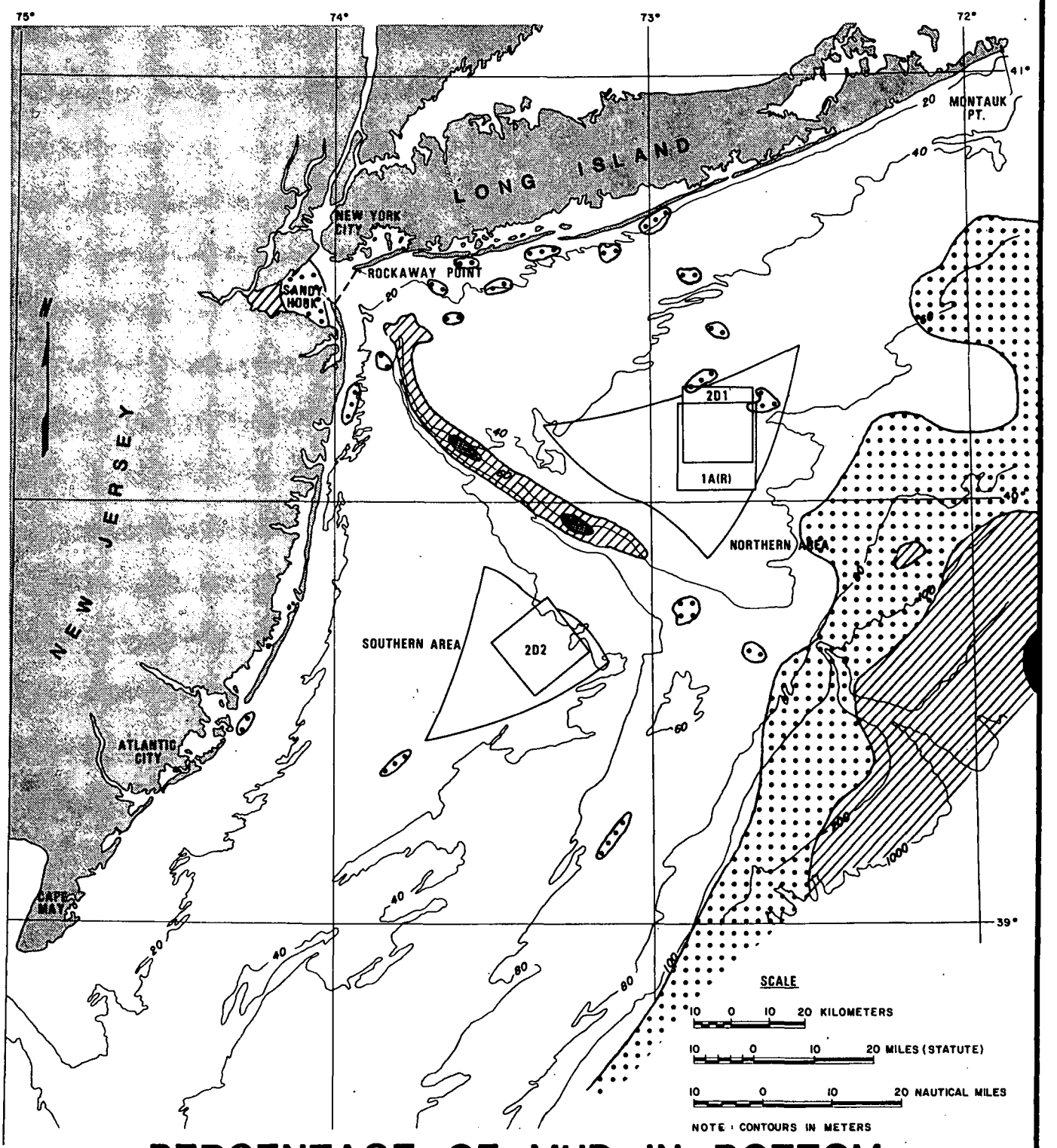
Gravel. There are indications of a large gravel deposit in the near-shore areas of the northern New Jersey shelf, a major portion of which lies in the Southern Area, as shown in Figure 6 (Schlee and Platt, 1970; Schlee, 1975). These deposits are thought to consist of riverborne terrace gravels transported to the exposed shelf by glacial meltwaters, probably from the Hudson River system (Schlee and Platt, 1970). Bottom samples taken in Subarea 2D2 (Southern Area) contain up to 39 percent gravel. Scattered deposits, high in gravel content, are also present on the Long Island shelf.

Mud. The distribution of mud (fines), less than 62 microns (0.002 in) in size, in the New York Bight is shown in Figure 27. The high percentage of fines in the area south of eastern Long Island delineates the western edge of a large relict silt deposit on the southern New England shelf (McKinney and Friedman, 1970). In general, the percentage of fines on the inner and middle shelves is less than 0.5 percent, at least out to about the 64 m (210 ft) depth contour, although locally, in depressions, the percentage of fines can be up to 5 percent.

Between the 64 and 92 m (209 and 301 ft) depth contours, the shelf is characterized by values of 5 to 10 percent fines. In the depression area of the Long Island Shelf Valley, fines increase to 20 to 30 percent locally, and at the 100 m (330 ft) depth contour, the percentages increase markedly. Finally, at the shelf edge, where the depth is about 183 m (600 ft), values of 40 to 50 percent fines are common. The inner and middle segments of the Hudson Shelf Valley are characterized by high percentages of fines, generally greater than 25 percent and locally greater than 50 percent. Overall, the New Jersey shelf is lower in fine material.

Suspended Particulate Matter

Studies of suspended particulate matter (SPM) in waters of the eastern continental shelf of the United States (Manheim *et al.*, 1970; Meade, 1969, 1972; Meade *et al.*, 1975) and of other shelves (McCave, 1972) indicate that concentrations, in both surface and bottom waters, decrease rapidly away from the coastal



PERCENTAGE OF MUD IN BOTTOM SEDIMENTS OF THE NEW YORK BIGHT

PERCENT LESS THAN 62μ (0.0024 IN)

KEY :

- > 1.0
- 1.0 TO 25
- 25 TO 50
- 50 TO 75

SOURCES: SCHLEE, 1973; HOLLISTER, 1973;
NOAA-MESA, FEBRUARY 1976;
McKINNEY AND FRIEDMAN, 1970.

FIGURE 27

zone. This condition is aided by the predominantly coast-parallel longshore currents of the inner shelf, which transport SPM-rich estuarine plumes along the shelf; for example, surface flow out of the Hudson River estuary produces a turbid plume which comes within 5 to 10 km (3 to 5 n mi) of the New Jersey coast (Drake, 1974; Charnell *et al.*, 1974). The Hudson River plume at times extends as far south as 35 km (19 n mi) from the New York Harbor entrance.

A schematic model of SPM distribution across the continental shelf is presented in Figure 28. As indicated in the model, there are three major SPM sources in continental shelf waters: riverborne SPM, resuspended bottom sediment and organic matter produced on the shelf itself (Meade *et al.*, 1975).

Over 90 percent of riverborne SPM is trapped in the estuaries and wetlands (Manheim *et al.*, 1970; Meade *et al.*, 1975; Schubel and Okubo, 1972); only 10 percent actually reaches coastal waters, and not all of it remains there. The dominant transport system is a two-layered circulation pattern: the less-dense, less-saline water flows seaward in the upper layer; and the denser, more saline water returns landward in the bottom layer. The SPM in the upper layer is carried seaward, while the SPM in the bottom layer is carried landward. The contribution of riverborne SPM to the continental shelf water system is carried in the river's surface layer plume. The resuspension of fine, inorganic sediments near estuary mouths is related to the effects of wave surge and wind-drift currents in these shallow waters.

In size, the particles of inorganic material in the Bight Apex are generally like fine silt or clay, with less than 10 percent of the particles exceeding 16 microns (0.0006 in). Inorganic material constitutes 25 to 50 percent by volume of the total SPM close to shore and near the bottom. In contrast, in the seaward portions of the Bight Apex, near the clearer waters of the central shelf, inorganic content ranges from 5 to 10 percent of the total SPM (Drake, 1974).

Drake (1974) estimates that a single November storm resuspended a minimum of 10,000 metric tons (11,000 tons) of fine sediments throughout the water column in the Bight Apex, indicating the great influence of storms in sediment resuspension. Other agents include the activities of benthic organisms and fishing trawlers.

Surface water SPM consists mostly of combustible plankton and their noncombustible remains (Meade *et al.*, 1975). Total SPM concentrations in surface waters range from 100 to 500 ug/1, of which 80 percent is combustible planktonic matter, 15 percent is siliceous and calcareous noncombustible planktonic matter, and 5 percent or less is land-derived noncombustible matter.

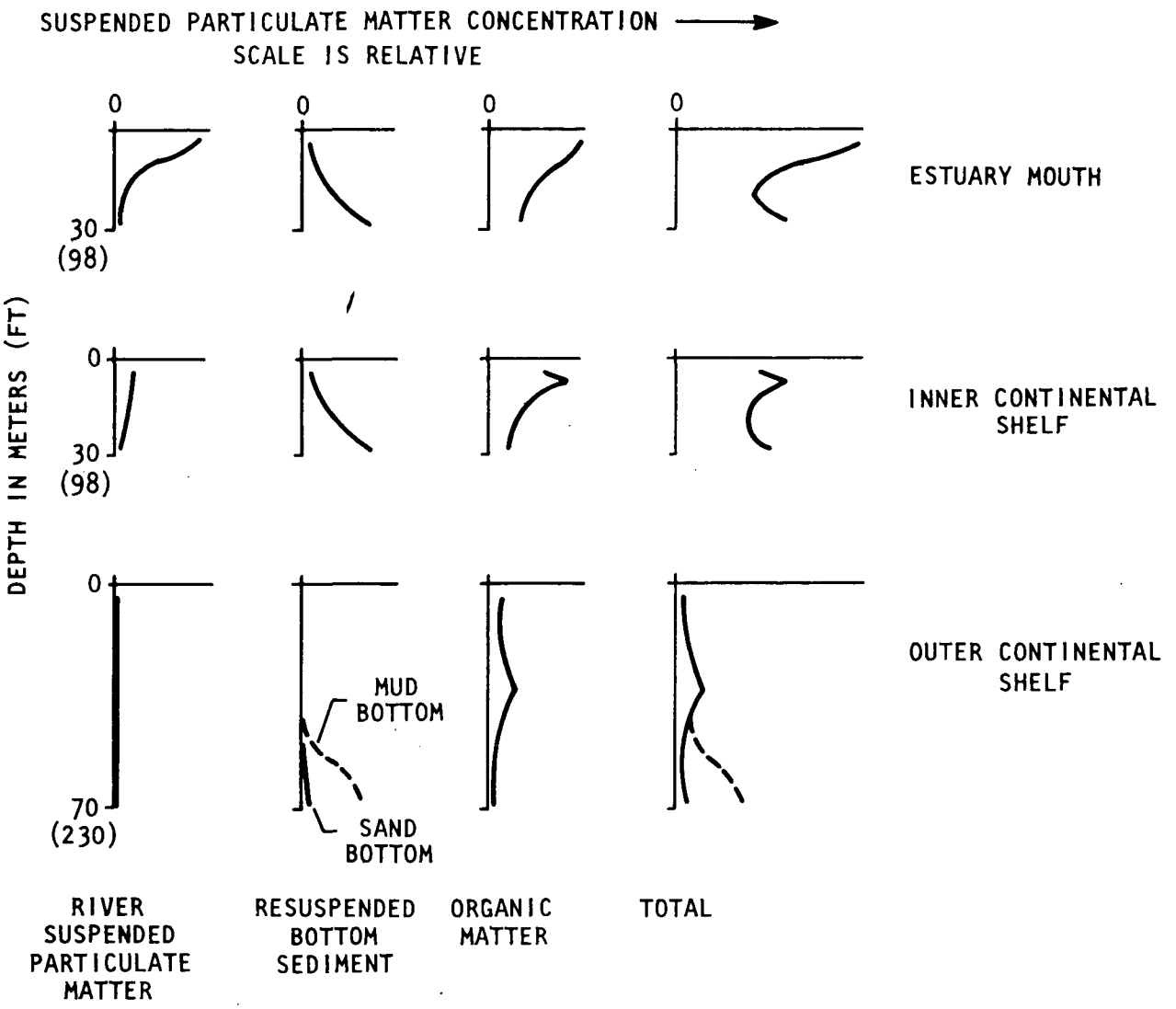
The SPM concentrations in subsurface waters are about the same or somewhat lower, with higher concentrations noted about 10 m (30 ft) above the bottom. The bottom layer has SPM concentrations of 500 to 2,000 ug/1, consisting of 30 to 60 percent combustible matter and 40 to 70 percent noncombustible matter.

Northern Area

Morphology. The Northern Area is located in the central portion of the Long Island continental shelf near the headward portions of the relict Long Island Shelf Valley (Figure 26). The bathymetry of Subarea 2D1 (Figure 29), based on early surveys which used one-fathom contour intervals (Stearns, 1967), reveals an inferred relict drainage system with a well-developed drainage element oriented northwest and another oriented east-northeast.

Geophysical surveys (NOAA-MESA, February 1976) have also been conducted in Subarea 2D1 (Figure 30). Preliminary results indicate that the generally thin, 1.5 to 1.8 m (5 to 6 ft), surficial sand sheet is underlain by lagoonal clays, and that in a number of places these clays are exposed on the sea floor.

Surficial Sediments. Bottom sediments in the Northern Area (Figure 29) have been sampled by NOAA-MESA (February 1976), Raytheon (1975a, 1975b), and McKinney and Friedman (1970). Fine sands are located along the axial segments of the relict drainage system (Figure 31), fine-medium sands are located in the south-central portion, and coarse-medium sands characterize the rest of the area.



SCHEMATIC MODEL OF SUSPENDED PARTICULATE MATTER DISTRIBUTION ON THE CONTINENTAL SHELF

SOURCE: MEADE ET AL., 1975.

FIGURE 28



BATHYMETRY AND SAMPLE LOCATIONS FOR SUBAREA 2D1

2 0 2 4 6 8 KILOMETERS

2 0 2 4 6 8 MILES (STATUTE)

2 0 2 4 6 8 NAUTICAL MILES

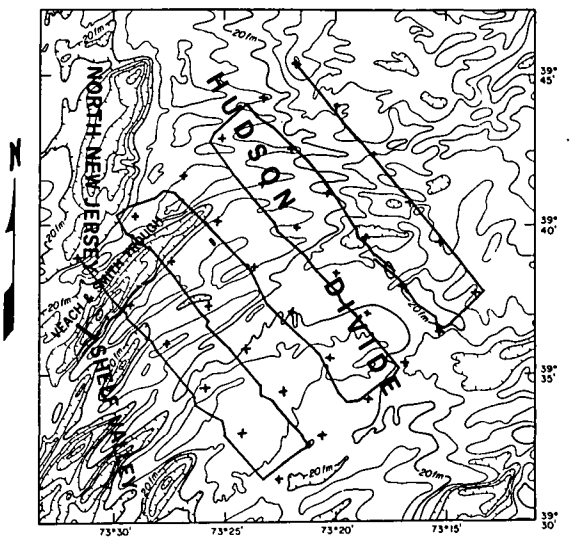
CONTOUR INTERVAL = 1 FATHOM = 1.83M (6FT)

K E Y:

- NOAA-MESA SAMPLES
- RAYTHEON SAMPLES
- McKINNEY AND FRIEDMAN 1970
- INFERRED RELICT DRAINAGE PATTERN

SOURCES: NOAA-MESA, FEBRUARY 1976;
RAYTHEON, 1975a, 1975b;
McKINNEY AND FRIEDMAN 1970.

FIGURE 2

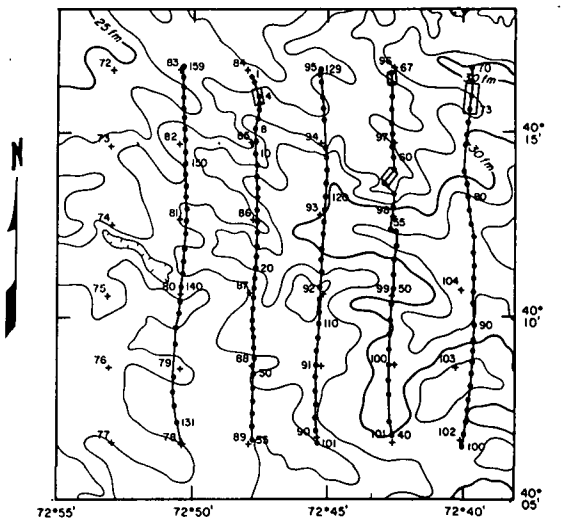


SUBAREA 2D2

5 0 5 10 KILOMETERS

5 0 5 10 STATUTE MILES

5 0 5 10 NAUTICAL MILES



SUBAREA 2D1

5 0 5 10 KILOMETERS

5 0 5 10 STATUTE MILES

0 5 10 NAUTICAL MILES

GEOPHYSICAL TRACTS

KEY:

BATHYMETRIC CONTOUR LINE

CONTOUR INTERVAL = 1 FATHOM = 1.83m (6FT)

TRACT LINES

SOURCE: NOAA-MESA, FEBRUARY, 1976.

FIGURE 30

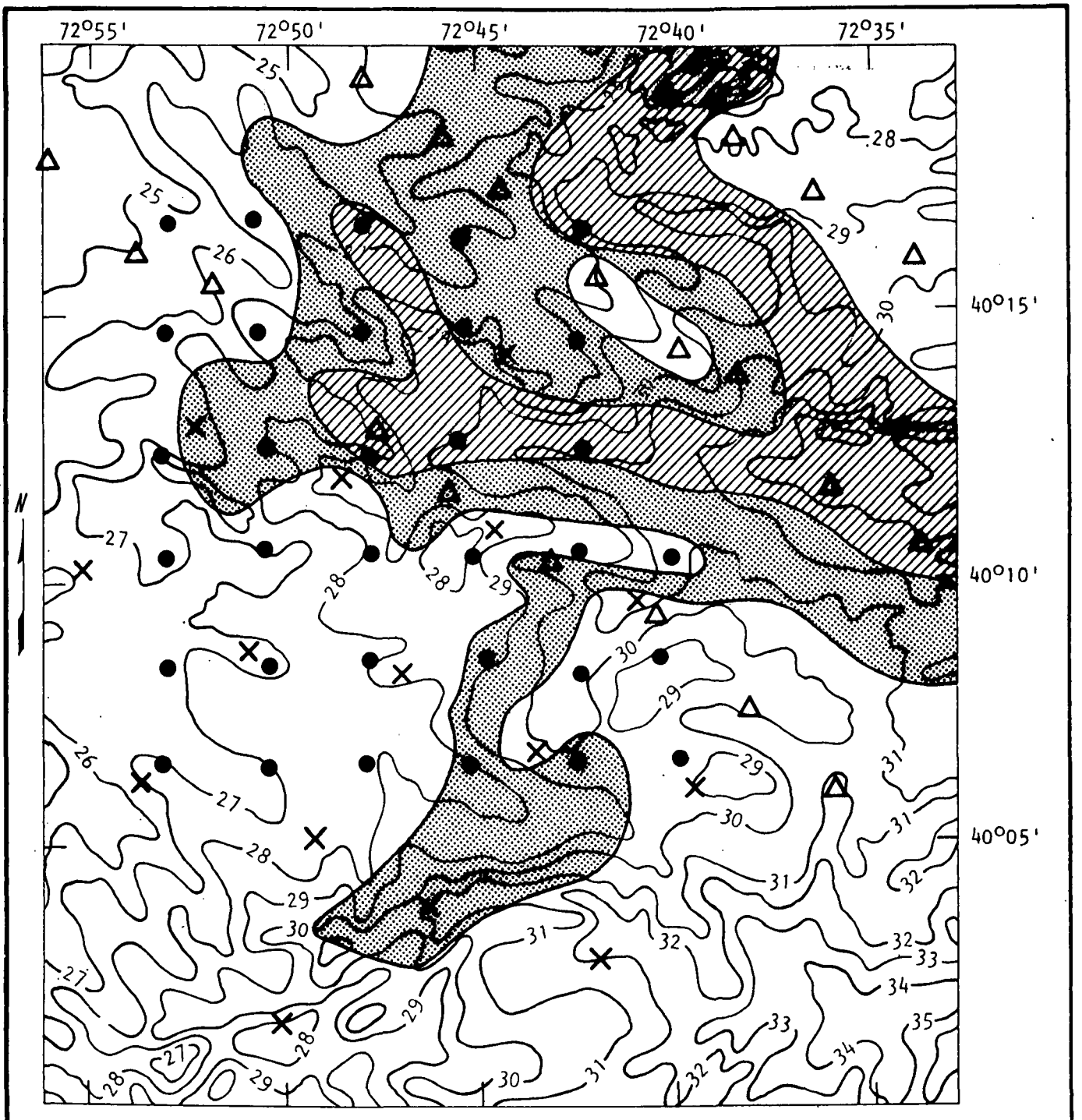
REVISIONS BY DATE BY DATE BY DATE PLATE OF

FILE 7004-003-29 E.Pd

BY DATE CHECKED BY DATE

FILE A-1

466.10 (4-84)



MEAN GRAIN SIZE OF BOTTOM SEDIMENTS IN SUBAREA 2D1

2 0 2 4 6 8 KILOMETERS

2 0 2 4 6 8 MILES (STATUTE)

2 0 2 4 6 8 NAUTICAL MILES

CONTOUR INTERVAL = 1 FATHOM = 1.83M (6FT)

1MM = (0.03937 IN)

K E Y:

- ● MOMENT MEAN OF SAND FRACTION ONLY: BY RAPID SETTLEMENT ANALYZER
- △ MOMENT MEAN: BY SIEVING
- X FOLK GRAPHIC MEAN; BY SIEVING

- 0.50 TO 0.35 MM
- 0.35 TO 0.25 MM

} MEDIUM SAND

- 0.25 TO 0.177 MM – FINE SAND

SOURCES: NOAA-MESA, FEBRUARY 1976; RAYTHEON, 1975a, 1975b; McKINNEY AND FRIEDMAN, 1970.

FIGURE 31

The highest percentage of gravel in sediments, approximately 40 percent, occurs in the raised areas between the relict valleys (Figure 32). A number of other samples, containing 5 to 10 percent gravel, were obtained from the floors of the valleys.

Most samples in Subarea 2D1 contain less than 1 percent fines (muds), although values of more than 5 percent are found locally in low topographic areas (Figure 33).

Bedforms. The sandy bottom of the Northern Area is characterized by forms which appear slightly undulated or mounded and by wave ripples which are thought to be the result of storm-generated bottom currents.

Side-scan sonar surveys of the Northern Area (NOAA-MESA, February 1976) reveal longitudinal bedforms, called large-scale current lineations (McKinney *et al.*, 1974), that run parallel to prevailing currents. They occur as sediment zones, oriented on an east-west axis, in the valleys of the northern portion of the study area. This is also the area where thin layers of fine sands cover the underlying *basement of clay*.

The large-scale current lineations appear to be formed by the movement of fine sands in response to secondary flow in the bottom boundary layer. The fine sand is swept out and away by the downward moving divergent currents and accumulates in the zones of current convergence.

Southern Area

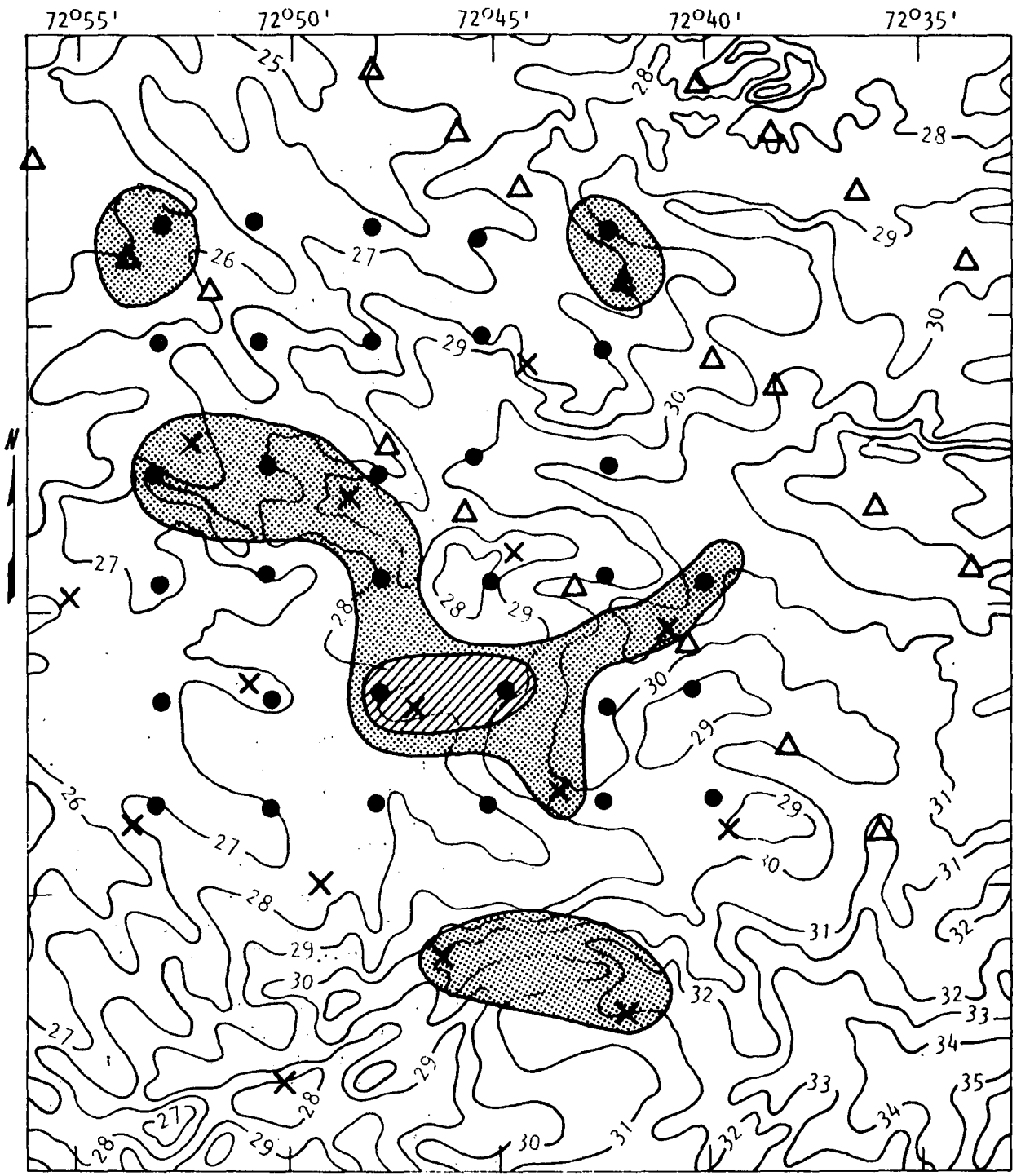
Morphology. The western portion of the Southern Area is characterized by a north-south chain of depressions, the depths of which exceed 37 m (120 ft); elongate high regions characterize the eastern portion. Individual depressions, which alternate with sand ridges, are oriented toward the northeast and are up to 6 m (24 ft) deep. A dominant landward-facing scarp to the west of the Southern Area parallels the north-south depressions and high regions within the area itself (Figure 26). The northern portion of the Southern Area is located along the northward-sloping rim of the Hudson Shelf Valley.

Geophysical and geologic data for the shelf and for the Southern Area (NOAA-MESA, February 1976; McClennen, 1973) suggest the following sequence of strata: a sheet of sand which forms the shelf surface; a layer of upper lagoonal clay; a unit of sand or gravel; and a lower clay layer. Locally, within the deeper, flatter troughs, erosion has cut through the upper sand and clay strata to expose the strata of lower clay. In addition, NOAA-MESA (February 1976) reports the presence of a buried channel in the southern portion of the Southern Area; the channel appears to be cut into the lower clay strata and has a general east-west orientation. The bathymetry of Subarea 2D2 is presented in Figure 30.

Surficial Sediments. The distribution of surficial sediments has been reported by NOAA-MESA (February 1976). The gravel and sand distributions in Subarea 2D2 are shown in Figures 34 and 35.

The most prominent feature of the bottom sediment is a band of coarse, gravelly sand along the northeast rim of the study area, parallel to the Hudson Shelf Valley. Regional sampling by USGS and WHOI also suggests gravelly deposits along the southern rim of the Hudson Shelf Valley, to the northwest of the study area (Schlee and Platt, 1970). Progressively finer sands are found to the southwest of these gravelly deposits; this suggests that they have been reworked and subsequently transported to the southwest, perhaps during the periods of lower sea levels when the ridges formed.

Bedforms. Observations in the Southern Area reveal the same types of bedforms as in the Northern Area (NOAA-MESA, February 1976). Wave ripples up to 1 m (3.3 ft) wide, apparently caused by winter storms, are found there, too. Low-relief elongate bands (lineations) and irregular patches of contrasting textured sediments are also found in the area. In addition to the longitudinal forms, there are widely spaced, 3 to 5 m (10 to 16 ft), low relief, wave-like features in the Southern Area. The orientation of these wave-like (transverse to the flow) and longitudinal (parallel to the flow) forms in the New York Bight is presented in Figure 36. The hydraulic origin of these forms, especially of the wave-like features, is not clear at present, although they may be the result of breaking internal waves.



PERCENTAGE OF GRAVEL IN SUBAREA 2D1

2 0 2 4 6 8 KILOMETERS

2 0 2 4 6 8 MILES (STATUTE)

2 0 2 4 6 8 NAUTICAL MILES

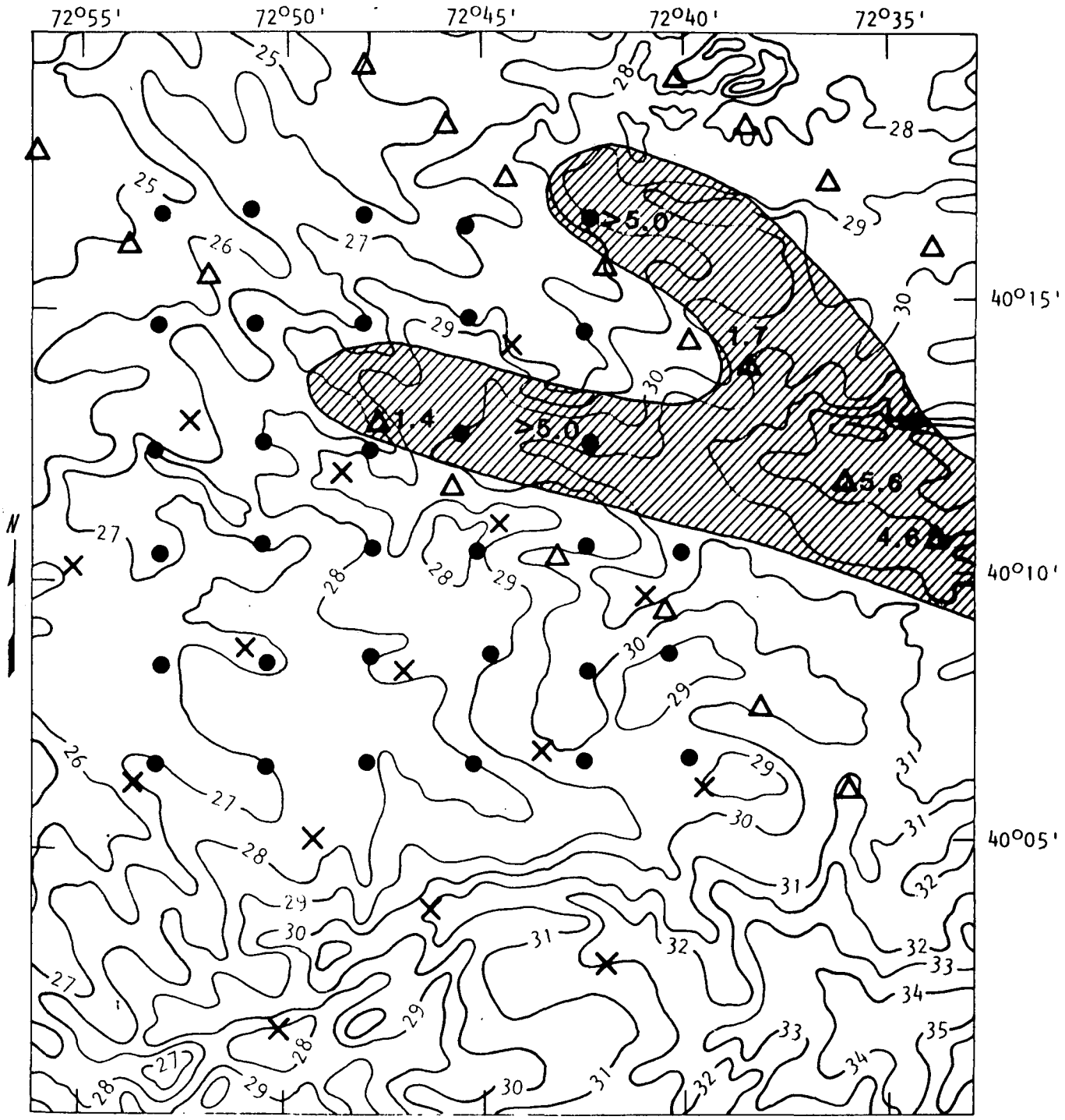
CONTOUR INTERVAL = 1 FATHOM = 1.83m (6FT)

K E Y:

- < 5 PERCENT
- 5 TO 10 PERCENT
- 10 TO 40 PERCENT
- SAMPLE STATIONS

SOURCES: NOAA-MESA, FEBRUARY 1976;
RAYTHEON, 1975a, 1975b;
McKINNEY AND FRIEDMAN 1970.

FIGURE 32



PERCENTAGE OF MUD IN BOTTOM SEDIMENTS FROM SUBAREA 2D1

2 0 2 4 6 8 KILOMETERS

2 0 2 4 6 8 MILES (STATUTE)

2 0 2 4 6 8 NAUTICAL MILES

CONTOUR INTERVAL = 1 FATHOM = 1.83M (6FT)

K E Y: PERCENT LESS THAN 62μ (0.0024 IN)

△1.7 = 1.7 PERCENT

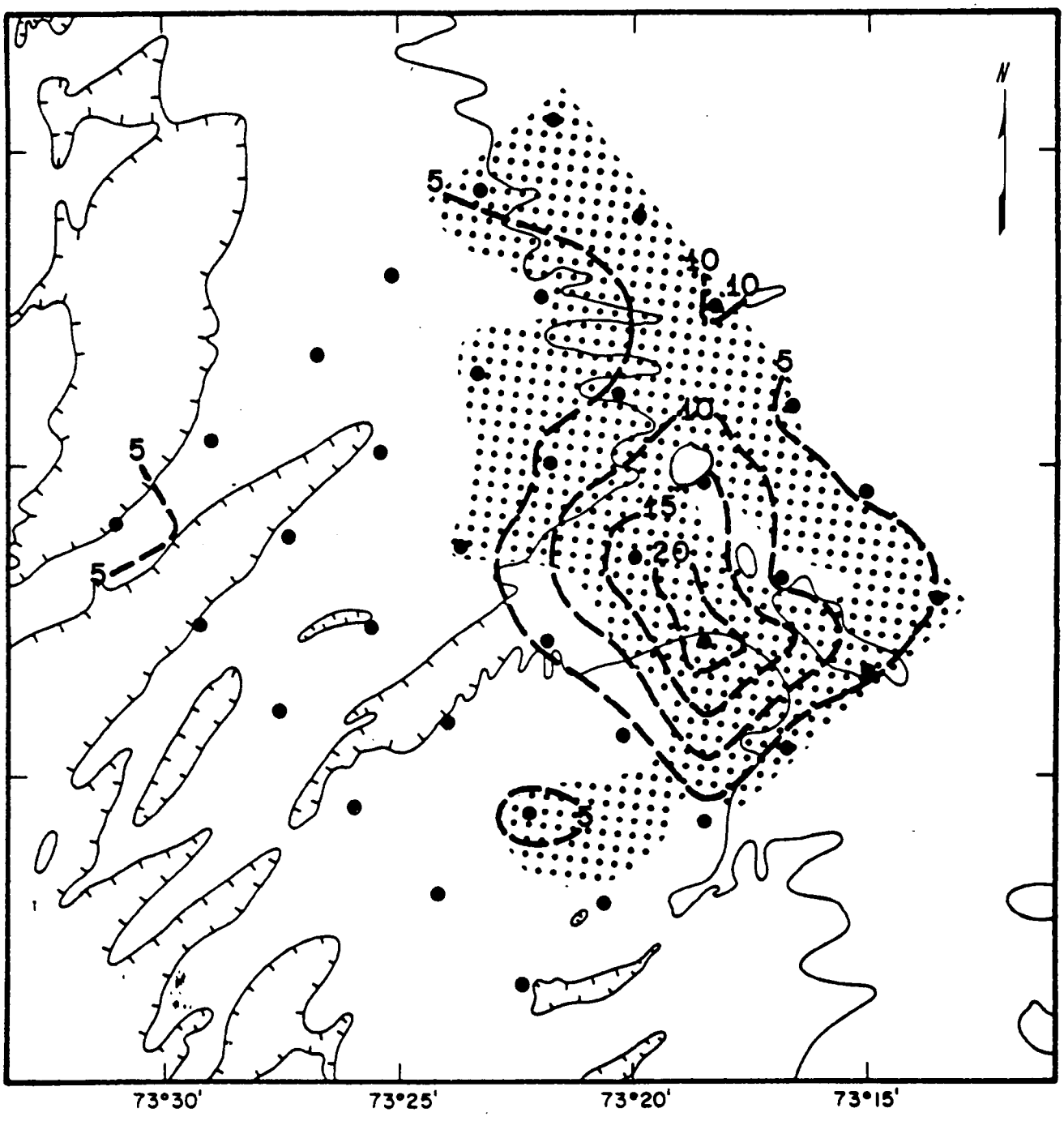
< 2.0

> 2.0

PERCENT

SOURCES: NOAA-MESA, FEBRUARY 1976;
RAYTHEON, 1975a, 1975b;
McKINNEY AND FRIEDMAN, 1970.

FIGURE 33



PERCENTAGE OF GRAVEL IN BOTTOM SEDIMENTS OF SUBAREA 2D2

KEY:

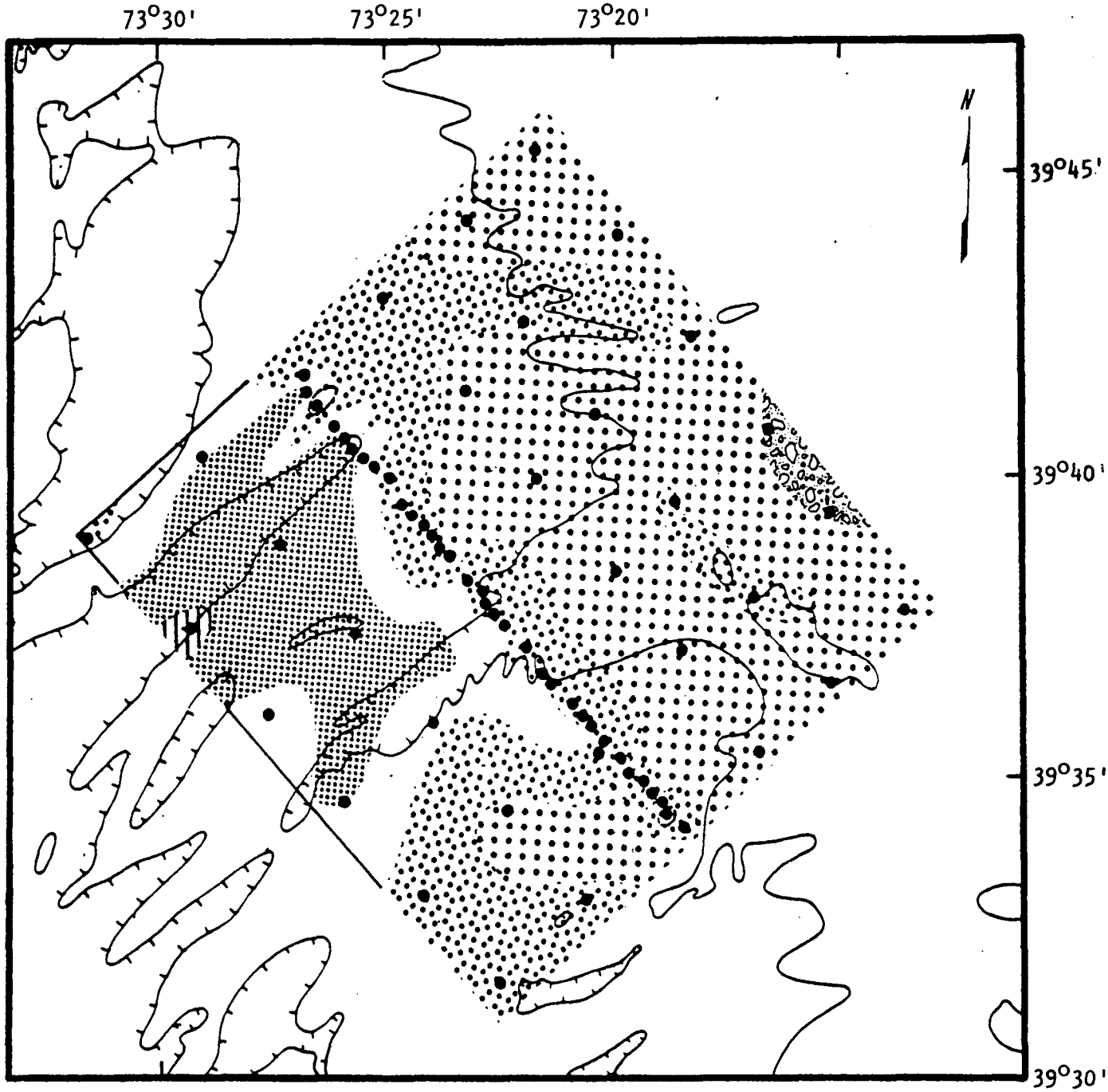
5% GRAVEL

MEDIUM SAND-0.42 TO 0.50 MM MEAN GRAIN SIZE

1 MM = 0.03937 IN

SOURCE: NOAA-MESA, FEBRUARY 1976.

FIGURE 34



MEAN GRAIN SIZE OF BOTTOM SEDIMENTS OF SUBAREA 2D2



K E Y:

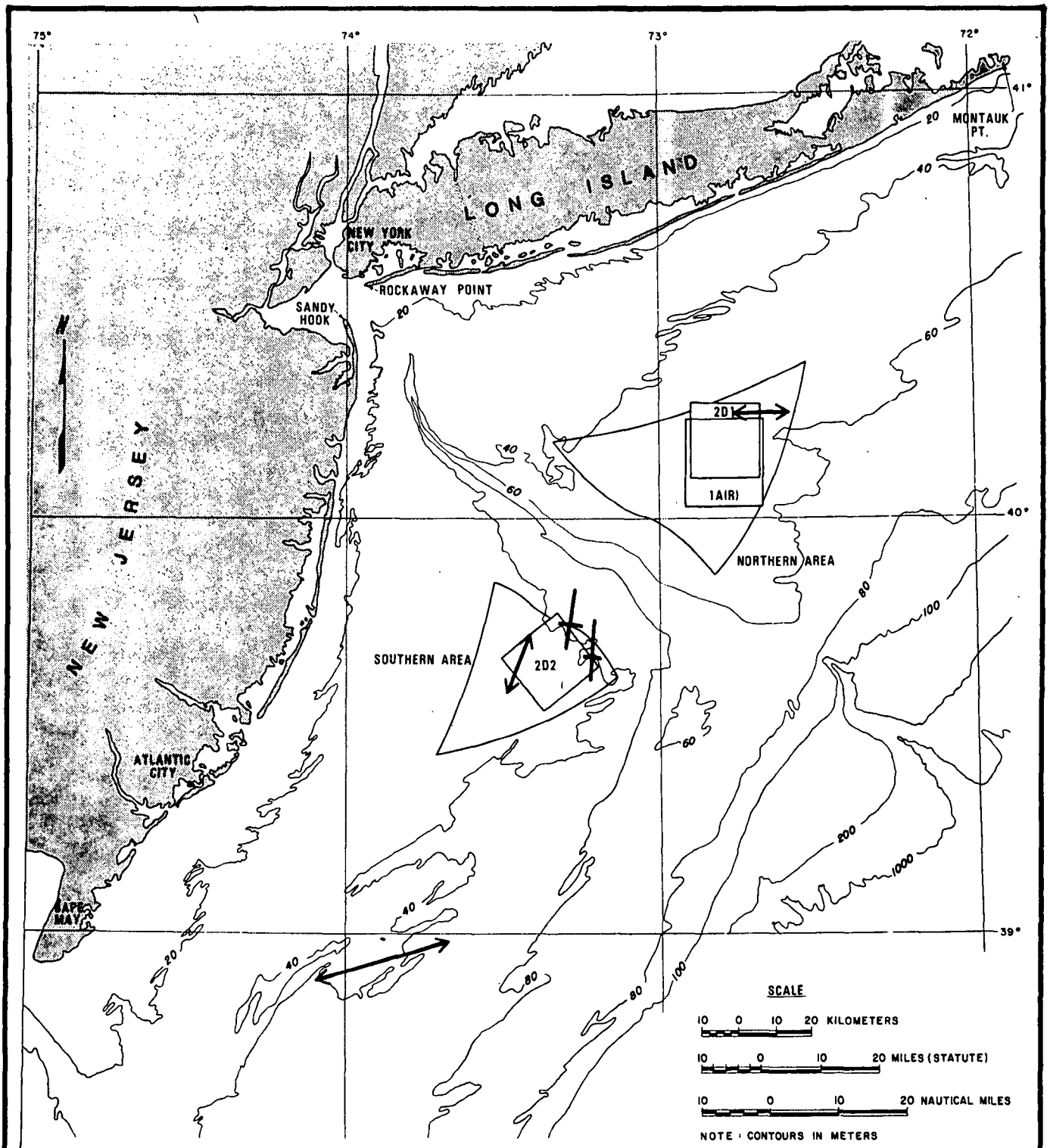
	> 0.50 MM	COARSE SAND
	0.50 - 0.42 MM	MEDIUM SAND
	0.42 - 0.35 MM	
	0.35 - 0.30 MM	
	0.30 - 0.25 MM	
	> 0.25 MM	FINE SAND

1 MM = 0.03937 IN

NOTE: <LESS THAN, >GREATER THAN

SOURCE: NOAA-MESA, FEBRUARY 1976.

FIGURE 35



MESOSCALE BEDFORMS

KEY:

LONGITUDINAL LINEATIONS

TRANSVERSE WAVE-LIKE FORMS

SOURCES: NOAA-MESA, FEBRUARY 1976; McKINNEY ET AL., 1974.

FIGURE 36

CHEMICAL OCEANOGRAPHY

This section includes descriptions of the heavy metal, dissolved oxygen, nutrient, organic carbon, and chlorinated hydrocarbon concentrations in the New York Bight and, more specifically, in the Northern and Southern Areas.

Heavy Metals

Water Column. The concentration of dissolved heavy metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc) in the water column of the New York Bight varies both seasonally and spatially; background concentrations, however, are generally higher than those reported for the open ocean (Brewer, 1975). This is caused by a number of factors, but especially by the proximity of the metropolitan area, a large source of heavy metals, and by the higher concentrations of suspended matter in the Bight waters (Benninger *et al.*, 1975). Suspended matter, including clay minerals, organic matter, and finely dispersed iron and manganese oxides, can influence the distribution of dissolved metals. High concentrations of dissolved metals are often noticeable in summer, when waters are stratified (oxygen depletion near the bottom mobilizes metals), and in winter after storm activity (sediment resuspension contributes metals to the water column).

In general, concentrations of dissolved heavy metals are highest in the Bight Apex, where the influences of man are strongest. The Northern and Southern Areas are pristine by comparison. There is little difference in concentrations of dissolved heavy metals between the two areas (Table 20).

Sediment. Heavy-metal concentrations in bottom sediments are not uniformly distributed throughout the New York Bight, but vary according to sediment grain size, quantity of organic material present, mineral composition, and proximity to the metropolitan area. The importance of proximity to the source of heavy metals is evident from the elevated concentrations in the Bight Apex (Carmody *et al.*, 1973). Based on available data, there appears to be no significant difference between the Northern and Southern Areas in concentrations of heavy metals in sediments (Table 21).

Bight Apex. Sewage sludge dumping at the existing site is a minor source of heavy-metal contamination in the Bight Apex (Table 22). Sources of dumped and non-dumped pollutants in the Bight Apex are discussed in Chapter II.

Dissolved Oxygen

Surface Waters. With the exception of the waters near the Sandy Hook-Rockaway Point transect and in the Lower Bay (Figure 2), surface waters in the New York Bight are saturated or nearly saturated with oxygen. Low levels of oxygen, generally less than 50 percent saturation, have been noted in surface waters off Cape May, New Jersey, and in a corridor along the northern New Jersey coast.

Mid-Depth Waters. Oxygen levels in mid-depth waters are generally transitional between surface and bottom levels and depend on the degree of stratification and vertical mixing (which, in turn, depends on seasonal changes).

Bottom Waters. Oxygen levels in bottom waters begin to decline in spring as the thermocline develops; by late summer, the oxygen levels have reached their lowest point. Oxygen levels of 20 percent saturation or less have been observed in Bight Apex bottom waters during summer stratification. For example, an area of several hundred square kilometers near the existing dredged material and sewage sludge dump sites is characterized by oxygen depleted bottom waters (less than 50 percent of saturation) during the summer. Oxygen saturation levels increase in the fall, following breakup of the thermocline, and continue to increase as greater mixing occurs (Segar *et al.*, 1975).

TABLE 20

DISSOLVED HEAVY METALS IN THE WATER COLUMN OF THE NEW YORK BIGHT

Sampling Location	Concentrations in µg/l						
	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Northern and Southern Areas[1]	0.06 to 19	3 to 15	0.23 to 18	0.69 to 2.4	0.05 to 0.24	0.72 to 1.0	1.8 to 38
Bight Apex in the Vicinity of Sewage Sludge and Dredged Material Dump Sites[2]	0.11 to 46	NA*	0.6 to 47	NA	NA	NA	2.1 to 190

*NA = Not Available

Sources:

[1] Raytheon, 1975a and 1975b; NOAA-MESA, October 16, 1975.

[2] NOAA-MESA, October 16, 1975; NOAA-NMFS, 1972.

TABLE 21

HEAVY METALS IN THE SEDIMENTS OF THE NEW YORK BIGHT

Sampling Location	Concentrations in ppm							
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Northern and Southern Areas[1]	4 to 8	<14	<22	8	<14	<0.05	<17	<32
Bight Apex in the Vicinity of Sewage Sludge and Dredged Material Dump Sites[2]	<12	<5	0.6 to 460	0.2 to 620	0.9 to 700	<4	0.8 to 50	1.3 to 1500

Sources:

[1] Greig and Pearce, 1975; Raytheon, 1975a and 1975b.

[2] Greig *et al.*, 1974; Carmody *et al.*, 1973; NOAA-NMFS, 1972.

The introduction of large amounts of oxidizable organic carbon to bottom waters of the Bight Apex is the principal cause of oxygen depletion there (Segar *et al.*, 1975). The sources are *in situ* photosynthetically-fixed carbon (the primary source of oxidizable carbon in the Bight Apex), riverborne particulate carbon, and ocean-dumped carbonaceous materials (Table 23).

Benthic oxygen demand appears to be responsible for only a small fraction of the oxygen depletion in the Bight Apex (Segar *et al.*, 1975). In the vicinity of the existing sludge dump site, the total seabed oxygen consumption rates in late August and early September (stratified water column) ranged from 10 to 60 ml/sq m/hr (3 to 18 lbs/a/day) (NOAA-MESA, February 1976). Highest values were noted near wastewater effluent outfalls along the New Jersey coast. Seabed oxygen consumption rates observed during winter cruises in the Northern Area (NOAA-MESA, February 1976) ranged from 5 to 20 ml/sq m/hr (1.5 to 6.0 lbs/a/day); the average rate for the Northern Area has been reported to be about 6.9 ml/sq m/hr (2.1 lbs/a/day).

Northern and Southern Areas. Recent data (Raytheon, 1975a, 1975b, 1975c) indicate that dissolved oxygen concentrations in surface, mid-depth, and bottom waters in the Northern Area are moderately to highly saturated under winter, spring, and critical summer conditions (Table 24). The saturation value for oxygen at these sampling depths probably does not fall below 50 percent at any time of year and is usually much higher (75 to 110 percent). Recent investigations (NOAA-MESA, October 16, 1975) in both the Northern and Southern Areas showed similar seasonal and vertical trends. There appears to be no significant difference in dissolved oxygen concentrations between the two areas.

Nutrients

Nitrogen. According to Mueller *et al.* (1976), the Bight Apex receives a total nitrogen load of 520 metric tons/day (573 tons/day). Of this, 210 metric tons (231 tons) are in the form of ammonium and 190 metric tons (209 tons) are incorporated in organic compounds. The remainder, 120 metric tons (132 tons), occurs as nitrate and nitrite, 60 percent of which comes from natural river runoff; atmospheric fallout contributes another 30 percent. The two major sources of ammonium loadings are wastewater discharges, including 4.3 million cu m/d (1,140 mgd) of primary and secondary effluents and 1.1 million cu m/d (296 mgd) of raw sewage discharge, and sludge dumping (O'Connors and Duedall, 1975).

The ammonium loading caused by wastewater discharges from the Sandy Hook-Rockaway Point transect zone was estimated to be five to ten times greater than that caused by sludge dumping (Mueller *et al.*, 1976). The concentration of total nitrogen in the Bight Apex largely depends on the extent to which the nutrient-rich river waters are diluted by seawater and on the use of nitrogen by phytoplankton.

Generalized concentration ranges of nitrogen in the New York Bight are shown in Table 25.

Phosphorous. Phosphorous occurs in the Bight as total phosphorous, reactive (ionic) phosphorous, particulate phosphorous, ortho-phosphorous, and meta-phosphorous. Reactive phosphorous in surface waters of the Bight Apex ranges from 38 ug/1 to more than 95 ug/1; in surface waters of the outer Bight it ranges from less than 10 to 57 ug/1. Deeper waters generally show higher phosphorous concentrations. Particulate phosphorous concentrations also range from less than 10 ug/1 to more than 95 ug/1 (Alexander and Alexander, 1975).

During the summer, when the water column is stratified, total phosphorous concentrations appear to be higher in the deeper waters of the New York Bight than in the surface waters (Corwin, 1970), although this trend was not noted during the Raytheon cruise of September 1974 (Raytheon, 1975a). In the winter months, total phosphorous concentrations are relatively uniform throughout the water column. Eighty-five percent of the total phosphorous load to the Bight is contributed by dredged material and wastewater discharges. Generalized concentration ranges of ortho-phosphate in the Bight are shown in Table 25.

Relationship to Productivity. Productivity in the Bight Apex during summer is higher than that observed in similar temperate coastal zones (Segar *et al.*, 1975). This appears to be the result of the relatively high nutrient loading within the euphotic (light penetrating) zone. Major sources of the high nitrogen loading in the New York Bight are: riverborne nitrogen, which supplies 120 thousand kg/day (204 thousand lbs/day); dredged material, which contributes 30 thousand kg/day (66 thousand lbs/day); and dumped sew-

TABLE 22

LOADINGS OF HEAVY METALS IN THE BIGHT

Metal	Sewage Sludge Loadings metric tons/day*	Total Bight Loadings metric tons/day*	Percent from Sewage Sludge
Cadmium	0.044	2.4	1.8
Chromium	0.73	5.0	14.6
Copper	0.70	13.8	5.1
Lead	0.72	12.7	5.7
Mercury	0.013	0.3	4.3
Zinc	1.8	33	5.5

*metric ton = 1.10 tons.

Source: Mueller *et al.*, 1976.

TABLE 23

SOURCES OF OXIDIZABLE CARBON IN THE BIGHT APEX

Source	Input (Annual Average) In millions of kg/day	(lbs/day)
Photosynthetically-Fixed Carbon	2.2	(4.8)
(Summer Average)	6.5	(14.3)
River-Borne Particulate Carbon	1.0	(2.2)
Ocean Dumping		
Sewage Sludge	0.14	(0.31)
Dredged Material	0.26	(0.57)

Source: Segar *et al.*, 1975.

TABLE 24

DISSOLVED OXYGEN LEVELS AT THE NORTHERN AREA

Position In Water Column	Winter Cruise 1974		Spring Cruise 1975		Summer Cruise 1975	
	Concentration ppm	Saturation percent	Concentration ppm	Saturation percent	Concentration ppm	Saturation percent
Surface	8.3 to 10.0	85 to 105	9.7 to 11.6	75 to 95	7.4 to 9.5	85 to 110
Mid-depth	6.6 to 9.3	60 to 85	11.1 to 12.0	90 to 100	9.1 to 10.2	85 to 100
Bottom	6.4 to 7.4	55 to 65	10.5 to 11.5	80 to 90	7.5 to 7.7	60 to 65

Sources: Raytheon, 1975b, and 1975c.

TABLE 25

NUTRIENTS IN THE NEW YORK BIGHT

Sampling Location	Concentrations in µg/l			
	Ammonia[1]	Nitrite[2]	Nitrate[2]	Ortho-Phosphate[2]
Bight Apex	<2 to 126	<2 to 59	<7 to 252	<10 to 133
Northern and Southern Areas	<2 to 28	<2	<2 to 48	<0.1 to 48

Sources:

[1] Alexander and Alexander, 1975.

[2] NOAA-MESA, October 16, 1975.

age sludge, which adds 20 thousand kg/day (44 thousand lbs/day). The riverborne nitrogen may exert a significant influence on photosynthetically-fixed carbon because it remains longer in the euphotic zone due to the lower density of fresh water. A large portion of the nutrients in dredged material are buried on the bottom and are therefore unavailable for photosynthesis.

Organic Carbon

Water Column. In the fall of 1974, TOC levels in the water column of the Northern Area ranged from 2 to 9 mg/1, with most samples averaging 4 to 5 mg/1. The TOC concentrations did not appear to vary significantly with depth. In the spring of 1975, TOC concentrations ranged from 2.8 to 7.4 mg/1.

Sediments. The TOC levels in the New York Bight sediments vary according to distance from waste sources (Figure 37). The relatively clean continental shelf areas generally contain less than 0.2 percent TOC. Sediments containing more than 2 percent TOC are probably contaminated by wastewater discharges, ocean dumping, or other waste sources (Gross, 1972b). Forty-one percent of New York Harbor is characterized by sediment deposits with a TOC content of more than 2 percent, the average being 5.6 percent. Near the sewage sludge, dredged material, and cellar dirt dump sites, more than 52 sq km (15 sq n mi) of bottom area are covered by sediments containing more than 2 percent TOC; the highest TOC concentration (6.4 percent) occurs at the dredged material dump site. High concentrations of TOC (5 percent or more) were also detected at the head of the Hudson Shelf Valley (Charnell, 1975). In the shallow coastal regions off Long Island and New Jersey, sediments contain between 0.1 and 0.2 percent TOC (Gross, 1972a).

Northern and Southern Areas. The TOC levels in the sediments of Subarea 2D1 range from 0.0011 to 0.1177 percent, based on samples collected by NOAA-MESA (August 23, 1974). Raytheon (1975a, 1975b), using different sampling grids, reported TOC concentrations ranging from 0.042 to 0.61 percent for the fall-winter 1974 cruise and from 0.034 to 0.131 percent for the spring 1975 cruise. The elevated concentration ranges are not easily explained.

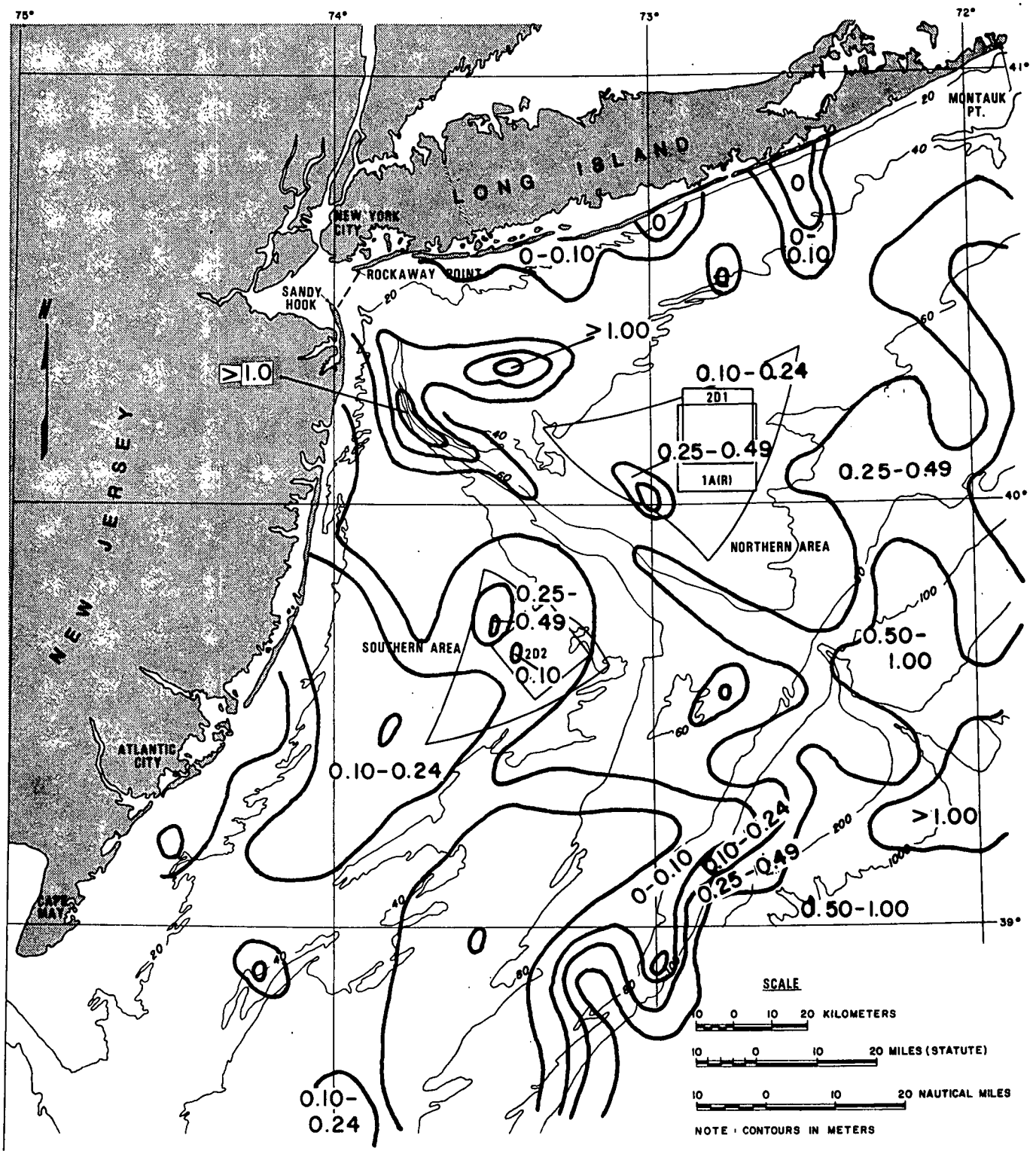
The TOC levels in the sediments of Subarea 2D2 range from 0.0271 to 0.0691 percent, based on samples collected by NOAA-MESA (August 23, 1974). The TOC in sediments from the axis of the Hudson Shelf Valley ranges from 0.1 to 0.2 percent.

Relationship to Toxic Substances. The importance of organic carbon in determining the fate of toxic substances (especially heavy metals) is twofold: organo-metallic complexes and compounds may act as transport agents for toxic substances; and sediments rich in organic matter often act as sinks for toxic substances. The presence of organic carbon is often inversely proportional to sediment grain size and, therefore, directly proportional to clays (aluminosilicates), which play an important adsorptive and desorptive role in metal ion distribution.

Carbon/Nitrogen (C/N) Ratio. The carbon (TOC) to nitrogen (TKN) ratio in New York Bight sediments varies greatly (Figure 38). Near the Sandy Hook-Rockaway Point transect, ratios are generally greater than 10. Over most of the Bight, ratios range from 3 to 11 (Milliman, 1972). Sediments near shore, which contain much organic matter from land-based sources, generally have high C/N ratios. These ratios generally decrease with distance from land, although relict sediments on the shelf may also exhibit high C/N ratios because they too are likely to contain land-derived organic matter.

TCH/TOC Ratio. Charnell (1975) devised a useful indicator for sewage-derived components in sediments: the ratio of total carbohydrate content (TCH) to TOC. The technique is based on the assumption that most carbohydrate materials from sewage (dumped or discharged) are oxidation-resistant structural carbohydrates, such as cellulose and hemicellulose. Land-derived carbohydrates contain cellulose-deficient materials; thus, their TCH/TOC ratio is low, generally less than 10.

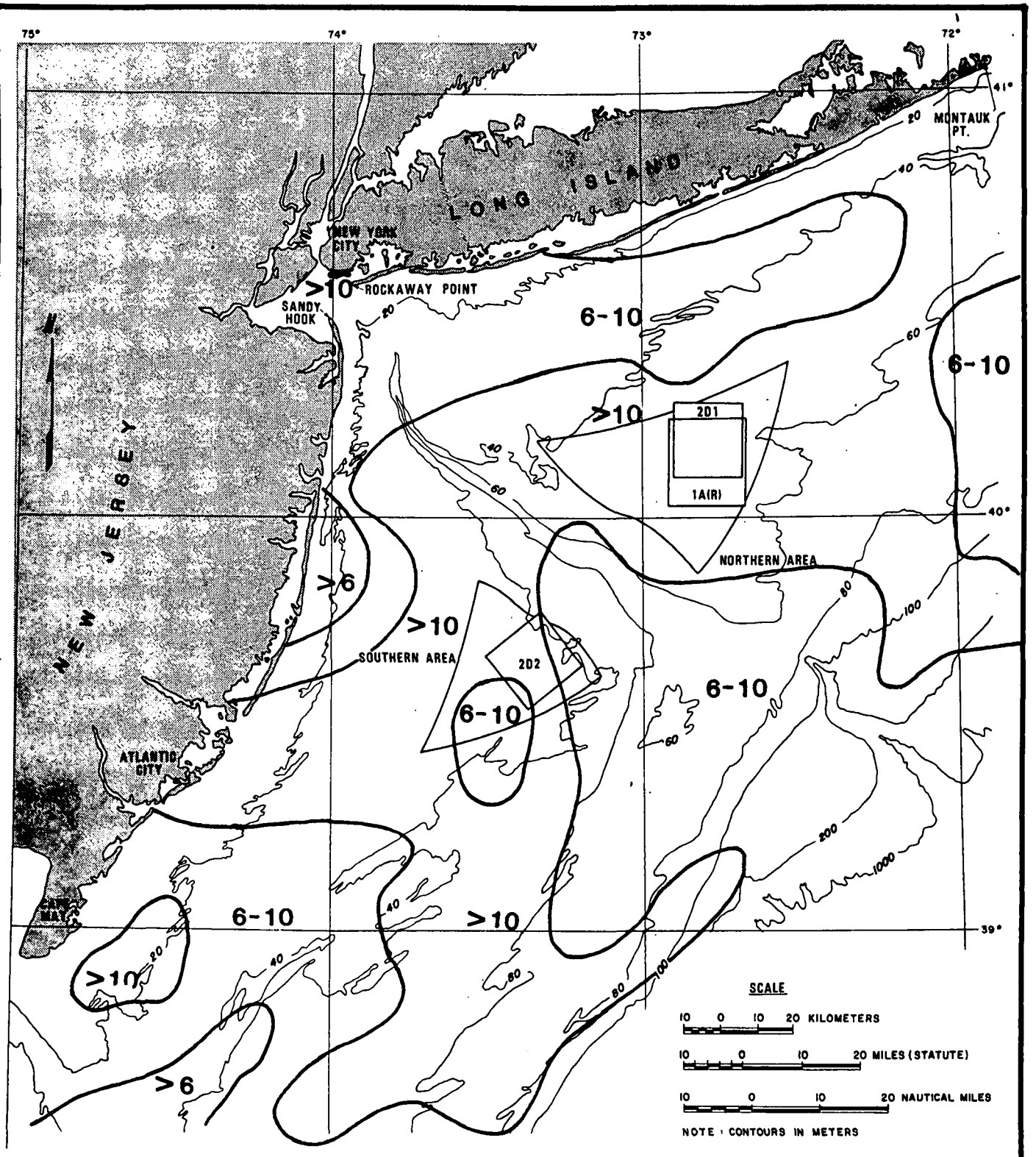
Sediments in the Bight Apex generally have TCH/TOC ratios greater than 20. Samples from the existing dump sites (sludge, dredged material, acid wastes, and cellar dirt) and from the Hudson Shelf Valley have ratios ranging from 30 to 65 (Figure 39). The TCH/TOC ratios for samples collected south of Rockaway Beach, Long Beach, and Jones Beach range from 13 to 67. Samples from Jones Inlet and East Rockaway Inlet have ratios ranging from 13 to 24 (Charnell, 1975).



PERCENTAGE OF TOTAL ORGANIC CARBON IN NEW YORK BIGHT SEDIMENTS

SOURCE: HATHAWAY, unpub.

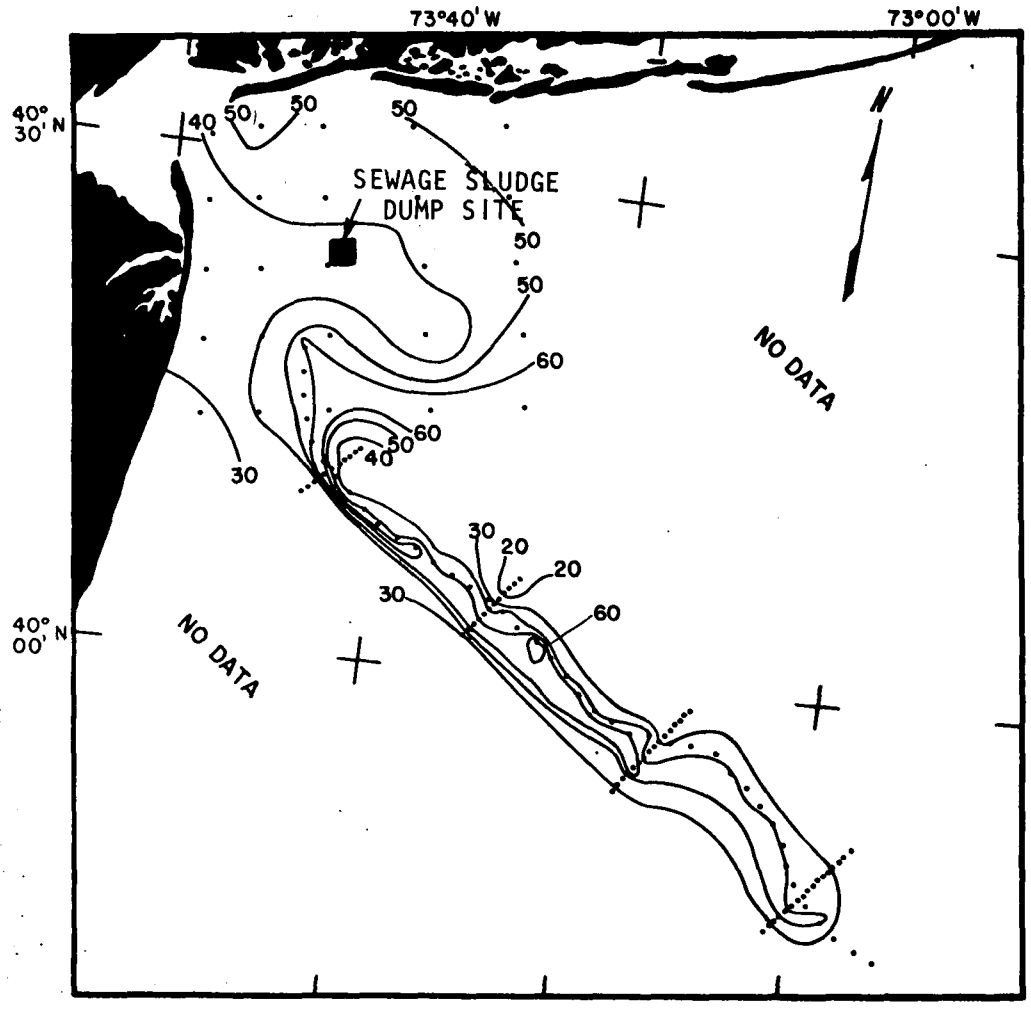
FIGURE 37



DISTRIBUTION OF CARBON/NITROGEN RATIOS IN NEW YORK BIGHT SEDIMENTS

SOURCE: MILLIMAN, 1972.

FIGURE 38



DISTRIBUTION OF TCH/TOC RATIOS IN NEW YORK BIGHT APEX SEDIMENTS

10 0 10 20 30 40 KILOMETERS

10 0 10 20 30 40 MILES (STATUTE)

10 0 10 20 30 40 NAUTICAL MILES

KEY:

—— ISOBARS OF TCH/TOC RATIO

····· SAMPLING STATIONS

SOURCE: HATCHER AND KEISTER, 1975.

FIGURE 39

Chlorinated Hydrocarbons

Because of the persistence and toxicity of chlorinated hydrocarbons such as DDT (dichlorodiphenyltrichloroethane) and PCB (polychlorinated bi-phenyl), great concern has been expressed about their abundance and distribution in the marine environment. However, very little data on chlorinated hydrocarbons exist for the New York Bight.

Potential Sources. Although little specific information on chlorinated hydrocarbons in the New York Bight is available, some insights can be gained from a study of the percentage contribution of chlorinated hydrocarbons by source in the Southern California Bight. (Young *et al.*, 1974a; 1974b; 1975). It showed that 77 percent of the DDT mass loading in the Southern California Bight was introduced by surface runoff, 14 percent by direct industrial discharge, 6 percent by atmospheric fallout, 3 percent by municipal wastewater discharge, and less than 0.1 percent by marine antifouling paints. For Arochlor 1254, a PCB, calculations showed that 64 percent was contributed by surface runoff, 34 percent by direct industrial discharge, 1 percent by atmospheric fallout, 1 percent by municipal wastewater discharge, and less than 0.1 percent by marine antifouling paints. Although these data cannot be applied directly to mass balance determinations for the New York Bight, they do indicate potential chlorinated hydrocarbon loadings.

The New York Bight. Little data on chlorinated hydrocarbon distribution in the New York Bight have been published. Two studies in the Northern and Southern Areas were conducted for this EIS (USEPA, March 25, 1975; Raytheon, 1975a, 1975b). The results of these studies are shown in Table 26. A small number of sediment samples taken in the vicinity of the dredged material and sewage sludge dump sites show slightly elevated levels of DDD (a DDT breakdown product) and an anomalously high DDT concentration at one station.

An earlier NOAA study, the results of which were published in September 1976, compared PCB and DDT concentrations in sewage sludge samples from four metropolitan treatment plants (Wards Island, Hunts Point, and Tallmans Island in New York, and Passaic Valley in New Jersey) with concentrations found in sediment samples taken during a September 1973 cruise in the New York Bight Apex. According to the report, "...the highest total PCB and DDT concentrations are found in sediments at the sewage sludge dump site..." (West *et al.*, September 1976). However, the report cautions that there was a high degree of variability in the sediment samples and the sewage sludge samples, and that while sludge dumping is probably a major source of PCBs and DDT, it may not be the only source. The report recommends that the extent of all other inputs, including transport of outer shelf sediments to the Apex, transfer across the air/sea interface, and inputs through the Hudson-Raritan estuary, be investigated through other NOAA study programs.

Summary

The Bight Apex is a heavily used and environmentally stressed coastal area. Municipal and industrial wastewater effluents, along with runoff, atmospheric fallout, and the materials disposed of at the different dump sites, contribute large quantities of heavy metals, nutrients, organic matter, and chlorinated hydrocarbons to the waters there. The distribution of these materials is generally a function of the distance from the source and the composition of the solids that are either suspended in the water column or accumulated on the bottom. Within the Bight Apex, the presence of large amounts of organic matter from numerous sources results in localized areas of low dissolved oxygen values. Outside the Bight Apex, nutrient and dissolved oxygen levels are quite predictable and are a function of the water's temperature-salinity structure and the degree of weather-induced mixing.

TABLE 26

CHLORINATED HYDROCARBONS IN THE SEDIMENTS OF THE NEW YORK BIGHT

Northern Subarea 1A(R)[1]

Pesticide	Concentration µg/kg dry weight
Aldrin	13
Chlordane	41
Dieldrin	20
Endrin	20
Heptachlor	15
Heptachlorepoxide	12
Methoxychlor	28
P, P' DDD	18
P, P' DDE	18
P, P' DDT	19
Lindane	15
Toxephene	47

Southern Subarea 2D2[2]

Sampling Station	Concentration µg/kg dry weight PCB
29	<1.0
55	<1.0
56	<5.0
54	<5.0
53	4.0
30	<5.0
28	<5.0
27	<5.0
65	37.0
69	<5.0
68	<1.0

Vicinity of Dredged Material and Sewage Sludge Dump Sites[3]

Sampling Station	Concentration µg/kg dry weight		
	DDE	DDD	DDT
X4	13	48	126
X5	17	81	13
X3	19	61	19
Z5	15	39	16

Sources:

[1] Raytheon, 1975a and 1975b.

[2] USEPA, March 25, 1975.

[3] NOAA-NMFS, 1972.

CHAPTER VI

FATE OF SEWAGE SLUDGE DUMPED AT THE PROPOSED AREAS

The total impact of sewage sludge on the marine environment depends on the interactions of sludge with seawater. These interactions control the ultimate fate of the dumped sludge, but they are quite complex and cannot be precisely predicted. However, there are theoretical models, which, together with the limited information collected at existing dump sites, can give some indication of what happens to the sludge after it is dumped in the ocean.

The fate of sewage sludge depends on the forces governing initial settling and dispersion, resuspension, and chemical and biochemical reactions.

SETTLING AND DISPERSION IN THE WATER COLUMN

The rates of settling and dispersion of dumped sludge are affected by many factors, including the characteristics of the sludge itself: its bulk density (the density of the sludge mixture, both solids and liquid); its solids density (the density of the sludge particles alone); and its solids concentration. Characteristics of the receiving water also affect the rate at which sludge settles; these include the water's density structure, which is controlled by its temperature and salinity, and the current circulation patterns.

Bulk Density

The bulk density of sewage sludge currently dumped in the New York Bight averages 1.009 g/cu cm, ranging from 1.0007 to 1.0181 g/cu cm. This is generally less than the density of the ambient seawater, which ranges from 1.019 to 1.025 g/cu cm for the Bight, so most of the sludge remains suspended in the upper layer of the ocean. The solids are composed primarily of organic materials (densities of 1.02 g/cu cm to 1.70 g/cu cm) and smaller amounts of inorganic mineral matter (density of 2.65 g/cu cm). The density of sludge solids ranges from 1.12 to 1.75 g/cu cm and averages 1.50 g/cu cm (Callaway *et al.*, 1975). Most of this fine, low-density organic matter, tends to remain in suspension, but the small fraction of heavier minerals settles rapidly to the bottom.

Settling Velocities

Sludge solids tend to settle at different rates, depending on their size and density. Callaway *et al.* (1975) monitored the dispersion of sludge solids dumped at the existing site in the Bight Apex and estimated that the larger, flocculated particles (small diameter particles bound together into large diameter groups) had an average settling velocity of 0.5 to 1.0 cm/sec (0.2 to 0.4 in/sec). Most of the particles, however, had settling velocities of 0.01 to 0.30 cm/sec (0.004 to 0.120 in/sec), as measured by plotting the settling velocity of the waste field's center of mass. The remaining fine particles had settling velocities of 0.0010 cm/sec (0.0004 in/sec) or less. These *in situ* determinations correlate positively with laboratory measurements made by Greene (1974).

During periods of stratification (summer conditions), most of the solids remained in the upper layer and dispersed laterally (Callaway *et al.*, 1975), although some of the heavier particles, with settling rates of about

2.0 cm/sec (0.8 in/sec), may have passed through the upper layer and reached bottom. During periods of non-stratification (winter conditions), the solids were rapidly dispersed throughout the entire water column. Taking the currents, the initial dilution of the sludge, and the small fraction of heavier particles into account, Callaway *et al.* (1975) concluded that a substantial accumulation of sludge on the bottom was unlikely. These field measurements support the findings of earlier model studies (Edge and Dysart, 1972) of the physical fate of dumped sewage sludge.

Modeling Results

A simple, two-dimensional diffusion and dispersion model was used to evaluate the fate of dumped sludge in the Northern and Southern Areas. Assumptions made in this steady-state mass balance model were: 1) the dumped sludge is a point source; 2) the oceanic velocity and density fields are uniform; and 3) the oceanic dispersion coefficients are constant. The model's applicability is limited to time periods greater than tidal periods but less than seasonal ones. The dispersion coefficients used were those given by Neumann and Pierson (1966). Table 27 shows the model results. Figure 40 depicts an initial sludge load on the bottom as predicted by the model.

Considering water depths at the Northern and Southern Areas and the wide range of settling velocities of sludge solids, most sludge particles are expected to remain in suspension for periods ranging from one hour to several days. The heavier sludge particles and flocs, which tend to settle out faster, will be greatly affected by short-term currents, such as tidal or storm-wind-driven currents, and by wave activity. Sludge particles with lower settling velocities will oscillate in the water column through the action of short-term currents, but will ultimately be dispersed by long-term currents such as density-driven coastal currents, prevailing wind-driven currents, and ocean turbulence.

The model results (Table 27) indicate that heavier sludge particles, settling at 2.0 cm/sec (0.8 in/sec) or more, will be deposited a maximum of 0.30 km (0.16 n mi) from the dump site; lighter particles, settling at about 0.10 cm/sec (0.04 in/sec), will be deposited a maximum of 15.0 km (8.1 n mi) from the dump site. Prevailing currents will transport the lightest particles at velocities from 10.0 to 30.0 cm/sec (4.0 to 11.8 in/sec); however, these particles will be so dispersed and biochemically degraded that extremely low sludge particle concentrations are expected beyond 15.0 km (8.1 n mi). Sludge will probably be more widely distributed during the summer, when stratified conditions prevail, than during the winter, when vertical mixing prevails, since stratification results in a longer retention of sludge in the upper water layers.

The model (Table 27) projected that about 95 percent of the sludge mass on the bottom would be contained within a maximum radius of 950 m (3,100 ft). This sludge mass, however, is a very small percentage of the total dumped sludge solids, most of which are not expected to reach bottom. The Northern Area's greater depth would result in a slightly larger bottom area being affected there than would be affected in the Southern Area. Assuming a current velocity of 10.0 cm/sec (4.0 in/sec), materials settling at 0.10 cm/sec (0.04 in/sec) will be transported 1 km (0.54 n mi) farther in the Northern Area. The model indicated, however, that concentrations of sludge per unit area of bottom will be lower in the Northern Area. Callaway *et al.* (1975) reached similar conclusions.

RESUSPENSION

That small fraction of dumped sludge which reaches the sea floor is further affected by biological activities and physical forces. Benthic organisms burrowing in the deposits incorporate the material into existing substrates, reducing the possibility that it will be transported out of the area. Benthic organisms also consume fine sludge solids and void them, along with other waste products, as coarse pellets; the potential for resuspension of this debris is much lower than that for freshly deposited sludge solids.

TABLE 27

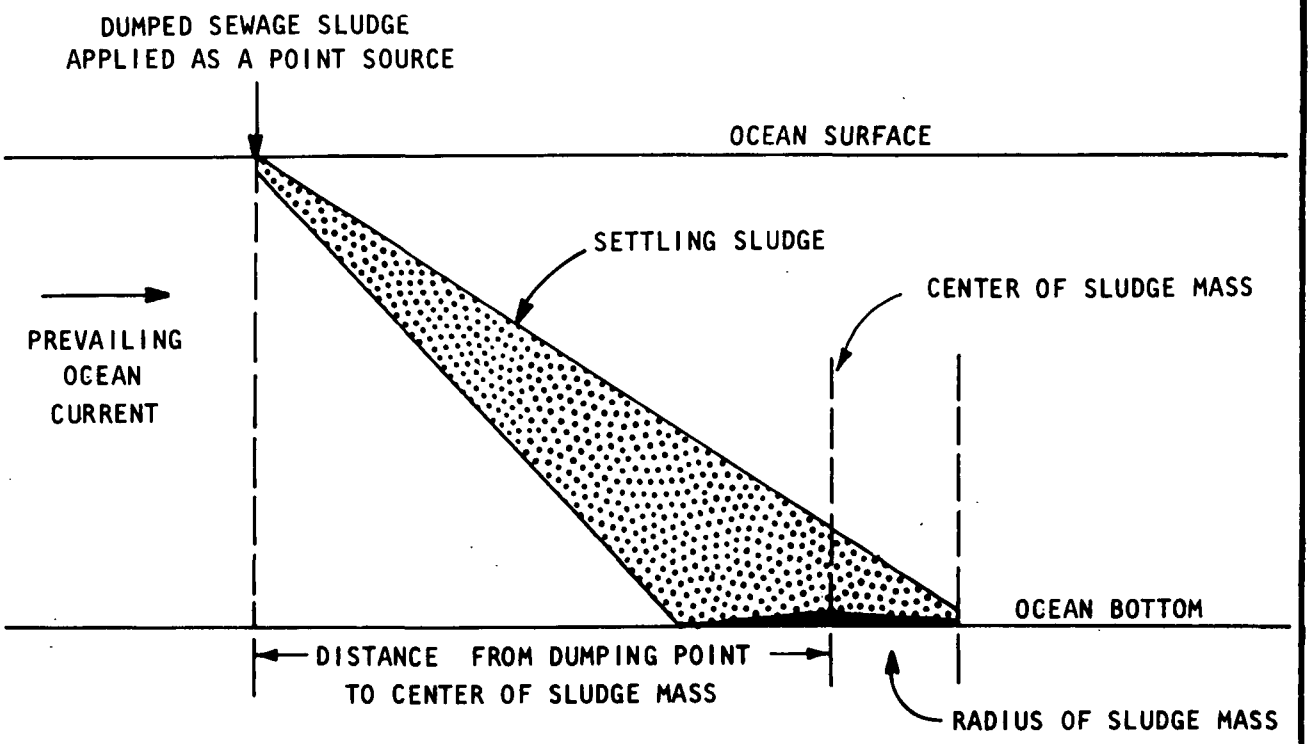
MODEL RESULTS OF TRANSPORT AND DISPERSION OF SEWAGE SLUDGE AT THE NORTHERN (60 m DEPTH) AND SOUTHERN (50 m DEPTH) AREAS[1]

Depth	Current Velocity	Settling Velocity of Sludge Solids	Horizontal Dispersion Coefficient	Vertical Dispersion Coefficient	Time	Distance From Dumping Point To Center of Sludge Mass[2]	Radius of Sludge Mass[3]
meters (feet)	cm/sec (in./sec)	cm/sec (in./sec)	sq cm/sec (sq in./sec)	sq cm/sec (sq in./sec)	minutes	kilometers (n miles)	meters (feet)
50 (164)	10.0 (4.0)	2.0 (0.8)	1,000 (155)	10.0 (1.5)	60	0.25 (0.15)	65 (213)
60 (197)	10.0 (4.0)	2.0 (0.8)	1,000 (155)	10.0 (1.5)	60	0.30 (0.16)	72 (238)
50 (164)	10.0 (4.0)	0.1 (0.04)	1,000 (155)	10.0 (1.5)	1250	5.00 (2.70)	300 (985)
60 (197)	10.0 (4.0)	0.1 (0.04)	1,000 (155)	10.0 (1.5)	1250	6.00 (3.24)	330 (1,082)
50 (164)	10.0 (4.0)	2.0 (0.8)	10,000 (1,550)	10.0 (1.5)	60	0.25 (0.15)	212 (697)
50 (164)	30.0 (11.8)	0.1 (0.04)	10,000 (1,550)	10.0 (1.5)	1250	15.00 (8.09)	950 (3,117)

[1] See Figure 40 for a typical representation of sludge transport and dispersion.

[2] Horizontal distance traveled before reaching the ocean bottom (see Figure 40).

[3] Radius of sludge mass after reaching the ocean bottom (95 percent of mass within radius, see Figure 40).



TYPICAL TRANSPORT AND DISPERSION OF SEWAGE SLUDGE IN OCEAN WATERS

NOTE: SEE TABLE 27.

FIGURE 40

Bottom sediments are resuspended primarily by storm waves and currents and by internal waves. Once resuspended, these sediments can be transported by bottom currents.

Storm Waves and Currents

Strong storm-wind-driven currents resuspend large quantities of fine bottom sediments in the Bight Apex (Drake, 1974). The bottom sediments in both the Northern and Southern Areas exhibit wave ripples, indicating that these sediments have been moved back and forth by storm-generated surface waves. The Northern Area, however, because of its greater depth, has a slightly lower potential for resuspension of fine-grained sediments by surface waves than does the Southern Area.

Internal Waves

Internal waves have been observed in the vicinity of the Hudson Shelf Valley. These waves dissipate as they break along the bottom (at depths where the density gradient upon which they travel intersects the bottom), but only bottom sediments shoreward of the 30 to 35 m (98 to 115 ft) depth contour are likely to be affected. The bedforms observed in the Northern and Southern Areas may have been produced by either internal waves or storm currents. The deeper sections of the Northern Area have a lower potential for resuspension of fine bottom sediments by internal waves than do the shallower sections of the Southern Area.

Bottom Currents

Once fine bottom sediments are resuspended in the water column, they are transported by bottom currents. Results obtained using bottom drifters indicate that a generalized line of divergence (Figure 17) exists on the continental shelf at depths of about 60 m (197 ft). Shoreward of this line, the bottom drift tends to have an onshore component; seaward of the line, it tends to have an offshore component.

All of the Southern Area is shoreward of the line of divergence. If sludge were dumped in this area, the particles that reached bottom would be subjected to a slow, steady, shoreward movement. The deeper portions of the Northern Area, on the eastern border, are along the line of divergence. If sludge were dumped into these areas, particles would probably move in an offshore direction.

The presence of relict mud deposits in the Northern Area indicates that the agents of resuspension and transport have been ineffective in removing mud from these sediments. Designation of a dump site near the deeper portions of the Northern Area would probably result in the transport of sludge particles to the adjacent low-lying areas of the relict drainage system (Figure 29), where they would remain. Although a physical accumulation on the bottom is not expected, increases in the levels of organic material and heavy metal concentrations are.

CHEMICAL EQUILIBRIA AND BIOLOGICAL OXIDATION

When sewage sludge is dumped into the ocean, it is physically dispersed within the water column and begins to chemically interact with the seawater. Basic laws of chemistry regarding concentration equilibria and adsorption are the major factors affecting the chemical reactions that occur.

Heavy Metals

Field analyses at the Hyperion Sewage Treatment Plant in Los Angeles, California, show that a significant portion of the heavy metals in sewage sludge is contained in the particulate fraction (fines). The analyses also show that many of these metals are released into the seawater (Table 28) (Chen, 1974; Rohatgi and Chen, 1975). As soon as the sludge is dumped, there is a rapid, initial (first-stage) release of metals, followed by a slower, long-term (second-stage) release. The first-stage release is attributable to the oxidation of organic particles and metal sulfides and to the desorption of metals from particles. Desorption may be responsible for some of the second-stage releases as well (Rohatgi and Chen, 1975).

TABLE 28

RELEASE IN SEAWATER OF HEAVY METALS FROM SLUDGE*

Metal	Percent Released
Cadmium	93-96
Chromium	2
Copper	5-9
Lead	35
Manganese	35
Nickel	49-64
Zinc	18-39

*From suspended particulates in digested sludge at equilibrium with seawater.

Source: Rohatgi and Chen, 1975.

The equilibria equations of Morel *et al.* (1975) indicate that the metal sulfides in sludge rapidly dissolve when mixed with seawater, freeing metal ions and promoting rapid dilution.

In situ studies at the existing sludge dump site (Callaway *et al.*, 1975) show that initial dilutions of seawater to sludge range from 500:1 to 1000:1 within ten minutes of release. Other researchers have noted that concurrent with initial dilution there is a drop in the ambient oxygen level around the dump site. Metal concentrations in the water immediately after cessation of dumping are reported to be highly variable, and seven hours after dumping, concentrations of metals in the water column reportedly remain elevated (Hilovsky and Szucs, 1975).

Metals not dissolved or oxidized during first-stage release can be released in time as the organic matter with which they are bound decomposes or as they are desorbed from inorganic material. Conversely, metals already in solution or which come into solution during dumping can be immobilized through sorption to suspended particulate matter.

Chromium, copper, lead, and zinc are expected to accumulate in bottom sediments, but cadmium is not expected to do so because it rapidly dissolves in the water column. Segar and Cantillo (1975) calculated the average residence time of heavy metals in the Bight Apex and concluded that a considerable portion of the metals originating in sewage sludge or dredged material is rapidly flushed out.

Organic Matter

Organic constituents of ocean dumped sludge are subject to oxidation and scavenging in both the water column and bottom sediments. Duedall *et al.* (1975) have demonstrated that the organic carbon content of bottom sediments in the vicinity of the existing dredged material and sewage sludge dump sites is not high when compared with that in other coastal areas. Further, they postulate that different microorganisms act to hydrolyze the organic matter in sludge, and they note specifically that cutin, a common component of sludge, is degraded by bacteria and fungi. These biological oxidation processes, however, reduce the dissolved oxygen levels in seawater.

As discussed in Chapter V, substantial quantities of oxidizable organic matter reach the Bight Apex. The oxidation of this matter depletes the dissolved oxygen there, especially during the summer months when biological activity is high. Segar *et al.* (1975) concluded that relocation of the sewage sludge and dredged material dump sites would not significantly improve the dissolved oxygen levels in the bottom waters of the Bight Apex. They also concluded that a twofold increase in the area's nutrient loading from inland runoff could raise photosynthetic productivity to a level that would seriously deplete oxygen in the bottom waters.

OTHER DUMP SITES

Philadelphia Dump Site

A brief analysis of sludge dumping at the Philadelphia site can provide some insights into what might be expected at the Northern and Southern Areas in the New York Bight. The volume of sludge dumped at the Philadelphia site in 1974 was approximately 0.6 million cu m (0.8 million cu yd), or about one-sixth the volume of sludge dumped in the New York Bight that year (Lear and Pesch, 1975). The water depth, hydraulic activity, and net drift at the Philadelphia site are similar to conditions within the Northern and Southern Areas.

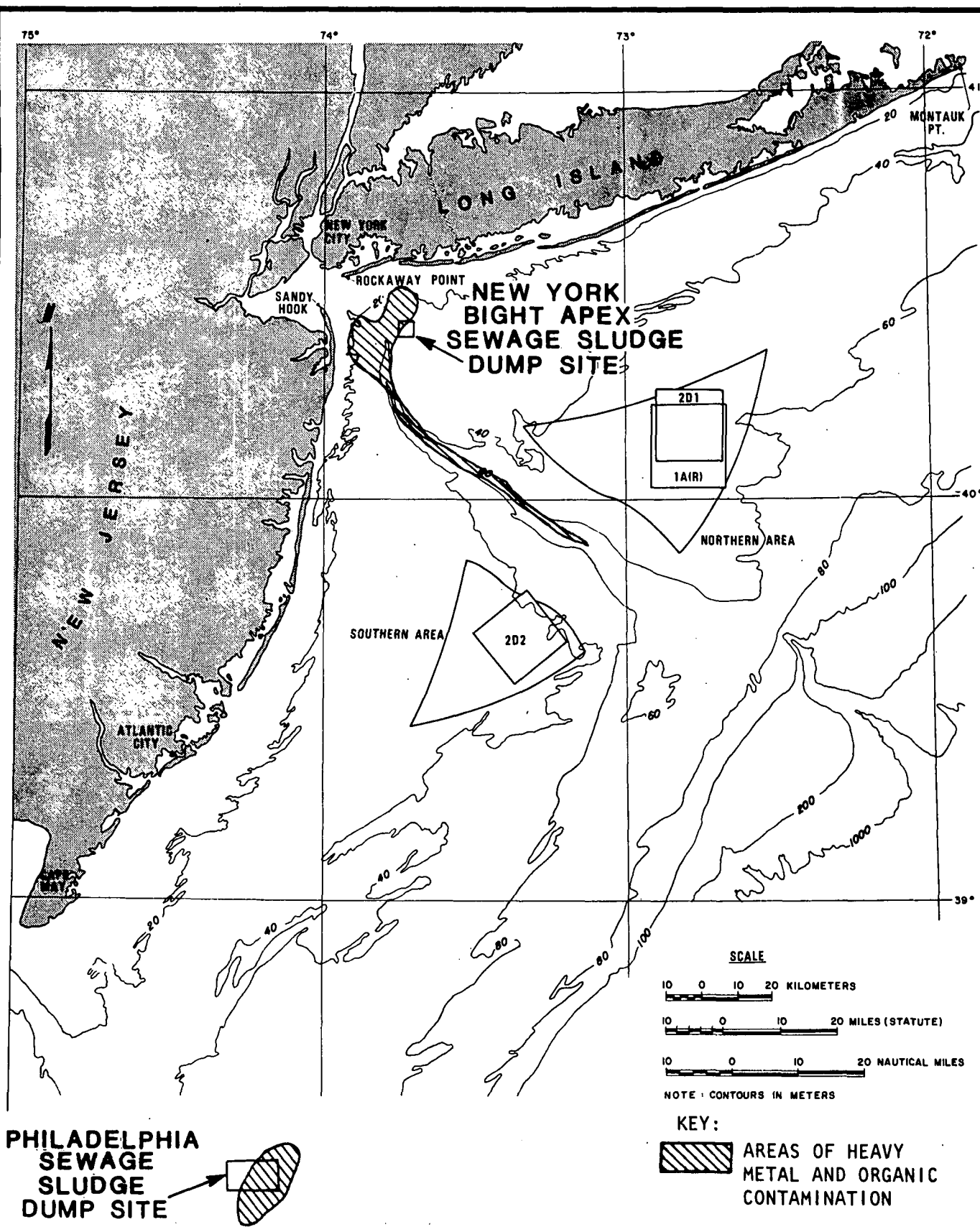
Organic carbon accumulation in the vicinity of the Philadelphia site is small. Background concentrations are approximately 0.1 percent organic carbon by dry weight, and the highest concentration found in the affected areas was only 1.4 percent, observed approximately 19 km (10 n mi) south of that dump site.

The highest metal concentrations also were found there (Lear and Pesch, 1975); chromium, lead, and zinc showed accumulation with respect to background concentrations. Manganese and iron also were high, but this was attributed to industrial waste dumping at an adjacent site. Mercury, copper, and nickel had not accumulated in the bottom sediments to any appreciable degree. On the other hand, there was an accumulation of PCB

Figure 41 is a general representation, based on metal and organic content, of the bottom areas affected by pollutant sources in the Bight Apex and near the Philadelphia dump site. Dumping at the Philadelphia site has a pronounced influence on downcoast areas, which may be the result of coast-parallel transport caused by the predominant southwesterly drift.

Dump Sites in Other Waters

In Scotland, sludge dumping in the Firth of Clyde has affected an area of between 2.9 and 10.0 km (1.6 to 5.4 n mi) in diameter (MacKay *et al.*, 1972). Concentrations of heavy metals in the immediate vicinity of this dump site are quite similar to those found in the Bight Apex, although the bottom sediments in the Firth of Clyde contain more organic carbon (8.2 percent). Background concentrations of pollutants in the Firth of Clyde are generally higher as well. Water depths in the Firth of Clyde are less than 90 m (295 ft), and tidal flushing is a dominant dispersal agent.



BOTTOM AREAS AFFECTED AT EXISTING SEWAGE SLUDGE DUMP SITES IN THE MID-ATLANTIC BIGHT

SOURCES: LEAR, 1973; CARMODY ET AL., 1973;
HATCHER AND KEISTER, 1975

FIGURE 41

In England, studies have been conducted on sludge dumping in the Thames estuary, which is only about 20 m (65 ft) deep and which is subjected to tidal currents on the order of 90 cm/sec (35.4 in/sec). These studies show no appreciable loss in oxygen concentration in bottom waters (Shelton, 1971).

SUMMARY

It is expected that the bottom area surrounding a dump site in either the Northern or Southern Area will be contaminated by increased levels of fine organic matter, heavy metals (chromium, copper, lead, and zinc), bacteria, and chlorinated hydrocarbons. Detectable contamination from sludge dumping will be limited to areas within 15 km (8 n mi) of the dump site; the affected area will be elongated in the direction of the prevailing currents (to the west and southwest off Long Island, to the south and southwest off New Jersey). A larger bottom area will be affected if dumping occurs in the Northern Area because of the greater depth, although there will be less accumulation of solids per unit area. In general, however, significant accumulations of sludge solids on the bottom are not expected at a dump site in either area.

The area with the least potential for resuspension and transport of fine sludge contaminants is the easternmost portion of the Northern Area. This area is characterized by large amounts of fine sediments, indicating that resuspension and transport are minimal.

The impact of sludge contaminants on the ecosystem is discussed in Chapter VII.

CHAPTER VII

IMPACTS OF THE PROPOSED ACTION

The proposed action will have an impact on water quality and the marine ecosystem at and around the alternate dump site. The extent of the impact will depend on the nature of the sludge and on the environmental conditions at the site. The proposed action will also have an impact on the quality of shellfish in the area of the dump site and may have a number of economic impacts beyond those associated with use of the existing dump site in the Bight Apex. These include increased sludge transportation costs, decreased commercial fishing, reduced potential for developing shellfish resources, and interference with mineral resource development. The loss of a potentially valuable resource, the sludge itself, will continue. The proposed action may also conflict with other dumping activities in the New York Bight.

IMPACTS ON PUBLIC HEALTH, WATER QUALITY, AND SAFETY

The proposed action will have no significant adverse effect on the public health and welfare of beach communities or on the quality of Long Island or New Jersey coastal waters. Floatables from an alternate dump site in either the Northern or Southern Area are not expected to reach these beaches under any weather conditions, including winter storms. Potential coliform contamination of commercial shellfish (surf clams, ocean quahogs, and sea scallops) from sludge dumping will be limited to the immediate vicinity of the alternate dump site.

Swimming

Recent studies indicate that no significant contamination of bathing (primary contact) waters results from the dumping of sludge at the existing site; the random, elevated coliform levels along the Long Island and New Jersey beaches are attributed to contamination from inland sources rather than to ocean dumping (FDA, 1974a, 1974b; USEPA, July 1974, April 1975). Data collected by EPA and FDA indicate that discharges from municipal wastewater treatment plants were the principal cause of the elevated coliform levels in New Jersey beach waters. Both agencies have concluded that there is no indication of coliform contamination of waters along the Long Island and New Jersey beaches that can be attributed to the ocean dumping of sewage sludge. Bacterial contamination from sludge dumping, in fact, appears to be confined to the immediate vicinity of the existing dump site.

Brook's model has been used to predict the theoretical dispersion of bacteria resulting from ocean dumping at a site with characteristics similar to those of the existing dump site (USEPA, unpub.). Using conservative values for onshore currents, coliform die-off rates, and dispersion coefficients, it was concluded that there would be at most a low probability of coliform contamination of nearby beach waters. Since the Northern and Southern Areas are much farther from shore than the existing dump site, and in different current regimes, the potential for bacterial or viral contamination of primary contact waters from use of either area is virtually non-existent.

Shellfish

Contamination of edible commercial and sport shellfish taken from the New York Bight remains a significant potential public health hazard. Shellfishing has been prohibited in the immediate area of the existing dump site, as well as in other estuarine and coastal waters of the Bight Apex (Figure 25). The health hazard from consumption of contaminated shellfish is much greater than that from direct contact (swimming) because shellfish (as fish feeders) have the capacity to concentrate pollutants in their gut and circulatory system.

Use of a dump site in either the Northern or Southern Area is likely to result in at least a temporary FDA closure of the area to commercial and sport shellfishing. It is difficult to predict the size of the area that would be closed, but judging from present FDA practices, a precautionary closure would involve a circular area, 11.1 km (6.0 n mi) in radius, around the designated dump site. The greatest abundance of surf clams is found in and around the Southern Area (Figures 20, 21, and 22); ocean quahogs are abundant in both areas (Figure 23), but their resource potential in comparison with surf clams has not been defined.

The potential hazards to public health would be greatest in those areas currently used for large-scale commercial shellfishing, such as off the New Jersey coast, shoreward of the Southern Area. Assuming that commercial shellfishing patterns remain essentially unchanged over the next five years, the potential public health hazard from consumption of contaminated shellfish would be less if a site in the Northern Area were chosen.

Floatables

Certain aesthetically unpleasant components of dumped sludge (oil, grease, and artifacts) are expected to accumulate in a surface slick within the immediate area of an alternate dump site. Although some of the floatables currently washed up on Long Island and New Jersey beaches may come from the existing dump site, this has not been verified (NOAA-MESA, March 1975). Floatables from other sources (the Hudson estuary, inland runoff, municipal wastewater discharges, combined sewer and stormwater runoff, and vessel discharges) are thought to far outweigh those from sludge dumping at the existing site.

Sludge dumping in either the Northern or Southern Area would have a much lower potential for affecting the beaches because both areas are farther from shore than the existing dump site. However, floatables resulting from use of an alternate dump site would contribute to the degradation of relatively clean waters there.

Hazards to Navigation

The proposed action would result in a greater potential hazard to navigation in the New York Bight. Due to the increased volumes projected for 1981, sludge vessels would have to make more trips per year; if a new site farther offshore were designated, each trip would take longer. The sludge dumping vessels are inherently slow, with speeds ranging from 9 km/hr (5 knots) for towed barges to 13 km/hr (7 knots) for tankers. Towed barges in particular would be more hazardous on longer trips because they are difficult to control and appear on radar screens as two separate vessels. Because of the greater trip frequency and duration, there would be greater statistical chances for sludge vessels to collide with other commercial vessels, such as oil tankers and freighters, or with stationary structures, such as navigation aids, breakwaters, or oil drilling platforms.

Precautionary Zone. The greatest potential for accident would occur as the sludge vessels passed through the heavily traveled precautionary zone in the Bight Apex (Figure 5), although this impact would be mitigated somewhat by abandoning the existing dump site, which lies within this zone. Both the Northern and Southern Areas lie outside established navigational lanes and are therefore relatively hazard-free.

The Southern Area. Navigation of sludge vessels in the Southern Area might be complicated by increased traffic (work boats, supply ships, oil tankers, etc.) associated with development of nearby oil and gas lease tracts (Figure 6). There is also a slight possibility of sludge vessels colliding with oil platforms in the lease area. Whether these hazards to navigation materialize will depend on the speed and scope of oil and gas development and on the duration of ocean dumping at the site.

Other Hazards. It is unlikely that other proposed offshore facilities, such as artificial islands or deepwater ports, will be constructed in the near future.

IMPACTS ON THE ECOSYSTEM

The magnitude of impact of dumped sludge on the marine ecosystem is primarily a function of: 1) the concentration of the sludge which reaches bottom, 2) its areal extent, and 3) the subsequent bottom transport of contaminants, which increases the lateral extent of the impacted area. Characteristics of sludge dumped in the New York Bight in the future are not expected to be much different from those of the sludge currently dumped there (Tables 3 and 4).

Ecosystem impacts may be minimized either by containing the pollutants in a very small area (to concentrate the toxic substances) or by dispersing them over a large area (to achieve maximum dilution). Impacts on biota, especially benthos, can best be mitigated by dispersing the contaminants in the water column, thereby diluting them before they reach bottom.

With maximum dilution, the impact of pollutants that eventually reach bottom will be minimal if the potential for resuspension and bottom transport is low. To the extent possible, selection of an alternate dump site should be based on the optimization of these physical forces.

Benthos

The benthic community is composed of those organisms that live on or in the bottom sediments or substrates. For the purposes of this EIS, demersal fish and shellfish are discussed in the next section, Fisheries Resources.

Similar Areas. Impacts of sludge dumping on benthos in the Northern and Southern Areas are likely to be much the same as those observed at existing sewage sludge dump sites. At present, a bottom area of approximately 52 sq km (15 sq n mi) around the existing dredged material and sewage sludge dump sites shows evidence of reduced biomass and a shift in benthic composition and diversity. Studies by NOAA-NMFS (1975b) show the major impact to be suffocation of those benthic organisms buried by dredged material. In this respect, adverse biological effects from dumping of dredged material are thought to be far more severe than those from dumping of sludge. Contamination of the nearby Hudson Shelf Valley has also been observed, but the benthic communities there are more productive than those at the existing dump sites (NOAA-NMFS, 1972).

A study of the Philadelphia sewage sludge dump site, which is located about 74 km (40 n mi) east of Ocean City, Maryland, was unable to detect any impacts of sludge dumping on the benthos (Lear, 1973), although an accumulation of heavy metals in scallops and clams onsite was observed. At the time of Lear's study, however, this site had been in use for less than a year, and the volume of sludge that had been dumped there was about one-sixth the annual volume dumped at the existing sludge site in the Bight Apex. Depths at the Philadelphia dump site are comparable to those in the Southern Area.

In Scotland, sludge dumping in the Firth of Clyde has resulted in a bottom accumulation of organics and metals, as well as in a change from a clam and starfish community to a polychaete worm community. An increase in the benthic biomass has also been observed, but it appears to be of little or no value as fish food since none of the species were found in the guts of fish taken from the area (MacKay *et al.*, 1972). Steel *et*

al. (1973) also reported an increase in the level of sludge-related contaminants, with impacts on the benthos being most evident. The volume of sludge dumped in the Firth of Clyde is approximately a quarter of that currently dumped in the New York Bight. Depths at the Firth of Clyde site are comparable to those in both the Northern and Southern Areas.

Northern and Southern Areas. The Northern Area is somewhat deeper than the Southern Area. Consequently, use of the Northern Area would result in greater dilution of contaminants and a lesser impact on the benthos. The potential for resuspension and transport of contaminated sediments also appears to be less in deeper portions of the Northern Area than in the Southern Area.

Hudson Shelf Valley. Sewage sludge dumped in either the Northern or Southern Area is not likely to reach the Hudson Shelf Valley; this conclusion is based on predictions of lateral transport in the water column prior to settling or after resuspension. At the very worst, extremely low concentrations of fine sludge particles might settle on the bottom 15 km (8 n mi) from a dump site located in either the Northern or Southern Area. The Hudson Shelf Valley is 18.5 km (10.0 n mi) from the nearest boundary of either area (Figure 10).

The Hudson Shelf Valley is currently receiving contaminated materials from the Bight Apex (NOAA-MESA, March 1975) (Figure 41). The existing dredged material and sewage sludge sites, located near the rim of the inner terminus of the valley, may be the sources of this contamination.

The red crab and American lobster, abundant in the lower parts of the Hudson Shelf Valley, would be adversely affected if sludge contaminants accumulated there. Special emphasis should thus be placed on avoiding contamination of the valley's upper reaches, where breeding zones are located.

Fisheries Resources

Fisheries resources in the New York Bight include pelagic fish (water column feeders), demersal fish (bottom feeders), and shellfish (bivalves and crustaceans), as described in Chapter V.

Attempts to define the impacts of dumping on fisheries resources at existing sites in the Bight Apex have been hampered by a lack of temporal and spatial coverage, by inadequate sampling design, and by limited numbers of replicate samples, all of which preclude statistical verification. In addition, the motile and highly migratory nature of most finfish species has prevented delineation of cause-and-effect relationships. Nevertheless, for the purpose of recommending an alternate dump site where adverse impacts would be minimal, the available data are sufficient because they do allow relative comparisons.

Northern and Southern Areas. Non-motile shellfish species in or near the two areas are the fisheries resources most likely to be impacted by sludge dumping at an alternate site. The surf clam, sea scallop, and ocean quahog are found in both areas, often in numbers suitable for commercial harvesting. Based on recent surveys, greater surf clam resources are found in and around the Southern Area, especially along the New Jersey coast (Figures 20, 21, and 22), than in the Northern Area; ocean quahogs are numerous in both areas; and sea scallops are less common in the New York Bight than either surf clams or ocean quahogs (Figure 24). Surf clams and ocean quahogs are not found in significant numbers at the existing sludge dump site.

The potential impact on shellfish resources would be minimized by dumping within the Northern Area, since surf clams are abundant in commercial quantities near the Southern Area. Use of the Northern Area would also minimize the danger of illegal harvesting of contaminated shellfish, as the Southern Area is currently and potentially a more lucrative commercial source.

Significant impacts on the crustaceans (crab and lobster) that frequent the two areas could also be expected, but these impacts would be mitigated to some extent by the crustaceans' ability to move out of the affected zones. There is no evidence that these species are more or less abundant in either area.

Since most commercial finfish are found throughout the New York Bight, impacts on these species will be about the same in either area. Impacts on finfish might be expected to differ if one of the areas exhibited physical characteristics particularly conducive to migratory behavior, but at present there is no evidence of this.

Fish Migration. As part of a NOAA-NMFS study (1975b), groundfish in the New York Bight were sampled twice yearly in an attempt to relate dumping to the normal migratory activities of fish. The catch of bony fish in areas of the Bight Apex with high-carbon sediments (such as at the existing sludge dump site) was found to be lower, on a seasonal basis, than in low-carbon sediment areas. It was concluded from this that migratory movements are affected by the ocean dumping of sewage sludge.

Both the Northern and Southern Areas contain topographical lows which favor the accumulation of high-carbon sediments. Hydraulic activity in these areas is lower than at the existing dump site, and this, too, favors the accumulation of these sediments. The Northern Area is characterized by slightly deeper waters and somewhat finer-textured sediments than are found in the Southern Area, which indicates a greater propensity in the Northern Area for the accumulation of high-carbon sediments from dumped sludge; consequently, fewer groundfish would be expected there. Considering the dilution and dispersion of sludge associated with depth, however, dumping in either area should not significantly alter migratory patterns.

Fin Rot. The occurrence of fin rot in demersal fishes has been attributed to pollution in the Bight Apex and in Raritan Bay (Murchelano and Ziskowski, 1975). Causative agents have not been isolated, however, nor has the anomaly been exclusively linked to ocean dumping. Despite a significant difference in the occurrence of fin rot between fish taken from the Bight Apex and those taken from the outer New York Bight, the overall percentage of occurrence is low (3.8 percent of winter flounder from the Bight Apex, 0.7 percent from the outer New York Bight). A greater percentage of occurrence was observed in samples taken from areas of high-carbon sediment (5.1 percent of winter flounder sampled).

Considering the substantial dilution expected at either the Northern or Southern Area and the lack of significant additional pollutant loadings, fin rot is not expected to occur at a dump site in either area. On the other hand, considering the widespread occurrence of fin rot in the Bight Apex and the many sources of pollution there, the overall occurrence of fin rot could not be expected to decrease even if the existing dump site were abandoned.

Plankton

Plankton are defined as those plants (phytoplankton) and animals (zooplankton) that float in the water column.

Similar Areas. Past and present ocean dumping practices in the Bight Apex have had no observable effect on phytoplankton productivity. Increased sludge dumping would probably neither increase nor decrease the rate of primary productivity, but it might expand the area of productivity (NOAA-NMFS, 1975b). Similarly, ocean dumping practices have had no discernible effect on the species composition, abundance, or distribution of zooplankton in the Bight Apex (NOAA-NMFS, 1975b).

Pararas-Carayannis (1973) reported, "no short-term adverse effects have been observed on free-floating or swimming marine organisms. No effects were observed on zooplankton species composition and distribution. Reported inhibition in the growth of phytoplankton has not been substantiated."

This may indicate the inability of present field techniques to detect the effects of sludge on plankton, since certain laboratory investigations suggest that there are such effects. The applicability of these laboratory investigations to the evaluation of an alternate dump site, however, is limited. Barber and Krieger (1970) reported phytoplankton productivity to be inhibited by sewage sludge, but this has not yet been substantiated. Dunstan (1975), investigating the effects of sewage effluents, found the response of phytoplankton quite varied and unpredictable. Although growth was generally enhanced by the addition of nitrogen and phosphorous, the role of minor growth substances (trace metals, vitamins) became paramount in the regulation of phytoplankton productivity, composition, and abundance.

The effects of sludge on zooplankton are only slightly less confused. Based on field and laboratory data, NOAA-NMFS (1972) reported that sludge and dredged material cause pathological anomalies in larger crustaceans; it thus seems likely that smaller crustaceans, such as gammarid amphipods (a common fish food), would be affected in a similar manner.

Northern and Southern Areas. Impacts on plankton in either of the two areas would probably be undiscernible. Although the addition of nutrients might favor localized increases in phytoplankton productivity, other factors would tend to decrease productivity. Increased turbidity, for example, which lessens the depth of light penetration, would probably result in a localized reduction of productivity. Since primary productivity is limited to the euphotic zone in the upper layers of the water column, high levels of nutrients below this zone would not be utilized in photosynthesis.

Potential impacts of sludge dumping on zooplankton would be more severe in the Northern and Southern Areas than at the existing dump site. Since zooplankton biomass is generally greater in the shelf and mixed zone waters which characterize these two areas than in near-shore waters, any adverse effect (such as pathological anomalies or impediments to larval growth) would threaten a larger zooplankton population at a site in the Northern or Southern Area than at the existing dump site. Furthermore, zooplankton populations in the two offshore areas are oceanic in nature and less adapted to environmental stress than those in the Bight Apex, which are estuarine in nature.

Short Dumping

The proposed action may encourage "short dumping," that is, the dumping of sludge before the vessel reaches the designated dump site. However, surveillance by USCG radar, shipriders, planes, and escort or patrol vessels, together with the use of dump-site transponders, is expected to prevent or at least curtail illegal short dumping.

Emergency Situations. Ocean dumping permits allow the master of a vessel to dump at any location or in any manner necessary to safeguard life at sea. (Appendix A, General Condition 9) The increased number of trips and the greater distance and travel time to the Northern or Southern Area would increase the potential for emergency dumping.

Rough weather during late fall, winter, and early spring can cause emergency situations which require short dumping. Other emergencies that could occur include vessel breakdowns under hazardous conditions and potential collisions with stationary objects or other ships.

The effects of emergency dumping, however, would normally be mitigated by the dilution and dispersion provided by storm conditions. Moreover, each emergency would be unique in time and place, so that sludge would not be continually dumped at the same point under the same wind and weather conditions.

Potential Impact. Were an alternate dump site located within the Southern Area, sludge vessels would probably use the Hudson Canyon Navigational Lane (Figure 5) for much of the distance. Because this route runs over or near the Hudson Shelf Valley, at least minor adverse effects could be expected since the valley would tend to trap short-dumped sludge. The alternate route to the Southern Area, following the Barnegat Navigational Lane (Figure 5), would increase both transportation costs and travel time and would probably not be used. Furthermore, use of the Barnegat route would pose a greater threat to New Jersey beaches should a short dump coincide with onshore winds or currents.

Transporting sludge to the Northern Area would not present a serious hazard to the Hudson Shelf Valley since sludge vessels would probably use the Nantucket Navigational Lane (Figure 5), which parallels Long Island. Use of this route, however, would threaten New York City and Long Island beaches in the event of a short dump when winds or currents were onshore. Use of the Hudson Canyon Navigational Lane to the Northern Area would be longer and more costly, so few sludge vessels, if any, would be likely to use it. If it were used, of course, there would be a direct threat to the Hudson Shelf Valley.

The impact of short dumping would be most severe in the Bight Apex; however, the probability is that most short dumping would take place beyond this area.

Potential for Ecosystem Recovery

The potential for recovery of the existing dump site's ecosystem is an important consideration in assessing the impact of using an alternate dump site. Previous studies of repopulation rates following pollution abatement in the Raritan estuary indicate that freshwater forms rapidly reestablished themselves in the upper estuary (Dean and Haskin, 1964). More recent surveys in western Raritan Bay, however, found an impoverished benthos, one not indicative of recovery (NOAA-NMFS, 1972). McNulty (1970) found no evidence of increased commercial or sport fish populations following pollution abatement in Raritan Bay, and he concluded that pollution and dredging have resulted in long-lasting detrimental effects.

The NOAA-NMFS study (1972) predicted that after abandonment of the existing dredged material and sewage sludge dump sites, recovery to former levels of productivity, if it is possible at all, will require years or even decades. The FDA (1975) has found shellfishing areas around these two dump sites to be very degraded, and has concluded that moving the sites would be of little benefit in promoting recovery of the area.

The recovery potential of the Northern and Southern Areas is about equal, although no prediction can yet be made about the time required for recovery after dumping is phased out.

Considering the high potential for degrading an alternate dump site in the Northern or Southern Area, and the low potential for promoting recovery of the existing dump site in the Bight Apex, it is concluded that the proposed action would result in no overall benefit to the benthic ecosystem.

ECONOMIC IMPACTS

The proposed action would significantly increase the cost of sewage sludge disposal in the New York-New Jersey metropolitan area. In addition, it could conflict with the operation of commercial fisheries and with the development of mineral resources. Finally, it would preclude the beneficial use of sludge.

Sludge Transportation Costs

The cost of transporting sludge to an alternate dump site in either the Northern or Southern Area or at the chemical wastes site was evaluated in terms of two key considerations: capital costs, for potential fleet expansion, and hauling costs, including operation, maintenance, and repair.

Fleet Expansion. As discussed in Chapter II, there is an existing fleet of thirteen vessels currently approved for sludge hauling in the New York Bight (Table 7). Of these thirteen vessels, the barge *Westco I* is not seaworthy for use beyond the existing sludge dump site and the barge *Liquid Waste No. 1* is currently in use in Puerto Rico. Therefore, an eleven-vessel fleet (all vessels except the barges *Westco I* and *Liquid Waste No. 1*) was used in evaluating the fleet hauling capacity to a dump site in the Northern or Southern Area or at the chemical wastes site. For the existing site, the full thirteen-vessel fleet and a twelve-vessel fleet (excluding the *Liquid Waste No. 1*) were evaluated. These analyses are summarized in Table 29.

Fleet expansion would not be necessary if the existing dump site were used until 1981, even if the projected volume of 9.9 million cu m (13.0 million cu yd) in 1981 were realized. However, as shown in Table 29, expansion would be necessary prior to 1981 if an alternate dump site were designated at the 121 km (65 n mi) limit of the Northern or Southern Area. Additional hauling capacity would be required between 1979 and 1980, when the sludge volumes are expected to be 7.8 million cu m (10.2 million cu yd) and 8.6 million cu m (11.3 million cu yd), respectively (Table 9).

Fleet expansion must be viewed in terms of the sludge dumping phase-out date of 1981. Construction of new vessels would not be justified in economic terms. Therefore a shortage of hauling capacity would most likely be resolved by bringing in additional vessels from other areas, as required. Of course, additional

TABLE 29

FLEET HAULING CAPACITY

Factors Affecting Capacity	Existing Dump Site				Northern or Southern Area				Chemical Wastes Site	
	Thirteen-Vessel Fleet		Twelve-Vessel Fleet		Eleven-Vessel Fleet				Eleven-Vessel Fleet	
					Minimum		Maximum			
One-Way Distance[1] in km (n mi)	22	(12)	22	(12)	65	(35)	121	(65)	210	(115)
Round Trip Distance[2] in km (n mi)	136	(74)	136	(74)	222	(120)	334	(180)	510	(280)
Average Speed[3] in km/hr (knots)										
Tanker	13	(7)	13	(7)	13	(7)	13	(7)	13	(7)
Barge	9	(5)	9	(5)	9	(5)	9	(5)	9	(5)
Round-Trip Time[4] in hr										
Tanker	10.7		10.7		17.1		25.7		39.3	
Barge	15		15		24		36		56.8	
Loading and Docking Time in hr	10		10		10		10		10	
Discharge Time in hr	5		5		5		5		5	
Total Trip Time[5] in hr										
Tanker	25.7		25.7		32.1		40.7		54.3	
Barge	30		30		39		51		71.8	
Maximum Trips[6] per year										
Tanker	1,870		1,870		1,496		1,181		884	
Barge	1,869		1,602		1,027		785		558	
Maximum Sludge Hauling Capacity[7] in millions of cu m (cu yd)										
Tanker	4.0	(5.3)	4.0	(5.3)	3.2	(4.2)	2.5	(3.3)	1.8	(2.4)
Barge	8.7	(11.4)	8.0	(10.5)	6.9	(9.1)	4.5	(6.0)	3.2	(4.2)
Total	12.7	(16.7)	12.0	(15.8)	10.1	(13.3)	7.0	(9.3)	5.0	(6.6)
1981 Sludge Volume[8] in millions of cu m (cu yd)	9.9	(13.0)	9.9	(13.0)	9.9	(13.0)	9.9	(13.0)	9.9	(13.0)
Reserve in millions of cu m (cu yd)	2.6	(3.7)	2.1	(2.8)	0.2	(0.3)	None		None	

[1] One-way distance is from the Sandy Hook-Rockaway Point transect.
[2] Round trip distance includes approximately 92 km (50 n mi) travel within New York Harbor and waterways.
[3] Average speed under conservative conditions.
[4] Round trip time equals the round trip distance divided by the average speed.
[5] Total trip equals round trip time plus loading and docking.
[6] Maximum trips per year equals (8,008 hr/total trip time) X the number of vessels. The 8,008 hours of operations allow one month overhaul (out of service) per vessel per year.
[7] Sludge hauling capacity equals maximum number of trips X average vessel capacity.
[8] The 1981 sludge volume projected for the Bight (Table 9).

vessels would not be needed if the actual volume were to fall substantially short of the projected 1981 volume.

Hauling Costs. The hauling costs associated with sludge dumping have been discussed previously (Chapter III). Overall, the proposed action would increase total hauling costs during the 1978–1981 period by 323 to 400 percent (Table 30); the total costs would range from $204 million to $253 million. On the other hand, continued use of the existing dump site between 1978 and 1981 would cost about $63 million. Use of the chemical wastes site for sewage sludge dumping would cost between $405 million and $505 million for the period 1978 to 1981; this represents an increase of 641 to 800 percent over the cost of using the existing site. These conservative estimates (Table 30) were based on current unit costs from haulers and on projected sludge volumes (Table 9).

Commercial Fishing

The proposed action may adversely affect the commercial harvesting of shellfish at or near an alternate dump site. The commercial harvest of surf clams along the New Jersey shore would be particularly sensitive to sludge dumping at the Southern Area.

Southern Area. Ocean dumping of sludge anywhere in this area would probably damage commercial shellfish resources. The area near the New Jersey shore is an important and established fisheries resource, supporting significant quantities of commercially valuable surf clams, sea scallops, and ocean quahogs (Figures 20 through 24). Dispersion and movement of sludge particles dumped at a site in the Southern Area would appear to be generally onshore and thus over the adjacent shellfishing area.

In December 1975, New Jersey prohibited the taking of surf clams smaller than 8.9 cm (3.5 in) in diameter within the 3-mile (5.6 km) limit. This action was precipitated by commercial overfishing of state waters (*The New York Times*, December 31,1975). As a result of this prohibition, there may be pressure to develop the more abundant areas farther offshore.

Northern Area. Surf clams are not abundant in this area, so dumping would have little effect on commercial fisheries. In addition, the net dispersive flow in the Northern Area appears to be offshore and off the continential shelf.

Potential Shellfish Resources. Dumping in either the Northern or Southern Area could reduce the potential for development of ocean quahogs and sea scallops as commercial shellfish resources since both species appear to be abundant in the two areas and would undoubtedly be affected by sludge contamination. Because of their distribution in and near the areas, however, ocean quahogs and surf clams would appear to be the most vulnerable to ocean dumping.

In 1976, the commercial shellfish catch in the metropolitan area was worth $35.5 million, compared with $12.4 million for the commercial fish catch (Table 13). Neither of these figures includes fish or shellfish that were taken from the New York Bight and landed in neighboring states (Rhode Island, Connecticut, Delaware, Maryland, and Virginia) or in other countries. Hard clams ($19.4 million), surf clams ($3.3 million), and sea scallops ($3.2 million) were the most valuable shellfish taken from the Bight in 1976.

The New York Bight may currently supply at least half the edible surf clam meats harvested from U.S. waters (McHugh, 1975). Any damage to or closing of a specific area within commercial harvesting zones could significantly impact the shellfish industry. Although there is no guarantee that an area once closed to shellfishing could be immediately reopened after the cessation of sludge dumping, it should be noted that the old Philadelphia sludge dump site off Delaware Bay was reopened by FDA within two years. The volume of sludge dumped at this site, however, was only one-sixth that dumped at the Bight Apex dump site.

Mineral Resource Development

The proposed action may conflict with the potential development of mineral resources in or immediately adjacent to the Southern Area.

TABLE 30

SLUDGE HAULING COSTS

Year	Cost in Millions of Dollars				
	Existing Dump Site[1]	Northern or Southern Area[2]		Chemical Wastes Site[3]	
		Minimum	Maximum	Minimum	Maximum
1978	12.28	39.69	49.14	78.75	98.28
1979	15.01	48.51	60.06	96.25	120.12
1980	16.57	53.55	66.30	106.25	132.60
1981	19.30	62.37	77.22	123.75	154.44
Total	63.16	204.12	252.72	405.00	505.44
Percent Increase	–	323	400	641	800

[1] Based on unit cost of $1.95 per cu m ($1.47 per cu yd).
[2] Based on unit cost range of $6.30 to $7.80 per cu m ($4.70 to $5.90 per cu yd).
[3] Based on unit cost range of $12.50 to $15.60 per cu m ($9.40 to $11.80 per cu yd).

Sand and Gravel. Designation of a dump site in the Southern Area would probably conflict with the development of sand and gravel deposits in the western portion of the area (Figure 6). Sludge dumping in this area could, over time, contaminate the sand and gravel deposits to some extent and probably limit their usefulness as construction material. Decontamination, in addition to normal washing practices, could increase mining costs.

Potential oil and gas development and pipeline operations, however, may pose a more serious obstacle to the mining of sand and gravel deposits in the Southern Area. Should spills of crude oil from wells, pipelines, or vessels contaminate the bottom areas, the sand and gravel deposits would probably be removed from consideration as a potential mining area.

Initial delineations of the gravel deposits were based on widely spaced surficial samples. Results of recent NOAA-MESA studies (February 1976), however, suggest that these deposits are sandwiched between clay layers in many areas and may not be as widespread or as readily accessible as had been thought.

Sand and gravel deposits also are located at or near the existing sludge dump site (Figure 6). Although these deposits are much closer to the metropolitan area and therefore have more intrinsic potential as a developable resource than those in the Southern Area, bottom areas at dump sites in the Bight Apex have long been contaminated by sewage sludge and dredged material dumping. Thus, sand and gravel in these areas may be unusable, or of limited use, without extensive decontamination. In contrast, the deposits within the Southern Area are clean.

Oil and Gas. Designation of a dump site in the Southern Area could have a significant adverse impact on the development of oil and gas lease tracts (Figure 6) off New Jersey.

Potential conflicts with development of oil and gas reserves include:

- Constraints on pipeline routing because of contaminated bottom sediments. Of course, the pipelines could be routed to minimize conflicts, although development costs might be greater.
- Increased difficulty of monitoring and assessing the extent and impact of pollution related solely to oil and gas development.
- Damage to, or elimination of, potential sport fisheries that might be expected around offshore drilling structures. Development of a viable sport fishery 148 km (80 n mi) from the New Jersey coast, however, is difficult to envision at this time.
- Navigation hazards from sludge barging or dumping operations during drilling, construction, and off-loading.
- Increased turbidity from dumping activities that could interfere with oil-related maintenance and repair work.

Whether or not these or other potential problems occur would depend, of course, on the overlap between sludge dumping in the Southern Area and offshore oil development. The Northern Area, on the other hand is approximately 111 km (60 n mi) northeast of the oil and gas development areas (Figure 6); sludge dumping here could not possibly conflict with exploration for or development of oil and gas reserves near the Southern Area.

Loss of Sewage Sludge as a Potentially Valuable Resource

In theory, the costs of sludge disposal can be significantly reduced by using the material as a soil conditioner, fertilizer, or energy source. From this standpoint, ocean dumping of sewage sludge represents the loss of a potentially valuable resource.

Metropolitan Area Sludges. As discussed in Chapter III, composting (with land application) and pyrolysis are the two major land-based alternatives to ocean dumping. The costs and the environmental constraints associated with these alternatives are shown in Table 31.

Some of the sewage sludge produced by metropolitan area treatment facilities is unsuitable for use as a soil conditioner or fertilizer because of the high content of heavy metals and toxic organics, and the low

TABLE 31

COMPARISON OF ALTERNATIVE SEWAGE SLUDGE DISPOSAL METHODS FOR THE METROPOLITAN AREA

Disposal Method	Cost per Dry Metric Ton	Environmental Constraints
Composting and Land Application	$70-150	Heavy metals and nitrates contamination of ground and surface waters; bioaccumulation of metals in plants
Pyrolysis	$100-190	Particulate matter, gases, residues, and odors
Ocean Dumping	$30	Heavy metals, coliforms, nutrients, organics, pesticides

Source: Interstate Sanitation Commission, 1976a.

nutrient content. Only sludge that is low in heavy metals and toxic organics is considered suitable for agricultural land application.

Future Value. As ocean dumping costs increase, the value of sludge as a resource will become more important in evaluating the net costs of any alternative disposal method. At present the ocean dumping of sewage sludge cannot be considered a significant loss of a valuable resource. The future value of sludge will depend on the total costs of implementing land-based alternatives; such alternatives may eventually prove cost-competitive for some generators of municipal sewage sludge.

IMPACT ON OTHER DUMPING ACTIVITIES IN THE NEW YORK BIGHT

The proposed action should not affect other dumping activities in the foreseeable future. If dredged material were dumped with sewage sludge at an alternate dump site, as had been considered by EPA, the combined environmental impact would almost certainly be more severe than that of sludge dumping alone.

Dredged Material

At present, it is impossible to predict the environmental impact of dumping both sewage sludge and dredged material at a site within either the Northern or Southern Area. Ocean dumping of dredged material was not considered a serious environmental problem until recently (Table 10 and Figure 4), and its environmental effects are only now being established.

Based on historical evidence at the existing dump site, 90 to 95 percent of ocean-dumped dredged material reaches bottom; this is in direct contrast to the very small percentage of dumped sewage sludge that reaches bottom.

Wrecks

Relocating the wreck dump site seaward of the Barnegat Navigational Lane would neither environmentally nor physically affect the proposed action. Creation of a potential hazard to navigation is most unlikely, since this is the principal reason for relocating the wreck site. The wrecks might even become a feeding ground for fish and a stimulus to sport fishing.

Other Dumping Activities

Most dumping at the existing acid and chemical wastes dump sites will be phased out in favor of land-based disposal methods or process modifications.

The cellar dirt dump site will continue to be used as needed, depending on major metropolitan construction activity and the availability of alternate disposal sites. This should have little environmental impact in any case because cellar dirt is essentially inert and nontoxic.

MISCELLANEOUS IMPACTS

There is a remote possibility that the proposed action would have certain miscellaneous impacts not directly related to ocean dumping. These could include potential effects on marine-related recreation (sport fishing, boating, and beach attendance) and possible induced population growth in the metropolitan area.

Potential Impact on Marine-Related Recreational Activities

The proposed action is not expected to affect marine-related recreational activities, with the possible exception of sport fishing at and near an alternate dump site. Recreational activities (sport fishing and pleasure boating) in the New York Bight, which usually take place within a 5 to 20 km (3 to 11 n mi) band along the Long Island and New Jersey coasts, would not be affected by the proposed action. Sport fish that feed in this zone, and the associated biomass, would also be unaffected. Because of the generally shoreward drift of currents in the Southern Area, however, sport fishing within 46 km (25 n mi) of the New Jersey coast could be impacted by sludge dumping in this area.

Beach attendance, which is critical to Long Island and New Jersey shore resorts, would not be affected by dumping in either the Northern or Southern Area.

Effect on Population Growth in the New York-New Jersey Metropolitan Area

The proposed action is not expected to influence population growth in the metropolitan area. This conclusion is based on the following general observations regarding metropolitan wastewater treatment and population trends:

- The decision to provide secondary wastewater treatment has already been made and is being implemented by upgrading existing facilities and constructing new ones.
- The metropolitan area is receiving adequate sewerage service; the service area is fixed and cannot be expanded.
- Population in the metropolitan area is not expected to increase significantly during the next ten years and may even decline. There is no reason to believe that regional population densities will change significantly.
- The method of sludge disposal does not appear to influence, either directly or indirectly, the attractiveness of living in the metropolitan area.
- Increased costs attributed to the proposed action are insignificant when compared with total costs for municipal services.
- Although water quality in the metropolitan area should improve as a result of upgrading wastewater treatment, this cannot be considered a significant factor in attracting people to the area.

SUMMARY COMPARISON OF THE NORTHERN AREA, THE SOUTHERN AREA, AND THE EXISTING DUMP SITE

Table 32 compares the environmental impacts associated with use of a dump site in the Northern Area, use of one in the Southern Area, and continued use of the existing site.

Dumping at a site within the Northern Area would result in a moderate impact on the local marine ecosystem, although impacts on the benthos (bottom marine organisms) would probably be severe. The area

TABLE 32

COMPARATIVE EVALUATION OF A NORTHERN OR SOUTHERN ALTERNATE DUMP SITE AND THE EXISTING DUMP SITE

Affected Component*	Northern Area	Southern Area	Existing Dump Site
Impacts on Public Health and Water Quality	Very slight potential effects.	Slight potential effects.	Slight potential effects.
Swimming	Virtually no potential for pathogen contamination of swimming beaches.	Virtually no potential for pathogen contamination of swimming beaches.	Slight potential for contamination of swimming beaches; no more significant than exists at present.
Shellfish	Slight potential for consumption of contaminated shellfish as the area does not have commercially abundant quantities of surf clams or ocean quahogs.	Moderate potential for consumption of contaminated shellfish as the area has commercially abundant quantities of surf clams.	No potential for consumption of contaminated shellfish as the area is closed to shellfishing (Figure 25).
Floatables	Very slight potential for floatables reaching beach.	Very slight potential for floatables reaching beach.	Slight potential for floatables reaching beach.
Hazards to Navigation	Increased barge traffic, especially through the Precautionary Zone (Figure 5).	Increased barge traffic, especially through the Precautionary Zone (Figure 5). Potential interference with oil and gas development.	Increased barge traffic, especially through the Precautionary Zone (Figure 5).
Impacts on the Ecosystem	Potentially moderate impacts.	Potentially moderate to severe impacts.	Slight impacts.
Benthos	A high probability for severe modification of the benthic community.	A high probability for severe modification of the benthic community.	No significant degradation beyond the present state.
Fisheries Resources	Slight loss, due to closure, of non-commercial shellfish resources.	Moderate loss, due to closure, of commercially valuable shellfish resources.	Slight impact on shellfish resources, no loss beyond present closure areas.
Plankton	Very slight impacts; stimulation of productivity may be offset by toxic effects and turbidity.	Very slight impacts; stimulation of productivity may be offset by toxic effects and turbidity.	Slight impact, if any.
Short Dumping	Slight impact upon offshore Long Island waters along the Nantucket Navigational Lane.	Moderate impact upon Hudson Canyon along the Hudson Canyon Navigational Lane.	Very slight impact.
Recovery	Moderate potential for recovery of the site following cessation of dumping.	Moderate potential for recovery of the site following cessation of dumping.	Very low potential for recovery if site is moved now or if it is used in the interim.

TABLE 32 (Continued)

Affected Component*	Northern Area	Southern Area	Existing Dump Site
Economic Impacts	Greatly increased transportation costs.	Greatly increased transportation costs and potential conflicts with commercial shellfishing and mineral resource development.	No significant secondary effects.
Sludge Transportation Costs	A 323 to 400 percent increase in sludge transportation costs.	A 323 to 400 percent increase in sludge transportation costs.	No increase in sludge transportation costs besides short-term inflation.
Commercial Fishing	Very slight potential for impact upon commercial shellfishing (see "Shellfish" above and Figure 21).	Significant potential for interference with shellfish catches, especially surf clams, shoreward of the area (see "Shellfish" above and Figure 21).	Closed to commercial shellfishing (Figure 25).
Mineral Resource Development	No potential resources identified (Figure 6).	Potential conflict with (sand and gravel, oil and gas) resource development (Figure 6).	No effect since sand and gravel deposits are already contaminated.
Loss of Sludge as a Resource	No real potential for beneficial use during the short-term future.	No real potential for beneficial use during the short-term future.	No real potential for beneficial use during the short-term future.
Impact of Other Dumping Activities	Potentially severe impact if dredged material dumping were to occur.	Potentially severe impact if dredged material dumping were to occur.	Area already contaminated by dredged material.
Miscellaneous Impacts	No effect.	No effect.	No effect.
Marine Related Recreation	No potential for reaching beaches or near-shore waters.	No potential for reaching beaches or near-shore waters.	Very slight potential for reaching beaches and near-shore waters.
Population Growth	No anticipated effect.	No anticipated effect.	No anticipated effect.
International Legal Implications	Potential problem in controlling international fishing in the vicinity.	Potential problem in controlling international fishing in the vicinity.	Existing site is within the international 22.2 km (12 n mi) pollution control limit.

*The affected components and the effects are discussed in much greater detail in Chapter VII of this EIS. Only the most significant effects are summarized here.

surrounding the dump site would probably be closed to shellfishing, but this would result in only a slight economic loss. Travel time and transportation costs would increase greatly over present levels. Use of this area should not result in hazards to public health or welfare or degradation of coastal water quality.

Dumping at a site within the Southern Area would result in a moderate-to-severe overall impact on the marine ecosystem; impacts on the benthos probably would be severe. Closure of the area around the site to shellfishing would result in a severe economic loss. In addition, dumping in the area would conflict with development of mineral resources in and adjacent to this area. Travel time and transportation costs would increase greatly over present levels. Use of this area should not result in hazards to public health or welfare or degradation of coastal water quality.

Continued dumping of present volumes of sludge at the existing dump site would result in only a slight additional adverse environmental impact, and would not pose a significant threat to the public health or welfare or cause additional degradation of coastal water quality.

CHAPTER VIII

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSED ACTION BE IMPLEMENTED

The proposed action would adversely affect the benthos at and near an alternate dump site in either the Northern or Southern Area by adding heavy metals (cadmium, chromium, lead, zinc, and possibly nickel), bacteria (fecal and total coliforms), and organic matter to the marine environment. As the benthic community adapted to these polluted conditions, it would become less diverse, that is, it would be composed of fewer species; only those species that could tolerate the altered environment would flourish at and near the dump site.

Effects on the benthos would be severe, but localized. Only a small percentage of the dumped sludge would be expected to actually reach bottom; most would remain in suspension, where it would be subject to degradation by pelagic (free-swimming) organisms in the water column.

Sludge dumping would cause bacterial and viral contamination of shellfish (surf clams, ocean quahogs, and sea scallops) at and near an alternate dump site; benthic organisms, especially shellfish, would also concentrate heavy metals from the sludge in their tissues. To prevent the use of contaminated shellfish, which could endanger public health, it might be necessary to prohibit shellfishing in the vicinity of the dump site.

Sludge particles that settled on the bottom could be resuspended under stormy conditions and transported to adjacent areas. Sensitive marine resource areas, however, such as the Hudson Shelf Valley, are far enough from both the Northern and Southern Areas to remain uncontaminated by transported sludge.

Sludge dumping would release floatables (oil, grease, and artifacts) in the vicinity of the dump site, but none of this material would be expected to reach the beaches of Long Island or New Jersey, even under the most extreme weather conditions.

CHAPTER IX

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed action would allow the timely implementation of land-based sludge disposal methods in the New York-New Jersey metropolitan area. At the same time, it would protect public health and preclude degradation of present water quality along the shores of Long Island and New Jersey. On the other hand, the proposed action would adversely affect the relatively clean waters at the alternate dump site; effects on benthos would be particularly severe. After termination of sludge dumping, the alternate dump site could be expected to recover to former levels of productivity and species diversity, although the extent of recovery and the time required for it would largely depend on the duration of dumping and the volume dumped.

Abandoning the existing dump site in the Bight Apex would not insure immediate or even eventual recovery of the area because contamination of the waters by dredged material dumping, municipal wastewater discharges, combined sewer and stormwater runoff, and other discharges to coastal and harbor waters would continue. The area around the existing dump site would probably remain closed to shellfishing for many years. Although the existing dump site is seriously polluted, its continued use would neither endanger public health or welfare nor degrade water quality along the shores of Long Island or New Jersey.

Interim use of an alternate dump site in either the Northern or Southern Area would have both short- and long-term effects on the marine environment. During a dumping operation, concentrations of dissolved oxygen in the water column would decrease, although shortly after the dumping ceased, dissolved oxygen would return to ambient saturation concentrations. Concentrations of dissolved heavy metals in the water column would be slightly elevated during and for a short time after a dump. A long-term effect of sludge dumping would be the increased concentrations of heavy metals and organic carbon in bottom sediments, and possible bioaccumulation of these materials.

For the short term, sludge dumping at a site in the Southern Area could interfere with the potential development of mineral resources (oil and gas, sand and gravel). On the other hand, gravel deposits at the existing dump site are already contaminated and may remain unusable for many years after dumping at the site is terminated.

Certainly for the short term, and possibly for the long term, sludge dumping at a site in the Southern Area would prohibit the further development of commercially valuable shellfish resources nearby. Whether short-term or long-term closure of the area to shellfishing were necessary would depend on the duration of dumping, the volume of sludge dumped, and the consequent effects.

For the short term, use of an alternate dump site in either the Northern or Southern Area would pose greater hazards to navigation than does use of the existing site because of the greater distances involved. The greatest potential hazard, however, would be expected in the Southern Area because of its proximity to offshore oil and gas resources.

CHAPTER X

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Money would be the major resource irreversibly and irretrievably committed in implementing the proposed action. Sludge transportation costs would increase by 323 to 400 percent in the interim period (1978 through 1981), during which permittees would be required to spend an additional $141 million to $190 million to use an alternate dump site in either the Northern or Southern Area; these are costs over and above the total amount ($63 million) needed for continued use of the existing site. Expansion of the existing sludge transportation fleet (Table 7) would also be necessary for implementation of the proposed action.

The only other irreversible and irretrievable resource commitment is that of the sludge itself. Sludge dumped into the ocean during the interim period will be lost for other, more beneficial uses, such as for land application or for use as fuel. Such use of sludge, however, will not be possible for several years at least; storing the material in the interim is not feasible and might be hazardous to the public health.

Use of an alternate dump site in either the Northern or Southern Area would not result in irreversible damage to the area or to the associated marine resources. Sludge dumping would cause short-term impairment of marine productivity at and near the dump site, but eventual recovery to previous levels of productivity could be expected after termination of sludge dumping.

CHAPTER XI

DISCUSSION OF PROBLEMS AND OBJECTIONS RAISED BY ALL REVIEWERS

The draft EIS was issued on February 27, 1976. Public hearings were scheduled in New York and New Jersey as follows:

— New York City, March 24 and 25, 1976, at the Federal Building, 26 Federal Plaza,
— Toms River, New Jersey, March 29, 1976, at Ocean County College,
— Mineola, Long Island, New York, April 1, 1976, at the Nassau County Executive Building.

The public was encouraged to participate in the hearings or to submit written comments. A list of all those who did participate can be found at the end of this chapter.

As the list shows, there was substantial public response to the draft EIS. During preparation of this final EIS, it became apparent that to answer each comment individually would be repetitive since many reviewers shared the same concerns. The most appropriate way of handling the comments received was to identify the major areas of concern and then to synthesize one or more representative comments on each subject. In this way, all salient points on a particular subject could be brought together, and EPA's response could address them as a whole.

In defining the major areas of concern, only significant negative comments were considered; minor or obvious errors pointed out by reviewers were corrected without acknowledgement. Thirteen major areas of concern were identified, and a fourteenth category was created for miscellaneous questions. Table 33 matches the areas of concern with those who commented on them. Copies of all of the written comments received on the draft EIS can be found in Appendix K.

The EPA sincerely thanks all those who commented on the draft EIS, especially those who submitted detailed criticisms that reflected a thorough analysis of the EIS.

TABLE 33

MAJOR AREAS OF CONCERN IN COMMENTS ON THE DRAFT EIS

	Bennett, D. W. American Littoral Society	Boghard, William Commissioner of Environmental Facilities, Westchester Co.	Calabrese, Josephine	Caso, Ralph G. County of Nassau	Denato, Michelle Environmental Society CUNY Law School	Flatow, Eugenia Parks Council Citizens' Advisory Board 208 Planning	Goodman, Charles Long Beach Township	Greenfield, Charles Carver-Greenfield Corp.	Harris, William CUNY Geology Department	Heenan, Jack Marine Environment Council of Long Island	Hughes, William J., Rep. 20th Cong. Dist., New Jersey	Islip, Town of Dept. of Environmental Control (Andres)	Kamlet, Kenneth S. National Wildlife Federation
Conclusions & Recommendations	X	X		X		X	X				X	X	X
Monitoring & Surveillance				X									X
Phase-Out Planning	X			X	X	X	X				X	X	X
Public Health, Water Quality		X	X	X	X	X	X						X
Recreational Impacts		X		X			X						X
Economic Impacts		X		X							X		X
Ecosystem Impacts		X							X				X
Sludge Dumping							X		X				X
Alternate Dump Sites	X			X					X			X	X
Heavy Metals & Other Toxicants						X			X				X
Land-Based Alternatives		X		X				X			X		X
Dredged Material Disposal	X				X								X
Scope of Study					X	X		X					X
Public Participation			X			X							
Legal Constraints													X
Miscellaneous Questions						X				X			X

TABLE 33 (Continued)

	Kramer, Morris H.	Lander, Paul	Lapiner, Arnold Marine Environmental Council of Long Island	Larga, Fred Village of Atlantic Beach	Lawrence, Village of Office of The Mayor	Lubetkin, Seymour A. Passaic Valley Sewerage Commissioners	Machlin, Albert N.Y. State Dept. of Environmental Conservation	Marshall, Shelby Friends of the Earth	Monmouth County Planning Board	Moskowitz, Paul Environmental Defense Fund	Nassau, County of Office of The Executive (Caso)	National Wildlife Federation (Kamlet)	New Jersey, State of Dept. of Environmental Protection (Schmidt)
Conclusions & Recommendations	X		X	X	X	X	X		X	X			X
Monitoring & Surveillance		X	X				X			X	X		X
Phase-Out Planning		X		X			X		X	X	X		
Public Health, Water Quality	X	X	X	X									
Recreational Impacts	X								X				
Economic Impacts											X		X
Ecosystem Impacts				X									X
Sludge Dumping	X	X					X		X				
Alternate Dump Sites				X			X					X	
Heavy Metals & Other Toxicants	X	X		X		X	X	X		X			
Land-Based Alternatives			X			X	X	X	X	X			
Dredged Material Disposal										X			
Scope of Study	X												
Public Participation	X												
Legal Constraints													
Miscellaneous Questions									X				

TABLE 33 (Continued)

	New York City Section 208 Citizens Advisory Committee (Szeligowski)	New York, State of Depart. of Environmental Conservation (Curran)	New York, State of, Dept. of Law (Berger)	Nuzzi, Robert County of Suffolk Dept. of Environmental Control	Paulson, Glenn N.J. State Dept. of Environmental Protection	Pike, Charles M. County of Ocean	Port Authority of New York and New Jersey (Alcott)	Richmond, Frederick W., Rep. 14th Cong. Dist., New York	Rochester Committee for Scientific Information (Berg)	Roffer, Mitchell A. Marine Science Students Assoc. Long Island University	Roney, James R. Franklin Institute	Salzman, Lorna Friends of the Earth
Conclusions & Recommendations		X	X	X	X	X	X	X			X	X
Monitoring & Surveillance		X			X							X
Phase-Out Planning	X	X	X	X								X
Public Health, Water Quality	X					X		X		X		
Recreational Impacts										X		
Economic Impacts	X		X					X	X			
Ecosystem Impacts					X							
Sludge Dumping		X										
Alternate Dump Sites		X	X	X	X						X	
Heavy Metals & Other Toxicants		X	X			X		X		X		X
Land-Based Alternatives		X	X		X	X		X	X			X
Dredged Material Disposal			X									
Scope of Study	X		X					X		X		X
Public Participation												
Legal Constraints												
Miscellaneous Questions	X		X									

TABLE 33 (Continued)

	Samowitz, Charles New York City EPA	Sea Bright, Borough of (Larson)	Sea Bright Conservation Committee (Hanley)	Seid, Sol Middlesex County Sewerage Auth.	Shaviro, Sol Greening of The Bronx	Sheehan, Martin Staten Island *Advance*	Smith, Bernard C., State Senator 2nd Senatorial Dist., New York	Stevenson, Mr. & Mrs. Richard C.	Swanson, R. Lawrence New York Bight Project NOAA-MESA	Thomas, Ariel A. Metcalf & Eddy, Inc.	U.S. Dept. of Agriculture Soil Conservation Service (Hilliard)	U.S. Dept. of Commerce Asst. Sec. for Science and Technology (Galler)	U.S. Dept. of Health Education and Welfare, Region II (Stringham)	U.S. Dept. of Housing and Urban Development Newark Area Office (Johnson)
Conclusions & Recommendations	X	X	X	X			X	X		X		X	X	
Monitoring & Surveillance				X						X		X		
Phase-Out Planning			X				X					X		X
Public Health, Water Quality			X	X			X			X			X	
Recreational Impacts				X						X				
Economic Impacts	X						X							
Ecosystem Impacts														
Sludge Dumping		X	X										X	
Alternate Dump Sites		X						X	X			X		
Heavy Metals & Other Toxicants														
Land-Based Alternatives	X				X	X		X	X					
Dredged Material Disposal														
Scope of Study														
Public Participation														
Legal Constraints														
Miscellaneous Questions														

TABLE 33 (Continued)

	U.S. Dept. of The Army N.Y. Dist. Corps of Engineers (Zammit)	U.S. Dept. of The Interior Northeast Region (Babb)	U.S. Dept. of Transportation U.S. Coast Guard (Schubert)	U.S. Environmental Protection Agency, Oil and Special Material Control (Biglane)	U.S. Environmental Protection Agency, Water Branch (Durfor)	Walnot, Jerome Long Beach Island Conservation Society	Water Pollution Control Federation (Cox)	Wydler, John M., Rep. 5th Cong. Dist., New York
Conclusions & Recommendations	X				X			X
Monitoring & Surveillance		X						X
Phase-Out Planning							X	X
Public Health, Water Quality							X	X
Recreational Impacts						X		
Economic Impacts							X	X
Ecosystem Impacts								X
Sludge Dumping				X			X	X
Alternate Dump Sites			X					X
Heavy Metals & Other Toxicants							X	
Land-Based Alternatives				X				X
Dredged Material Disposal					X		X	
Scope of Study		X				X		
Public Participation								
Legal Constraints								
Miscellaneous Questions				X				

COMMENTS AND RESPONSES

Conclusions and Recommendations

Comment 1. Both EPA and NOAA should reevaluate their data and analyses in order to resolve their conflicting recommendations regarding the choice of an alternate dump site.

Response 1. The EPA-Region II office worked closely with NOAA throughout the preparation of this EIS. The fact that EPA preferred the Northern Area while NOAA preferred the Southern Area is basically a reflection of the different responsibilities of the two agencies: NOAA is primarily a research agency while EPA is primarily a regulatory agency.

Before making its recommendation, NOAA evaluated the suitability of the Northern and Southern Areas. The scope of this evaluation was limited in the following respects:

1. Recommendations were based solely on findings within NOAA's area of expertise, that is, the scientific evaluation of the marine environment and the projected impact of disposing of sewage sludge in that environment;
2. Economic and technological problems associated with changing the dump site were not considered; and
3. A detailed evaluation of conflicting resource utilization was not made, although potential conflicts, when known, were identified.

In contrast, EPA's evaluation included an assessment of resource utilization and economic and technological factors. In addition, EPA's evaluation of the fate of dumped sewage sludge was applied to specific sites within the proposed areas, while NOAA's evaluation was a generic comparison of the entire Northern Area and the entire Southern Area. The criteria used by NOAA to select the boundaries of both the Northern and Southern Areas included criteria to minimize the possibility of contaminating the Hudson Shelf Valley. The 18.5 km (10.0 n mi) separation distance of the inner boundaries of both areas from the Hudson Shelf Valley reflects this concern. The alternate site in the Northern Area proposed by EPA is 45 km (24 n mi) from the Hudson Shelf Valley.

In February 1976, NOAA-MESA issued a report in which it recommended designation of an alternate dump site in the Southern Area, centered on latitude 39°40'N and longitude 73°18'W, with an area of no more than 41 sq km (12 sq n mi):

> Reasons for recommending this location include projected environmental effects, development of an effective monitoring program, and, to a lesser degree, the method and economy of the sewage sludge disposal operations. *This site minimizes the possibility of material being dispersed toward and into, as well as concentrated in, the Hudson Shelf Valley.* [emphasis added]

The EPA recommends designation of an alternate site in the Northern Area for three reasons. First, the site is far enough from the Hudson Shelf Valley to insure that sludge solids will not accumulate there. Second, the Northern Area does not have as great an existing commercial shellfishery resource as does the Southern Area. Third, the Southern Area contains or is adjacent to identified mineral resources (oil and gas, sand and gravel).

One of the most valuable resources in the New York Bight is the Hudson Shelf Valley, mainly because it is a breeding zone for many aquatic life forms. As discussed in Chapter VI, the maximum distance that sludge can be expected to travel after being dumped is about 15 km (8 n mi). The recommended site in the Northern Area is approximately 45 km (24 n mi) from the Hudson Shelf Valley; contamination of the valley as a result of sludge dumping at this site is highly improbable.

While the existing and potential fishery resources, especially shellfisheries, are probably about the same in both the Northern and Southern Areas, there is currently more commercial fishing in and near the Southern Area (see Chapters V and VII). This trend is expected to continue at least until sludge dumping is phased out. Since sludge dumping at an alternate site would probably restrict commercial shellfishing in and near that site, use of a site in the Southern Area would have a greater economic impact than use of a site in the Northern Area. Impacts on shellfish are of greater concern than those on fish because shellfish are essentially non-motile.

Use of a site in the Southern Area could also interfere with the potential development of identified mineral resources there. As shown in Figure 6, mineral resources (sand and gravel, oil and gas) appear to be greater in and near the Southern Area than in and near the Northern Area. Besides conflicting with resource development, sludge dumping in the Southern Area could compound the potential environmental impacts of such development. The economic impact of sludge dumping on mineral resource development is expected to be somewhat less than that on commercial fishing.

It must be emphasized that use of an alternate site in either the Northern or Southern Area would occur only if and when the existing dump site were abandoned. Both NOAA and EPA, as well as several other federal, state, and local agencies, recommend continued use of the existing dump site (see the discussion of the 1976 fish kill and beach closure incidents in Chapter II).

Comment 2. Data and analyses presented in the draft EIS do not support the stated conclusions and recommendations. The EPA's reversal of its earlier position regarding relocation of the dump site is counterproductive and deplorable.

Response 2. The EPA disagrees that the data and analyses presented in the EIS do not support the stated conclusions and recommendations. The EIS represents a major effort by EPA to bring together all of the pertinent information available on the ocean dumping of sewage sludge in the New York Bight. The reversal of EPA's earlier position regarding relocation of the dump site was dictated by the facts presented in the EIS. With the exception of Mayor Lager of Atlantic Beach, Long Island, all government officials expressed concurrence with the conclusions and recommendations stated in the draft EIS.

Comment 3. Unless the alternate dump sites have a 100 percent chance of recovery, their use should be considered an "irreversible and irretrievable commitment of resources".

Response 3. Available evidence does not indicate that sludge dumping permanently contaminates an ocean dump site for all marine and other uses. For example, should dumping at an existing site be discontinued, the marine environment might require a long time to recover to former levels of biological productivity, but mineral resources, especially oil and gas, would be immediately available for commercial development. The time required for biological recovery and the extent of recovery are less predictable because they depend on so many factors, including the type and amount of material that has been dumped at the site, the number of years that the site has been in use, and other sources of pollution in the area. Although no situation is completely analogous, the old Philadelphia sewage sludge dump site off Delaware Bay was reopened by FDA to shellfishing within two years after dumping ceased.

Comment 4. Even though the Northern Area is not extensively used for fishing and no mineral resource development is planned there, the area is still potentially valuable.

Response 4. The Northern Area, indeed the entire New York Bight, is potentially valuable for future resource development. However, indications are that the Southern Area has the highest present use and the greatest potential value for resource development within the timeframe that ocean dumping can be expected to continue (until December 31, 1981).

Comment 5. How can EPA reach a decision on an alternate site without quantifying impacts?

Response 5. Where possible, the potential impacts have been quantified: sludge transportation costs and shellfish populations for example. Some impacts, however, can be only qualitatively expressed because of minimal data or uncertainty about the cause and effect relationship.

Comment 6. Figure 40 indicates that bottom areas of the Hudson Shelf Valley are being affected by sewage sludge dumping at the existing site. This would tend to support the proposal for moving the site.

Response 6. Pollutants from a variety of sources in the Bight Apex, including sludge and dredged material dumping, have apparently contaminated the upper portion of the Hudson Shelf Valley. The relative contribution of sewage sludge to this contamination is unknown. However, the degree of overall contamination within the Apex area was one of the many factors considered in making the recommendations of this EIS.

Comment 7. The section on physical oceanography from the NOAA-MESA February 1976 report, contained in Appendix C of the draft EIS [now Appendix G], indicates that there is a distinct up-valley flow in the Hudson Shelf Valley which, in combination with the predominant southwesterly flow in midshelf waters, would increase the potential for shoreward transport of any sludge dumped in the Northern Area. But in Chapter XI of the draft EIS [now Chapter XII, Conclusions and Recommendations], the Northern Area is described as an optimum location with very low potential for transport of contaminants to coastal areas or the Hudson Shelf Valley. This apparent discrepancy should be explained.

Response 7. The recommendations in the draft EIS refer to a specific site in the Northern Area, while the NOAA-MESA discussions refer in broad terms to the entire Northern Area. The EPA recommendations are based on the analysis of the expected fate of sludge material, as discussed in Chapter VI, and on the physical oceanography data collected by NOAA-MESA and Raytheon. The EPA recommendations also incorporate the limited available data on circulation patterns in the Hudson Shelf Valley.

Monitoring and Surveillance Program

Comment 1. The proposed expanded monitoring program and review process should be described in detail to provide reasonable assurance that such a program will be able to detect possible adverse sludge movement or water-quality deterioration in time to protect the environment. The monitoring program must be a well defined, comprehensive, coordinated program involving EPA, NOAA, NASA, the USCG, and local health departments, rather than the present loose arrangement, which does not clearly define responsibilities.

Response 1. As noted in the recommendations of this EIS, continued use of the existing sewage sludge dump site demands that an effective monitoring program and review process be established to protect public health and welfare and to prevent coastal water-quality degradation. If such a program could not be established, EPA would require immediate abandonment of the existing dump site and use of an alternate site.

Under the MPRSA, NOAA has the overall responsibility for conducting "a comprehensive and continuing program of monitoring and research regarding the effects of dumping of material into ocean waters." In meeting this congressional mandate, NOAA has established the Marine Ecosystems Analysis (MESA) – New York Bight Project with offices in Stony Brook, Long Island. As indicated in the EIS, NOAA-MESA has been active since 1973 in collecting significant oceanographic data in the Bight. This commitment continues with seven comprehensive monitoring cruises in the Bight completed between February and October 1977. These NOAA-MESA cruises, together with five research cruises conducted by the National Marine Fisheries Service of NOAA, have provided the oceanographic data needed for the expanded program.

The USCG, in its surveillance role, continues to conduct a regular schedule of multi-mission aircraft and vessel patrols in the Bight, and continues to maintain a responsive posture, on an operations-permitting basis, to requests for logistical assistance by other federal agencies. In addition, testing of the Ocean Dumping

Surveillance System (ODSS) is scheduled for mid-1978. Implementation of this system in late 1978 is expected to increase the quality of present USCG surveillance and to reduce manpower expenditures. The USCG, which is normally the first federal agency cognizant of a pollution-related crisis, has established effective lines of communication with critical federal and state agencies on a 24-hour basis.

In addition, NASA continues to provide technical support appropriate to its research and development mission. In cooperation with NOAA and EPA, NASA is investigating the use of remote-sensing technology for surveillance activities. Finally, NASA can be called upon to provide existing satellite and aircraft capabilities as needed.

The EPA, which under the MPRSA administers and enforces the overall ocean dumping program, has taken the responsibility for coordinating the expanded monitoring program. Region II continues to be concerned with the adverse impacts of ocean dumping on the marine environment and with the potential health hazards associated with contact recreation along the beaches of Long Island and New Jersey. In 1973, Region II initiated a sampling program to provide "real time" data on the chemical and bacterial quality of water and bottom sediments in the Bight Apex and along the beaches. This monitoring program remains the principal source of timely data for immediate use by EPA in its decision-making role. Other data inputs from NOAA, state, county, and local agencies, while valuable contributions in the long term, are normally unavailable for immediate use in crisis situations.

During the spring of 1977, this monitoring program was greatly expanded both in the frequency of sampling and in the number of stations sampled. A total of 130 sampling points up to 22 km (12 n mi) offshore, both at the surface and near the bottom, are sampled by helicopter or boat at least once a week for a combination of eight water-quality parameters. Tests include dissolved oxygen, nutrients, suspended solids, organics, temperature, salinity, and bacterial counts. Forty-five stations along the Long Island and New Jersey shores, frequented by bathers, are sampled for bacteria three times a week during the summer months. In addition, data collected by municipal dumpers as part of an EPA-imposed monitoring program (see Special Condition No. 6, Appendix A) are reported daily to EPA. Reports on any significant aberration in oceanographic data are submitted by NOAA at the end of each cruise for EPA's evaluation as well. Thus, the availability of water-quality data has been greatly improved, and the visual observation of the waters for floatables, slicks, and other pollutants, using EPA and USCG helicopter overflights has been expanded.

Recognizing the need for formal review of technical data collected by a number of federal, state, and local agencies, Region II has established a "command post" at its office in Edison, New Jersey, to receive reports from data-gathering agencies, to receive pollution reports on toll free "hot lines", and to initiate clean-up or corrective measures. The command post issues weekly reports on beach conditions, plus special bulletins as required. Region II also chairs an interagency technical review panel, including representatives of NOAA, the USCG, and the states of New York and New Jersey. Other agencies participate in the review panel on a case-by-case basis.

Comment 2. The USCG's positive recording system, which verifies that dumping vessels reach the dump site, has no dump sensor. The EPA should encourage the development of such a sensor and should require its use on all dumping vessels.

Response 2. The EPA agrees that a dump sensor should be developed to record the time, rate, and volume of the dumping of sewage sludge, or for that matter of any other material dumped. The feasibility of dump door sensors, which would record the activation of dumping mechanisms, is being investigated by the USCG. The sensor would be used in conjunction with the electronic ODSS, which is expected to be implemented in late 1978. The EPA has, at the request of the USCG, placed a condition in all ocean dumping permits, requiring the installation and use of the system upon notification by the USCG (see General Condition No. 17, Appendix A).

Phase-Out Planning

Comment 1. The EIS should candidly address the question of whether ocean dumping of sewage sludge will, in fact, be phased out in 1981. Concrete steps for implementing the phase-out program, including firm schedules instead of "intentions" or "goals", are needed and should be detailed in the EIS.

Response 1. The Interim Permits issued to sewage sludge dumpers in August 1976 require the selection and implementation of alternate sludge disposal methods on or before December 31, 1981 (Appendix A). The ocean dumping regulations published by EPA-Headquarters on January 11, 1977, provide that no new permit may be issued to present holders of Interim Permits unless "best efforts" are being made to phase out ocean dumping of sewage sludge on or before December 31, 1981 (Appendix B). Finally, the MPRSA was amended on November 4, 1977 to make the December 31, 1981 deadline, which had been a matter of EPA policy, a legal requirement as well.

Comment 2. The EIS seems to suggest that the phase out of sludge dumping may not be feasible before 1985. The effects of failing to meet the 1981 deadline should be detailed, and contingency plans should be discussed.

Response 2. Even though there is substantial federal funding available for implementing land-based sludge disposal, a certain degree of skepticism persists about whether the 1981 phase out date can be met. The EPA's position is that the legislatively mandated deadline can be met, but only with the cooperation and sincere efforts of all of the parties involved.

As discussed in Chapter III, the major land-based alternatives are land application (probably with composting) and heat treatment (pyrolysis). In its Phase 1 report, ISC seemed unconvinced that these alternatives could be implemented by 1981. The Phase 1 report implies that 1985 would be the earliest possible date for the completion of pyrolysis facilities:

> It is estimated that it will take about one year to make the necessary small scale plant studies. After that a full-scale demonstration plant appears to be indicated, and its design, construction, and operation will take another 2–3 years. After about 4 years the design of actual processing facilities could be started, and they can be placed in operation in about 8–10 years after the initial studies are begun. (ISC, 1975)

According to the Phase 1 report, most of the sludge in the New York-New Jersey metropolitan area would be handled by these pyrolysis facilities.

However, in its Phase 2 report (ISC, 1976a) and in another recent study (ISC, 1976b), ISC has modified its original time estimates, indicating that pyrolysis facilities can be completed by 1981, if necessary:

> Pyrolysis (thermal destruction in an oxygen-deficient atmosphere) of sludge has been studied only in pilot-scale tests. Larger-scale pyrolysis demonstrations have utilized solid wastes. The phase 1 study indicated that multiple-hearth furnaces could be built by 1981, initially operated in the incineration mode, and then converted to pyrolysis units as the technology developed. Further review during this study has shown that such furnaces could be designed and constructed as pyrolysis units during the same time frame. Therefore, incineration has been dropped from consideration. (ISC 1976a).

At this time, it appears that the 1981 phase-out date can and will be met.

Public Health and Water Quality

Comment 1. The draft EIS fails to consider the public health effects of the ocean dumping of sewage

sludge containing antibiotic-resistant microorganisms; it also fails to discuss the incubative effects on these microorganisms of oil from spills or blowouts in the New York Bight.

Response 1. Information on antibiotic-resistant microorganisms is presented in Chapter V. The presence of these microorganisms in the area of the Christiaensen Basin is of concern, and further evaluation of the distribution of such components is warranted. The unresolved question regarding the potential danger of such R-factor pathogens is whether, in fact, they are capable of being transmitted from one bacterium to another through normal bacterial reproduction.

It has been suggested that the oil medium would tend to preserve and enhance these pathogens. However, to date, analysis of grease/tar ball samples from the coastal sector has shown no evidence of pathogens (*Salmonella*) (see the section on the fish kill and beach closure incidents in Chapter II.

The potential for combined effects from oil and sludge was considered in choosing an alternate dump site. The Northern Area is less likely to present such problems than is the Southern Area, which is nearer the Mid-Atlantic oil and gas lease tracts.

Comment 2. The source of grease/tar balls and other highly visible coastal water pollutants and the dangers they pose to public health are not addressed in the draft EIS.

Response 2. A thorough discussion of the origin and nature of grease/tar balls and other floatable contaminants has been included in the final EIS as part of the summary of pollution events that occurred in the coastal waters of the New York Bight in the summer of 1976 (see the section on the fish kill and beach closure incidents in Chapter II).

Comment 3. The draft EIS should have discussed the sources and fates of all known pollutants in the New York Bight and should have described the relationship between sewage sludge and other pollutants.

Response 3. The major pollutant loadings to the New York Bight, including sewage sludge, are quantified in Table 10. Chapter II has been revised and expanded to provide more information on the pollutants entering the New York Bight. For more detailed information, however, see Mueller *et al.* (1976), from which these data were summarized.

Comment 4. The draft EIS does not adequately discuss the impact of sludge dumping on bathing water quality nor does it consider land-based disposal alternatives.

Response 4. The effects of sludge dumping in the New York Bight on bathing beaches and bathing water quality are set forth in Chapter VII.

Land-based disposal alternatives are discussed in some detail in the final EIS. Specific recommendations, however, are beyond the scope of this report. the object of which is to assess the effects of ocean dumping of sewage sludge in the New York Bight. Recommendations for land-based disposal alternatives are the joint responsibility of EPA-Region II and ISC and are handled under the Sludge Management Program instituted for that purpose in 1974 (see Chapter III).

Comment 5. The analyses leading to the conclusion that contamination of shellfish waters is due to onshore pollutant sources should be presented.

Response 5. In Chapter V of the final EIS, it is noted that FDA had closed shellfishing in near-shore waters (out to the 3-mile, or 5.6-km, limit) because of the potential coliform contamination from onshore sources. Additional information regarding this action is available elsewhere (FDA, 1972).

Comment 6. The discussion of bottom currents indicates that there is a Line of Divergence of bottom drift on the continental shelf at the 60-meter (200-foot) isobath. According to the draft EIS, sludge dumped at a site in the Southern Area would be subjected to a slow, steady, shoreward movement. It would seem that sludge dumped at the existing site would be subject to this same steady, shoreward drift since the site is on the shoreward side of this current divergence.

Response 6. Studies of the existing sewage sludge dump site in the New York Bight and of other sludge dump sites indicate that a physical accumulation of sludge on the seafloor is not to be expected. Some contaminated particles are expected to reach the seafloor and be incorporated into the existing surficial sediments. The subsequent movement of such contaminated sediments in the open ocean and the effects of such transport on the concentrations of their contaminants is complex and generally unpredictable.

The position of the line of bottom current divergence indicates that sediments of the Southern Area would have a higher probability of shoreward movement than sediments of the Northern Area. It is expected that this movement would be at a very slow rate and that contaminant components would be subject to dilution and degradation as they moved away from the dump area.

The contamination of bottom sediments in the Bight Apex is the product of the multiple pollutant inputs in this area, including sewage sludge dumped at the existing site. The high proportion of contaminated bottom sediment in the Christiaensen Basin, located shoreward of the existing sludge site, may reflect a shoreward movement of sludge contaminants caused by the reported net shoreward drift of bottom waters in this area (NOAA, 1975). The Christiaensen Basin is a deep area and apparently acts as a trap, retarding further shoreward movement of contaminated bottom sediments.

Recreational Impacts

Comment 1. The EIS should identify the recreational areas of the New York Bight and the recreational needs, attendance figures, use patterns, etc. associated with those areas.

Response 1. Swimming, sport fishing, and pleasure boating, the three main recreational activities in the area of the New York Bight, were discussed in the draft EIS to the extent that they might be affected by sludge dumping at the existing or at an alternate site (see Chapters II and VII). As stated in the draft EIS, there has not been nor is there expected to be any substantial, wide-range effect on recreation as a result of sludge dumping at the existing site. Current restrictions on such activities as shellfishing were necessitated by pollution from several sources, and most likely could not be lifted even if sludge dumping were not a factor. Incidents that have disrupted recreational activities in the metropolitan area have been traced primarily to a combination of natural phenomena and pollution from sources other than sludge dumping (see the section on the fish kill and beach closure incidents in Chapter II).

Most of the area's recreational activity takes place within a 5-to-20-km (3-to-11-n-mi) band along the coasts of Long Island and New Jersey. If an alternatate dump site in the Northern or Southern Area were selected, the distance of the dump site from this inshore recreational area would reduce the already slight potential for adverse effects on recreation to negligibility.

Consequently, further discussion of recreational areas, recreational needs, attendance figures, use patterns, and so on is considered unwarranted within the context of this EIS. Statistics and other detailed information on recreation can be found in the references cited in the EIS. Specific information on the Gateway National Recreation Area, which is the most significant, recent recreational development in the metropolitan area, can be obtained from the National Park Service, Gateway National Recreation Area, Headquarters Building No. 69, Floyd Bennett Field, Brooklyn, New York 11234.

Comment 2. The effects of sludge dumping at either the existing site or an alternate site on recreational activities, such as swimming and sport fishing, and on the recreation industry should be detailed.

Response 2. As explained in the response to the previous comment, sludge dumping at the existing site has a minimal effect on recreational activities, and sludge dumping at an alternate site in the Northern or Southern Area would have even less of an effect. The same, of course, is true about effects on the recreation industry.

Comment 3. The beach attendance figures given in Table 16 of the draft EIS do not include the Staten Island and Long Island sections of the Gateway National Recreation Area or Jacob Riis Park.

Response 3. Beach attendance figures for Jones Beach State Park and for the Staten Island and Breezy Point (formerly Jacob Riis State Park) sections of the Gateway National Recreation Area in Brooklyn have been included in the final EIS. Municipal beach attendance figures were not tabulated because of the general unavailability or unreliability of such figures.

Economic Impacts

Comment 1. The economic impact of barging sludge to either the Northern or the Southern Area or to a site off the continental shelf is not adequately considered in the draft EIS. Barging costs should be corrected to reflect the true, total costs (including inspections, additional fuel requirements, operating salaries, supplementary barging, loss of commercial fisheries, etc.).

Response 1. The text of the EIS has been updated to reflect current estimates of sludge hauling costs. The analysis used to determine hauling costs considered the total operational costs, including labor costs, maintenance, and repair, according to vessel type and ownership.

Comment 2. The costs of sludge composting developed by the ISC Phase 1 report are unrealistic. The figures should be double checked.

Response 2. The text of the EIS has been updated, using cost estimates from ISC's latest reports (1976a, 1976b). Many permittees are now developing their own cost estimates in compliance with the implementation schedules specified in their permits (see Special Condition No. 7, Appendix A).

Comment 3. Economic justification of land-based alternatives vis-a-vis ocean dumping should be included in the EIS.

Response 3. Table 31 compares the cost of ocean dumping at the existing site with the costs of land-based alternatives. Although land-based disposal would be more expensive than ocean dumping at the existing site, it would be comparable to the cost of ocean dumping at an alternate site in the Northern or Southern Area. Use of one of the alternate sites would be 3.2 to 4 times more expensive than use of the existing site. Thus the cost of ocean dumping would go from $30 per metric ton at the existing site to between $96 and $120 per metric ton at one of the alternate sites. Depending on the alternative selected, land-based disposal would cost between $70 and $190 per metric ton.

Comment 4. Table 32 of the draft EIS should indicate that the economic impact of selecting the Northern Area could include potential conflicts with oil and gas leasing.

Response 4. The present and proposed oil and gas lease areas (neither of which is in or near the Northern Area) have the highest potential for development prior to 1981 — the time frame considered by the EIS. Future leasing of oil and gas tracts in the vicinity of the Northern Area is possible but unlikely, according to available information.

Comment 5. The discussion in the draft EIS of sand and gravel resources should be expanded to show the degree to which the proposed action may curtail the regional availability of these resources. The evaluation should include a general assessment of the probable needs and the known available supplies. If the general assessment indicated that the proposed action would have a significant impact on resources, an assessment of the economic effects would be necessary.

Response 5. The sand and gravel deposits in the Southern Area have the potential for development. Therefore, contamination of these deposits by sludge dumping would result in the loss or degradation of a potentially developable resource. However, since it is impossible to forecast the economic pressures that would trigger such development, the EPA can only qualify, not quantify, the effect of the proposed action on sand and gravel resources.

Comment 6. The draft EIS analyzes the cost of sludge dumping, but not the benefits.

Response 6. There are no dollar benefits of sludge dumping. The objective is to minimize both costs and environmental impacts, if possible.

Comment 7. The draft EIS discusses only the domestic side of commercial fishing in the New York Bight. An accurate picture of the Bight's resource productivity would also include the commercial fishing done by foreign countries. Likewise, the retail value of foreign and domestic commercial fisheries and associated industries should be evaluated.

Response 7. While ocean dumping of sewage sludge could adversely impact the commercial catches of all nations fishing in the New York Bight, the concern of this EIS is with the United States' share of the catch, especially that landed in the metropolitan area. In addition, commercial catches of foreign nations are expected to be substantially lower due to the enactment of a 200-mile (322-km) fishing limit by the United States.

Comment 8. The increased costs of relocating the dump site farther offshore are largely attributable to energy consumption for the longer distance.

Response 8. True, and this factor is included, along with labor, maintenance, and amortization, in the per-unit hauling cost for each type of vessel.

Comment 9. If the sludge volume increases as projected and the dump site is moved, additional vessels will be required to handle the increased volume.

Response 9. As shown in Table 29, the existing fleet has the capacity to transport the volumes of sludge projected for 1981 to the existing dump site. However, additional vessels would be needed to transport sludge to an alternate site in the Northern or Southern Area, assuming that the projected volume of 9.9 million cu m (13.0 million cu yd) is realized.

Comment 10. In Chapter IX of the draft EIS (Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity), it is implied that more trips will be required to an alternate dump site and that this will result in greater navigation hazards.

Response 10. The implication that more trips would be required as a consequence of relocating the dump site was unintentional. More trips will be required, but because of the expected increase in sludge volumes not distance. The use of an alternate site would, however, compound the problem by extending the time during which sludge vessels would be on the open ocean and thus exposed to the hazards of vessel traffic and stationary structures.

Comment 11. The one-way and round-trip distances given in Table 29 of the draft EIS are confusing.

Response 11. The round trip distance includes an average 92 km (50 n mi) of travel within New York harbor and waterways before the vessel passes through the Sandy Hook-Rockaway Point transect.

Ecosystem Impacts

Comment 1. The cumulative environmental effects of all present and projected developments in the New York Bight — including sludge dumping, oil exploration and drilling, sand and gravel recovery, dredged material disposal, and construction and operation of offshore superports and other large structures — should have been addressed and evaluated in the draft EIS.

Response 1. Proposed developments in the New York Bight were discussed in the draft EIS insofar as they related to the proposed action and insofar as reliable information on them could be obtained. The discussion was somewhat limited in the case of proposals that were in doubt (such as offshore islands), or that were unlikely to be contemporaneous with the proposed action (such as deepwater ports) or that could not be adequately forecast (such as recovery of sand and gravel resources, which would depend on unpredictable market forces).

An accurate, comprehensive assessment of these potential developments cannot be made with the sketchy information available. Moreover, the subject of this EIS is sludge dumping, an action which is to be phased out by the end of 1981; most of the potential developments, on the other hand, are long-range proposals that will take many years to develop. A discussion of the cumulative effects of all of the potential developments in the New York Bight would thus be highly speculative and inappropriate in this EIS.

A review of the national status of the marine environment is conducted each year by NOAA (November 1977). Assessment of the marine ecosystem in the New York Bight as it relates to existing and proposed projects is the special responsibility of NOAA-MESA.

Comment 2. Ocean currents in the New York Bight should be considered in greater detail.

Response 2. Once again, ocean currents are discussed in the EIS to the extent that they have a bearing on the proposed action. Recent studies, used in preparing this EIS, that provide detailed information on ocean currents in the New York Bight are Charnell (1975) and NOAA-MESA (February 1976).

Comment 3. Sludge dumping's impact on the red crab and lobster populations of the Hudson Shelf Valley should be more fully discussed in view of the heavy metals and organic materials contamination shown in Figure 41.

Response 3. The Hudson Shelf Valley is considered an important breeding ground for shellfish and for other fish species found in the New York Bight; however, the precise distribution of red crab and lobster there is unknown (NOAA-MESA, February 1976). Such information as is available is reported in Chapter V. Besides the lack of information on species distribution, there is the fact that the heavy metals and organic materials contamination shown in Figure 41 is attributable not only to sewage sludge but also to several other sources, principally dredged material (Mueller *et al.*, 1976). Given the available information, all that can be said is that crustaceans in the area of the dump site would be adversely affected, but that their ability to move out of the area would at least mitigate the overall effects.

Comment 4. Sea scallops should be included in the discussion of potential adverse effects on fisheries resources. Long-term use of the proposed area would substantially increase the area of degradation, thus potentially increasing any associated adverse effect.

Response 4. Sea scallops are included in the discussion of impacts on non-motile shellfish (along with surf clams and ocean quahogs). The effects on each of these species are expected to be about the same. A more specific analysis is not possible because available data are insufficient to quantify real differences in effects according to species, and because the distribution of sea scallops has not been adequately documented to date.

Comment 5. The draft EIS ignores benthic, plankton, and other biological and chemical data on the study area that were gathered by Raytheon and NOAA to assess the proposed action.

Response 5. As stated in Chapter V, both the NOAA and Raytheon studies were thoroughly evaluated in preparing the EIS. Specific biological information was left out of the assessment only when it was considered irrelevant or unreliable.

Comment 6. Sewage sludge accumulating in the Bight Apex is the cause of both skeletal diseases in crustaceans and fin rot in fish.

Response 6. Sewage sludge dumping does contribute to diseases in fish and crustaceans. However, the conclusion that sludge dumping is the direct or sole cause of fin rot is not substantiated by the literature, as pointed out in the EIS. Fin rot occurs in species found in areas where sewage sludge dumping does not occur.

Comment 7. The draft EIS describes only organisms living in the sea and completely overlooks the numerous marine birds living on and above the sea surface in the area.

Response 7. A discussion of birds was not applicable to the problem at hand, nor was there any ascertainable geographic difference in bird distribution that might have contributed to the site selection process.

Comment 8. The evaluation of shellfish impacts in Table 32 of the draft EIS should include sea scallops.

Response 8. Sea scallops were not included in Table 32 because the available data were insufficient to estimate the species' population in the alternate areas. All that can be said with certainty is that sea scallops are present in both areas, which is simply not enough information with which to evaluate the effects of sludge dumping on sea scallops.

Comment 9. Sea scallops are abundant in the alternate areas and should be included in the discussion of fisheries resources in Chapter V.

Response 9. Figure 24, Sea Scallop Distribution in the Mid-Atlantic Bight (1975), shows that sea scallops are distributed throughout the Mid-Atlantic Bight, and the text of the final EIS states that they are present in both the Northern and Southern Areas. However, their relative abundance is unknown because, although sampling was done in the area, the equipment used was inappropriate for quantifying sea scallop populations (NOAA-NMFS, 1975b).

Comment 10. Some research indicates that not all organisms are capable of digging out when buried. Surf clams, especially, seem to lack this ability.

Response 10. That statement was included only to generally characterize sand fauna vs. the other faunal assemblages. The ability of surf clams to dig themselves out if they are buried is not crucial in the

context of sludge dumping because sludge, unlike dredged material, is not expected to substantially accumulate on the ocean floor at or near the dump site.

Sludge Dumping

Comment 1. The movement of sludge in the water column and bottom sediments should be treated in greater detail.

Response 1. The final EIS reflects the present state of knowledge with regard to the movement of sludge in the water column and in the bottom sediments, especially as it would apply to the alternate areas (Table 27). A continuing study of the processes of sludge movement is being conducted at the existing site. Data collected so far are discussed in detail in recent NOAA publications (Charnell, 1975; NOAA-MESA, February 1976); these data were used in preparing this EIS.

Comment 2. The EIS should discuss the feasibility and impact of reducing the rates of sludge discharge at the existing dump site in order to promote greater dispersion.

Response 2. The EPA considered making a reduction in the discharge rate a special condition of the ocean dumping permits issued in August 1976. But the proposal was dropped when the USCG objected that reducing the rate would increase the discharge time, thereby increasing the potential for vessel collisions.

Comment 3. The use of clean dredged sediment to coat the bottom in the vicinity of the existing dump site should be considered as a means of stabilizing the sludge and minimizing its impact.

Response 3. The EPA agrees that such a possibility should be considered as part of the phase-out of the existing site. It would have to be determined at that time whether such an operation were feasible and whether it would significantly enhance recovery of the benthic ecosystem at the existing dump site. Possible adverse impacts would also have to be evaluated; NOAA studies of the existing site indicate that there is no physical accumulation of sludge materials on the bottom and that coating it would, at the least, tend to smother the remaining benthos there.

Comment 4. The statement in the draft EIS that most of the sludge is retained in the upper layer of the ocean is contradicted by the NOAA report.

Response 4. That statement in the EIS is based on actual field measurements and sampling at the dump site by Callaway *et al.* (1975). The statement in the NOAA report (February 1976) was based solely on visual observation of sludge dumping from onboard ship. As discussed in Chapter VI, sludge dispersion depends on the water column conditions at the time of the dumping and on the characteristics of the sludge itself. During the summer, when a thermocline exists, there is a greater probability of the sludge remaining in the upper water layers than there is during the winter, when the waters are more homogeneous. However, relatively little sludge is expected to accumulate on the bottom even under winter conditions because the currents and the composition of the sludge load are such that only the small fraction of heavier sludge particles will reach bottom.

Comment 5. More information, especially on suspension, flocculation, and sedimentation, should be presented to support the stated conclusions about the ultimate fate of the bulk of the sludge solids.

Response 5. Callaway *et al.* (1975) found that fine sludge particles measured *in situ* at the existing dump site tend to flocculate and generally remain suspended in the upper water layer because of low settling

velocities. Only the heavier particles reach the bottom. Callaway *et al.* concluded that dumped sludge would not accumulate "substantially" on the sea floor, especially in the deeper waters.

Comment 6. Poor weather conditions and heavy vessel traffic in the New York Bight should be given greater consideration in the discussion of navigation hazards.

Response 6. Both weather and vessel traffic were considered in preparing this EIS. Weather, at least, is expected to be an insignificant factor. Lettau *et al.* (1976) collected visibility data for the New York Bight and shore stations, and reported that the greatest incidence of fog in the Bight occurs in June. (As a point of perspective, New York City experiences fog conditions more frequently in May than the Bight does in June.) When unfavorable weather conditions do occur, sludge vessels will not go out unless it is absolutely necessary.

Vessel traffic is a greater potential hazard. The increased volume of sludge will require that more trips be made to the dump site. Dumping time at the existing site has been limited to roughly five hours per day to reduce the potential for vessel collisions; this restriction would not apply at an alternate dump site. With the increased distance and the increased dumping time to promote dispersion, an alternate dump site would increase the total travel time for each sludge vessel. The longer a vessel is in transit, the greater the potential for collision with stationary structures or with other vessels. The use of a dump site in the Northern or Southern Area would minimize this potential for collision because both areas are almost entirely outside existing navigational lanes.

Alternate Dump Sites

Comment 1. The EIS should consider the additional alternative of moving the present sewage sludge dump site only a few miles away, just far enough to take it out of the center of the active shipping lanes where it is now located.

Response 1. Although a detailed analysis has not been conducted, the use of an alternate site in the Bight Apex would probably result in additional closures of shellfishing areas due to bottom contamination. The potential for further contamination of the Hudson Shelf Valley would also have to be considered. Interference of sludge dumping with shipping activities has been minimized by limiting the amount of time that dumping vessels can remain in the dump area to five hours per day.

Comment 2. Alternate dump sites should be compared on the basis of detailed cost-benefit data, rather than on the basis of simple semi-quantitative estimates of their relative merits.

Response 2. Where appropriate, detailed analyses of economic impacts were conducted. For the comparative evaluation of alternate sites, it was deemed more appropriate to use a weighted rating system because a number of the evaluation factors, such as public health considerations and impacts on the ecosystem, did not lend themselves to cost-benefit analysis techniques.

Comment 3. Greater consideration should be given to *off-the-shelf* dumping, especially for those sewage sludges and dredged materials that contain very high concentrations of toxic materials, such as heavy metals.

Response 3. As stated in the EIS, many marine scientists consider *off-the-shelf* dumping an undue environmental risk because of the many unknowns associated with dumping in this environment. Their judgment is supported in a report commissioned by the EPA, from the Ocean Disposal Study Steering Committee. The report was prepared under the auspices of the Ocean Affairs Board's Ocean Science Committee of

the National Research Council's Commission on Natural Resources. It concluded:

> Data for the evaluation of the deep sea as a disposal site are inadequate. This is due to: difficulties in conducting bioassays; slow rates of mixing and diffusion potentially resulting in anaerobic conditions; slow organic degradation; and narrow tolerance ranges for sensitive assemblages of organisms. Although the area is relatively stable in comparison to the shelf and nearshore, the much greater scientific uncertainty, and consequently increased risk associated with offshelf disposal, dictate that any but the most innocuous use of the area should be approached with extreme caution. (NAS, 1976).

A similar finding was made in the EPA-Headquarters decision report on the Toms River hearing. With specific reference to possible relocation of the Philadelphia dump site, the report concluded:

> ii. At the present time, there is insufficient data on which to base an accurate predictive judgment as to the environmental impact of dumping large volumes of sewage sludge on marine biota and marine ecosystems at the 106-mile site [the chemical wastes site]. Additionally, I do not believe that, as a practical matter, an effective monitoring program for the site can be implemented before January 1, 1981. For these reasons, I conclude that it would be preferable to continue using a site which is already degraded but capable of recovery rather than risk unknown and potentially irreversible environmental impacts at a new location. (See Appendix D.)

In addition to being environmentally inadvisable, off-the-shelf dumping poses transportation problems. While the existing sludge disposal fleet has the capacity to transport present volumes of sludge to an off-the-shelf site, the 1981 sludge volume is expected to be about one and a half times greater than the 1977 volume, and the fleet would have to be expanded to accommodate the increase. The resulting economic costs cannot be justified considering: 1) that ocean dumping is to be phased out by the end of 1981; 2) that off-the-shelf dumping is not recommended; and 3) that other, more environmentally acceptable, alternatives are available (see Chapter III).

Comment 4. Instead of the 31-sq-km(9-sq-n-mi) site proposed in the Conclusions and Recommendations of the draft EIS, the USCG recommends that the designated alternate site be the approximate parallelogram whose boundaries coincide with the following Loran-C time delay lines: 9930-Y – 50625 to 50675, and 9930-Z – 70000 to 70100. These Loran-C time delay lines define an area which is approximately 33.3 km (18 n mi) long by 7.4 km (4 n mi) wide with its four corners located at 40° 16′ 15″N, 72° 42′ 50″W; 40° 03′ 12″N, 72° 27′ 35″W; 40° 01′ 20″N, 72° 32′ 40″W; and 40° 14′ 35″N, 72° 47′ 55″W.

This enlarged site should be able to accommodate any future growth in sludge dumping and to allow for greater on-site dispersal. Orientation of the site with the Loran-C time delay line grid will maximize the navigational capabilities of the dump vessels, allowing them time to maintain adequate track separation required by environmental and maritime safety considerations.

Response 4. The use of Loran-C navigational lanes as dump site boundaries to promote navigational efficiency would not present any problems at the proposed alternate site. However, the size of the USCG's recommended site is too large and its southern portion is too near the Hudson Shelf Valley. Contamination would be spread over a very large area of the bottom, and monitoring would be difficult. (The alternate site proposed by EPA is only slightly larger than the existing site.)

Heavy Metals and Other Toxicants

Comment 1. Information on future sources of pollutants is not covered adequately in the draft EIS, nor is it clear how pollutant loadings in the New York Bight will be affected by improved wastewater treatment facilities resulting from Best Practicable Control Technology Currently Available (BPT).

Response 1. Two time frames must be considered when evaluating future sources of pollutants to the New York Bight: short-term and long-term. As previously discussed, ocean dumping of sewage sludge, most acid wastes, and chemical wastes is to be phased out by December 31, 1981. Other pollutant sources will continue beyond that date; these include urban runoff, municipal wastewater discharges, and atmospheric sources. A date for the cessation of dredged material dumping has not been set.

Generally, water quality in the New York Bight is expected to improve as upgraded wastewater treatment systems are instituted. Through the use of secondary treatment, at least 85 percent of the influent suspended solids and biochemical oxygen demand will be removed from municipal wastewaters. All but two of the New York City treatment plants will be providing secondary treatment by December 1978, according to current construction schedules. The Red Hook and North River treatment plants are expected to be providing secondary treatment by 1984 and 1986, respectively.

Treatment of industrial wastewaters presents a more complex problem primarily because of the types of wastewaters produced. However, EPA recently issued general pretreatment regulations for existing and new sources of pollution (USEPA, June 26, 1978). These pretreatment regulations will have little effect on ocean dumping of sewage sludge because they will not be fully implemented before sludge dumping is phased out. But, they will have a long-range beneficial effect on water quality in the New York Bight in terms of wastewater discharges and will facilitate the implementation of land-based sludge disposal methods.

Comment 2. The draft EIS does not adequately treat the environmental impact of heavy metals and other toxicants in sewage sludge dumped in the New York Bight. The volume of these substances in bottom sediments, and their areal extent, should be detailed.

Response 2. The environmental impact of dumping sewage sludge at the alternate areas is discussed in Chapter VII. This discussion is based on the predicted fate of the contaminants in dumped sludge, as set forth in Chapter VI. Uncertainties remain, of course: the physical fate of dumped sludge cannot be predicted with absolute assurance, and data on the benthos in the alternate areas are still somewhat limited. Nevertheless, Chapters VI and VII represent the best estimates of what would happen if sewage sludge were dumped at one of the alternate areas, and what the long-range effects on the ecosystem would be. The discussion of heavy metals and toxicants in the New York Bight, while not exhaustive, is appropriate for this analysis. Details on the distribution of heavy metals and other toxicants in sediments of the New York Bight are presented in recent NOAA studies (Charnell, 1975; NOAA-MESA, February 1976; West *et al.*, September 1976).

Comment 3. The possibility of handling some sewage sludges differently than others is not considered in the draft EIS. For example, sludges containing large amounts of heavy metals might be disposed of at a 120-km (65-n-mi) dump site, while less contaminated sludges might continue to be dumped at the present site.

Response 3. David H. Wallace, the Associate Administrator for Marine Resources at NOAA, states, "We do not know enough about the behavior and the impacts of the various components of the waste load [of sewage sludge] to have a factual basis for designating that some wastes should continue to be dumped at the existing site, whereas others should be moved to a new site" (NOAA, September 17, 1974).

Comment 4. Pretreatment methods that might make ocean dumping of sewage sludge a more acceptable alternative to land-based disposal have not been adequately investigated in the draft EIS.

Response 4. The EPA issued general pretreatment regulations for existing and new sources of pollution on June 26, 1978. While pretreatment would make any sludge disposal method more environmentally acceptable, it would not necessarily make ocean dumping more acceptable than land-based disposal. In any case, the pretreatment standards will not be fully implemented before ocean dumping of sewage sludge is phased out in 1981.

Comment 5. The anticipated effect of pretreatment requirements upon the future character (constituents) of ocean dumped sewage sludge is not clear from the draft EIS.

Response 5. Pretreatment is not expected to significantly reduce the content of heavy metals and toxic substances in sludge until after 1981 (see Chapter II). As noted in the draft EIS, ocean dumping of sewage sludge is to be phased out by the end of 1981.

Comment 6. In the draft EIS, Figure 4, Sources of Pollutants in the New York Bight, misrepresents the heavy metals contribution because it shows only the lead distribution, which comes primarily from atmospheric sources. A more representative heavy metal should be included.

Response 6. Chromium (50 percent from barged sources) has replaced lead in the revised Figure 4. It accurately identifies dredged material as the source of most heavy metals.

Land-Based Sludge Disposal Alternatives

Comment 1. More data should be included in the EIS to show a thorough appraisal of all land-based sludge disposal alternatives.

Response 1. Land-based sludge disposal alternatives did not receive a more detailed appraisal in the EIS for three reasons. First of all, ISC was in the process of evaluating the possible land-based alternatives under a grant from EPA and had not yet reached a conclusion about the best approach to the problem of sludge disposal in the metropolitan area. At the time the draft EIS was issued, ISC had published only its preliminary findings in its Phase 1 report. As noted in the EIS, Phases 2 and 3, which were to address in detail the feasible alternatives and to evaluate any legal/institutional implementation problems, had yet to be completed.

Second, none of the possible land-based alternatives had reached the stage where it could be implemented in place of the proposed action in the metropolitan area. Since they could not be considered immediately available alternatives to the proposed action, land-based alternatives did not warrant exhaustive analysis in the EIS.

Third, since ISC was engaged in publishing detailed analyses of the land-based alternatives, duplicate detailed analyses in the EIS would have been unnecessary, even if they had been possible at the time.

Since the draft EIS was issued, ISC has completed its three-phase study of sludge management in the metropolitan area. The final EIS presents ISC's findings and summarizes each of ISC's three reports. Those interested in the details of the study may obtain copies of the original reports from ISC.

Comment 2. The EIS should present practical plans for implementing land-based sludge disposal alternatives.

Response 2. Since the draft EIS was issued, EPA has taken four major steps to insure that land-based sludge disposal alternatives are implemented.

First, as explained in response to the first comment about Phase-Out Planning, the ocean dumping permits issued to sewage sludge generators by EPA in 1976 contained a special condition requiring each permittee to comply with the a phase-out schedule developed by EPA in cooperation with the states of New York and New Jersey (Special Condition Number 7). In essence, this requires the ocean dumping permittees to perform site specific evaluations, using information gathered in the ISC studies, and to develop facility plans and environmental assessment statements for each proposed sludge disposal facility.

Second, EPA has made the costs of feasibility studies, design, and construction eligible for 75 percent federal funding. This will help to alleviate the financial burden of implementing the phase-out operation.

Third, EPA included a special condition in the ocean dumping permits issued to municipalities in 1976, requiring each of them to submit a study of heavy metal sources (Special Condition Number 7). The "heavy

metal source determination study report" must enumerate the steps being taken by the permittee to reduce or eliminate controllable heavy metal sources. The objective of this permit requirement is the reduction of the heavy metal content of sewage sludges to make them more suitable for land application.

Fourth, EPA-Region II has developed an enforcement strategy to insure that ocean dumping of sewage sludge is phased out by December 31, 1981 (see Appendix F).

Comment 3. The EIS demonstrates an unwarranted emphasis on pyrolysis as the only viable land-based disposal alternative, coupled with an obvious deprecation of those methods that return organic matter to the soil. Sludge should be considered a valuable resource not just a contaminant to be disposed of.

Response 3. The emphasis on pyrolysis in the draft EIS reflected the preliminary evaluation of land-based sludge disposal methods made by ISC in its Phase 1 report (ISC, 1975). According to the Phase 1 report, the heavy metal content of metropolitan area sludges precluded extensive land application. On this basis, ISC tentatively chose pyrolysis as the principal solution to the metropolitan area's sludge disposal problems, recommending the construction of pyrolysis facilities sufficient to handle roughly 90 percent of the sludge that would be produced in the year 2000.

The latest ISC reports (1976a; 1976b), however, indicate that a greater quantity of sludge can be safely applied to the land than was originally thought (see Chapter III and Appendix J). Consequently, ISC now recommends the construction of only five pyrolysis facilities, sufficient to handle a total of 832 dry metric tons/day (917 dry tons/day) or roughly 50 percent of the sludge that would be produced in the year 2000.

Although ISC has determined that land application of some of the sludge produced in the metropolitan area is acceptable, problems remain, especially with the use of sludge as a soil conditioner or fertilizer (see Chapter III).

Comment 4. The statement in Chapter VII that land-based disposal will be cost-competitive with ocean disposal is in apparent contradiction with Table 31.

Response 4. The statement in question referred to EPA's belief that land-based disposal would eventually be cost-competitive with ocean dumping. At present, all of the land-based disposal alternatives are more expensive than ocean dumping, as Table 31 shows.

Dumping of Dredged Material

Comment 1. The EIS should clarify the relationship between dredged material and sewage sludge, especially with regard to their effects on the environmental quality of the New York Bight. The effects of relocating the dredged material dump site, instead of the sludge dump site, should be considered, and the effects of relocating both dump sites should be addressed in detail. In addition, EPA should emphasize its commitment to phase out the ocean dumping of dredged material in the New York Bight by fixing a firm date for such a phase-out.

Response 1. Since ocean dumping of dredged material and its effects on the marine environment are not the subject of this EIS, they are discussed only insofar as they have a bearing on sewage sludge dumping and its effects. For this reason, most of the information presented on dredged material dumping and on other sources of pollutants in the New York Bight is comparative in nature.

With regard to the possibility of relocating the dredged material dump site, the effects of such an action cannot be assessed without appropriate, specific, in-depth studies. Detailed environmental studies of dredged material dumping are now being conducted by the COE, NOAA, and EPA. These studies will have to be completed before relocation of the dump site can even be considered because current ocean dumping regulations require that an EIS be prepared prior to designation of any site as an EPA-approved dump site (40

CFR 228.6). Consequently, the existing dump site in the New York Bight, which was designated in 1940, has been approved on an interim basis.

Needless to say, an EIS on dredged material dumping would consider not only the effects of dumping at the existing and at alternate sites, but also the feasibility of phasing out dredged material dumping in favor of land-based disposal methods.

Comment 2. The bioavailability of the high pollutant loading associated with dredged material is not discussed.

Response 2. Dredged material dumping and its effects are not the subject of this EIS.

Comment 3. The impacts of dredged material are probably short-term, rather than long-term as implied in Chapter VII.

Response 3. There are no data to suggest that the effects of dredged material dumping are short-term.

Comment 4. In Chapter VII, EPA states that dredged material dumping has recently been recognized as a serious environmental problem. Why is it considered serious?

Response 4. As shown in Table 10 and on Figure 4, dredged material is a major source of contamination to the New York Bight because of the types and amounts of pollutants involved.

Public Participation and Coordination

Comment. A greater effort should be made to encourage public participation in seeking solutions to environmental problems. It is especially important to solicit and fully consider the opinions of outside, independent experts when preparing EISs. Public hearings should receive greater publicity in local media to insure the broadest possible public participation in EPA's decision-making process.

Response. One of the main purposes of an EIS is to maximize public participation in the federal decision-making process. A concerted effort was made to inform the public that this EIS was being prepared and to encourage public involvement in its development.

When the decision to prepare this EIS was first made, EPA developed a mailing list of approximately 200 government agencies and public groups that would be affected by, or interested in, the ocean dumping of sewage sludge. These included federal, state, and local agencies, interstate agencies, the ocean dumping permittees, citizens groups, academic and research institutions, news media, private consultants and industries, and libraries.

When a preliminary draft of the EIS was completed in December 1975, it was distributed to other federal agencies (NOAA-MESA, USCG, COE, FDA, and BLM) and to several oceanographic experts for review and comment. Their comments were incorporated in the draft EIS that was issued in February 1976. Over the two-year EIS preparation period, the mailing list grew to approximately 350 agencies and groups. More than 1000 copies of the draft EIS were distributed.

A continuing effort was made to keep interested government agencies and public groups abreast of the EIS preparation activities:

- January 17, 1975: EPA issues a Notice of Intent to prepare the EIS.
- February 7, 1975: EPA issues an information letter and EIS outline to members of the NOAA-MESA New York Bight Advisory Committee, an organization established specifically to act as a public input group.

— April 23, 1975: EPA distributes the EIS working outline, again requesting comment and public input.
— June 26, 1975: EPA, with the cooperation of NOAA, establishes three public information centers in the New York-New Jersey area.
— February 27, 1976: EPA issues the draft EIS and notifies the public of three upcoming public hearings on it.
— March 24–25, 1976: EPA holds the first public hearing on the draft EIS in New York City.
— March 29, 1976: EPA holds the second public hearing on the draft EIS in Toms River, New Jersey.
— April 1, 1976: EPA holds the third public hearing on the draft EIS in Mineola, New York.

In addition, news releases were issued at critical points during the preparation of the EIS.

Miscellaneous Questions

Comment 1. The EPA should take a more active and open role in warning the public of potential health dangers, especially with regard to water quality in the New York Bight.

Response 1. As discussed previously (see Monitoring and Surveillance Program), EPA is taking an active role in keeping the public informed and is responding to public inquiries. This is being done in coordination with state and local agencies and groups.

Comment 2. The impact of sewage sludge dumping should not be compared to the impact of developing offshore oil and gas reserves. Oil spill contamination of a sand or gravel deposit is just a possibility, whereas sludge contamination is assured if dumping takes place over the deposit.

Response 2. While sand and gravel deposits would be contaminated to some extent by ocean dumping in the Southern Area, they would probably recover with time. An oil spill, however, would probably result in a serious and permanent impact. Here, we are dealing with the degree of contamination and potential reuse rather than with the frequency or probability of contamination.

Comment 3. The mass loading of the ocean dumped sewage sludge should be shown in Table 3.

Response 3. This information has been included in a revised Table 10, which gives the mass loading and percentage contribution of all "barged" pollutants to the New York Bight.

Comment 4. There is no discussion in the draft EIS of the Baltimore Canyon Trough.

Response 4. The Baltimore Canyon Trough was not discussed because it is not pertinent to the geology of the continental shelf as it relates to sewage sludge disposal. The important aspects of the near-surface geology are presented, and the impacts of resource development of the OCS lease areas in the Mid-Atlantic are discussed.

Comment 5. Data indicate that the sand ridges described in Chapter V are less than 11,000 years old and rest on slightly older lagoonal deposits of Holocene Age or Pleistocene sediments.

Response 5. This is correct; the designation of particular geologic ages to near-surface strata was not deemed significant to this EIS.

Comment 6. Landings of hard clams, defined as ocean quahogs (*Arctica islandica*), from the New York Bight in 1973, or at present, cannot represent an $11 million per year commercial fishery.

Response 6. Hard clams in this section were mislabeled as ocean quahogs. According to NOAA-NMFS, the hard clams landed from the estuarine and near-shore waters of the Bight are *Mercenaria mercenaria*, often referred to as the hardshell clam, common quahog, or little neck clam.

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CHAPTER XII

CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF GENERAL BACKGROUND

The New York Bight (Figure 1) encompasses some extremely valuable marine resources. It currently is used for commercial and sport fishing, navigation, swimming, and recreational boating, as well as for the ultimate disposal of municipal and industrial wastes, either through ocean dumping or through outfall discharges beyond the shoreline. In addition, the Bight has a potential for mineral resource development (oil and gas, sand and gravel).

Waste generators in the New York-New Jersey metropolitan area have long used the New York Bight for disposal of *hard-to-treat* waste materials. In 1977, approximately, 4.0 million cu m (5.3 million cu yd) of dredged material, 4.0 million cu m (5.3 million cu yd) of sewage sludge, 624 thousand cu m (821 thousand cu yd) of acid wastes, 135 thousand cu m (177 thousand cu yd) of cellar dirt, and 738 thousand cu m (970 thousand cu yd) of chemical wastes were dumped at sites in and adjacent to the Bight.

The volume of sludge dumped at the existing site has risen substantially since initial designation of the site in 1924. Current projections indicate that if construction schedules for municipal wastewater treatment facilities are maintained, the volume of sludge will increase from approximately 4.0 million cu m (5.3 million cu yd) in 1977 to 9.9 million cu m (13.0 million cu yd) in 1981.

The sludges currently dumped in the Bight Apex contain high concentrations of heavy metals (chromium, copper, lead, mercury, nickel, and zinc), reflecting the large amount of industrial wastewater discharged into the area's municipal systems. Pretreatment regulations and standards, which will require removal of industrial pollutants prior to discharge, are being promulgated by EPA, but a significant reduction of heavy metals in municipal sludge is not expected until the regulations and guidelines are fully implemented under the National Pollutant Discharge Elimination System permits program.

Ocean dumping of all municipal and most industrial wastes will be phased out by December 31, 1981, and must be replaced by environmentally acceptable, technically feasible, and economically reasonable alternative methods of disposal. Ocean dumping permits will not be issued by EPA to any municipal or industrial waste generator who is not currently developing or implementing an acceptable land-based disposal alternative. The Interim Permits issued to New York and New Jersey sludge dumping permittees since 1976 have contained a requirement (Special Condition Number 7) to implement land-based sludge management alternatives, thereby eliminating ocean dumping, by December 31, 1981. In addition, EPA-Region II has developed an enforcement strategy that provides for systematic oversight and control of the progress of permittees toward the phasing out of ocean dumping of sewage sludge (Appendix F).

Under an EPA grant, ISC developed a regional program for land-based disposal of those municipal sludges now dumped in the ocean. This New York-New Jersey Metropolitan Area Sewage Sludge Disposal Management Program, which was issued in October 1976, calls for land application and pyrolysis of approximately equal volumes of the sludge to be produced in the year 2000. All municipal ocean dumping permittees in the metropolitan area are required to participate in this program or to develop and implement their own alternative disposal methods.

The projected increase in the volume of ocean dumped sludge, the potential adverse environmental impacts associated with this increase, and the implementation schedule for land-based alternatives made a study of alternate dump sites necessary. In 1974, EPA and NOAA jointly recommended two mid-shelf areas, the Northern and Southern Areas (Figure 10), as possible locations for an alternate sewage sludge dump site. The oceanographic studies conducted by NOAA in both the Northern and Southern Areas were augmented by baseline data collected by the Raytheon Company in a portion of the Northern Area.

These and other studies were used in preparing a draft EIS on EPA's proposal to designate an alternate site for the dumping of sewage sludge. The most significant finding of the draft EIS was that the proposed action was unnecessary and might be more environmentally damaging than taking no action whatsoever. Therefore, pending development of land-based disposal alternatives, continued use of the existing dump site was recommended. Also recommended were an expanded monitoring program for the existing site and designation of an alternate site in the Northern Area that could be available for use in the future if necessary.

During the summer of 1976, two incidents occurred that raised questions about continued use of the existing dump site. One incident was the extensive fish kill off the coast of New Jersey; the other was the washup of foreign matter on Long Island's beaches. Results of the many studies undertaken in response to these incidents have shown that both were basically the result of atypical atmospheric and hydrographic conditions in the New York Bight, and that sludge dumping was at most a minor contributing factor. Therefore, neither of these incidents alters the findings of the draft EIS or the recommendation to continue using the existing site until ocean dumping is phased out or until the criteria developed by EPA-Region II indicate the need to move sludge dumping to an alternate site for public health reasons. This is the course of action favored by most of the government agencies expressing an opinion on sludge dumping, and it is the course of action endorsed in the EPA-Headquarters decision report dated March 1, 1978 (Appendix D).

CONCLUSIONS

Existing Sewage Sludge Dump Site

1. Monitoring studies by EPA, NOAA, FDA, and the Town of Hempstead show that sludge dumping at the existing site has not significantly affected the water quality off Long Island or New Jersey beaches. Where coastal water quality has deteriorated, it appears to have been the combined result of raw and inadequately treated wastewater discharges, sewer and stormwater runoff, and other land-based discharges to harbor and coastal waters.

2. Although small quantities of floatables (oil, grease, and artifacts) are present at the existing site for short periods immediately after sludge dumping, there is no direct evidence that they ever reach Long Island or New Jersey beaches; the probability is that those materials washed ashore come from other sources.

3. Continued dumping at the existing sludge site will not have a significant additional effect on water quality in the Bight Apex. Preliminary studies there (Mueller *et al.*, 1976) indicate that pollutant loadings associated with sludge dumping are small (5 percent) in comparison with those associated with dredged material dumping, inland runoff, or wastewater discharges.

4. Dumping of current volumes of sewage sludge will not have a significant impact on the rather limited benthic community at the existing site. This community would not recover in the near future even if the existing site were abandoned, nor would areas now closed to shellfishing be reopened in the near future.

5. The present method of sludge dumping, discharge in the vessel's wake, is effective in maximizing dilution and dispersion of the dumped sludge.

6. Because the volume of sludge to be ocean dumped will increase, so will the number of trips to the existing dump site. Since this site is located in the Nantucket Navigational Lane, there will be an increase in hazards to navigation.

7. Potential adverse environmental impacts of dumping increased volumes of sludge at the existing site are related to the dispersive characteristics and the assimilative capacity of Bight Apex waters, both of which are unknown. Therefore, an expanded program has been established to monitor the impact of continued dumping at the existing site, especially the impact along the Long Island and New Jersey beaches and in the Hudson Shelf Valley. Results of such a program can be useful to those responsible for deciding when or whether to phase out or abandon the existing dump site. Criteria that can be used to determine whether

public health reasons require moving from the existing to an alternate site at any time before December 31, 1981 have been established (Appendix E).

Northern and Southern Areas

1. Degradation of coastal water quality is not expected, even if greatly increased volumes of sludge are dumped at a new site in the Northern or Southern Area.

2. The quality of Bight Apex waters will not be significantly improved by using a new site in the Northern or Southern Area because most pollutants entering the Apex come from sources other than sludge dumping (primarily dredged material dumping, inland runoff, and wastewater discharges).

3. Concentrations of dissolved oxygen in the water column at a new site may temporarily decrease immediately following a dump, but this is not likely to significantly affect the ecosystem.

4. Heavy metals, toxic organics, and microbiological agents will contaminate bottom sediments at and near a new dump site after initial use. Smothering of benthic organisms is not likely to occur, however, unless dredged material is also dumped there.

5. Composition of the benthic fauna at a new site may change; the benthic biomass will probably decrease in diversity, and this localized alteration of food supplies may also affect fish populations in the area.

6. Sites can be chosen within each alternate area to mitigate possible impacts on the biological resources of the Hudson Shelf Valley. Transport of dumped sludge from either area to the Hudson Shelf Valley through resuspension and resettlement is possible but unlikely.

7. The FDA will probably close areas in and near a new dump site to shellfish harvesting, based on the potential for bacterial contamination. Nevertheless, use of a new dump site will increase the risks of human consumption of illegally harvested contaminated shellfish.

8. An alternate site in the Northern Area would be preferable to one in the Southern Area in terms of minimizing the overall impact on the marine ecosystem, the economic impact on the shellfishing industry, and the potential conflict with mineral resource development.

9. Increased transportation time in open waters, as well as the greater number of trips, will increase hazards to navigation.

10. There is an increased probability that short dumping, including emergency dumping, will occur. The USCG will require increased manpower and equipment to provide adequate surveillance and enforcement of dumping regulations.

11. The costs of transportation, monitoring, and surveillance will all increase.

Other Options

1. Land-based sludge disposal methods constitute the only legitimate long-range solution to the New York-New Jersey metropolitan area's sludge disposal problem.

2. Designation and use of a site in each of the alternate areas would result in the potential degradation of two separate, relatively clean areas, rather than one.

3. Use of one of the other existing dump sites in the Bight Apex for sludge disposal would violate the original concept of segregating wastes and would make it extremely difficult to isolate the true cause of any adverse environmental effects.

4. Use of a dump site off the continental shelf, such as the chemical wastes site, is considered unfeasible based on an analysis of environmental acceptability, monitoring and surveillance capabilities, logistics and economics, and the effect of such use on the ability of dumpers to meet the December 31, 1981 deadline for phasing out ocean dumping of sewage sludge.

RECOMMENDATIONS

1. The development and implementation of environmentally acceptable, technically feasible, and economically reasonable land-based alternatives should proceed without delay.

2. The Regional Enforcement Strategy (Appendix F) developed by EPA-Region II should be strictly adhered to.

3. The existing sewage sludge dump site should continue to be used.

4. The existing method of ocean dumping, uniform discharge in the vessel's wake, should be continued.

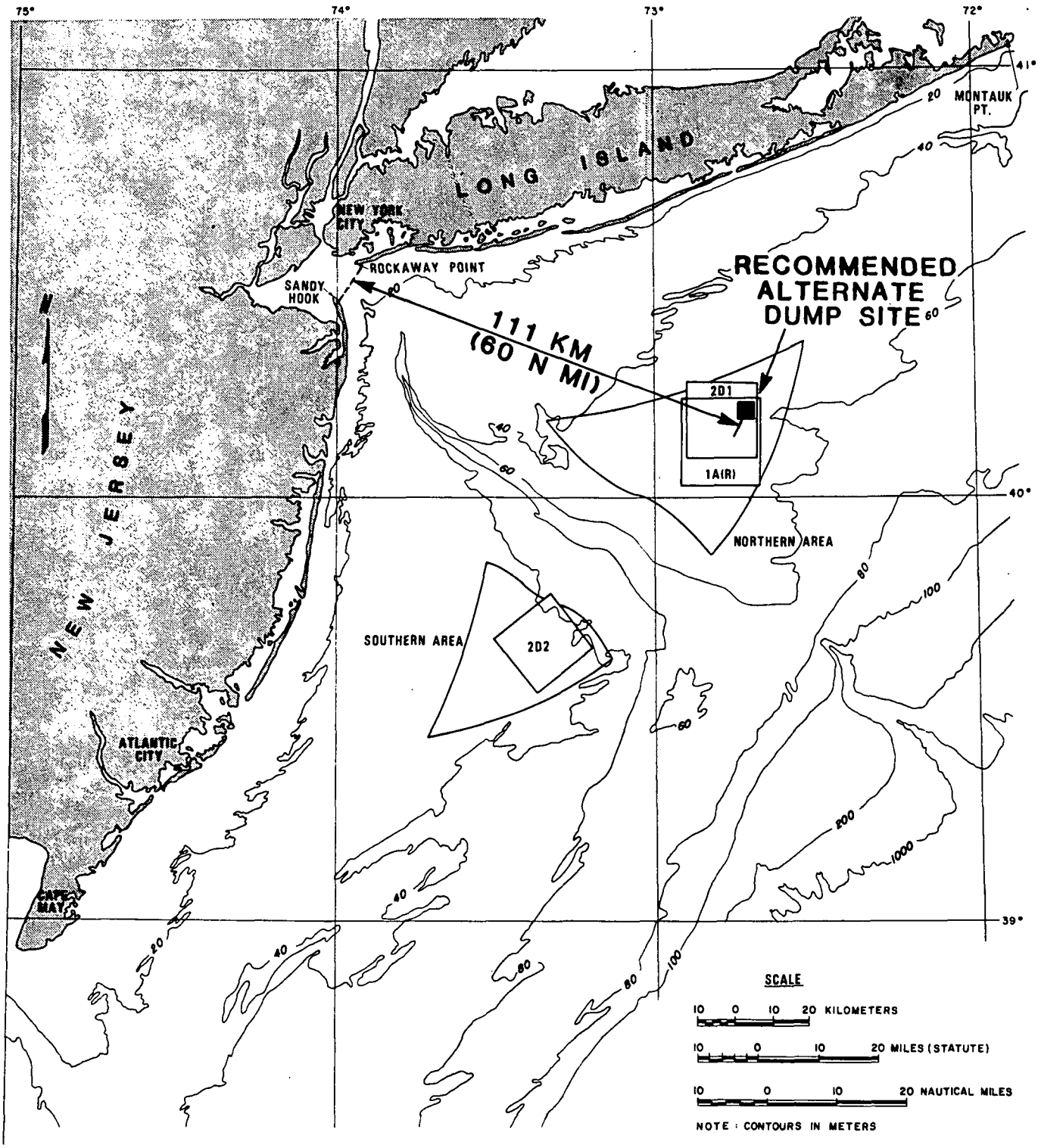
5. The expanded monitoring program and the criteria developed to determine when and if public health or environmental factors warrant the phasing out or abandonment of the existing dump site should continue.

6. An alternate dump site should be designated in the Northern Area for potential use if and when the existing dump site is abandoned or phased out (Figure 42). This site should be a square, roughly 31 sq km (9 sq n mi) with center coordinates at 72°42′ W longitude and 40°12′N latitude, at a depth of 55 m (180 ft). The center of this recommended site is about 61 km (33 n mi) south of Long Island, about 111 km (60 n mi) east of New Jersey, about 45 km (24 n mi) from the Hudson Shelf Valley, and about 111 km (60 n mi) from the Sandy Hook-Rockaway Point transect.

This site offers the following advantages:

- Because of its depth, there will be a low potential for resuspension of bottom sediments from surface and/or internal waves and wind-driven currents. In addition, nearby deeper troughs of the Long Island Shelf Valley will act as *traps* for sludge contaminants, thus inhibiting their bottom transport to adjacent areas.
- It is distant from the Long Island and New Jersey shorelines and from the Hudson Shelf Valley. Since the Long Island beaches are located updrift of the prevailing coastal currents, the location is an optimum one, with a very low potential for contaminant transport to either the coastal areas or the Hudson Shelf Valley.
- It has neither significant biological resources (shellfish) nor known potential mineral resources (oil and gas, sand and gravel).
- Oceanographic studies, including those of NOAA and the Raytheon Company, provide a data base for future trend assessments, should the site actually be used.

7. Studies of oceanographic conditions and characteristics of the New York Bight by NOAA should be expanded to facilitate a clearer understanding of this complex ecosystem. To this end, studies by the NOAA-MESA New York Bight Project should be supported, especially studies of pollutant loading and the dispersive and assimilative characteristics of Bight waters.



RECOMMENDED ALTERNATE DUMP SITE

NOTE:.
CENTER COORDINATES OF RECOMMENDED ALTERNATE DUMP SITE ARE $40^{o}12'N$, $72^{o}42'W$.

FIGURE 42

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ABBREVIATIONS USED

a	acre(s)
API	American Petroleum Institute
BPT	Best Practicable Control Technology
BOD	biochemical oxygen demand
BLM	Bureau of Land Management
C/N	Carbon/Nitrogen Ratio
cfs	cubic feet per second
cm	centimeter(s)
cm/sec	centimeters per second
COD	chemical oxygen demand
CFR	Code of Federal Regulations
cu m	cubic meter(s)
cu m/sec	cubic meters per second
cu yd	cubic yard(s)
°C	degrees Celsius
°F	degrees Fahrenheit
EIS	environmental impact statement
FWPCA	Federal Water Pollution Control Act
ft	foot, feet
FDA	Food and Drug Administration
g/cu cm	grams per cubic centimeter
in	inch(es)
in/sec	inches per second

IEC	Interstate Electronics Corporation
ISC	Interstate Sanitation Commission
kg	kilogram(s)
kg/day	kilograms per day
km	kilometer(s)
LORAN-C	Long Range Aid to Navigation
MPRSA	Marine Protection, Research, and Sanctuaries Act
m	meter(s)
m/sec	meters per second
ug/kg	micrograms per kilogram, or millionth gram per kilogram
ug/l	milligrams per liter, or millionth gram per liter
u	micron(s)
mi	mile(s)
mg	milligram(s), or thousandth gram
mg/l	milligrams per liter
ml	milliliter(s), or thousandth liter
ml/sq m/hr	milliliters per square meter per hour
mm	millimeter(s), or thousandth meter
mph	miles per hour
NAS	National Academy of Science
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act of 1969

NOAA	National Oceanic and Atmospheric Administration
NOAA-MESA	National Oceanic and Atmospheric Administration-Marine Ecosystems Analysis
NOAA-NMFS	National Oceanic and Atmospheric Administration-National Marine Fisheries Service
NSF	National Science Foundation
n mi	nautical mile(s)
NJDEP	New Jersey Department of Environmental Protection
OCS	outer continental shelf
ODSS	Ocean Dumping Surveillance System
PCB	polychlorinated bi-phenols
ppm	parts per million
ppt	parts per thousand
lb	pound(s)
lb/a/day	pounds per acre per day
lb/day	pounds per day
sec	second(s)
sq	square
SPM	suspended particulate matter
SS	suspended solids
TCH	total carbohydrate content
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
COE	U.S. Army Corps of Engineers

USCG	U.S. Coast Guard
EPA	U.S. Environmental Protection Agency
EPA-Headquarters	U.S. Environmental Protection Agency, Headquarters, Washington, D.C.
EPA-Region II	U.S. Environmental Protection Agency, Region II, New York, N.Y.
UNLOS III	The Third United Nations Law of the Sea Conference
U.S.	United States of America

METRIC EQUIVALENTS OF ENGLISH UNITS

Metric	English
Celsius (°C)	Fahrenheit (°F)
centimeter(s) (cm)	inch(es) (in)
centimeters/second (cm/sec)	inches/second (in/sec)
cubic meter(s) (cu m)	cubic yard(s) (cu yd)
cubic meters/day (cu m/day)	million gallons per day (mgd)
hectare(s) (ha)	acre(s) (a)
kilogram(s) (kg)	pound(s) (lb), ton(s)
kilograms/day (kg/day)	pounds/day (lbs/day), tons/day
kilograms/meter (kg/m)	pounds/foot, (lbs/ft)
kilometer(s) (km)	mile(s) (mi), nautical mile(s) (n mi)
kilometers/hour (km/hr)	knots
liter(s) (l)	gallon(s) (g)
meter(s) (m)	foot, feet (ft)
meters/second (m/sec)	miles per hour (mph)
metric ton(s) (MT)	ton(s)
metric tons per day	tons per day
milliliters/square meter/hour (ml/sq m/hr)	pounds/acre/day (lb/a/day)
square kilometer(s) (sq km)	square nautical mile(s) (sq n mi)

APPENDIX A

SAMPLE FORM:

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT

(OCEAN DUMPING) PERMIT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

MARINE PROTECTION, RESEARCH AND
SANCTUARIES ACT (OCEAN DUMPING) PERMIT

PERMIT NO. AND TYPE:	II-NY 009 - Interim
EFFECTIVE DATE:	February 15, 1978
EXPIRATION DATE:	January 9, 1979
REAPPLICATION DATE:	July 10, 1978
APPLICANT:	Charles Samowitz, P.E., Commissioner Dept. of Water Resources, NYC EPA Municipal Building New York, New York 10007
WASTE GENERATOR(S):	Same as applicant
WASTE GENERATED AT:	See Table I
PORT OF DEPARTURE:	New York, N.Y.
WASTE TRANSPORTER(S):	NYC, Envir. Protection Adminis., DWR Municipal Building New York, N.Y. 10007 and any person owning or operating a towing vessel employed for the purpose authorized herein.

This permit authorizes the transportation and dumping into ocean waters of certain material pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. 1401-1444, (hereinafter referred to as "the Act"), regulations promulgated thereunder, and the terms and conditions set forth below.

General Conditions:

1. All transportation and dumping authorized herein shall at all times be undertaken in a manner consistent with the terms and conditions of this permit. The applicant, waste generator(s) and waste transporter(s) designated above shall be the permittees liable for compliance with such terms and conditions. The liability of each is set forth in the Special Conditions. Compliance by any permittee with one or more but less than all of the conditions with which such permittee must comply will not constitute a ground or grounds of defense in any proceeding against that permittee for violation of the provisions of this permit.

2. Any person who violates any provision of the Act, the Final Regulations issued thereunder, or any term or condition of this permit shall be liable for a civil penalty of not more than $50,000 for each violation. Additionally, any knowing violation of the Act, Final Regulations, or permit may result in a criminal action being brought with penalties of not more than $50,000 or one year in prison, or both.

3. a. Transportation to, and dumping at any location other than that authorized by this permit shall constitute a violation of the Act and of the terms and conditions of this permit.

b. Transportation and dumping of any material not identified in or significantly in excess of that identified in the application for this permit, unless specifically authorized by a written modification hereto, shall constitute a violation of the Act and of the terms and conditions of this permit.

4. Nothing contained herein shall be deemed to authorize, in any way, the transportation from the United States for the purpose of dumping into the ocean waters, into the territorial sea, or into the contiguous zone, of the following material:

a. High-level radioactive wastes.

b. Materials, in whatever form, produced for radiological, chemical or biological warfare.

c. Persistent synthetic or natural materials which may float or remain in suspension in the ocean.

5. The applicant may not apply for, nor any permittee simultaneously hold, a permit from another EPA Regional Office for any of the material to which this permit is applicable, nor may the applicant or any permittee transfer material from one EPA Region to another if a permit for the transportation or dumping of such material has been denied by one EPA Region.

6. After notice and opportunity for a hearing, this permit may be modified or revoked, in whole or in part, during its term for cause including, but not limited to, the following:

a. Violation of any term or condition of the permit;

b. Misrepresentation, inaccuracy, or failure by the applicant to disclose all relevant facts in the permit application;

c. A change in any condition or material fact upon which this permit is based that requires either a temporary or permanent reduction or elimination of the authorized transportation or dumping including, but not limited to, changes in conditions at the designated dump site, and newly discovered scientific data relative to the granting of this permit.

d. Failure to keep records, to engage in monitoring activities, or to notify appropriate officials in a timely manner of transportation and dumping activities as specified in any condition of this permit.

7. This permit shall be subject to suspension by the Regional Administrator or his delegate if he determines that the permitted dumping has resulted, or is resulting, in imminent and substantial harm to human health or welfare or the marine environment. Such suspension shall be effective subject only to the provisions of 40 C.F.R. 223.2(c).

8. The authority conferred by this permit may, at the discretion of the Regional Administrator or his delegate, be transferred to a waste transporter other than that (those) named herein, provided that a request for such a transfer be made, in writing, by the applicant at least 10 days prior to the requested transfer date.

9. If material which is regulated by this permit is discharged due to an emergency to safeguard life at sea in locations or in a manner not in accordance with the terms of this permit, one of the permittees shall make a full report, in accordance with the provisions of 18 U.S.C. 1001, within 10 days to the Regional Administrator detailing the conditions of this emergency and the actions taken.

10. Unless otherwise provided for herein, all terms used in this permit shall have the meanings assigned to them by the Act or the Final Regulations issued thereunder.

11. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of rights, nor any infringement of Federal, State or local laws or regulations, nor does it obviate the necessity of obtaining State or local assent required by applicable law for the activity authorized.

12. This permit does not authorize or approve the construction of any onshore physical structures or facilities or, except as authorized by this permit, the undertaking of any work in any navigable water.

13. Each permittee shall at all times maintain in good working order and operate as efficiently as possible all facilities, including vessels, used by such permittee in achieving compliance with the terms and conditions of this permit.

14. This permit, or a true copy thereof, shall be placed in a conspicuous place on the vessel which will be used for the transportation and dumping authorized by this permit. If the dumping vessel is an unmanned barge, the permit or true copy of the permit shall be transferred to the towing vessel or an additional true copy shall be available on board the towing vessel.

15. Every scow or boat engaged in the transportation of wastes for ocean disposal shall have its name and number painted in letters and numbers at least fourteen inches high on both sides of the scow or boat. The name and number shall be kept distinctly legible at all times, and no scow or boat not so marked shall be used to transport or dump any such material.

16. The permittee(s) shall allow the EPA Regional Administrator, the Commander, Third U.S. Coast Guard District, and/or their authorized representatives:

(a) To enter into, upon, or through the permittee's premises, vessels, or other premises or vessels under the control of the permittee, where, or in which, a source of material to be dumped is located or in which any records are required to be kept under the terms and conditions of this permit or the Act;

(b) To have access to and copy any records required to be kept under the terms and conditions of this permit or the Act;

(c) To inspect any monitoring equipment or monitoring method required in this permit;

(d) To sample or require that a sample be drawn under EPA/CG supervision of any materials discharged or to be discharged; and

(e) To inspect any dumping and navigation equipment installed on board any towing vessel, barge, or self-propelled vessel utilized in ocean dumping activities authorized under this permit.

17. The waste transporter shall cause to be installed, maintained, and operated on board any towing vessel or self-propelled vessel departing port for ocean dumping activities under this permit, a commercially available LORAN-C automatic tracking and recording device, acceptable to the U.S. Coast Guard for this purpose. Such equipment may be portable. Such equipment shall be employed no later than six months after notification of the requirement, but not before the transporter has been afforded the opportunity for a public hearing by the Commander Third Coast Guard District concerning any such requirement. Such equipment shall be operated in accordance with procedures provided by the Coast Guard. No such towing or self-propelled vessel shall depart on a dumping mission six months after such notification with such equipment not installed or not operational without first obtaining written authorization from the Coast Guard.

Special Conditions:

1. Permit Term - This permit shall expire at midnight on January 9, 1979. This permit is nonrenewable. Application for a new permit must be submitted to EPA at least 180 days prior to expiration of this permit.

2. Description of Material - During the term of this permit, the type and quantity of material permitted for transportation for the purpose of ocean dumping shall be in accordance with the following:

3,965,000 wet tons annually of digested sewage sludge

generated by the facilities listed in Table I.

Waste volumes ocean dumped must comply not only with the total volume limit noted above, but also to the individual volume limit set for each waste treatment plant listed in Table I.

The waste generator shall submit quarterly reports (on a calendar basis) of volumes removed from its facilities by the waste transporter under this permit, and the waste transporter shall submit similar reports of volumes transported by it to the dump site specified in Special Condition No. 3. Such volumes shall be expressed in the following units - gallons, cubic yards, wet tons, and dry tons. Such reports shall be submitted within 20 days of the end of the reporting period

3. Disposal Site - Transportation for the purpose of ocean dumping shall terminate at, and waste disposal shall be confined to, the area described below:

Latitude:	$40^{\circ}22'30''N$ to $40^{\circ}25'0''N$
Longitude:	$73^{\circ}41'30''W$ to $73^{\circ}45'0''W$

TABLE I

Sewage Treatment Plant/Port of Departure	Wet Tons/Year
Bowery Bay	483,840
Coney Island	126,720
Hunts Point	422,400
Jamaica	422,400
Newtown Creek	768,000
Oakwood Beach	0
Owls Head	287,700
Port Richmond	230,150
Rockaway	57,600
Tallman Island	253,440
Wards Island	698,880
26th Ward	211,200

4. Method of Disposal - a. The waste transporter shall use only the following vessel(s)/barge(s) for transportation and dumping of wastes authorized under this permit:

Newtown Creek, Bowery Bay, North River, Owls Head

b. The waste transporter shall comply with the following restrictive conditions:

(1) The master of the ocean dumping vessel shall prepare at the time of occurrence a navigational overlay of the dumping vessel's trackline during the dumping operation, indicating the times and positions at critical points (e.g. entry and exit from the dump site; beginning and end of dump). The overlay shall be signed and dated by the master and forwarded within 72 hours after completion of the trip to:

Captain of the Port
U.S. Coast Guard
c/o New York Station
Governors Island
New York, N.Y. 10004

(2) The master shall also submit to Captain of the Port, New York, in the manner outlined above, a statement signed and dated, indicating whether or not the conditions of the permit were met.

(3) The waste transporter shall provide telephone confirmation to Captain of the Port, New York of the following information within 15 minutes of the time of departure of a dumping vessel for the dump site:

(a) COTP Reference Number
(b) Name of dumping vessel
(c) Actual time of departure

(4) The master shall notify Coast Guard Group Sandy Hook via VHF-FM within ten (10) minutes of occurrence of the actual time that a dumping operation begins. The master will contact Group Sandy Hook on Channel 16 and then shift and transmit on Channel 12 (or other agreeable frequency) the following information:

(a) COTP Reference Number
(b) Name of dumping vessel
(c) Actual time dumping operation started

(5) The waste transporter shall install and utilize during the course of each nighttime dumping operation a spotlight, which shall be of sufficient intensity to illuminate the discharge immediately astern of the dumping vessel. The spotlight shall be sufficiently elevated so as to give ample coverage to the wake of the vessel, while at the same time maintaining the direction of the light beam vertically into the water column. The spotlight shall be fixed firmly into position and shall be installed on the vessel so as not to interfere with or to be confused with any other required navigational lights.

These restrictive conditions apply only when Coast Guard shiprider surveillance is not conducted.

c. Waste materials are to be discharged at a uniform rate while moving at a speed of not more than 5 knots over a distance of at leaast five (5) nautical miles within the dump site designated in Special Condition No. 3. If two or more vessels/barges are discharging simultaneously, a safe separation distance must be maintained.

5. Analysis of Authorized Wastes - (a) Analyses shall be conducted quarterly for each treatment facility listed on Table I by the waste generator on a representative sample of a vessel/barge load for the following parameters:

Bioassay (mg/l, TL 50, 96 hrs.) using the organisms Skeletonema costatum, Menidia menidia, and/or any substitute organism designed to be more appropriate by EPA, Region II.

Mercury (mg/kg), liquid and solid phase

Cadmium (mg/kg), liquid and solid phase

Specific gravity at 20°C

Oil and grease (mg/l), using liquid-liquid extraction with trichlorotrifluoroethane

Petroleum hydrocarbon (oil in mg/l), using tentative IR procedure

Fecal coliform (MPN/100 ml)

Total coliform (MPN/100 ml)

Arsenic (mg/l)	Vanadium (mg/l)
Chromium (mg/l)	Zinc (mg/l)
Copper (mg/l)	COD (mg/l)
Lead (mg/l)	Total solids (mg/l)
Nickel (mg/l)	Suspended solids (mg/l)

b. Analytical data shall be submitted to EPA no later than 30 days after sampling.

c. All analyses will be conducted according to one of the following:

(1) Specific analytical procedures distributed by EPA, Region II;

(2) Approved test procedures contained in "Guidelines Establishing Test Procedures for Analysis of Pollutants", 40 C.F.R. 136; or

(3) Test procedures selected by the waste generator and approved by EPA, Region II

d. Within 20 days of effective date, the name and address of the designated laboratory and a description of all analytical test procedures being used shall be provided to the EPA. Any variation or change in the designated laboratory or procedures shall be reported to EPA, in writing, immediately.

e. Any laboratory employed for purposes of performing the analyses specified in Special Condition No. 5(a) shall maintain a viable analytical quality control program. This program will include:

(1) Use of EPA-approved analytical test procedures as listed in Special Condition No. 5(c).

(2) Use of sample preservation techniques and the holding time specified in analytical method employed or in EPA manual entitled "Methods for Chemical Analysis of Water and Wastes".

(3) Routine use and documentation of intra-laboratory quality control practices as recommended in the EPA manual "Handbook for Analytical Quality Control in Water and Wastewater Laboratories". These practices will include use and documentation of internal quality control samples.

f. The laboratory facilities, data, records, and quality control records are subject to periodic inspection by EPA Personnel.

g. EPA may require analysis of quality control samples by any laboratory employed for purposes of compliance with Special Condition No. 5(a). Upon request, the waste generator shall provide EPA with the analytical results from such samples.

6. Monitoring - The waste generator is required to continue to implement its EPA approved monitoring program as a means of determining the short-term environmental impacts of ocean dumping of its waste.

7. Implementation Plan, Schedule, or Alternative - a. In accordance with 40 CFR 227.16, the waste generator shall be responsible for the selection and implementation of one or more land-based sludge-management alternatives, determined by EPA and the responsible State to be environmentally acceptable, technically feasible, and economically reasonable. The alternative(s) selected shall be implemented in accord with 40 CFR 220.3(d) on or before December 31, 1981.

The waste generator may utilize any source of funding available to it for implementation of the alternative(s) selected. Whether the waste generator is awarded an EPA Construction Grant, or whether it chooses, or has, to spend its own money, it is obligated to comply with the schedule set forth below:

(1) Apply for a "Step 1" Construction Grant for a facility plan, including an environmental assessment and a detailed "heavy metal source determination study" report, detailing the origins of the heavy metals found in its ocean-dumped sludge, and describing the steps to be taken to reduce or eliminate controllable heavy metal sources, for implementation of the alternatives(s) selected:	October 1, 1976
Submit an approvable contract for review by City officials, NYSDEC, and EPA;	November 23, 1977
Receive necessary contracts approval from City officials, NYSDEC, and EPA;	December 7, 1977
Request BOE resolution;	December 7, 1977
Receive necessary BOE approval;	December 15, 1977
Request consultant to proceed with contract;	December 15, 1977
Submit contract to EFCB for review;	December 17, 1977
Execute contract and submit to EFCB;	December 22, 1977

b. The waste generator shall submit monthly progress reports on compliance with the implementation plan and on progress to reduce to a minimum controllable heavy metal sources beginning February 1, 1978. The waste generator shall inform EPA within 10 days of noncompliance with any phase of the aforementioned implementation schedule, and shall notify EPA immediately of its failure to obtain necessary approvals from appropriate regulatory agencies.

8. Digester Cleanout - a. The waste generator may contract authorized waste transporters, who in turn may dispose of "digester cleanout" wastes generated by facilities listed in Special Condition No. 2 at the 106-mile chemical wastes dump site (Latitude 38°40'N to 39°0'N, Londitude 72°0'W to 72°30'W). The following vessel(s)/barge(s) are authorized under this permit for transportation and dumping of "digester cleanout" wastes:

Ocean Disposall No. 1; Lisa;

Raritan; Forest; Susan Frank; Rebecca K

With respect to the disposal of "digester cleanout" wastes, the method of disposal shall be in accord with Special Condition No. 4(c).

b. A representative sample of the "digester cleanout" material shall be collected and analyzed by the waste transporter on each vessel/barge load for the following parameters:

Mercury, liquid and solid phase (mg/kg)
Cadmium, liquid and solid phase (mg/kg)
Petroleum hydrocarbon (mg/kg), using IR procedure
Total solids (mg/kg)
Total volatile solids (mg/kg)
Specific gravity at 20°C

Analyses shall be conducted in accordance with Special Condition No. 5(c) and submitted to EPA no later than 30 days following the discharge.

	Register contract;	December 29, 1977
	Issue order for consultant to proceed along two-track approach (i.e., short-term and long-term solution);	January 1, 1978
	Commence short-term facility plan, environmental assessment, and heavy metal report;	January 1, 1978
	Advertise public hearing date;	May 21, 1978
	Complete draft EAS and preliminary facility plan;	June 15, 1978
	Submit draft EAS and preliminary facility plan to NYSDEC and EPA;	June 15, 1978
	Conduct public hearing;	June 21, 1978
	Complete EAS facility plan, and heavy metals report;	July 15, 1978
	Submit approvable facility plan, EAS, and heavy metal report to NYSDEC and EPA.	August 1, 1978
(2)	Decide number of consultants needed to accomplish "Step 2";	June 15, 1978
	Conduct pre-proposal meeting with consultants;	June 18, 1978
	Receive proposals for "Step 2";	July 10, 1978
	Rank and nominate consultants to selection board;	July 21, 1978
	Apply for a "Step 2" Construction Grant or independently fund the preparation of plans and specifications for the alternative(s) selected;	August 1, 1978
	Select consultants;	August 1, 1978

	Submit approvable contract to City officials, NYSDEC, and EPA for approval;	August 21, 1978
	Receive necessary contract approval from City officials, NYSDEC, and EPA;	September 7, 1978
	Request BOE resolution;	September 7, 1978
	Receive BOE approval;	September 14, 1978
	Submit contract to EFCB for review;	September 17, 1978
	Execute contract;	September 21, 1978
	Register contract;	September 28, 1978
	Issue order for consultant to proceed;	October 1, 1978
	Initiate the preparation of plans and specifications;	October 1, 1978
	Complete approvable plans and specifications;	June 1, 1979
	Submit approvable plans and specifications to NYSDEC and EPA;	June 1, 1979
	Receive NYSDEC and EPA approval.	July 10, 1979
(3)	Apply for "Step 3" Construction Grant or independently fund the construction of facilities for the alternative(s) selected;	July 15, 1979
	Commence construction of such facilities;	February 15, 1980
	Complete construction of such facilities and cease the ocean dumping of its wastes.	December 31, 1981
(4)	Commence preparation of facility plans and environmental assessment for long-term sludge disposal.	November 1, 1978

9. Notice to Regulatory Agencies - (a) The waste transporter shall provide telephone notification of sailing to Captain of the Port (COTP), New York at 212-264-8753 during working hours (8:00 a.m. to 4:30 p.m. Monday through Friday) and at 212-264-8770 during the nonworking hours, weekends, and holidays not later than two (2) hours prior to the estimated time of departure for the dump site designated in Special Condition No. 3 or not later than twenty-four (24) hours prior to the estimated time of departure for the dump site designated in Special Condition No. 8. The waste transporter shall immediately notify the COTP upon any changes in the estimated time of departure greater than one (1) hour.

Surveillance of use of the dump site designated in Special Condition No. 8, will generally be accomplished by a Coast Guard shiprider who will be on board the towing conveyance for the entire voyage. Within two (2) hours after receipt of the initial notification the waste transporter will be advised as to whether or not a Coast Guard shiprider will be assigned to the voyage. His quarters and subsistence while on board shall be provided by and shall be at the expense of the waste transporter. He shall be treated courteously and afforded free and immediate access to all navigational capabilities on the vessel which can provide information on position, course speed, depth of water, bearings, etc.

(b) The following information shall be provided in the notification of sailing:

(1) Permit number

(2) Name of the towing vessel and barge or tank vessel

(3) Name of the transporter

(4) Description of the vessel's contents including volume

(5) Place of departure

(6) Location of the dump site

(7) The time of departure

(8) Estimated time of arrival at the dump site

(9) Estimated time of departure from the dump site

(10) Estimated time of return to port

c. The waste transporter shall maintain and submit to EPA on a monthly basis the following information with regard to Special Condition Nos. 9(a) and (b):

(1) Permit number

(2) Name of Person contacted

(3) Time of contact

(4) Confirmation code

(5) Other pertinent information

d. The waste transporter shall maintain and submit Coast Guard Form CCGD 3-278, Monthly Transportation and Dumping Log, to COTP, USCG, c/o New York Station, Governors Island, New York, N.Y. 10004. Waste transporter shall enter on this form under the column entitled "Dump Site" the latitude and longitude at which the actual dumping occurred. These forms are to be mailed to both the Coast Guard and EPA during the first week of the succeeding month for which they were prepared. If additional forms are required, they may be obtained by forwarding a written request to Commander (mep), Third Coast Guard District, Governors Island, New York, N.Y. 10004.

10. Reports and Correspondence - All reports and related correspondence required by Special Condition Nos. 2, 4, 5, 6, 7, 8, and 9 shall be submitted to the following address:

U.S. Environmental Protection Agency, Region II
Surveillance and Analysis Division
Edison, New Jersey 08817
Attn: Marine Protection Program

All other material, including applications, shall be submitted to the following address:

U.S. Environmental Protection Agency, Region II
Enforcement Division
26 Federal Plaza
New York, New York 10007
Attn: Status of Compliance Branch

11. Liability - a. The waste generator and waste transporter shall be jointly and severally liable for compliance with Special Condition Nos. 2 and 10, as well as all applicable General Conditions.

b. Any person owning or operating a towing vessel employed for purposes of the activities authorized by this permit shall be, for purposes of each discharge, a joint permittee herein who shall be jointly and severally liable together with the waste transporter for compliance with Special Condition Nos. 3, 4(b), 4(c) and 8, as well as all applicable General Conditions.

c. The waste transporter shall be solely liable for compliance with Special Condition Nos. 4(a) and 9.

d. The waste generator shall be solely liable for compliance with Special Condition Nos. 1, 5, 6, and 7.

By authority of Eckardt C. Beck, Regional Administrator,
United States Environmental Protection Agency:

Signed this 10th day of January 1978

Meyer Scolnick
Director
Enforcement Division

APPENDIX B

USEPA

OCEAN DUMPING REGULATIONS

JANUARY 11, 1977

AND

NOVEMBER 28, 1977

federal register

TUESDAY, JANUARY 11, 1977

PART VI



ENVIRONMENTAL PROTECTION AGENCY

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OCEAN DUMPING

Final Revision of Regulations and Criteria

Title 40—Protection of Environment

(FRL 667-7)

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER H—OCEAN DUMPING

FINAL REVISION OF REGULATIONS AND CRITERIA

The Environmental Protection Agency today publishes final regulations and criteria with respect to the transportation of wastes for the purpose of ocean dumping. Under Title I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 32 U.S.C. 1401 et seq., (hereafter "the Act") the Agency on October 15, 1973, (38 FR 28610 et seq.) published regulations setting forth the procedures to be followed, and the criteria to be applied, in reviewing applications to dispose of materials in ocean waters. These rules now appear at 40 CFR Parts 220–227. In addition, the October 15 notice set forth substantive criteria to be applied in evaluating permits to discharge materials through ocean outfalls, pursuant to sections 402 and 403(c) of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1342, 1343. The regulations published today delete all reference to section 403(c) ocean outfall criteria and make Parts 220–227 (with the addition of Parts 228 and 229) solely addressed to ocean dumping and implementation of the Act. In the near future the Agency will propose significant revisions to the criteria for ocean outfalls.

The final regulations and criteria published today affect both the procedures to be followed in reviewing applications for ocean dumping and the substantive criteria to be applied in evaluating those applications.

The revisions announced today do not include changes to 40 CFR Parts 223 and 226. Significant changes will be made to those Parts in the near future. Parts 223 and 226 will be greatly expanded to present more detailed procedures for enforcement proceedings and for proceedings brought to revoke or suspend a permit pursuant to section 105(f), 33 U.S.C. 1415(f). However, these Parts as presently in force are reprinted here as they originally appeared to provide a complete set of the regulations presently in force.

The Agency believes that changes in the present regulations announced today are appropriate for several reasons:

Operating experience of EPA pointed to several ways in which the regulations required modification. There is a need to specify in more detail the considerations which go into a determination of whether a permit will be issued. The present regulations do not adequately address the regulation of ocean dumping sites. Also, some people consider the present regulations inadequate with respect to the disposal of dredged material.

A petition for additional rulemaking by the National Wildlife Federal was received in April of 1974 and pointed out several areas in which the present regulations require changes if they are to completely satisfy the Act, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (hereafter, "Convention") open for signature December 29, 1972, at London, and the Amendments to the Act in light of the Convention which were brought about by Pub. L. 93–254 (March 22, 1974). The Convention became effective, according to Article XIX (1), on August 30, 1975, when the fifteenth party acceded to its terms. The first Consultative Meeting of the Contracting Parties was held in London in September, 1976, and these final regulations reflect agreements on procedures reached at that meeting.

In addition to the petition from the National Wildlife Federal, an individual has requested that the emergency permit provisions contained in the regulations be modified to require more adequate public notice and opportunity for hearing prior to the issuance of those permits. EPA has thoroughly revised and expanded the ocean dumping regulations and criteria to allow for greater public participation in the program.

The Agency has held several major hearings on applications to dispose of materials; the experiences of these hearings and the Regional Administrators' experiences in reviewing applications have prompted several suggestions as to ways in which the present regulations and criteria can be improved to more adequately address the implementation of the Act and Convention, and to address the problems encountered by the Regional Administrators.

The criteria have been modified to reflect recent advances in scientific knowledge, but there is no change in EPA's intent to eliminate ocean dumping of unacceptable materials as rapidly as possible.

It is not possible to note in this preamble all the places in the regulations in which changes have been made; many modifications are minor and will not affect the day-to-day operation of the program. However, the major substantive changes have been noted below. It must be emphasized that these final regulations will replace or amend seven existing Parts of Title 40 CFR, and will add Part 228. While the regulations appear to be long and complicated, the Agency has attempted to follow a logical pattern which will make their use more convenient than one might assume at first inspection. It also must be noted that these regulations will constitute the entire set of tools one needs to implement the Act and the Convention.

These regulations and criteria were published in proposed form in the FEDERAL REGISTER on June 28, 1976, (41 FR 26644 et seq.) and a Draft Environmental Impact Statement on the criteria (Parts 227–228) was issued on July 14, 1976. The public comment period closed September 24, 1976; 75 sets of comments were received comprising some 375 pages. Some substantive technical issues were raised, and EPA held a technical workshop on October 19–20, 1976, concerning the trace contaminant and dredged material criteria. The comments received, the EPA responses to the individual comments, and the report and transcript of the technical workshop are all included in the Final Environmental Impact Statement which is available from the address given at the end of this preamble.

SUMMARY OF CHANGES MADE AS A RESULT OF COMMENTS RECEIVED

PART 220

Section 220.1—Purpose and scope. One commenter suggested that Section 220.1 (a) (3) (ii) be changed to apply these regulations to a 200-mile contiguous zone. This is not possible since the Act limits jurisdiction over foreign flag vessels to the territorial sea and the 12-mile contiguous zone of the United States. See section 2(c) of the Act, as amended by Pub. L. 93–254 (33 U.S.C. 1401).

It has been suggested that Section 220.1(c)(4) be changed to refer to "human life at sea" rather than "life at sea." The language of this section follows that of the Act. It is implicit that this section refers to human life.

Section 220.2—Definitions. The definition of sewage treatment works in paragraph (b) has been amended to make it consistent with the definition found in the FWPCA.

Section 220.3—Categories of permits.

(c)—Emergency permits. Consultation procedures for emergency permits have been adopted by the Contracting Parties to the International Convention. The procedures in these regulations are consistent with those adopted on an international basis.

(d)—Interim permits. The Agency received a substantial number of comments with respect to the interim permit provisions.

Section 220.3(d) in its revised form provides that interim permits will be issued after April 23, 1978, only to interim permit holders who have exercised best efforts to meet the requirements of a Special permit by that date and have implementation schedules adequate to allow phasing out of ocean dumping or compliance with the requirements of a special permit, by December 31, 1981.

Commenters have questioned the legality of interim permits under the Act, and have further questioned the issuance of interim permits after the 1978 deadline. Others have argued that the 1978 cutoff date is too strict. Some have suggested that this deadline be deleted altogether, with applications for interim permits to be considered on a case-by-case basis.

Interim permits are not illegal under the Act, since they do not authorize dumping which would "unreasonably" degrade or endanger the marine environment. The Act lists need for ocean dumping as one factor to be considered in issuing permits. The "need factor" has outweighed other considerations due to the lack of alternative methods of disposal and technology necessary to meet environmental criteria. The need factor is largely a matter of time, and interim permits have been issued in order to give existing dumpers sufficient time to develop alternatives or to comply with environmental criteria. It should be noted that in no event does this section authorize dumping of materials that are absolutely barred by the Act or the Convention, or authorize dumping above trace contaminant levels of materials proscribed above trace contaminant levels.

The April 23, 1978, deadline corresponds to the fifth anniversary of the effective date of the Act. This date is significant in that Title II of the Act provides for a research program aimed at "minimizing or ending all dumping of materials within five years of the effective date of this Act." Congress has expressed impatience with the continued issuance of interim permits (see H.R. Rep. No. 94–1047, 94th Cong., 2d Sess. (1976)), and the EPA agrees that five years is sufficient time for dumpers to develop technology to end reliance on ocean dumping which violates environmental criteria.

Existing dumpers who are unable to meet the 1978 deadline may receive interim permits after that date if they have implementation schedules adequate to allow phasing out of ocean dumping or compliance with all requirements of a special permit by December 31, 1981. Experience to date has shown that, while five years is sufficient time to develop alternatives and technology, three more years are needed to implement them. The 1981 deadline is based on the implementation schedules contained in current interim permits, all of which provide for compliance or phasing out by the end of 1981. The proposed regulations required implementation schedules for industrial dumpers to provide for compliance or phasing out by April 23, 1981. Revised § 220.3(d) changes this date to December 31, 1981, since it now applies also to municipal dumpers, who are unable to meet the April 23 date.

It has been suggested that the 1981 compliance date be changed to 1979 for industrial dumpers. This change has not been made since some industrial dumpers are expected to meet the 1981 deadline but would not be able to meet a 1979 deadline. It should be stressed that § 220.3(d) requires implementation plans to provide for phasing out or compliance by December 31, 1981, at the latest. Interim permit holders who are able to meet earlier deadlines will be required to do so. Interim permits with earlier deadline dates are not to be deemed to be affected by the regulations promulgated today.

The deadlines contained in this section are based on current projections of technological feasibility, and it is reasonable to expect dumpers to meet them. The primary purpose of the Act is to protect the marine environment, and dumping in violation of environmental criteria cannot be allowed to continue indefinitely. The EPA therefore will not retain discretion to issue interim permits to applicants who do not meet the requirements of this section.

The proposed regulations authorized issuance of interim permits for sewage treatment works on a showing that the dumper had exercised best efforts to comply with the requirements of a special permit. They did not require the dumper to have an implementation schedule adequate to permit compliance or phasing out by a specific date. No deadline was imposed on municipal dumpers because of their often complicated dependence on public agency funding sources. In response to several objections, the distinction between municipal and industrial dumpers has been removed, and all holders of interim permits will now be required to meet a deadline of no later than 1981. Technology exists to permit municipalities to meet this deadline; and all interim permits currently held by municipalities provide for compliance or phasing out by the end of 1981.

Thus, the regulations promulgated today do not substantially affect the planning which must be conducted by municipalities in light of the terms of existing interim permits held by those communities. It is noted that in a letter to the Administrator dated October 26, 1976, from Congressmen Robert L. Leggett, John B. Breaux, Edwin B. Forsythe and Charles A. Mosher, all of the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the Committee on Merchant Marine and Fisheries, it was strongly recommended that municipalities and industries be treated the same, with respect to interim permits. The Agency has changed the final regulations consistent with this recommendation.

New interim permits may be issued after 1978 to existing dumpers who exercise best efforts to comply with the requirements of past permits. As an example, municipal dumpers will not be denied new permits for inability, despite best efforts, to raise necessary revenues to comply with implementation schedules. While the precarious financial position of some municipalities may justify noncompliance with implementation schedules, it is expected that few, if any, exceptions will be granted by the Agency. The showing which must be made is significant, such as demonstrating that an outside construction or waste disposal firm with which the municipality has entered into contracts has become insolvent. In the past the communities employing ocean dumping as the means to dispose of sludge have on occasion submitted bare conclusions that no other alternatives are available. Not only will half-hearted attempts at compliance with the regulations and weak efforts to find alternatives not be considered to be good faith efforts under the revised criteria, but the Agency will undertake independent enforcement actions to stop such practices. It is not expected that financial reasons will be sufficient justification for noncompliance by industrial dumpers.

Section 220.3(d) authorizes issuance of interim permits after 1978 to dumpers who have implementation schedules adequate to allow phasing out of ocean dumping or compliance with the requirements of a special permit by 1981. Congressmen Leggett, Breaux, Forsythe and Mosher, in their letter of October 26, 1976, to the Administrator, have recommended that EPA make it explicit "that the choice between phasing out and complying with the criteria for a special permit is to be made by EPA—not by the applicant." Section 227.23 does make clear that this choice is up to the Regional Administrator.

Other commenters have challenged the authority of EPA to require phasing out of ocean dumping, maintaining that special permits must be issued to all applicants who meet the requirements therefor.

Subpart C of Part 227 provides that special permits may be denied to applicants who have no need to ocean dump, a factor which the Act directs the EPA to consider in issuing permits. The environmental criteria of Part 227 indicate only that the materials to be dumped by a particular dumper are not environmentally unacceptable. Since the cumulative effects of many dumpers may be environmentally unacceptable, the EPA must limit the total amount of ocean dumping and will therefore grant permits only to applicants who demonstrate lack of acceptable alternatives to ocean dumping. The purpose of implementation plans is to assure that dumping in violation of the requirements of Part 227 does not continue indefinitely. The Regional Administrators must have discretion to determine whether this purpose will be achieved by compliance with special permit requirements or by obviating the need for dumping.

Section 220.3(d) also provides that new interim permits will be issued only to applicants who demonstrate that they have exercised best efforts to comply with all requirements of previous permits.

One commenter has objected to this provision as requiring denial of permit applications for minor violations of previous permits. The same commenter has suggested that permit violations be dealt with according to the terms of the permit, rather than by denying future permits. There is no reason not to require permit holders to follow all terms of their permits in good faith, and it will be within the discretion of the Regional Administrator to determine whether best efforts have been exercised.

The primary purpose of this provision is to ensure compliance with implementation schedules. Most interim permits provide for compliance with schedules to be determined as of the expiration date of the permit. If there are no penalties for noncompliance during the term of a permit, the only way to enforce compliance is to deny subsequent permits.

There is no reason to give interim permits to dumpers who have demonstrated an unwillingness to exercise best efforts to comply with the terms of a permit.

Several minor changes have been made in § 220.3(d) in response to comments. The proposed regulations provided for the issuance of interim permits "under certain conditions in accordance with Subpart A of Part 227". One commenter requested examples of the "certain conditions" under which interim permits would issue. Since the phrase "certain conditions" referred only to the conditions specified in Subpart A and was therefore redundant, it has been deleted.

The phrase "has a treatment facility under construction" has been changed to "has an implementation schedule" since there are methods to phase out dumping or comply with environmental criteria which do not require construction of treatment facilities.

Proposed § 220.3(d) would deny interim permits to the "expansion or modification of an existing facility". Since it has been pointed out that many implementation plans require modification or expansion, this provision has been changed to deny interim permits "for the dumping of an increased amount of waste from an existing facility".

The criticism of EPA's repeated use of interim permits has come from many informed persons, and the objections have been given careful consideration. As expressed by Congressmen Leggett, Breaux, Forsythe and Mosher in the letter of October 26, 1976, to the Administrator, "EPA continues to allow a substantial volume of dangerous, toxic materials to be dumped under 'interim permit' arrangements. * * * We feel that such 'interim permits' should be summarily phased out without continued exceptions. The revised regulations * * * do not effect the intent of Congress as expressed in the Marine Protection, Research, and Sanctuaries Act of 1972."

The answer to the question of repeated use of interim permits is founded on the lack of firm scientific conclusions with respect to individual and combined dumping of wastes in the oceans. The answer to this question is inextricably linked to the issues of defining trace contaminants and to the setting of special permit conditions. If materials are in trace quantities or less, or if they comply with special permit conditions, then one need not rely on interim permits for continued dumping. Thus, by lenient definitions of trace contaminants or special permit criteria, the Agency could avoid the interim permit dilemma. Obviously, the Agency will not arbitrarily define trace contaminants or special permits to so avoid the issues.

What the Agency has attempted to do is to estimate as best it can those levels of pollutants which may be expected to cause environmental harm, to apply a safety factor, and to refuse to sanction dumping of wastes containing pollutants in these amounts unless there is no other environmentally acceptable alternative. EPA has also tried to prepare its regulations in view of criteria established under the Federal Water Pollution Control Act, State laws, and other Federal pollution control laws. Obviously it makes little sense to allow discharges of mercury through a pipe into Chesapeake Bay at levels higher than discharges from a barge into the deep ocean waters, for example. The Agency also must consider its credibility as the regulating agency. If it demands that a small community or an industry cease dumping within a period of time, it should be confident that there are feasible alternatives which may be implemented within that time period. Increasingly, this is true; and this is the reason all interim permit holders have been given firm phase-out dates. It would be improper to adopt a cessation date which has little factual foundation. Increasingly, EPA has become aware that the alternatives to ocean dumping require careful evaluation; they may not always be better.

The interim permit remains EPA's most effective tool because it requires the permittee to periodically report to EPA as to the steps being taken to cease dumping or bring the dumping within the special permit limits, allows EPA to retain conservative limits on special permits, and gives EPA the flexibility to refuse reissuance when the Agency concludes that good faith efforts to find alternatives are not being made. EPA refused to reissue an interim permit to the City of Camden.

Conceivably, EPA could abolish the category of interim permits or make interim permits of a five-year duration. This would avoid some of the stigma attached to the Agency's repeated issuance to the same applicant of interim permits. As with an artificial modification of the special permit criteria, these options are unacceptable to EPA.

It must be emphasized that the numerical limits on special permits (which define when interim permits only can be obtained) are not founded on the most precise analytical process. They may be within orders of magnitude of a "correct" limit, but there is no confident means to determine this. EPA has over the past four years conducted several open workshops with respect to the "safe" or "unacceptable" levels of pollutants which may be dumped into the oceans. The latest was in October of this year. The only agreement reached at those sessions is that responsible scientists are not confident as to a "safe" number and that measuring environmental effects in the ocean is most difficult. With respect to any suggested alternative permit criteria, significant objections can be raised. In the discussion of § 227.6 below, more details are presented with respect to this problem.

The question, then, is not whether EPA has established environmentally unacceptable levels and continues to issue permits which violate those levels, but is whether EPA (1) has established levels which responsibly estimate concentrations of wastes not acutely toxic or otherwise clearly harmful; (2) has created a permit system which forces dumpers to find satisfactory alternatives as soon as possible; and (3) has established environmental criteria which are not inconsistent with criteria established under other laws with respect to discharges into inland waters. EPA believes it has adequately met these regulatory challenges.

(f) Permits for incineration at sea. One commenter has suggested that § 220.3(f) be revised to allow only research or interim permits to be issued for incineration at sea until criteria on this type of disposal are promulgated. This change has not been made. While there is currently insufficient information on which to base general criteria for ocean incineration, it is possible to conduct sufficient research on specific incineration projects to satisfy EPA that special permits should be issued in specific instances.

PART 221

Section 221.1—Applications for permits. This section has been revised slightly to require that applications must be in writing, but not necessarily by letter; that a full evaluation of all alternatives is not necessary; and that the environmental impact of alternatives must be considered.

Section 221.4—Adequacy of information in application. This section has been revised to allow an "adequate" description of the material to be dumped, rather than requiring a "full" description. It was pointed out that, in a practical sense, it would be impossible to ever achieve a "full" description of any material.

PART 222

In response to public comments, the Agency has made several changes in the regulations which govern procedures to be followed in reviewing applications for ocean dumping permits.

Section 222.3—Notice of applications. The Coastal Zone Management Program of the Commonwealth of Massachusetts recommended that the notice requirements of § 222.3(b) be modified to provide that the State agencies with responsibility to implement the Coastal Zone Management Act also receive notice of applications for ocean dumping permits. The requested modification has been made. Also, in paragraph (g) of that section, a sentence has been added to clarify that copies of these notices will also be sent to officials of the Departments of Commerce and Interior who are responsible for programs which may be affected by ocean dumping.

The notice provisions of § 222.3 prompted several requests for major expansion of the procedures to be followed in providing notices to the public of ocean dumping applications. Some commenters suggested that notices be placed in several newspapers in the area from which the transportation for the purpose of dumping is to commence; other commenters asked that specific provisions be included in the FEDERAL REGISTER for service of notices on particular states and private parties. Some parties stated that the notice provision does not provide adequate time to comment on the application. Other parties are protesting that the notice provision allowed for unnecessary delay in the processing of applications.

The Agency believes that adequate notice is provided to the public by regulations promulgated today. In practice, the Regional Administrators provide substantially more notice to parties known to be interested in ocean dumping matters and to Federal and State authorities within those Regions than is provided in these regulations. The intent of the regulations promulgated today is not to dictate the procedure which may be followed in each instance but rather to state the minimum procedures which must be followed. Several of the commenters who wish to be provided with more elaborate notice of proposed applications may receive substantially more details on proposed dumping than is provided for in this Part by simply requesting the Regional Administrator for the Region in which they are located to so provide with respect to each ocean dumping application. Likewise, parties who believe that they will continue to have an interest in ocean dumping matters may resuest that they be sent detailed information on each application. With respect to the request that the notice provisions allow for more or less time, the Agency believes that the present regulations provide an adequate compromise between the need to allow parties to prepare adequately for presentations at the public hearings and for the need to promptly process ocean dumping applications. The Agency is concerned that the entire permit review process may take an unreasonable period of time if lengthy periods are allowed at the various stages to provide opportunity for parties to prepare new objections or recommendations to the proposed Agency action. The present regulations attempt to allow time for responsible participation in the permit review process while at the same time expediting that process.

Section 222.4—Initiation of hearings. A change has been made to the proposed § 222.4(b). In accordance with the decision of Judge Gerhard A. Gesell in the case of "State of Maryland et al. v. Train et al." (D.Md. Civil Action No. 5–1731) May 10, 1976, 8 ERC 2050, 2054, the Agency discretion with respect to the convening of the initial public hearing is narrowly circumscribed. Therefore, the final regulations state that the initial hearing may be called whenever a person properly requests such a hearing or whenever the Administrator or Regional Administrator, as the case may be, determines that such request presents genuine issues. The prior language required that the request present "substantial issues of public interest". It is intended that the Administrator or Regional Administrator deny the request for a hearing only when it is clear that the request is not in good faith or raises issues which have been clearly addressed in prior hearings when there is no new evidence. Denials of hearing requests will be rare.

Section 222.8—Recommendations of Presiding Officer. This section has been amended to provide that the recommendations of the Presiding Officer shall include a description of evidence relied upon. Most recommended decisions have already included such a description of evidence, but this amendment clarifies the requirement. It is not intended that this regulation will require that the presiding officers cite to a transcript or exhibit for every fact for which they rely upon; rather, it is merely intended to ensure that there is a clear explication of the factual bases for the recommended decision.

Section 222.9—Issuance of permits. In § 222.9(b)(1) the last phrase has been deleted because a change has been made to § 222.10(b) to the effect that the Administrator or Regional Administrator may not on their own discretion convene an adjudicatory hearing. A new paragraph (c) has been added to this section to make clear that the term of a presently valid permit may be extended pending the conclusion of the proceedings held pursuant to §§ 222.7–222.9, at the discretion of the Administrator or Regional Administrator.

Section 222.10—Appeal to adjudicatory hearing. Paragraph (a) of this section has been amended to provide that the request for an adjudicatory hearing must be sent within 10 days following the receipt of the notice of issuance or the denial of a permit. The previous language required computation of the 10 days following the dispatch of the notice. In all time requirements under the Part 222 rules, if a document is sent by the required date, it is considered timely even if it is received after the time constraint. As noted above, paragraph (b) has been changed to delete the reference to the Administrator or Regional Administrator convening a public hearing sua sponte. The original assumption was that there may be rare circumstances in which it may be appropriate for the Agency to convene an adjudicatory hearing to resolve difficult factual issues; it was pointed out by many commenters if there are significant factual issues involved there no doubt will be a request for such a hearing. Paragraph (b) has also been amended to provide that the Administrator or Regional Administrator, as the case may be, may call an adjudicatory hearing when a proper request has been made and when he determines that such a hearing is warranted. The change deletes the language requiring that such a request present substantial issues of public interest. This modification makes clear that discretion is allowed the Administrator or the Regional Administrator to determine the appropriateness of the convening of an adjudicatory hearing. It is anticipated that requests for adjudicatory hearings which raise genuine issues and which are brought in good faith, not in an attempt to delay, will be acted upon favorably by the Regional Administrator or Administrator. Adjudicatory hearings should be commenced as soon as possible following granting of the request. The provision in these regulations for the convening of an adjudicatory hearing is an effort by EPA to provide a forum for resolution of major factual issues which may be involved in the more significant permit proceedings.

In paragraph (c) modification has been made to allow the Administrator or Regional Administrator, prior to the conclusion of the adjudicatory hearing and appeal process, to extend the duration of the previously issued permit until a final determination has been made. This change follows substantially the recommendation made by the City of Philadelphia.

Section 222.11—Conduct of adjudicatory hearings. The first sentence of this section has been modified to delete the word "any" and insert the words "a reasonable" to modify the time in which someone must request to be admitted as a party to an adjudicatory hearing. The reason for the change is that persons should not be allowed to wait until the last minute to enter an adjudicatory hearing and thus to possibly alter the issues which have been narrowed for consideration at that hearing. The last sentence of paragraph (a) is new. It clarifies that the EPA staff will automatically be considered a party to the adjudicatory hearing.

In paragraph (d), subparagraph (6) has been deleted. This had provided that the prehearing conference could include discussion of prehearing discovery. It was concluded that prehearing discovery in most instances would be inappropriate and would lengthen the hearing to be conducted pursuant to this section beyond the time contemplated when this section was originally drafted. Of course, the Presiding Officer may request that the parties undertake informal discovery to assist in the expedition of the actual hearing, but this discovery should not be overly formal or time-consuming.

There was a great deal of comment with respect to paragraph (e), setting forth the adjudicatory hearing procedures. Much of the comment went to the statement that the burden of proof shall be on the applicant in the case of adjudicatory hearings held pursuant to § 222.10. This subsection has been changed. It now provides that, in the case of adjudicatory hearings held pursuant to § 222.10(b)(1), the person filing the request under § 222.10(a) has the burden of going forward as to each issue raised by that request. This suggestion substantially follows the recommendation made by the City of Philadelphia. Furthermore, references to the burden of proof have been deleted since it was deemed inappropriate to attempt to allot the burden of proof in procedural regulations. The Legislative History of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, is clear that the overall burden of persuasion rests with the applicant for permit with respect to basic issues which must be satisfied for a permit to be issued.

Paragraph (e)(5) has been changed to provide that rulings of the Presiding Officer on the admissibility of evidence,

the propriety of cross-examination, and other procedural matters merely shall appear in the record. The prior statement that these rulings shall be final has been deleted since these issues can be clearly raised on appeal. And since interlocutory appeals are disallowed, there is no necessity for such a phrase.

In paragraph (f), which addresses the procedures to be followed after the close of the adjudicatory hearing, the page limitations on briefs and other documents have been revised to allow the filing of lengthier documents.

Section 222.12—Appeal to Administrator. Consistent with changes made to other sections of Part 222, in paragraph (a) the ten-day limitation begins to run after receipt of the determination of the Regional Administrator rather than after the determination itself. Also, in later subsections of this section, the page limitations have been expanded slightly to allow more opportunity to summarize and comment on the findings and conclusions of law.

Section 222.13—Computation of time. This section is new. It has been added to clarify the means by which calculation of time should be accomplished. The section is identical to 40 CFR § 125.44, which applies to National Pollutant Discharge Elimination System Permit proceedings.

PART 223

Revisions to this Part will be promulgated in the near future.

PART 224

Section 224.2—Reports. Specific language has been added to state the type of information that must be reported when an emergency dump at sea is made.

PART 225

Section 225.2—Review of Dredge Material Permits. The requirement that EPA respond to Corps of Engineers permit actions only after a notice of intent is received has been deleted, since a permit action may be terminated prior to that point in some cases, and EPA review would normally begin prior to issuance of a notice of intent.

PART 226

Revisions to this Part will be promulgated in the near future.

PART 227

Many of the comments severely criticized the lack of a definition for "trace contaminants", the basis upon which the trace contaminant levels were set, and the differences between the dredged material criteria and the criteria for other materials. A technical workshop was convened by EPA to discuss these issues. There was general agreement among the participants that the criteria should be based, wherever possible, on impacts of dumped materials on marine ecosystems, and that these impacts could be measured best by bioassays rather than by relying on determination of total amounts of specific constituents present in a waste. The full transcript of that workshop is included in the Final EIS.

It was recognized that dredged material is merely a special case of a material containing liquid, suspended particulate, and solid phases, and that, while bioassay techniques on liquid materials have been developed to the point where they can be applied on a routine basis, bioassay techniques for the suspended particulate and solid phases of materials are still in an advanced stage of research and are not yet available for routine use. Nevertheless, the participants agreed that the criteria should be based on solid phase bioassays, recognizing that there will be an interim period during which the procedures will have to be specified on a case-by-case basis, and that such interim procedures may be less reliable and more difficult to perform than procedures which will be developed in the future.

Sections of Part 227 have been revised to reflect the recommendations of the workshop; thus, all criteria are based on ecosystem impact rather than on assumptions regarding allowable deviations from normal ambient values. These revisions are consistent with the concept of "unreasonable degradation" in these regulations and are directed toward achieving the goal of preventing significant impact on the biota. The use of bioassay results for regulatory purposes will provide EPA with direct measurements of the impact of dumping materials, so that it will no longer be necessary to infer damage indirectly through measurements related to normal ambient values.

Substantial revisions have been made in §§ 227.6, 227.13, and Subpart G. Details of the specific changes are presented below in the discussion of those sections. In general, § 227.6 has been revised to use liquid, suspended particulate, and solid phase bioassays as the basis for determining trace contaminants; § 227.13 has been changed to require bioassay results to be used in determining whether or not dredged material is environmentally acceptable for ocean dumping; and Subpart G has been revised to include definitions of liquid, suspended particulate, and solid phases, and of initial mixing allowances and limiting permissible concentrations for both liquid and solid phases.

Section 227.1—Applicability. Paragraph (b) of this section has been changed to make all of § 227.6 as well as §§ 227.9 and 227.10 applicable to dredged material, in addition to the other sections already made applicable. This is consistent with changes made in §§ 227.6, 227.13, and Subpart G.

Section 227.6—Trace contaminants. This section has been completely redrafted in response to the many comments received and to reflect the agreements reached at the technical workshop called by EPA to discuss those comments received during the public comment period. The redrafted section differs from that in the proposed regulations published on June 28, 1976:

1. The Agency is providing a broad narrative interpretation of the term "trace contaminants." The term "trace contaminants" is used in the Convention only, not in the Act. When the contracting parties to the Convention define this term, the United States will be bound by that definition. Should the Convention adopt a definition requiring more stringent operational levels than the United States is using, these levels will have to be changed accordingly. In the meantime, the Act and the Convention can be enforced effectively by stating the basis for regulation of these constituents.

Section 227.6(b) provides in general terms that these constituents will be considered as trace contaminants only when they are present in such amounts and forms that they will cause no significant undesirable effects through either toxicity or bioaccumulation.

2. Section 227.6(c) states the criteria for special permits and for wastes which otherwise can be deemed environmentally acceptable under Subpart B. Paragraph (c) of § 227.6 does not define trace contaminants; it merely states what is acceptable for ocean dumping under the environmental criteria of Subpart B. The test to be applied on all wastes is the direct determination of the impact of these constituents present in a waste on the marine ecosystem, as measured by bioassay techniques.

For liquid wastes and the liquid phases of mixed wastes, it is assumed that all of these constituents present are in forms available to the biota. Section 227.6(c)(1) provides that constituents in the liquid phase will be considered environmentally acceptable (i.e., they qualify for special permits) if they conform to the EPA marine water quality criteria. These criteria are based on the most recent and comprehensive compilation of bioassay data presently available, and recommend permissible ambient levels to avoid either chronic toxicity or potential for bioaccumulation of toxic materials, whichever factor is more restrictive. Thus, by applying the marine water quality criteria to the liquid phase, it is practical to determine environmental impact through chemical analysis.

For mercury, however, the marine water quality criteria are set near the lowest ambient levels observed in ocean waters; ambient levels in many parts of the ocean deviate from this level significantly. Therefore, an allowance for an increase in mercury of 50 percent over the local ambient level after initial mixing is allowed. This is consistent with the existing criteria for both liquid and solid phases, which are based on the range and variation of historically observed values for mercury in ocean waters and sediments. It should be noted that "normal ambient concentrations" refers to concentrations that would be present were there no dumping in the area. It should also be noted that, within areas for which a natural ambient concentration has been identified, deviations in mercury concentration up to 100 percent are not uncommon; allowing for a change of 50 percent of the average ambient levels therefore falls within the range of deviation which occurs naturally in ocean waters.

There are some organohalogens for which marine water quality criteria have not been set at this time. When such compounds are present in the liquid phase of a waste, bioassay data on those specific compounds must be presented by the applicant, either through his own efforts or from a search of the scientific literature. Alternatively, a bioassy may be performed on the waste itself rather than on these specific constituents, but such bioassays must be of such a nature as to provide data on chronic toxicity and bioaccumulation potential.

For suspended particulate and solid phases, however, the state-of-the-art has not yet advanced to the point where sediment quality criteria can be set. In fact, research on benthic bioassays is only now at the stage where interim procedures can be developed and used. Nevertheless, there was general agreement among the participants at the technical workshop that even the interim procedures now available provide much better information on the impact of solid phases of waste materials on the marine ecosystem than does any form of bulk analysis. Therefore, bioassays on the solid phase are called for in the criteria, recognizing that interim procedures must be used for a period of several months until standard procedures are developed by EPA and Corps of Engineers research activities. EPA and the Corps of Engineers will publish jointly, in the very near future, standard benthic bioassay procedures. Until that time, guidance on interim procedures will be supplied by the Regional Administrator or the District Engineer. Interim and final benthic bioassay procedures acceptable for implementation of this section will deal with the chronic toxic effects or the bioaccumulation of mercury, cadmium, organohalogens, oils and greases.

The criterion for acceptability of a waste based on the solid phase bioassay is absence of significant difference between the control bioassay and the test bioassay due to the presence of any of the constituents listed in this section.

This section also recognizes that there may be carcinogens, mutagens, and teratogens, for which water quality criteria do not presently exist. In such cases, special studies may be required to establish appropriate limits. It is the intent of this section that such studies will be required, unless there is sufficient information in the scientific literature for the Regional Administrator to determine acceptable levels of these constituents for ocean dumping. If there is insufficient information in the scientific literature and the applicant is unwilling to conduct special studies, a special permit will be denied under § 227.5(c), which prohibits the dumping of materials whose properties are insufficiently described to permit application of the Criteria.

3. Provision is made for the continuing use of the existing numerical levels for solid phases as an interim measure for those cases in which satisfactory interim bioassay procedures are not available.

The present levels allow about a 50 percent deviation from normal ambient values. This is a very stringent requirement and it should be retained as a basic requirement for use when further information is not available. The language has, however, been changed to allow the application, in the case of solid materials, of a limit not more than 50 percent greater than the normal ambient value in the vicinity of the proposed dump site. This is in response to comments pointing out that the data base on which these criteria were set is quite small and may not be representative of actual oceanic sediments which may contain significantly lower concentrations of these materials than is reflected in the numerical criteria.

This section, as redrafted, applies to all materials to be dumped, including dredged materials. The terms "liquid phase", "suspended particulate", and "solid phase" are defined in § 227.32, and apply to all materials containing soluble and insoluble materials.

Section 227.7—Limits established for specific wastes or waste constituents.

Paragraph (a) has been modified to clarify its application only to liquid materials immiscible with sea-water, not those which may interact with seawater. Paragraph (c) has been changed to clarify that the intent of the paragraph is to protect human health and that of the marine ecosystem. Paragraph (d) has been changed to include a requirement for no more than 10 percent change in acidity or alkalinity for neutralization of wastes.

Section 227.10—Hazards to fishing, navigation, shorelines, and beaches. This section has been changed to include the term "unacceptable" interference or damage rather than "no" interference or damage. This change was made in response to comments which pointed out the impossibility of proving that there is no possibility of interference or damage. Applicants will be required to present reasonable evidence that interference or damage will be avoided, and the Regional Administrator will have discretion to determine what is "unacceptable".

Section 227.13—Dredged materials. This section has been completely redrafted in response to comments pointing out that the dredged material criteria were not comparable to those for other materials. As redrafted, dredged material, as well as all other wastes containing liquid, suspended particulate and solid phases, must meet the requirements of §§ 227.5, 227.6, 227.9, 227.10, 227.13, and Subpart G, in order to be environmentally acceptable for ocean disposal.

An initial screening procedure is incorporated which is similar to the requirement of § 227.12 for inert natural wastes, except that the exclusions in § 227.13 are more specific than those in § 227.12. The rationale for these exclusions is presented in the final EIS. Dredged materials which cannot meet these requirements are subject to further testing of both the liquid and solid phases. To be environmentally acceptable for ocean dumping, the liquid phase, suspended particulate phase, and solid phase must meet both the trace contaminant requirements of § 227.6 and the Limiting Permissible Concentration requirements of § 227.27.

Since the concepts of liquid phase, suspended particulate phase, and solid phase apply to all multiphase materials, the definition of the liquid phase for dredged material (i.e., the elutriate) has been removed from § 227.13 and incorporated in the definitions of Subpart G as part of § 227.32.

Section 227.15—Factors considered in determining the need for ocean dumping. Paragraph (a) has been changed to require that treatment be useful as well as feasible. Paragraph (c) has been changed to include a provision for evaluating risks to the environment for the use of alternatives. This change is also reflected in § 227.16.

Section 227.18—Factors considered. A requirement for considering impact on potential recreational and commercial use is included.

Section 227.19—Assessment of impact. A requirement for assessing the impact of alternatives is included.

Section 227.27—Limiting Permissible Concentration (LPC). This section has been redrafted to define LPC for the liquid, suspended particulate, and solid phases. The liquid phase LPC has been associated, wherever possible, with the applicable marine water quality criteria, and the suspended particulate and solid phases have been based on the avoidance of overall chronic toxicity after allowance for initial dispersion. Procedures for conducting the appropriate bioassays will be published in the near future by EPA and the Corps of Engineers. Until such procedures are published, interim guidance can be obtained from the Regional Administrator or the District Engineer.

Some commenters pointed out that the proposed regulations do not explicitly require analysis of wastes for those constituents listed in Annex II of the Convention. EPA has not specifically enumerated these constituents since it is not necessary to do so in order to determine whether or not a waste is environmentally acceptable for dumping. Section 227.27(a)(1) requires compliance with all applicable marine water quality criteria; there are criteria for all materials listed in Annex II, except fluorides. Section 227.27(a)(2) requires a bioassay to be conducted on the waste, which will reveal toxic levels of any fluorides present, as well as of other chemical constituents which, though not listed in the Convention, may be toxic. The purpose of the Act and the Convention is to prevent unacceptable or unreasonable degradation of the marine environment. The combination of bioassay procedures specified in the criteria provide information on adverse impact directly for the entire waste. Thus, the presence or absence of any specific constituent, other than those listed in Section 227.6, is not a significant factor as long as the overall impact of the waste is known.

A provision has been added in this section to allow for changes in the applica-

tion factor used to determine the LPC if there is reasonable scientific evidence on a specific waste to support such a claim. When such evidence is presented, on this or other scientific aspects of the criteria, EPA may convene an appropriate scientific review panel to examine the reasonableness of the evidence prior to taking action.

Section 227.29—Initial mixing. Initial mixing for the solid phase is included. Field data and mathematical models for predicting dispersion may be used where available; when they are not available, solid phases are assumed to be evenly distributed over the ocean bottom in an area equivalent to that of the release zone. This is an assumption, but it is a conservative one which would err on the side of environmental protection. Provision is also made in this section for using different approaches to initial mixing based on reasonable scientific evidence in specific cases.

Section 227.30—High-level radioactive wastes. It is noted that this definition, which is given in the Act, is more restrictive than that provisionally recommended by the International Atomic Energy Agency, which is the minimum standard binding on Contracting Parties to the Convention.

Section 227.31—Applicable marine water quality criteria. This is a new section added to define the applicable marine water quality criteria as being the criteria presented for marine waters in the EPA publication "Quality Criteria for Water" as amended by subsequent publications.

Section 227.32—Liquid, suspended particulate, and solid phases of materials. This is a new section added to define, for the purpose of these regulations, how liquid, suspended particulate, and solid phases are determined for different types of materials. Because some materials may interact with seawater, a general provision is included to give the Regional Administrator direction to require the use of elutriation with seawater when he has reason to believe that the elutriation procedure may reveal toxic effects which might otherwise remain hidden. These definitions apply to any multi-phase material regardless of origin; i.e., sewage sludge as well as dredged material.

The definition of the liquid phase of dredged material is the same as the definition of the elutriate in § 227.13(c) of the regulations proposed on June 28, 1976. For other materials containing both soluble and insoluble matter, the relative proportions of waste material and seawater are to be determined by EPA on a case-by-case basis. This gives EPA discretion to select the best proportions for measuring the maximum effect a material might have when dumped in seawater.

PART 228

Section 228.2—Definitions. The first sentence in this section has been changed to make that sentence consistent with other statements in Part 228. The term "disposal site" means an interim or final approved site, since the conditions of Part 228 clearly apply to those interim sites for which final Environmental Impact Statements have not yet been conducted and for which final designations, therefore, have yet to be made.

Section 228.4—Procedures for designation of sites. Paragraph (e) of this section has been revised in response to criticisms concerning the proposed procedures for designation of dredged material disposal sites. This section now explicitly states that EPA will designate dredged material disposal sites and describes the procedures that will be used.

These procedures are the same that are to be used in the designation of disposal sites for the dumping of materials under special and interim permits. The Act allows the Corps of Engineers to use other sites than those recommended by EPA when the use of EPA-designated sites is not feasible. This section requires that the same criteria be used by the Corps of Engineers in site designation as are used by EPA.

Section 228.12—Delegation of management authority for interim ocean dumping sites. The Coast Guard has withdrawn its request to have disposal sites reoriented to use LORAN-C time delay coordinates, and this section has been changed accordingly. The dredged material sites designated in § 228.4 have been added to the list of sites in the table following § 228.12.

ENVIRONMENTAL AND INFLATIONARY IMPACT STATEMENTS

Although the Agency is not required by law to prepare an Environmental Impact Statement in connection with revision of the regulations and criteria pertaining to ocean disposal, it has chosen to prepare such a statement with respect to the proposed revision to Part 227. See 39 FR 37419 (October 21, 1974). A final Environmental Impact Statement has been prepared and is available for inspection in the office noted in the last paragraph of this preamble. In addition, there are a limited number of the statements available to persons who have an interest in reviewing that document. Requests for copies should be sent to the address noted below.

Executive Order 11821 (November 27, 1974) requires that major proposals for legislation and promulgation of regulations and rules by agencies of the Executive Branch be accompanied by a statement certifying that the inflationary impact of the proposal has been evaluated; OMB Circular A-107 (January 28, 1975) prescribes guidelines for the identification and evaluation of major proposals requiring preparation of inflationary impact certifications. The Administrator has directed that EPA regulatory actions will require certification when they are likely to result in: (1) annualized costs exceeding $100,000,000; (2) total additional costs of production of any major project exceeding 5 percent of selling price; or (3) increase in net national energy consumption by the equivalent of 25,000 barrels of oil per day. None of these limiting criteria is exceeded by the proposed revisions announced today and, therefore, an inflationary impact statement has not been prepared.

These regulations and criteria will become effective February 10, 1977, and all ocean dumping permits issued after that date must be in compliance with these regulations and criteria.

The Agency will consider all written comments on these final regulations and criteria in making any future revisions. Comments should be provided in triplicate and addressed to Chief, Marine Protection Branch (WH-548), Oil and Special Materials Control Division, Environmental Protection Agency, 401 M Street SW, Washington, D.C. 20460.

(33 U.S.C. 1412 and 1418.)

Dated: December 30, 1976.

RUSSELL E. TRAIN,
Administrator.

Subchapter H of Chapter I of Title 40 is hereby amended to read as follows:

SUBCHAPTER H—OCEAN DUMPING

Part

220 General.
221 Applications for Ocean Dumping Permits under section 102 of the Act.
222 Action on Ocean Dumping Permit applications under section 102 of the Act.
223 Contents of permits.
224 Records and reports required of ocean dumping permittees under section 102 of the Act.
225 Corps of Engineers Dredged Material Permits.
226 Enforcement.
227 Criteria for the evaluation of permit applications for ocean dumping of materials.
228 Criteria for the management of disposal sites for ocean dumping.
229 General permits.

PART 220—GENERAL

Sec.

220.1 Purpose and scope.
220.2 Definitions.
220.3 Categories of permits.
220.4 Authorities to issue permits.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 220.1 Purpose and scope.

(a) *General.* This Subchapter H establishes procedures and criteria for the issuance of permits by EPA pursuant to section 102 of the Act. This Subchapter H also establishes the criteria to be applied by the Corps of Engineers in its review of activities involving the transportation of dredged material for the purpose of dumping it in ocean waters pursuant to section 103 of the Act. Except as may be authorized by a permit issued pursuant to this Subchapter H, or pursuant to section 103 of the Act, and subject to other applicable regulations promulgated pursuant to section 108 of the Act:

(1) No person shall transport from the United States any material for the purpose of dumping it into ocean waters;

(2) In the case of a vessel or aircraft registered in the United States or flying the United States flag or in the case of a United States department, agency, or instrumentality, no person shall transport from any location any material for the purpose of dumping it into ocean waters; and

(3) No person shall dump any material transported from a location outside the United States:

(i) Into the territorial sea of the United States; or

(ii) Into a zone contiguous to the territorial sea of the United States, extending to a line twelve nautical miles seaward from the base line from which the breadth of the territorial sea is measured, to the extent that it may affect the territorial sea or the territory of the United States.

(b) *Relationship to international agreements.* In accordance with section 102(a) of the Act, the regulations and criteria included in this Subchapter H apply the standards and criteria binding upon the United States under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter to the extent that application of such standards and criteria do not relax the requirements of the Act.

(c) *Exclusions.* (1) *Fish wastes.* This Subchapter H does not apply to, and no permit hereunder shall be required for, the transportation for the purpose of dumping or the dumping in ocean waters of fish wastes unless such dumping occurs in:

(i) Harbors or other protected or enclosed coastal waters; or

(ii) Any other location where the Administrator finds that such dumping may reasonably be anticipated to endanger health, the environment or ecological systems.

(2) *Fisheries resources.* This Subchapter H does not apply to, and no permit hereunder shall be required for, the placement or deposit of oyster shells or other materials for the purpose of developing, maintaining or harvesting fisheries resources; provided, such placement or deposit is regulated under or is a part of an authorized State or Federal program certified to EPA by the agency authorized to enforce the regulation, or to administer the program, as the case may be; and provided further, that the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, and the U.S. Army Corps of Engineers concur in such placement or deposit as it may affect their responsibilities and such concurrence is evidenced by letters of concurrence from these agencies.

(3) *Vessel propulsion and fixed structures.* This Subchapter H does not apply to, and no permit hereunder shall be required for:

(i) Routine discharges of effluent incidental to the propulsion of vessels or the operation of motor-driven equipment on vessels; or

(ii) Construction of any fixed structure or artificial island, or the intentional placement of any device in ocean waters or on or in the submerged land beneath such waters, for a purpose other than disposal when such construction or such placement is otherwise regulated by Federal or State law or made pursuant to an authorized Federal or State program certified to EPA by the agency authorized to enforce the regulations or to administer the program, as the case may be.

(4) *Emergency to safeguard life at sea.* This Subchapter H does not apply to, and no permit hereunder shall be required for, the dumping of material into ocean waters from a vessel or aircraft in an emergency to safeguard life at sea to the extent that the person owning or operating such vessel or aircraft files timely reports required by § 224.2(b).

§ 220.2 Definitions.

As used in this Subchapter H:

(a) "Act" means the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1401);

(b) "FWPCA" means the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251);

(c) "Ocean" or "ocean waters" means those waters of the open seas lying seaward of the baseline from which the territorial sea is measured, as provided for in the Convention on the Territorial Sea and the Contiguous Zone (15 UST 1606; TIAS 5639); this definition includes the waters of the territorial sea, the contiguous zone and the oceans as defined in section 502 of the FWPCA.

(d) "Material" means matter of any kind or description, including, but not limited to, dredged material, solid waste, incinerator residue, garbage, sewage, sewage sludge, munitions, radiological, chemical, and biological warfare agents, radioactive materials, chemicals, biological and laboratory waste, wreck or discarded equipment, rock, sand, excavation debris, industrial, municipal, agricultural, and other waste, but such term does not mean sewage from vessels within the meaning of section 312 of the FWPCA. Oil within the meaning of section 311 of the FWPCA shall constitute "material" for purposes of this Subchapter H only to the extent that it is taken on board a vessel or aircraft for the primary purpose of dumping.

(e) "Dumping" means a disposition of material: Provided, That it does not mean a disposition of any effluent from any outfall structure to the extent that such disposition is regulated under the provisions of the FWPCA, under the provisions of section 13 of the River and Harbor Act of 1899, as amended (33 U.S.C. 407), or under the provisions of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011), nor does it mean a routine discharge of effluent incidental to the propulsion of, or operation of motor-driven equipment on, vessels: Provided further, That it does not mean the construction of any fixed structure or artificial island nor the intentional placement of any device in ocean waters or on or in the submerged land beneath such waters, for a purpose other than disposal, when such construction or such placement is otherwise regulated by Federal or State law or occurs pursuant to an authorized Federal or State program; And provided further, That it does not include the deposit of oyster shells, or other materials when such deposit is made for the purpose of developing, maintaining, or harvesting fisheries resources and is otherwise regulated by Federal or State law or occurs pursuant to an authorized Federal or State program.

(f) "Sewage Treatment Works" means municipal or domestic waste treatment facilities of any type which are publicly owned or regulated to the extent that feasible compliance schedules are determined by the availability of funding provided by Federal, State, or local governments.

(g) "Criteria" means the criteria set forth in Part 227 of this Subchapter H.

(h) "Dredged Material Permit" means a permit issued by the Corps of Engineers under section 103 of the Act (see 33 CFR 209.120) and any Federal projects reviewed under section 103(e) of the Act (see 33 CFR 209.145).

(i) Unless the context otherwise requires, all other terms shall have the meanings assigned to them by the Act.

§ 220.3 Categories of permits.

This § 220.3 provides for the issuance of general, special, emergency, interim and research permits for ocean dumping under section 102 of the Act.

(a) *General permits.* General permits may be issued for the dumping of certain materials which will have a minimal adverse environmental impact and are generally disposed of in small quantities, or for specific classes of materials that must be disposed of in emergency situations. General permits may be issued on application of an interested person in accordance with the procedures of Part 221 or may be issued without such application whenever the Administrator determines that issuance of a general permit is necessary or appropriate.

(b) *Special permits.* Special permits may be issued for the dumping of materials which satisfy the criteria and shall specify an expiration date no later than three years from the date of issue.

(c) *Emergency permits.* For any of the materials listed in § 227.6, except as trace contaminants, after consultation with the Department of State with respect to the need to consult with parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter that are likely to be affected by the dumping, emergency permits may be issued to dump such materials where there is demonstrated to exist an emergency requiring the dumping of such materials, which poses an unacceptable risk relating to human health and admits of no other feasible solution. As used herein, "emergency" refers to situations requiring action with a marked degree of urgency, but is not limited in its application to circumstances requiring immediate action. Emergency permits may be issued for other materials, except those prohibited by § 227.5, without consultation with the Department of State

when the Administrator determines that there exists an emergency requiring the dumping of such materials which poses an unacceptable risk to human health and admits of no other feasible solution.

(d) *Interim permits.* Prior to April 23, 1976, interim permits may be issued in accordance with Subpart A of Part 227 to dump materials which are not in compliance with the environmental impact criteria of Subpart B of Part 227, or which would cause substantial adverse effects as determined in accordance with the criteria of Subparts D or E of Part 227 or for which an ocean disposal site has not been designated on other than an interim basis pursuant to Part 228 of this Subchapter H; provided, however, no permit may be issued for the ocean dumping of any materials listed in § 227.5, or for any of the materials listed in § 227.6, except as trace contaminants; provided further that the compliance date of April 23, 1978, does not apply to the dumping of wastes by existing dumpers when the Regional Administrator determines that the permittee has exercised his best efforts to comply with all requirements of a special permit by April 23, 1978, and has an implementation schedule adequate to allow phasing out of ocean dumping or compliance with all requirements necessary to receive a special permit by December 31, 1981, at the latest. No interim permit will be granted for the dumping of waste from a facility which has not previously dumped wastes in the ocean (except when the facility is operated by a municipality now dumping such wastes), from a new facility, or for the dumping of an increased amount of waste from the expansion or modification of an existing facility, after the effective date of these regulations. No interim permit will be issued for the dumping of any material in the ocean for which an interim permit had previously been issued unless the applicant demonstrates that he has exercised his best efforts to comply with all provisions of the previously issued permits.

(e) *Research permits.* Research permits may be issued for the dumping of any materials, other than materials specified in § 227.5 or for any of the materials listed in § 227.6 except as trace contaminants, unless subject to the exclusion of § 227.6(g), into the ocean as part of a research project when it is determined that the scientific merit of the proposed project outweighs the potential environmental or other damage that may result from the dumping. Research permits shall specify an expiration date no later than 18 months from the date of issue.

(f) *Permits for incineration at sea.* Permits for incineration of wastes at sea will be issued only as research permits or as interim permits until specific criteria to regulate this type of disposal are promulgated, except in those cases where studies on the waste, the incineration method and vessel, and the site have been conducted and the site has been designated for incineration at sea in accordance with the procedures of § 228.4(b). In all other respects the requirements of Parts 220–228 apply.

§ 220.4 Authorities to issue permits.

(a) *Determination by Administrator.* The Administrator, or such other EPA employee as he may from time to time designate in writing, shall issue, deny, modify, revoke, suspend, impose conditions on, initiate and carry out enforcement activities and take any and all other actions necessary or proper and permitted by law with respect to general, special, emergency, interim, or research permits.

(b) *Authority delegated to Regional Administrators.* Regional Administrators, or such other EPA employees as they may from time to time designate in writing, are delegated the authority to issue, deny, modify, revoke, suspend, impose conditions on, initiate and carry out enforcement activities, and take any and all other actions necessary or proper and permitted by law with respect to special and interim permits for:

(1) The dumping of material in those portions of the territorial sea which are subject to the jurisdiction of any State within their respective Regions, and in those portions of the contiguous zone immediately adjacent to such parts of the territorial sea; and in the oceans with respect to approved waste disposal sites designated pursuant to Part 228 of this Subchapter H, and

(2) Where transportation for dumping is to originate in one Region and dumping is to occur at a location within another Region's jurisdiction conferred by order of the Administrator, the Region in which transportation is to originate shall be responsible for review of the application and shall prepare the technical evaluation of the need for dumping and alternatives to ocean dumping. The Region having jurisdiction over the proposed dump site shall take all other actions required by this Subchapter H with respect to the permit application, including without limitation, determining to issue or deny the permit, specifying the conditions to be imposed, and giving public notice. If both Regions do not concur in the disposition of the permit application, the Administrator will make the final decision on all issues with respect to the permit application, including without limitation, issuance or denial of the permit and the conditions to be imposed.

(c) *Review of Corps of Engineers Dredged Material Permits.* Regional Administrators have the authority to review, to approve or to disapprove or to propose conditions upon Dredged Material Permits for ocean dumping of dredged material at locations within the respective Regional jurisdictions. Regional jurisdiction to act under this paragraph (c) of § 220.4 is determined by the Administrator in accordance with § 228.4(e).

PART 221—APPLICATIONS FOR OCEAN DUMPING PERMITS UNDER SECTION 102 OF THE ACT

Sec.
221.1 Applications for permits.
221.2 Other information.
221.3 Applicant.
221.4 Adequacy of information in application.
221.5 Processing fees.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 221.1 Applications for permits.

Applications for general, special, emergency, interim and research permits under section 102 of the Act may be filed with the Administrator or the appropriate Regional Administrator, as the case may be, authorized by Section 220.4 to act on the application. Applications shall be made in writing and shall contain, in addition to any other material which may be required, the following:

(a) Name and address of applicant;

(b) Name of the person or firm transporting the material for dumping, the name of the person(s) or firm(s) producing or processing all materials to be transported for dumping, and the name or other identification, and usual location, of the conveyance to be used in the transportation and dumping of the material to be dumped, including information on the transporting vessel's communications and navigation equipment;

(c) Adequate physical and chemical description of material to be dumped, including results of tests necessary to apply the Criteria, and the number, size, and physical configuration of any containers to be dumped;

(d) Quantity of material to be dumped;

(e) Proposed dates and times of disposal;

(f) Proposed dump site, and in the event such proposed dump site is not a dump site designated in this Subchapter H, detailed physical, chemical and biological information relating to the proposed dump site and sufficient to support its designation as a site according to the procedures of Part 228 of this Subchapter H;

(g) Proposed method of releasing the material at the dump site and means by which the disposal rate can be controlled and modified as required;

(h) Identification of the specific process or activity giving rise to the production of the material;

(i) Description of the manner in which the type of material proposed to be dumped has been previously disposed of by or on behalf of the person(s) or firm(s) producing such material;

(j) A statement of the need for the proposed dumping and an evaluation of short and long term alternative means of disposal, treatment or recycle of the material. Means of disposal shall include without limitation, landfill, well injection, incineration, spread of material over open ground; biological, chemical or physical treatment; recovery and recycle of material within the plant or at other plants which may use the material, and storage. The statement shall also include an analysis of the availability and environmental impact of such alternatives; and

(k) An assessment of the anticipated environmental impact of the proposed dumping, including without limitation, the relative duration of the effect of the proposed dumping on the marine environment, navigation, living and non-living marine resource exploitation, scientific study, recreation and other uses of the ocean.

§ 221.2 Other information.

In the event the Administrator, Regional Administrator, or a person designated by either to review permit applications, determines that additional information is needed in order to apply the Criteria, he shall so advise the applicant in writing. All additional information requested pursuant to this § 221.2 shall be deemed part of the application and for purposes of applying the time limitation of §222.1, the application will not be considered complete until such information has been filed.

§ 221.3 Applicant.

Any person may apply for a permit under this Subchapter H even though the proposed dumping may be carried on by a permittee who is not the applicant; provided however, that the Administrator or the Regional Administrator, as the case may be, may, in his discretion, require that an application be filed by the person or firm producing or processing the material proposed to be dumped. Issuance of a permit will not excuse the permittee from any civil or criminal liability which may attach by virtue of his having transported or dumped materials in violation of the terms or conditions of a permit, notwithstanding that the permittee may not have been the applicant.

§ 221.4 Adequacy of information in application.

No permit issued under this Subchapter H will be valid for the transportation or dumping of any material which is not accurately and adequately described in the application. No permittee shall be relieved of any liability which may arise as a result of the transportation or dumping of material which does not conform to information provided in the application solely by virtue of the fact that such information was furnished by an applicant other than the permittee.

§ 221.5 Processing fees.

(a) A processing fee of $1,000 will be charged in connection with each application for a permit for dumping in an existing dump site designated in this Subchapter H.

(b) A processing fee of an additional $3,000 will be charged in connection with each application for a permit for dumping in a dump site other than a dump site designated in this Subchapter H.

(c) Notwithstanding any other provision of this § 221.5, no agency or instrumentality of the United States or of a State or local government will be required to pay the processing fees specified in paragraphs (a) and (b) of this section.

PART 222—ACTION ON OCEAN DUMPING PERMIT APPLICATIONS UNDER SECTION 102 OF THE ACT

Sec.
222.1 General.
222.2 Tentative determinations.
222.3 Notice of applications.
222.4 Initiation of hearings.
222.5 Time and place of hearings.
222.6 Presiding Officer.
222.7 Conduct of public hearing.
222.8 Recommendations of Presiding Officer.
222.9 Issuance of permits.
222.10 Appeal to adjudicatory hearing.
222.11 Conduct of adjudicatory hearings.
222.12 Appeal to Administrator.
222.13 Computation of time.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 222.1 General.

Decisions as to the issuance, denial, or imposition of conditions on general, special, emergency, interim and research permits under section 102 of the Act will be made by application of the criteria of Parts 227 and 228. Final action on any application for a permit will, to the extent practicable, be taken within 180 days from the date a complete application is filed.

§ 222.2 Tentative determinations.

(a) Within 30 days of the receipt of his initial application, an applicant shall be issued notification of whether his application is complete and what, if any, additional information is required. No such notification shall be deemed to foreclose the Administrator or the Regional Administrator, as the case may be, from requiring additional information at any time pursuant to § 221.2.

(b) Within 30 days after receipt of a completed permit application, the Administrator or the Regional Administrator, as the case may be, shall publish notice of such application including a tentative determination with respect to issuance or denial of the permit. If such tentative determination is to issue the permit, the following additional tentative determinations will be made:

(1) Proposed time limitations, if any;

(2) Proposed rate of discharge from the barge or vessel transporting the waste;

(3) Proposed dumping site; and

(4) A brief description of any other proposed conditions determined to be appropriate for inclusion in the permit in question.

§ 222.3 Notice of applications.

(a) *Contents.* Notice of every complete application for a general, special, interim, emergency and research permit shall, in addition to any other material, include the following:

(1) A summary of the information included in the permit application;

(2) Any tentative determinations made pursuant to paragraph (b) of § 222.2;

(3) A brief description of the procedures set forth in § 222.5 for requesting a public hearing on the application including specification of the date by which requests for a public hearing must be filed;

(4) A brief statement of the factors considered in reaching the tentative determination with respect to the permit and, in the case of a tentative determination to issue the permit, the reasons for the choice of the particular permit conditions selected; and

(5) The location at which interested persons may obtain further information on the proposed dumping, including copies of any relevant documents.

(b) *Publication.*

(1) *Special, interim and research permits. Notice of every complete* application for special, interim and research permits shall be given by:

(i) Publication in a daily newspaper of general circulation in the State in closest proximity to the proposed dump site; and

(ii) Publication in a daily newspaper of general circulation in the city in which is located the office of the Administrator or the Regional Administrator, as the case may be, giving notice of the permit application.

(2) *General permits.* Notice of every complete application for a general permit or notice of action proposed to be taken by the Administrator to issue a general permit, without an application, shall be given by publication in the FEDERAL REGISTER.

(3) *Emergency permits.* Notice of every complete application for an emergency permit shall be given by publication in accordance with paragraphs (b)(1) (i) and (ii) of this section; provided, however, that no such notice and no tentative determination in accordance with § 222.2 shall be required in any case in which the Administrator determines:

(i) That an emergency, as defined in paragraph (c) of § 220.3 exists;

(ii) That the emergency poses an unacceptable risk relating to human health;

(iii) That the emergency admits of no other feasible solution; and

(iv) That the public interest requires the issuance of an emergency permit as soon as possible.

Notice of any determination made by the Administrator pursuant to this paragraph (b)(3) shall be given as soon as practicable after the issuance of the emergency permit by publication in accordance with paragraphs (b)(1) (i) and (ii) and with paragraphs (a), (c)–(i) of this section.

(c) *Copies of notice sent to specific persons.* In addition to the publication of notice required by paragraph (b) of this section, copies of such notice will be mailed by the Administrator or the Regional Administrator, as the case may be, to any person, group or Federal, State or local agency upon request. Any such request may be a standing request for copies of such notices and shall be submitted in writing to the Administrator or to any Regional Administrator and shall relate to all or any class of permit applications which may be acted upon by the Admin-

istrator or such Regional Administrator, as the case may be.

(d) *Copies of notice sent to States.* In addition to the publication of notice required by paragraph (b) of this section, copies of such notice will be mailed to the State water pollution control agency and to the State agency responsible for carrying out the Coastal Zone Management Act, if such agency exists, for each coastal State within 500 miles of the proposed dumping site.

(e) *Copies of notice sent to Corps of Engineers.* In addition to the publication of notice required by paragraph (b) of this section, copies of such notice will be mailed to the office of the appropriate District Engineer of the U.S. Army Corps of Engineers for purposes of section 106 (c) of the Act (pertaining to navigation, harbor approaches, and artificial islands on the outer continental shelf).

(f) *Copies of notice sent to Coast Guard.* In addition to the publication of notice required by paragraph (b) of this section, copies of such notice will be sent to the appropriate district office of the U.S. Coast Guard for review and possible suggestion of additional conditions to be included in the permit to facilitate surveillance and enforcement.

(g) *Fish and Wildlife Coordination Act.* The Fish and Wildlife Coordination Act, Reorganization Plan No. 4 of 1970, and the Act require that the Administrator or the Regional Administrator, as the case may be, consult with appropriate regional officials of the Departments of Commerce and Interior, the Regional Director of the NMFS–NOAA, and the agency exercising administrative jurisdiction over the fish and wildlife resources of the States subject to any dumping prior to the issuance of a permit under this Subchapter H. Copies of the notice shall be sent to the persons noted in paragraph (g) of this section.

(h) *Copies of notice sent to Food and Drug Administration.* In addition to the publication of notice required by paragraph (b) of this section, copies of such notice will be mailed to Food and Drug Administration, Shellfish Sanitation Branch (HF–417), 200 C Street SW., Washington, D.C. 20204.

(i) *Failure to give certain notices.* Failure to send copies of any public notice in accordance with paragraphs (c) through (h) of this section shall not invalidate any notice given pursuant to this section nor shall such failure invalidate any subsequent administrative proceeding.

(j) *Failure of consulted agency to respond.* Unless advice to the contrary is received from the appropriate Federal or State agency within 30 days of the date copies of any public notice were dispatched to such agency, such agency will be deemed to have no objection to the issuance of the permit identified in the public notice.

§ 222.4 Initiation of hearings

(a) In the case of any permit application for which public notice in advance of permit issuance is required in accordance with paragraph (b) of § 222.3, any person may, within 30 days of the date on which all provisions of paragraph (b) of § 222.3 have been complied with, request a public hearing to consider the issuance or denial of, or the conditions to be imposed upon, such permit. Any such request for a public hearing shall be in writing, shall identify the person requesting the hearing, shall state with particularity any objections to the issuance or denial of, or to the conditions to be imposed upon, the proposed permit, and shall state the issues which are proposed to be raised by such person for consideration at a hearing.

(b) Whenever (1) a written request satisfying the requirements of paragraph (a) of this section has been received and the Administrator or Regional Administrator, as the case may be, determines that such request presents genuine issues, or (2) the Administrator or Regional Administrator, as the case may be, determines in his discretion that a public hearing is necessary or appropriate, the Administrator or the Regional Administrator, as the case may be, will set a time and place for a public hearing in accordance with § 222.5, and will give notice of such hearing by publication in accordance with § 222.3.

(c) In the event the Administrator or the Regional Administrator, as the case may be, determines that a request filed pursuant to paragraph (a) of this section does not comply with the requirements of such paragraph (a) or that such request does not present substantial issues of public interest, he shall advise, in writing, the person requesting the hearing of his determination.

§ 222.5 Time and place of hearings.

Hearings shall be held in the State in closest proximity to the proposed dump site, whenever practicable, and shall be set for the earliest practicable date no less than 30 days after the receipt of an appropriate request for a hearing or a determination by the Administrator or the Regional Administrator, as the case may be, to hold such a hearing without such a request.

§ 222.6 Presiding Officer.

A hearing convened pursuant to this Subchapter H shall be conducted by a Presiding Officer. The Administrator or Regional Administrator, as the case may be, may designate a Presiding Officer. For adjudicatory hearings held pursuant to § 222.11, the Presiding Officer shall be an Administrative Law Judge.

§ 222.7 Conduct of public hearing.

The Presiding Officer shall be responsible for the expeditious conduct of the hearing. The hearing shall be an informal public hearing, not an adversary proceeding, and shall be conducted so as to allow the presentation of public comments. When the Presiding Officer determines that it is necessary or appropriate, he shall cause a suitable record, which may include a verbatim transcript, of the proceedings to be made. Any person may appear at a public hearing convened pursuant to § 222.5 whether or not he requested the hearing, and may be represented by counsel or any other authorized representative. The Presiding Officer is authorized to set forth reasonable restrictions on the nature or amount of documentary material or testimony presented at a public hearing, giving due regard to the relevancy of any such information, and to the avoidance of undue repetitiveness of information presented.

§ 222.8 Recommendations of Presiding Officer.

Within 30 days following the adjournment of a public hearing convened pursuant to § 222.5, or within such additional period as the Administrator or the Regional Administrator, as the case may be, may grant to the Presiding Officer for good cause shown, and after full consideration of the comments received at the hearing, the Presiding Officer will prepare and forward to the Administrator or to the Regional Administrator, as the case may be, written recommendations relating to the issuance or denial of, or conditions to be imposed upon, the proposed permit and the record of the hearing, if any. Such recommendations shall contain a brief statement of the basis for the recommendations including a description of evidence relied upon in justification either (1) for permit provisions which differ from any tentative determinations issued prior to the hearing or (2) for any permit denial. Copies of the Presiding Officer's recommendations shall be provided to any interested person on request, without charge. Copies of the record will be provided in accordance with 40 CFR 2.

§ 222.9 Issuance of permits.

(a) Within 30 days following receipt of the Presiding Officer's recommendations or, where no hearing has been held, following the close of the 30-day period for requesting a hearing as provided in § 222.4, the Administrator or the Regional Administrator, as the case may be, shall make a determination with respect to the issuance, denial, or imposition of conditions on, any permit applied for under this Subchapter H and shall give notice to the applicant and to all persons who registered their attendance at the hearing by providing their name and mailing address, if any, by mailing a letter stating the determination and stating the basis therefor in terms of the Criteria.

(b) Any determination to issue or deny any permit after a hearing held pursuant to § 222.7 shall take effect no sooner than:

(1) 10 days after notice of such determination is given if no request for an adjudicatory hearing is filed in accordance with § 222.10(a); or

(2) 30 days after notice of such determination is given if a request for an adjudicatory hearing is filed in accordance with paragraph (a) of § 222.10 and the Administrator or the Regional Administrator, as the case may be, denies such request in accordance with paragraph (c) of § 222.10; or

(3) The date on which a final determination has been made following an adjudicatory hearing held pursuant to § 222.11.

(c) The Administrator or Regional Administrator, as the case may be, may extend the term of a previously issued permit pending the conclusion of the proceedings held pursuant to §§ 222.7–222.9.

(d) A copy of each permit issued shall be sent to the appropriate District Office of the U.S. Coast Guard.

§ 222.10 Appeal to adjudicatory hearing.

(a) Within 10 days following the receipt of notice of the issuance or denial of any permit pursuant to § 222.9 after a hearing held pursuant to § 222.7, any interested person who participated in such hearing may request that an adjudicatory hearing be held pursuant to § 222.11 for the purpose of reviewing such determination, or any part thereof. Any such request for an adjudicatory hearing shall be filed with the Administrator or the Regional Administrator, as the case may be, and shall be in writing, shall identify the person requesting the adjudicatory hearing and shall state with particularity the objections to the determination, the basis therefor and the modification requested.

(b) Whenever a written request satisfying the requirements of paragraph (a) of this section has been received and the Administrator or Regional Administrator, as the case may be, determines that an adjudicatory hearing is warranted, the Administrator or the Regional Administrator, as the case may be, will set a time and place for an adjudicatory hearing in accordance with § 222.5, and will give notice of such hearing by publication in accordance with § 222.3.

(c) Prior to the conclusion of the adjudicatory hearing and appeal process, the Administrator or the Regional Administrator, as the case may be, in his discretion may extend the duration of a previously issued permit until a final determination has been made pursuant to §§ 222.11 or 222.12.

(d) In the event the Administrator or the Regional Administrator, as the case may be, determines that a request filed pursuant to paragraph (a) of this section does not comply with the requirements of such paragraph (a) or that such request does not present substantial issues of public interest, he shall advise, in writing, the person requesting the adjudicatory hearing of his determination.

(e) Any person requesting an adjudicatory hearing or requesting admission as a party to an adjudicatory hearing shall state in his written request, and shall by filing such request consent, that he and his employees and agents shall submit themselves to direct and cross-examination at any such hearing and to the taking of an oath administered by the Presiding Officer.

§ 222.11 Conduct of adjudicatory hearings.

(a) *Parties.* Any interested person may at a reasonable time prior to the commencement of the hearing submit to the Presiding Officer a request to be admitted as a party. Such request shall be in writing and shall set forth the information which would be required to be submitted by such person if he were requesting an adjudicatory hearing. Any such request to be admitted as a party which satisfies the requirements of this paragraph (a) shall be granted and all parties shall be informed at the commencement of the adjudicatory hearing of the parties involved. Any party may be represented by counsel or other authorized representative. EPA staff representing the Administrator or Regional Administrator who took action with respect to the permit application shall be deemed a party.

(b) *Filing and service.*

(1) An original and two (2) copies of all documents or papers required or permitted to be filed shall be filed with the Presiding Officer.

(2) Copies of all documents and papers filed with the Presiding Officer shall be served upon all other parties to the adjudicatory hearing.

(c) *Consolidation.* The Administrator, or the Regional Administrator in the case of a hearing arising within his Region and for which he has been delegated authority hereunder, may, in his discretion, order consolidation of any adjudicatory hearings held pursuant to this section whenever he determines that consolidation will expedite or simplify the consideration of the issues presented. The Administrator may, in his discretion, order consolidation and designate one Region to be responsible for the conduct of any hearings held pursuant to this section which arise in different Regions whenever he determines that consolidation will expedite or simplify the consideration of the issues presented.

(d) *Pre-hearing conference.* The Presiding Officer may hold one or more pre-hearing conferences and may issue a pre-hearing order which may include without limitation, requirements with respect to any or all of the following:

(1) Stipulations and admissions;
(2) Disputed issues of fact;
(3) Disputed issues of law;
(4) Admissibility of any evidence;
(5) Hearing procedures including submission of oral or written direct testimony, conduct of cross-examination, and the opportunity for oral arguments;
(6) Any other matter which may expedite the hearing or aid in disposition of any issues raised therein.

(e) *Adjudicatory hearing procedures.*

(1) The burden of going forward with the evidence shall:

(i) In the case of any adjudicatory hearing held pursuant to § 222.10(b)(1), be on the person filing a request under § 222.10(a) as to each issue raised by the request; and

(ii) In the case of any adjudicatory hearing held pursuant to § 223.2 or pursuant to Part 226, be on the Environmental Protection Agency.

(2) The Presiding Officer shall have the duty to conduct a fair and impartial hearing, to take action to avoid unnecessary delay in the disposition of proceedings, and to maintain order. He shall have all powers necessary or appropriate to that end, including without limitation, the following:

(i) To administer oaths and affirmations;

(ii) To rule upon offers of proof and receive relevant evidence;

(iii) To regulate the course of the hearing and the conduct of the parties and their counsel;

(iv) To consider and rule upon all procedural and other motions appropriate to the proceedings; and

(v) To take any action authorized by these regulations and in conformance with law.

(3) Parties shall have the right to cross-examine a witness who appears at an adjudicatory hearing to the extent that such cross-examination is necessary or appropriate for a full disclosure of the facts. In multi-party proceedings the Presiding Officer may limit cross-examination to one party on each side if he is satisfied that the cross-examination by one party will adequately protect the interests of other parties.

(4) When a party will not be unfairly prejudiced thereby, the Presiding Officer may order all of part of the evidence to be submitted in written form.

(5) Rulings of the Presiding Officer on the admissibility of evidence, the propriety of cross-examination, and other procedural matters, shall be final and shall appear in the record.

(6) Interlocutory appeals may not be taken.

(7) Parties shall be presumed to have taken exception to an adverse ruling.

(8) The proceedings of all hearings shall be recorded by such means as the Presiding Officer may determine. The original transcript of the hearing shall be a part of the record and the sole official transcript. Copies of the transcript shall be available from the Environmental Protection Agency in accordance with 40 CFR 2.

(9) The rules of evidence shall not apply.

(f) *Decision after adjudicatory hearing.*

(1) Within 30 days after the conclusion of the adjudicatory hearing, or within such additional period as the Administrator or the Regional Administrator, as the case may be, may grant to the Presiding Officer for good cause shown, the Presiding Officer shall submit to the Administrator or the Regional Administrator, as the case may be, proposed findings of fact and conclusions of law, his recommendation with respect to any and all issues raised at the hearing, and the record of the hearing. Such findings, conclusions and recommendations shall contain a brief statement of the basis for the recommendations. Copies of the Presiding Officer's proposed findings of fact, conclusions of law and recommendations shall be provided to all parties to the adjudicatory hearing on request, without charge.

(2) Within 20 days following submission of the Presiding Officer's proposed findings of fact, conclusions of law and recommendations, any party may sub-

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mit written exceptions, no more than 30 pages in length, to such proposed findings, conclusions and recommendations and within 30 days following the submission of the Presiding Officer's proposed findings, conclusions and recommendations any party may file written comments, no more than 30 pages in length, on another party's exceptions. Within 45 days following the submission of the Presiding Officer's proposed findings, conclusions and recommendations, the Administrator or the Regional Administrator, as the case may be, shall make a determination with respect to all issues raised at such hearing and shall affirm, reverse or modify the previous or proposed determination, as the case may be. Notice of such determination shall set forth the determination for each such issue, shall briefly state the basis therefor and shall be given by mail to all parties to the adjudicatory hearing.

§ 222.12 Appeal to Administrator.

(a) Within 10 days following receipt of the determination of the Regional Administrator pursuant to paragraph (f) (2) of § 222.11, any party to an adjudicatory hearing held in accordance with § 222.11 may appeal such determination to the Administrator by filing a written notice of appeal, or the Administrator may, on his own initiative, review any prior determination.

(b) The notice of appeal shall be no more than 40 pages in length and shall contain:

(1) The name and address of the person filing the notice of appeal;

(2) A concise statement of the facts on which the person relies and appropriate citations to the record of the adjudicatory hearing;

(3) A concise statement of the legal basis on which the person relies;

(4) A concise statement setting forth the action which the person proposes that the Administrator take; and

(5) A certificate of service of the notice of appeal on all other parties to the adjudicatory hearing.

(c) The effective date of any determination made pursuant to paragraph (f) (2) of § 222.11 may be stayed by the Administrator pending final determination by him pursuant to this section upon the filing of a notice of appeal which satisfies the requirements of paragraph (b) of this section or upon initiation by the Administrator of review of any determination in the absence of such notice of appeal.

(d) Within 20 days following the filing of a notice of appeal in accordance with this section, any party to the adjudicatory hearing may file a written memorandum, no more than 40 pages in length, in response thereto.

(e) Within 45 days following the filing of a notice of appeal in accordance with this section, the Administrator shall render his final determination with respect to all issues raised in the appeal to the Administrator and shall affirm, reverse, or modify the previous determination and briefly state the basis for his determination.

(f) In accordance with 5 U.S.C. section 704, the filing of an appeal to the Administrator pursuant to this section shall be a prerequisite to judicial review of any determination to issue, deny or impose conditions upon any permit; or to modify, revoke or suspend any permit, or to take any other enforcement action, under this Subchapter H.

§ 222.13 Computation of time.

In computing any period of time prescribed or allowed in this part, except unless otherwise provided, the day on which the designated period of time begins to run shall not be included. The last day of the period so computed is to be included unless it is a Saturday, Sunday, or a legal holiday in which the Environmental Protection Agency is not open for business, in which event the period runs until the end of the next day which is not a Saturday, Sunday, or legal holiday. Intermediate Saturdays, Sundays and legal holidays shall be excluded from the computation when the period of time prescribed or allowed is seven days or less.

PART 223—CONTENTS OF PERMITS

Sec.
223.1 Contents of permits.
223.2 Generally applicable conditions of permits.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 223.1 Contents of permits.

Permits, other than general permits, which may be issued on forms to be published by EPA and must be displayed on the vessel engaged in dumping, will include at a minimum the following:

(a) Name of permittee;

(b) Means of conveyance and methods and procedures for disposal of material to be dumped; and, in the case of permits for the transportation of material for dumping, the port through or from which such material will be transported;

(c) A complete description, including all relevant chemical and physical properties and quantities, of the material to be dumped;

(d) The disposal site;

(e) The times at which the permitted dumping may occur;

(f) Such monitoring relevant to the assessment of the impact of permitted dumping activities on the marine environment at the disposal site as the Administrator determines is feasible; and

(g) Any other terms and conditions, including those with respect to release procedures, determined to be necessary and adequate in order to conform the permitted dumping activities to the factors set forth in Section 102(a) of the Act, and the criteria set forth in Part 227.

§ 223.2 Generally applicable conditions of permits.

(a) *Modification or revocation.* Any permit issued under this Part shall be subject to modification, or revocation in whole or in part for cause, as follows:

(1) Violation of any term or condition of the permit;

(2) Misrepresentation, inaccuracy, or failure to disclose all relevant facts in the permit application;

(3) Changed circumstances, such as changes in conditions obtaining at the designated dumping site, and newly discovered scientific data relevant to the granting of the permit;

(4) Failure to keep the records, and to notify appropriate officials of dumping activities, as specified in §§ 224.1 and 224.2.

(b) *Suspension.* In addition to the conditions of a permit imposed pursuant to paragraph (a) of this section, each permit shall be subject to suspension by the Administrator or Regional Administrator if he determines that the permitted dumping has resulted, or is resulting, in imminent and substantial harm to human health or welfare or the marine environment. Such suspension shall be effective immediately upon receipt of notification thereof by the permittee.

(c) *Hearings.* Within 30 days after receipt of notice of revocation or modification pursuant to paragraph (a) of this section, or of suspension pursuant to paragraph (b) of this section, a permittee or other interested person may request in writing a hearing on the issues raised by any such revocation or suspension. Upon receipt of any such request, the Administrator or Regional Administrator shall appoint a hearing officer to conduct an adjudicatory hearing as may be required by law and by this subchapter as now or hereafter in effect.

PART 224—RECORDS AND REPORTS REQUIRED OF OCEAN DUMPING PERMITTEES UNDER SECTION 102 OF THE ACT

Sec.
224.1 Records of permittees.
224.2 Reports.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 224.1 Records of permittees.

Each permittee named in a special, interim, emergency or research permit under section 102 of the Act and each person availing himself of the privilege conferred by a general permit, shall maintain complete records of the following information, which will be available for inspection by the Administrator, Regional Administrator, the Commandant of the U.S. Coast Guard, or their respective designees:

(a) The physical and chemical characteristics of the material dumped pursuant to the permit;

(b) The precise times and locations of dumping;

(c) Any other information required as a condition of a permit by the Administrator or the Regional Administrator, as the case may be.

§ 224.2 Reports.

(a) *Periodic reports.* Information required to be recorded pursuant to § 224.1 shall be reported to the Administrator or the Regional Administrator, as the case may be, for the periods indicated within 30 days of the expiration of such periods:

(1) For each six-month period, if any, following the effective date of the permit;

(2) For any other period of less than six months ending on the expiration date of the permit; and

(3) As otherwise required in the conditions of the permit.

(b) *Reports of emergency dumping.* If material is dumped without a permit pursuant to paragraph (c) (4) of § 220.1, the owner or operator of the vessel or aircraft from which such dumping occurs shall as soon as feasible inform the Administrator, Regional Administrator, or the nearest Coast Guard district of the incident by radio, telephone, or telegraph and shall within 10 days file a written report with the Administrator or Regional Administrator containing the information required under § 224.1 and a complete description of the circumstances under which the dumping occurred. Such description shall explain how human life at sea was in danger and how the emergency dumping reduced that danger. If the material dumped included containers, the vessel owner or operator shall immediately request the U.S. Coast Guard to publish in the local Notice to Mariners the dumping location, the type of containers, and whether the contents are toxic or explosive. Notification shall also be given to the Food and Drug Administration, Shellfish Sanitation Branch, Washington, D.C. 20204, as soon as possible.

PART 225—CORPS OF ENGINEERS DREDGED MATERIAL PERMITS

Sec.
225.1 General.
225.2 Review of Dredged Material Permits.
225.3 Procedure for invoking economic impact.
225.4 Waiver by Administrator.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 225.1 General.

Applications and authorizations for Dredged Material Permits under section 103 of the Act for the transportation of dredged material for the purpose of dumping it in ocean waters will be evaluated by the U.S. Army Corps of Engineers in accordance with the criteria set forth in Part 227 and processed in accordance with 33 CFR 209.120 with special attention to § 209.120(g) (17) and 33 CFR 209.145.

§ 225.2 Review of Dredged Material Permits.

(a) The District Engineer shall send a copy of the public notice to the appropriate Regional Administrator, and set forth in writing all of the following information:

(1) The location of the proposed disposal site and its physical boundaries;

(2) A statement as to whether the site has been designated for use by the Administrator pursuant to section 102 (c) of the Act;

(3) If the proposed disposal site has not been designated by the Administrator, a statement of the basis for the proposed determination why no previously designated site is feasible and a description of the characteristics of the proposed disposal site necessary for its designation pursuant to Part 228 of this Subchapter H;

(4) The known historical uses of the proposed disposal site;

(5) Existence and documented effects of other authorized dumpings that have been made in the dumping area (e.g., heavy metal background reading and organic carbon content);

(6) An estimate of the length of time during which disposal will continue at the proposed site;

(7) Characteristics and composition of the dredged material; and

(8) A statement concerning a preliminary determination of the need for and/or availability of an environmental impact statement.

(b) The Regional Administrator will within 15 days of the date the public notice and other information required to be submitted by paragraph (a) of § 225.2 are received by him, review the information submitted and request from the District Engineer any additional information he deems necessary or appropriate to evaluate the proposed dumping.

(c) Using the information submitted by the District Engineer, and any other information available to him, the Regional Administrator will within 15 days after receipt of all requested information, make an independent evaluation of the proposed dumping in accordance with the criteria and respond to the District Engineer pursuant to paragraphs (d) or (e) of this section. The Regional Administrator may request an extension of this 15 day period to 30 days from the District Engineer.

(d) When the Regional Administrator determines that the proposed dumping will comply with the criteria, he will so inform the District Engineer in writing.

(e) When the Regional Administrator determines that the proposed dumping will not comply with the criteria he shall so inform the District Engineer in writing. In such cases, no Dredged Material Permit for such dumping shall be issued unless and until the provisions of § 225.3 are followed and the Administrator grants a waiver of the criteria pursuant to § 225.4.

§ 225.3 Procedure for invoking economic impact.

(a) When a District Engineer's determination to issue a Dredged Material Permit for the dumping of dredged material into ocean waters has been rejected by a Regional Administrator upon application of the Criteria, the District Engineer may determine whether, under § 103 (d) of the Act, there is an economically feasible alternative method or site available other than the proposed dumping in ocean waters. If the District Engineer makes any such preliminary determination that there is no economically feasible alternative method or site available, he shall so advise the Regional Administrator setting forth his reasons for such determination and shall submit a report of such determination to the Chief of Engineers in accordance with 33 CFR §§ 209.120 and 209.145.

(b) If the decision of the Chief of Engineers is that ocean dumping at the designated site is required because of the unavailability of feasible alternatives, he shall so certify and request that the Secretary of the Army seek a waiver from the Administrator of the Criteria or of the critical site designation in accordance with § 225.4.

§ 225.4 Waiver by Administrator.

The Administrator shall grant the requested waiver unless within 30 days of his receipt of the notice, certificate and request in accordance with paragraph (b) of § 225.3 he determines in accordance with this section that the proposed dumping will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. Notice of the Administrator's final determination under this section shall be given to the Secretary of the Army.

PART 226—ENFORCEMENT

Sec.
226.1 Civil penalties.
226.2 Enforcement hearings.
226.3 Determinations.
226.4 Final action.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 226.1 Civil penalties.

In addition to the criminal penalties provided for in section 105(b) of the Act, the Administrator or his designee may assess a civil penalty of not more than $50,000 for each violation of the Act and of this subchapter. Upon receipt of information that any person has violated any provision of the Act or of this subchapter, the Administrator or his designee will notify such person in writing of the violation with which he is charged, and will convene a hearing no sooner than 60 days after such notice, at a convenient location, before a hearing officer. Such hearing shall be conducted in accordance with the procedures of § 226.2.

§ 226.2 Enforcement hearings.

Hearings convened pursuant to § 226.1 shall be hearings on a record before a hearing officer. Parties may be represented by counsel and will have the right to submit motions, to present evidence in their own behalf, to cross-examine adverse witnesses, to be apprised of all evidence considered by the hearing officer, and to receive copies of the transcript of the proceedings. Formal rules of evidence will not apply. The hearing officer will rule on all evidentiary matters, and on all motions, which will be subject to review pursuant to § 226.3.

§ 226.3 Determinations.

Within 30 days following adjournment of the hearing, the hearing officer will in all cases make findings of facts and recommendations to the Administrator including, when appropriate, a recommended appropriate penalty, after consideration of the gravity of the violation, prior violations by the person charged,

and the demonstrated good faith by such person in attempting to achieve rapid compliance with the provisions of the Act and this subchapter. A copy of the findings and recommendations of the hearing officer shall be provided to the person charged at the same time they are forwarded to the Administrator. Within 30 days of the date on which the hearing officer's findings and recommendations are forwarded to the Administrator, any party objecting thereto may file written exceptions with the Administrator.

§ 226.4 Final action.

A final order on a proceeding under this Part will be issued by the Administrator, or by such other person designated by the Administrator to take such final action, no sooner than 30 days following receipt of the findings and recommendations of the hearing officer. A copy of the final order will be served by registered mail (return receipt requested) on the person charged or his representative. In the event the final order assesses a penalty, it shall be payable within 60 days of the date of receipt of the final order, unless judicial review of the final order is sought by the person against whom the penalty is assessed.

PART 227—CRITERIA FOR THE EVALUATION OF PERMIT APPLICATIONS FOR OCEAN DUMPING OF MATERIALS

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Subpart A—General

§ 227.1 Applicability.

(a) Section 102 of the Act requires that criteria for the issuance of ocean disposal permits be promulgated after consideration of the environmental effect of the proposed dumping operation, the need for ocean dumping, alternatives to ocean dumping, and the effect of the proposed action on esthetic, recreational and economic values and on other uses of the ocean. This Part 227 and Part 228 of this Subchapter H together constitute the criteria established pursuant to section 102 of the Act. The decision of the Administrator, Regional Administrator or the District Engineer, as the case may be, to issue or deny a permit and to impose specific conditions on any permit issued will be based on an evaluation of the permit application pursuant to the criteria set forth in this Part 227 and upon the requirements for disposal site management pursuant to the criteria set forth in Part 228 of this Subchapter H.

(b) With respect to the criteria to be used in evaluating disposal of dredged materials, this section and Subparts C, D, E, and G apply in their entirety. To determine whether the proposed dumping of dredged material complies with Subpart B, only §§ 227.4, 227.5, 227.6, 227.9, 227.10 and 227.13 apply. An applicant for a permit to dump dredged material must comply with all of Subparts C, D, E, G and applicable sections of B, to be deemed to have met the EPA criteria for dredged material dumping promulgated pursuant to section 102(a) of the Act. If, in any case, the Chief of Engineers finds that, in the disposition of dredged material, there is no economically feasible method or site available other than a dumping site, the utilization of which would result in noncompliance with the criteria established pursuant to Subpart B relating to the effects of dumping or with the restrictions established pursuant to section 102(c) of the Act relating to critical areas, he shall so certify and request that the Secretary of the Army seek a waiver from the Administrator pursuant to Part 225.

(c) The Criteria of this Part 227 are established pursuant to section 102 of the Act and apply to the evaluation of proposed dumping of materials under Title I of the Act. The Criteria of this Part 227 deal with the evaluation of proposed dumping of materials on a case-by-case basis from information supplied by the applicant or otherwise available to EPA or the Corps of Engineers concerning the characteristics of the waste and other considerations relating to the proposed dumping.

(d) After consideration of the provisions of §§ 227.28 and 227.29, no permit will be issued when the dumping would result in a violation of applicable water quality standards.

§ 227.2 Materials which satisfy the environmental impact criteria of Subpart B.

(a) If the applicant satisfactorily demonstrates that the material proposed for ocean dumping satisfies the environmental impact criteria set forth in Subpart B, a permit for ocean dumping will be issued unless:

(1) There is no need for the dumping, and alternative means of disposal are available, as determined in accordance with the criteria set forth in Subpart C; or

(2) There are unacceptable adverse effects on esthetic, recreational or economic values as determined in accordance with the criteria set forth in Subpart D; or

(3) There are unacceptable adverse effects on other uses of the ocean as determined in accordance with the criteria set forth in Subpart E.

(b) If the material proposed for ocean dumping satisfies the environmental impact criteria set forth in Subpart B, but the Administrator or the Regional Administrator, as the case may be, determines that any one of the considerations set forth in paragraphs (a) (1), (2) or (3) of this section applies, he will deny the permit application; provided however, that he may issue an interim permit for ocean dumping pursuant to paragraph (d) of § 220.3 and Subpart F of this Part 227 when he determines that:

(1) The material proposed for ocean dumping does not contain any of the materials listed in § 227.5 or listed in § 227.6, except as trace contaminants; and

(2) In accordance with Subpart C there is a need to ocean dump the material and no alternatives are available to such dumping; and

(3) The need for the dumping and the unavailability of alternatives, as determined in accordance with Subpart C, are of greater significance to the public interest than the potential for adverse effect on esthetic, recreational or economic values, or on other uses of the ocean, as determined in accordance with Subparts D and E, respectively.

§ 227.3 Materials which do not satisfy the environmental impact criteria set forth in Subpart B.

If the material proposed for ocean dumping does not satisfy the environmental impact criteria of Subpart B, the Administrator or the Regional Administrator, as the case may be, will deny the permit application; provided however, that he may issue an interim permit pursuant to paragraph (d) of § 220.3 and Subpart F of this Part 227 when he determines that:

(a) The material proposed for dumping does not contain any of the materials listed in Section 227.6 except as trace contaminants, or any of the materials listed in § 227.5;

(b) In accordance with Subpart C there is a need to ocean dump the material; and

(c) Any one of the following factors is of greater significance to the public interest than the potential for adverse impact on the marine environment, as determined in accordance with Subpart B:

(1) The need for the dumping, as determined in accordance with Subpart C; or

(2) The adverse effects of denial of the permit on recreational or economic values as determined in accordance with Subpart D; or

(3) The adverse effects of denial of the permit on other uses of the ocean, as determined in accordance with Subpart E.

Subpart B—Environmental Impact

§ 227.4 Criteria for evaluating environmental impact.

This Subpart B sets specific environmental impact prohibitions, limits, and conditions for the dumping of materials into ocean waters. If the applicable prohibitions, limits, and conditions are satisfied, it is the determination of EPA that the proposed disposal will not unduly degrade or endanger the marine environment and that the disposal will present:

(a) No unacceptable adverse effects on human health and no significant damage to the resources of the marine environment;

(b) No unacceptable adverse effect on the marine ecosystem;

(c) No unacceptable adverse persistent or permanent effects due to the dumping of the particular volumes or concentrations of these materials; and

(d) No unacceptable adverse effect on the ocean for other uses as a result of direct environmental impact.

§ 227.5 Prohibited materials.

The ocean dumping of the following materials will not be approved by EPA or the Corps of Engineers under any circumstances:

(a) High-level radioactive wastes as defined in § 227.30;

(b) Materials in whatever form (including without limitation, solids, liquids, semi-liquids, gases or organisms) produced or used for radiological, chemical or biological warfare;

(c) Materials insufficiently described by the applicant in terms of their compositions and properties to permit application of the environmental impact criteria of this Subpart B;

(d) Persistent inert synthetic or natural materials which may float or remain in suspension in the ocean in such a manner that they may interfere materially with fishing, navigation, or other legitimate uses of the ocean.

§ 227.6 Constituents prohibited as other than trace contaminants.

(a) Subject to the exclusions of paragraphs (f), (g) and (h) of this section, the ocean dumping, or transportation for dumping, of materials containing the following constituents as other than trace contaminants will not be approved on other than an emergency basis:

(1) Organohalogen compounds;

(2) Mercury and mercury compounds;

(3) Cadmium and cadmium compounds;

(4) Oil of any kind or in any form, including but not limited to petroleum, oil sludge, oil refuse, crude oil, fuel oil, heavy diesel oil, lubricating oils, hydraulic fluids, and any mixtures containing these, transported for the purpose of dumping insofar as these are not regulated under the FWPCA;

(5) Known carcinogens, mutagens, or teratogens or materials suspected to be carcinogens, mutagens, or teratogens by responsible scientific opinion.

(b) These constituents will be considered to be present as trace contaminants only when they are present in materials otherwise acceptable for ocean dumping in such forms and amounts in liquid, suspended particulate, and solid phases that the dumping of the materials will not cause significant undesirable effects, including the possibility of danger associated with their bioaccumulation in marine organisms.

(c) The potential for significant undesirable effects due to the presence of these constituents shall be determined by application of results of bioassays on liquid, suspended particulate, and solid phases of wastes according to procedures acceptable to EPA, and for dredged material, acceptable to EPA and the Corps of Engineers. Materials shall be deemed environmentally acceptable for ocean dumping only when the following conditions are met:

(1) The liquid phase does not contain any of these constituents in concentrations which will exceed applicable marine water quality criteria after allowance for initial mixing; provided that mercury concentrations in the disposal site, after allowance for initial mixing, may exceed the average normal ambient concentrations of mercury in ocean waters at or near the dumping site which would be present in the absence of dumping, by not more than 50 percent; and

(2) Bioassay results on the suspended particulate phase of the waste do not indicate occurrence of significant mortality or significant adverse sublethal effects including bioaccumulation due to the dumping of wastes containing the constituents listed in paragraph (a) of this section. These bioassays shall be conducted with appropriate sensitive marine organisms as defined in § 227.27(c) using procedures for suspended particulate phase bioassays approved by EPA, or, for dredged material, approved by EPA and the Corps of Engineers. Procedures approved for bioassays under this section will require exposure of organisms for a sufficient period of time and under appropriate conditions to provide reasonable assurance, based on consideration of the statistical significance of effects at the 95 percent confidence level, that, when the materials are dumped, no significant undesirable effects will occur due either to chronic toxicity or to bioaccumulation of the constituents listed in paragraph (a) of this section; and

(3) Bioassay results on the solid phase of the wastes do not indicate occurrence of significant mortality or significant adverse sublethal effects due to the dumping of wastes containing the constituents listed in paragraph (a) of this section. These bioassays shall be conducted with sensitive benthic organisms using benthic bioassay procedures approved by EPA, or, for dredged material, approved by EPA and the Corps of Engineers. Procedures approved for bioassays under this section will require exposure of organisms for a sufficient period of time to provide reasonable assurance, based on considerations of statistical significance of effects at the 95 percent confidence level, that, when the materials are dumped, no significant undesirable effects will occur due either to chronic toxicity or to bioaccumulation of the constituents listed in paragraph (a) of this section; and

(4) For persistent organohalogens not included in the applicable marine water quality criteria, bioassay results on the liquid phase of the waste show that such compounds are not present in concentrations large enough to cause significant undesirable effects due either to chronic toxicity or to bioaccumulation in marine organisms after allowance for initial mixing.

(d) When the Administrator, Regional Administrator or District Engineer, as the case may be, has reasonable cause to believe that a material proposed for ocean dumping contains compounds identified as carcinogens, mutagens, or teratogens for which criteria have not been included in the applicable marine water quality criteria, he may require special studies to be done prior to issuance of a permit to determine the impact of disposal on human health and/or marine ecosystems. Such studies must provide information comparable to that required under paragraph (c)(3) of this section.

(e) The criteria stated in paragraphs (c) (2) and (3) of this section will become mandatory as soon as announcement of the availability of acceptable procedures is made in the FEDERAL REGISTER. At that time the interim criteria contained in paragraph (e) of this section shall no longer be applicable. As interim measures the criteria of paragraphs (c) (2) and (3) of this section may be applied on a case-by-case basis where interim guidance on acceptable bioassay procedures is provided by the Regional Administrator or, in the case of dredged material, by the District Engineer; or, in the absence of such guidance, permits may be issued for the dumping of any material only when the following conditions are met, except under an emergency permit:

(1) Mercury and its compounds are present in any solid phase of a material in concentrations less than 0.75 mg/kg,

or less than 50 percent greater than the average total mercury content of natural sediments of similar lithologic characteristics as those at the disposal site; and

(2) Cadmium and its compounds are present in any solid phase of a material in concentrations less than 0.6 mg/kg, or less than 50 percent greater than the average total cadmium content of natural sediments of similar lithologic characteristics as those at the disposal site; and

(3) The total concentration of organohalogen constituents in the waste as transported for dumping is less than a concentration known to be toxic to marine organisms. In calculating the concentration of organohalogens, the applicant shall consider that these constituents are all biologically available. The determination of the toxicity value will be based on existing scientific data or developed by the use of bioassays conducted in accordance with approved EPA procedures; and

(4) The total amounts of oils and greases as identified in paragraph (a)(4) of this section do not produce a visible surface sheen in an undisturbed water sample when added at a ratio of one part waste material to 100 parts of water.

(f) The prohibitions and limitations of this section do not apply to the constituents identified in paragraph (a) of this section when the applicant can demonstrate that such constituents are (1) present in the material only as chemical compounds or forms (e.g., inert insoluble solid materials) non-toxic to marine life and non-bioaccumulative in the marine environment upon disposal and thereafter, or (2) present in the material only as chemical compounds or forms which, at the time of dumping and thereafter, will be rapidly rendered non-toxic to marine life and non-bioaccumulative in the marine environment by chemical or biological degradation in the sea; provided they will not make edible marine organisms unpalatable; or will not endanger human health or that of domestic animals, fish, shellfish, or wildlife.

(g) The prohibitions and limitations of this section do not apply to the constituents identified in paragraph (a) of this section for the granting of research permits if the substances are rapidly rendered harmless by physical, chemical or biological processes in the sea; provided they will not make edible marine organisms unpalatable and will not endanger human health or that of domestic animals.

(h) The prohibitions and limitations of this section do not apply to the constituents identified in paragraph (a) of this section for the granting of permits for the transport of these substances for the purpose of incineration at sea if the applicant can demonstrate that the stack emissions consist of substances which are rapidly rendered harmless by physical, chemical or biological processes in the sea. Incinerator operations shall comply with requirements which will be established on a case-by-case basis.

§ 227.7 Limits established for specific wastes or waste constituents.

Materials containing the following constituents must meet the additional limitations specified in this section to be deemed acceptable for ocean dumping:

(a) Liquid waste constituents immiscible with or slightly soluble in seawater, such as benzene, xylene, carbon disulfide and toluene, may be dumped only when they are present in the waste in concentrations below their solubility limits in seawater. This provision does not apply to materials which may interact with ocean water to form insoluble materials;

(b) Radioactive materials, other than those prohibited by § 227.5, must be contained in accordance with the provisions of § 227.11 to prevent their direct dispersion or dilution in ocean waters;

(c) Wastes containing living organisms may not be dumped if the organisms present would endanger human health or that of domestic animals, fish, shellfish and wildlife by:

(1) Extending the range of biological pests, viruses, pathogenic microorganisms or other agents capable of infesting, infecting or extensively and permanently altering the normal populations of organisms;

(2) Degrading uninfected areas; or

(3) Introducing viable species not indigenous to an area.

(d) In the dumping of wastes of highly acidic or alkaline nature into the ocean, consideration shall be given to: (1) the effects of any change in acidity or alkalinity of the water at the disposal site; and (2) the potential for synergistic effects or for the formation of toxic compounds at or near the disposal site. Allowance may be made in the permit conditions for the capability of ocean waters to neutralize acid or alkaline wastes; provided, however, that dumping conditions must be such that the average total alkalinity or total acidity of the ocean water after allowance for initial mixing, as defined in § 227.29, may be changed, based on stoichiometric calculations, by no more than 10 per cent during all dumping operations at a site to neutralize acid or alkaline wastes.

(e) Wastes containing biodegradable constituents, or constituents which consume oxygen in any fashion, may be dumped in the ocean only under conditions in which the dissolved oxygen after allowance for initial mixing, as defined in § 227.29, will not be depressed by more than 25 per cent below the normally anticipated ambient conditions in the disposal area at the time of dumping.

§ 227.8 Limitations on the disposal rates of toxic wastes.

No wastes will be deemed acceptable for ocean dumping unless such wastes can be dumped so as not to exceed the limiting permissible concentration as defined in § 227.27; provided that this § 227.8 does not apply to those wastes for which specific criteria are established in § 227.11 or 227.12. Total quantities of wastes dumped at a site may be limited as described in § 228.5.

§ 227.9 Limitations on quantities of waste materials.

Substances which may damage the ocean environment due to the quantities in which they are dumped, or which may seriously reduce amenities, may be dumped only when the quantities to be dumped at a single time and place are controlled to prevent long-term damage to the environment or to amenities.

§ 227.10 Hazards to fishing, navigation, shorelines or beaches.

(a) Wastes which may present a serious obstacle to fishing or navigation may be dumped only at disposal sites and under conditions which will ensure no unacceptable interference with fishing or navigation.

(b) Wastes which may present a hazard to shorelines or beaches may be dumped only at sites and under conditions which will insure no unacceptable danger to shorelines or beaches.

§ 227.11 Containerized wastes.

(a) Wastes containerized solely for transport to the dumping site and expected to rupture or leak on impact or shortly thereafter must meet the appropriate requirements of §§ 227.6, 227.7, 227.8, 227.9 and 227.10.

(b) Other containerized wastes will be approved for dumping only under the following conditions:

(1) The materials to be disposed of decay, decompose or radiodecay to environmentally innocuous materials within the life expectancy of the containers and/or their inert matrix; and

(2) Materials to be dumped are present in such quantities and are of such nature that only short-term localized adverse effects will occur should the containers rupture at any time; and

(3) Containers are dumped at depths and locations where they will cause no threat to navigation, fishing, shorelines, or beaches.

§ 227.12 Insoluble wastes.

(a) Solid wastes consisting of inert natural minerals or materials compatible with the ocean environment may be generally approved for ocean dumping provided they are insoluble above the applicable trace or limiting permissible concentrations and are rapidly and completely settleable, and they are of a particle size and density that they would be deposited or rapidly dispersed without damage to benthic, demersal, or pelagic biota.

(b) Persistent inert synthetic or natural materials which may float or remain in suspension in the ocean as prohibited in paragraph (d) of § 227.5 may be dumped in the ocean only when they have been processed in such a fashion that they will sink to the bottom and remain in place.

§ 227.13 Dredged materials.

(a) Dredged materials are bottom sediments or materials that have been dredged or excavated from the navigable waters of the United States, and their disposal into ocean waters is regulated by the U.S. Army Corps of Engineers using the criteria of applicable sections of Parts 227 and 228. Dredged material consists primarily of natural sediments or materials which may be contaminated by municipal or industrial wastes or by runoff from terrestrial sources such as agricultural lands.

(b) Dredged material which meets the criteria set forth in the following paragraphs (1), (2), or (3) is environmentally acceptable for ocean dumping without further testing under this section:

(1) Dredged material is composed predominantly of sand, gravel, rock, or any other naturally occurring bottom material with particle sizes larger than silt, and the material is found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels; or

(2) Dredged material is for beach nourishment or restoration and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches; or

(3) When: (i) The material proposed for dumping is substantially the same as the substrate at the proposed disposal site; and

(ii) The site from which the material proposed for dumping is to be taken is far removed from known existing and historical sources of pollution so as to provide reasonable assurance that such material has not been contaminated by such pollution.

(c) When dredged material proposed for ocean dumping does not meet the criteria of paragraph (b) of this section, further testing of the liquid, suspended particulate, and solid phases, as defined in § 227.32, is required. Based on the results of such testing, dredged material can be considered to be environmentally acceptable for ocean dumping only under the following conditions:

(1) The material is in compliance with the requirements of § 227.6; and

(2) (i) All major constituents of the liquid phase are in compliance with the applicable marine water quality criteria after allowance for initial mixing; or

(ii) When the liquid phase contains major constituents not included in the applicable marine water quality criteria, or there is reason to suspect synergistic effects of certain contaminants, bioassays on the liquid phase of the dredged material show that it can be discharged so as not to exceed the limiting permissible concentration as defined in paragraph (a) of § 227.27; and

(3) Bioassays on the suspended particulate and solid phases show that it can be discharged so as not to exceed the limiting permissible concentration as defined in paragraph (b) of § 227.27.

(d) For the purposes of paragraph (c)(2), major constituents to be analyzed in the liquid phase are those deemed critical by the District Engineer, after evaluating and considering any comments received from the Regional Administrator, and considering known sources of discharges in the area.

Subpart C—Need for Ocean Dumping

§ 227.14 Criteria for evaluating the need for ocean dumping and alternatives to ocean dumping.

This Subpart C states the basis on which an evaluation will be made of the need for ocean dumping, and alternatives to ocean dumping. The nature of these factors does not permit the promulgation of specific quantitative criteria of each permit application. These factors will therefore be evaluated if applicable for each proposed dumping on an individual basis using the guidelines specified in this Subpart C.

§ 227.15 Factors considered.

The need for dumping will be determined by evaluation of the following factors:

(a) Degree of treatment useful and feasible for the waste to be dumped, and whether or not the waste material has been or will be treated to this degree before dumping;

(b) Raw materials and manufacturing or other processes resulting in the waste, and whether or not these materials or processes are essential to the provision of the applicant's goods or services, or if other less polluting materials or processes could be used;

(c) The relative environmental risks, impact and cost for ocean dumping as opposed to other feasible alternatives including but not limited to:

(1) Land fill;

(2) Well injection;

(3) Incineration;

(4) Spread of material over open ground;

(5) Recycling of material for reuse;

(6) Additional biological, chemical, or physical treatment of intermediate or final waste streams;

(7) Storage.

(d) Irreversible or irretrievable consequences of the use of alternatives to ocean dumping.

§ 227.16 Basis for determination of need for ocean dumping.

(a) A need for ocean dumping will be considered to have been demonstrated when a thorough evaluation of the factors listed in § 227.15 has been made, and the Administrator, Regional Administrator or District Engineer, as the case may be, has determined that the following conditions exist where applicable:

(1) There are no practicable improvements which can be made in process technology or in overall waste treatment to reduce the adverse impacts of the waste on the total environment;

(2) There are no practicable alternative locations and methods of disposal or recycling available, including without limitation, storage until treatment facilities are completed, which have less adverse environmental impact or potential risk to other parts of the environment than ocean dumping.

(b) For purposes of paragraph (a) of this section, waste treatment or improvements in processes and alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures, which need not be competitive with the costs of ocean dumping, taking into account the environmental benefits derived from such activity, including the relative adverse environmental impacts associated with the use of alternatives to ocean dumping.

(c) The duration of permits issued under Subchapter H and other terms and conditions imposed in those permits shall be determined after taking into account the factors set forth in this section. Notwithstanding compliance with Subparts B, D, and E of this Part 227 permittees may, on the basis of the need for and alternatives to ocean dumping, be required to terminate all ocean dumping by a specified date, to phase out all ocean dumping over a specified period or periods, to continue research and development of alternative methods of disposal and make periodic reports of such research and development in order to provide additional information for periodic review of the need for and alternatives to ocean dumping, or to take such other action as the Administrator, the Regional Administrator, or District Engineer, as the case may be, determines to be necessary or appropriate.

Subpart D—Impact of the Proposed Dumping on Esthetic, Recreational and Economic Values

§ 227.17 Basis for determination.

(a) The impact of dumping on esthetic, recreational and economic values will be evaluated on an individual basis using the following considerations:

(1) potential for affecting recreational use and values of ocean waters, inshore waters, beaches, or shorelines;

(2) potential for affecting the recreational and commercial values of living marine resources.

(b) For all proposed dumping, full consideration will be given to such nonquantifiable aspects of esthetic, recreational and economic impact as:

(1) responsible public concern for the consequences of the proposed dumping;

(2) consequences of not authorizing the dumping including without limitation, the impact on esthetic, recreational and economic values with respect to the municipalities and industries involved.

§ 227.18 Factors considered.

The assessment of the potential for impacts on esthetic, recreational and economic values will be based on an evaluation of the appropriate characteristics of the material to be dumped, allowing for conservative rates of dilution, dispersion, and biochemical degradation during movement of the materials from a disposal site to an area of significant recreational or commercial value. The following specific factors will be considered in making such an assessment:

(a) Nature and extent of present and potential recreational and commercial use of areas which might be affected by the proposed dumping;

(b) Existing water quality, and nature and extent of disposal activities, in the areas which might be affected by the proposed dumping;

(c) Applicable water quality standards;

(d) Visible characteristics of the materials (e.g., color, suspended particulates) which result in an unacceptable esthetic nuisance in recreational areas;

(e) Presence in the material of pathogenic organisms which may cause a public health hazard either directly or through contamination of fisheries or shellfisheries;

(f) Presence in the material of toxic chemical constituents released in volumes which may affect humans directly;

(g) Presence in the material of chemical constituents which may be bioaccumulated or persistent and may have an adverse effect on humans directly or through food chain interactions;

(h) Presence in the material of any constituents which might significantly affect living marine resources of recreational or commercial value.

§ 227.19 Assessment of impact.

An overall assessment of the proposed dumping and possible alternative methods of disposal or recycling will be made based on the effect on esthetic, recreational and economic values based on the factors set forth in this Subpart D, including where applicable, enhancement of these values, and the results of the assessment will be expressed, where possible, on a quantitative basis, such as percentage of a resource lost, reduction in user days of recreational areas, or dollars lost in commercial fishery profits or the profitability of other commercial enterprises.

Subpart E—Impact of the Proposed Dumping on Other Uses of the Ocean

§ 227.20 Basis for determination.

(a) Based on current state-of-the-art, consideration must be given to any possible long-range effects of even the most innocuous substances when dumped in the ocean on a continuing basis. Such a consideration is made in evaluating the relationship of each proposed disposal activity in relationship to its potential for long-range impact on other uses of the ocean.

(b) An evaluation will be made on an individual basis for each proposed dumping of material of the potential for effects on uses of the ocean for purposes other than material disposal. The factors to be considered in this evaluation include those stated in Subpart D, but the evaluation of this Subpart E will be based on the impact of the proposed dumping on specific uses of the ocean rather than on overall esthetic, recreational and economic values.

§ 227.21 Uses considered.

An appraisal will be made of the nature and extent of existing and potential uses of the disposal site itself and of any areas which might reasonably be expected to be affected by the proposed dumping, and a quantitative and qualitative evaluation made, where feasible, of the impact of the proposed dumping on each use. The uses considered shall include, but not be limited to:

(a) Commercial fishing in open ocean areas;

(b) Commercial fishing in coastal areas;

(c) Commercial fishing in estuarine areas;

(d) Recreational fishing in open ocean areas;

(e) Recreational fishing in coastal areas;

(f) Recreational fishing in estuarine areas;

(g) Recreational use of shorelines and beaches;

(h) Commercial navigation;

(i) Recreational navigation;

(j) Actual or anticipated exploitation of living marine resources;

(k) Actual or anticipated exploitation of non-living resources, including without limitation, sand and gravel places and other mineral deposits, oil and gas exploration and development and offshore marine terminal or other structure development; and

(l) Scientific research and study.

§ 227.22 Assessment of impact.

The assessment of impact on other uses of the ocean will consider both temporary and long-range effects within the state of the art, but particular emphasis will be placed on any irreversible or irretrievable commitment of resources that would result from the proposed dumping.

Subpart F—Special Requirements for Interim Permits Under Section 102 of the Act

§ 227.23 General requirement.

Each interim permit issued under section 102 of the Act will include a requirement for the development and implementation, as soon as practicable, of a plan which requires, at the discretion of the Administrator or Regional Administrator, as the case may be, either:

(a) Elimination of ocean disposal of the waste, or

(b) Bringing the waste into compliance with all the criteria for acceptable ocean disposal.

§ 227.24 Contents of environmental assessment.

A plan developed pursuant to this Subpart F must include an environmental assessment of the proposed action, including without limitation:

(a) Description of the proposed action;

(b) A thorough review of the actual need for dumping;

(c) Environmental impact of the proposed action;

(d) Adverse impacts which cannot be avoided should the proposal be implemented;

(e) Alternatives to the proposed action;

(f) Relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity;

(g) Irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented; and

(h) A discussion of problems and objections raised by other Federal, State and local agencies and by interested persons in the review process.

§ 227.25 Contents of plans.

In addition to the environmental assessment required by § 227.24, a plan developed pursuant to this Subpart F must include a schedule for eliminating ocean dumping or bringing the wastes into compliance with the environmental impact criteria of Subpart B, including without limitation, the following:

(a) If the waste is treated to the degree necessary to bring it into compliance with the ocean dumping criteria, the applicant should provide a description of the treatment and a scheduled program for treatment and a subsequent analysis of treated material to prove the effectiveness of the process.

(b) If treatment cannot be effected by post-process techniques the applicant should, determining the offending constituents, examine his raw materials and his total process to determine the origin of the pollutant. If the offending constituents are found in the raw material the applicant should consider a new supplier and provide an analysis of the new material to prove compliance. Raw materials are to include all water used in the process. Water from municipal sources complying with drinking water standards is acceptable. Water from other sources such as private wells should be analyzed for contaminants. Water that has been used in the process should be considered for treatment and recycling as an additional source of process water.

(c) If offending constituents are a result of the process, the applicant should investigate and describe the source of the constituents. A report of this information will be submitted to EPA and the applicant will then submit a proposal describing possible alternatives to the existing process or processes and level of cost and effectiveness.

(d) If an acceptable alternative to ocean dumping or additional control technology is required, a schedule and documentation for implementation of the alternative or approved control process shall be submitted and shall include, without limitation:

(1) Engineering plan;
(2) Financing approval;
(3) Starting date for change;
(4) Completion date;
(5) Operation starting date.

(e) If an acceptable alternative does not exist at the time the application is submitted, the applicant will submit an acceptable in-house research program or employ a competent research institution to study the problem. The program of research must be approved by the Administrator or Regional Administrator, as the case may be, before the initiation of the research. The schedule and documentation for implementation of a research program will include, without limitation:

(1) Approaches;
(2) Experimental design;
(3) Starting date;
(4) Reporting intervals;
(5) Proposed completion date;
(6) Date for submission of final report.

§ 227.26 Implementation of plans.

Implementation of each phase of a plan shall be initiated as soon as it is approved by the Administrator or Regional Administrator, as the case may be.

Subpart G—Definitions

§ 227.27 Limiting permissible concentration (LPC).

(a) The limiting permissible concentration of the liquid phase of a material is:

(1) That concentration of a constituent which, after allowance for initial mixing as provided in § 227.29, does not exceed applicable marine water quality criteria; or, when there are no applicable marine water quality criteria,

(2) That concentration of waste or dredged material in the receiving water which, after allowance for initial mixing, as specified in § 227.29, will not exceed a toxicity threshold defined as 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms in a bioassay carried out in accordance with approved EPA procedures.

(3) When there is reasonable scientific evidence on a specific waste material to justify the use of an application factor other than 0.01 as specified in paragraph (a) (2) of this section, such alternative application factor shall be used in calculating the LPC.

(b) The limiting permissible concentration of the suspended particulate and solid phases of a material means that concentration which will not cause unreasonable acute or chronic toxicity or other sublethal adverse effects based on bioassay results using appropriate sensitive marine organisms in the case of the suspended particulate phase, or appropriate sensitive benthic marine organisms in the case of the solid phase; or which will not cause accumulation of toxic materials in the human food chain. These bioassays are to be conducted in accordance with procedures approved by EPA, or, in the case of dredged material, approved by EPA and the Corps of Engineers.[1]

(c) "Appropriate sensitive marine organisms" means at least one species each representative of phytoplankton or zooplankton, crustacean or mollusk, and fish species chosen from among the most sensitive species documented in the scientific literature or accepted by EPA as being reliable test organisms to determine the anticipated impact of the wastes on the ecosystem at the disposal site. Bioassays, except on phytoplankton or zooplankton, shall be run for a minimum of 96 hours under temperature, salinity, and dissolved oxygen conditions representing the extremes of environmental stress at the disposal site. Bioassays on phytoplankton or zooplankton may be run for shorter periods of time as appropriate for the organisms tested at the discretion of EPA, or EPA and the Corps of Engineers, as the case may be.

(d) "Appropriate sensitive benthic marine organisms" means at least one species each representing filter-feeding, deposit-feeding, and burrowing species chosen from among the most sensitive species accepted by EPA as being reliable test organisms to determine the anticipated impact on the site; provided, however, that until sufficient species are adequately tested and documented, interim guidance on appropriate organisms available for use will be provided by the Administrator, Regional Administrator, or the District Engineer, as the case may be.

§ 227.28 Release zone.

The release zone is the area swept out by the locus of points constantly 100 meters from the perimeter of the conveyance engaged in dumping activities, beginning at the first moment in which dumping is scheduled to occur and ending at the last moment in which dumping is scheduled to occur. No release zone shall exceed the total surface area of the dumpsite.

§ 227.29 Initial mixing.

(a) Initial mixing is defined to be that dispersion or diffusion of liquid, suspended particulate, and solid phases of a waste which occurs within four hours after dumping. The limiting permissible concentration shall not be exceeded beyond the boundaries of the disposal site during initial mixing, and shall not be exceeded at any point in the marine environment after initial mixing. The maximum concentration of the liquid, suspended particulate, and solid phases of a dumped material after initial mixing shall be estimated by one of these methods, in order of preference:

(1) When field data on the proposed dumping are adequate to predict initial dispersion and diffusion of the waste, these shall be used, if necessary, in conjunction with an appropriate mathematical model acceptable to EPA or the District Engineer, as appropriate.

(2) When field data on the dispersion and diffusion of a waste of characteristics similar to that proposed for discharge are available, these shall be used in conjunction with an appropriate mathematical model acceptable to EPA or the District Engineer, as appropriate.

(3) When no field data are available, theoretical oceanic turbulent diffusion relationships may be applied to known characteristics of the waste and the disposal site.

(b) When no other means of estimation are feasible,

(1) The liquid and suspended particulate phases of the dumped waste may be assumed to be evenly distributed after four hours over a column of water bounded on the surface by the release zone and extending to the ocean floor, thermocline, or halocline if one exists, or to a depth of 20 meters, whichever is shallower, and

(2) The solid phase of a dumped waste may be assumed to settle rapidly to the ocean bottom and to be distributed evenly over the ocean bottom in an area equal to that of the release zone as defined in § 227.28.

(c) When there is reasonable scientific evidence to demonstrate that other methods of estimating a reasonable allowance for initial mixing are appropriate for a specific material, such methods may be used with the concurrence of EPA after appropriate scientific review.

§ 227.30 High-level radioactive waste.

High-level radioactive waste means the aqueous waste resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated waste from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuels or irradiated fuel from nuclear power reactors.

§ 227.31 Applicable marine water quality criteria.

Applicable marine water quality criteria means the criteria given for marine waters in the EPA publication "Quality Criteria for Water" as published in 1976 and amended by subsequent supplements or additions.

§ 227.32 Liquid, suspended particulate, and solid phases of a material.

(a) For the purposes of these regulations, the liquid phase of a material, subject to the exclusions of paragraph (b) of this section, is the supernatant remaining after one hour undisturbed settling, after centrifugation and filtration through a 0.45 micron filter. The suspended particulate phase is the supernatant as obtained above prior to centrifugation and filtration. The solid phase includes all material settling to the bottom in one hour. Settling shall be conducted according to procedures approved by EPA.

(b) For dredged material, other material containing large proportions of insoluble matter, materials which may interact with ocean water to form insoluble matter or new toxic compounds, or materials which may release toxic compounds upon deposition, the Administrator, Regional Administrator, or the District Engineer, as the case may be, may require that the separation of liquid, suspended particulate, and solid phases of the material be performed upon a mixture of the waste with ocean water rather than on the material itself. In

[1] An implementation manual is being developed jointly by EPA and the Corps of Engineers, and announcement of the availability of the manual will be published in the FEDERAL REGISTER. Until this manual is available, interim guidance on the appropriate procedures can be obtained from the Marine Protection Branch, WH-548, Environmental Protection Agency, 401 M Street SW, Washington, DC 20460, or the Corps of Engineers, as the case may be.

such cases the following procedures shall be used:

(1) For dredged material, the liquid phase is considered to be the centrifuged and 0.45 micron filtered supernatant remaining after one hour undisturbed settling of the mixture resulting from a vigorous 30-minute agitation of one part bottom sediment from the dredging site with four parts water (vol/vol) collected from the dredging site or from the disposal site, as appropriate for the type of dredging operation. The suspended particulate phase is the supernatant as obtained above prior to centrifugation and filtration. The solid phase is considered to be all material settling to the bottom within one hour. Settling shall be conducted by procedures approved by EPA and the Corps of Engineers.

(2) For other materials, the proportion of ocean water used shall be the minimum amount necessary to produce the anticipated effect (e.g., complete neutralization of an acid or alkaline waste) based on guidance provided by EPA on particular cases, or in accordance with approved EPA procedures. For such materials the liquid phase is the filtered and centrifuged supernatant resulting from the mixture after 30 minutes of vigorous shaking followed by undisturbed settling for one hour. The suspended particulate phase is the supernatant as obtained above prior to centrifugation and filtration. The solid phase is the insoluble material settling to the bottom in that period.

PART 228—CRITERIA FOR THE MANAGEMENT OF DISPOSAL SITES FOR OCEAN DUMPING

Sec.

228.1 Applicability.
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228.5 General criteria for the selection of sites.
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228.12 Delegation of management authority for interim ocean dumping sites.
228.13 Guidelines for ocean disposal site baseline or trend assessment surveys under Section 102 of the Act.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 228.1 Applicability.

The criteria of this Part 228 are established pursuant to section 102 of the Act and apply to the evaluation of proposed ocean dumping under Title I of the Act. The criteria of this Part 228 deal with the evaluation of the proposed dumping of material in ocean waters in relation to continuing requirements for effective management of ocean disposal sites to prevent unreasonable degradation of the marine environment from all wastes being dumped in the ocean. This Part 228 is applicable to dredged material disposal sites only as specified in §§ 228.4(e), 228.9, and 228.12.

§ 228.2 Definitions.

(a) The term "disposal site" means an interim or finally approved and precise geographical area within which ocean dumping of wastes is permitted under conditions specified in permits issued under sections 102 and 103 of the Act. Such sites are identified by boundaries established by (1) coordinates of latitude and longitude for each corner, or by (2) coordinates of latitude and longitude for the center point and a radius in nautical miles from that point. Boundary coordinates shall be identified as precisely as is warranted by the accuracy with which the site can be located with existing navigational aids or by the implantation of transponders, buoys or other means of marking the site.

(b) The term "baseline" or "trend assessment" survey means the planned sampling or measurement of parameters at set stations or in set areas in and near disposal sites for a period of time sufficient to provide synoptic data for determining water quality, benthic, or biological conditions as a result of ocean disposal operations. The minimum requirements for such surveys are given in § 228.13.

(c) The term "disposal site evaluation study" means the collection, analysis, and interpretation of all pertinent information available concerning an existing disposal site, including but not limited to, data and information from trend assessment surveys, monitoring surveys, special purpose surveys of other Federal agencies, public data archives, and social and economic studies and records of affected areas.

(d) The term "disposal site designation study" means the collection, analysis and interpretation of all available pertinent data and information on a proposed disposal site prior to use, including but not limited to, that from baseline surveys, special purpose surveys of other Federal agencies, public data archives, and social and economic studies and records of areas which would be affected by use of the proposed site.

(e) The term "management authority" means the EPA organizational entity assigned responsibility for implementing the management functions identified in § 228.3.

(f) "Statistical significance" shall mean the statistical significance determined by using appropriate standard techniques of multivariate analysis with results interpreted at the 95 percent confidence level and based on data relating species which are present in sufficient numbers at control areas to permit a valid statistical comparison with the areas being tested.

(g) "Valuable commercial and recreational species" shall mean those species for which catch statistics are compiled on a routine basis by the Federal or State agency responsible for compiling such statistics for the general geographical area impacted, or which are under current study by such Federal or State agencies for potential development for commercial or recreational use.

(h) "Normal ambient value" means that concentration of a chemical species reasonably anticipated to be present in the water column, sediments, or biota in the absence of disposal activities at the disposal site in question.

§ 228.3 Disposal site management responsibilities.

Management of a site consists of regulating times, rates, and methods of disposal and quantities and types of materials disposed of; developing and maintaining effective ambient monitoring programs for the site; conducting disposal site evaluation and designation studies; and recommending modifications in site use and/or designation (e.g., termination of use of the site for general use or for disposal of specific wastes).

Each site, upon interim or continuing use designation, will be assigned to either an EPA Regional office or to EPA Headquarters for management. These designations will be consistent with the delegation of authority in § 220.4. The designated management authority is fully responsible for all aspects of the management of sites within the general requirements specified in § 220.4 and this section. Specific requirements for meeting the management responsibilities assigned to the designated management authority for each site are outlined in §§ 228.5 and 228.6.

§ 228.4 Procedures for designation of sites.

(a) *General Permits.* Geographical areas or regions within which materials may be dumped under a general permit will be published as part of the promulgation of each general permit.

(b) *Special and Interim Permits.* Areas where ocean dumping is permitted subject to the specific conditions of individual special or interim permits, will be designated by promulgation in this Part 228, and such designation will be made based on environmental studies of each site, regions adjacent to the site, and on historical knowledge of the impact of waste disposal on areas similar to such sites in physical, chemical, and biological characteristics. All studies for the evaluation and potential selection of dumping sites will be conducted in accordance with the requirements of §§ 228.5 and 228.6.

The Administrator may, from time to time, designate specific locations for temporary use for disposal of small amounts of materials under a special permit only without disposal site designation studies when such materials satisfy the Criteria and the Administrator determines that the quantities to be disposed of at such sites will not result in significant impact on the environment. Such designations will be done by promulgation in this Part 228, and will be for a specified period of time and for specified quantities of materials.

(c) *Emergency Permits.* Dumping sites for materials disposed of under an emergency permit will be specified by the Administrator as a permit condition and will be based on an individual appraisal of the characteristics of the waste and the safest means for its disposal.

(d) *Research Permits.* Dumping sites for research permits will be determined by the nature of the proposed study. Dumping sites will be specified by the Administrator as a permit condition.

(e) *Dredged Material Permits.*

(1) Areas where ocean dumping of dredged material is permitted subject to the specific conditions of Dredged Material permits issued by the U.S. Army Corps of Engineers will be designated by EPA by promulgation in this Part 228, and such designation will be made based on environmental studies of each site, regions adjacent to the site, and on historical knowledge of the impact of dredged material disposal on areas similar to such sites in physical, chemical, and biological characteristics. All studies for the evaluation and potential selection of dredged material disposal sites will be conducted in accordance with the appropriate requirements of §§ 228.5 and 228.6, except that:

(i) Baseline or trend assessment requirements may be developed on a case-by-case basis from the results of research, including that now in progress by the Corps of Engineers.

(ii) An environmental impact assessment for all sites within a particular geographic area may be prepared based on complete disposal site designation or evaluation studies on a typical site or sites in that area. In such cases, sufficient studies to demonstrate the generic similarity of all sites within such a geographic area will be conducted.

(2) In those cases where a recommended disposal site has not been designated by the Administrator, or where it is not feasible to utilize a recommended disposal site that has been designated by the Administrator, the District Engineer shall, in consultation with EPA, select a site in accordance with the requirements of §§ 228.5 and 228.6(a). Concurrence by EPA in permits issued for the use of such site for the dumping of dredged material at the site will constitute EPA approval of the use of the site for dredged material disposal only.

(3) Sites designated for the ocean dumping of dredged material in accordance with the procedures of paragraphs (e)(1) or (e)(2) of this section shall be used only for the ocean dumping of dredged material under permits issued by the U.S. Army Corps of Engineers.

§ 228.5 General criteria for the selection of sites.

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(c) If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in §§ 228.5–228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

§ 228.6 Specific criteria for site selection.

(a) In the selection of disposal sites, in addition to other necessary or appropriate factors determined by the Administrator, the following factors will be considered:

(1) Geographical position, depth of water, bottom topography and distance from coast;

(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;

(3) Location in relation to beaches and other amenity areas;

(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;

(5) Feasibility of surveillance and monitoring;

(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;

(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);

(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;

(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;

(10) Potentiality for the development or recruitment of nuisance species in the disposal site;

(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

(b) The results of a disposal site evaluation and/or designation study based on the criteria stated in paragraphs (1)–(11) will be presented in support of the site designation promulgation as an environmental assessment of the impact of the use of the site for disposal, and will be used in the preparation of an environmental impact statement for each site where such a statement is required by EPA policy. By publication of a notice in accordance with this Part 228, an environmental impact statement, in draft form, will be made available for public comment not later than the time of publication of the site designation as proposed rulemaking, and a final EIS will be made available at the time of final rulemaking.

§ 228.7 Regulation of disposal site use.

Where necessary, disposal site use will be regulated by setting limitations on times of dumping and rates of discharge, and establishing a disposal site monitoring program.

§ 228.8 Limitations on times and rates of disposal.

Limitations as to time for and rates of dumping may be stated as part of the promulgation of site designation. The times and the quantities of permitted material disposal will be regulated by the EPA management authority so that the limits for the site as specified in the site designation are not exceeded. This will be accomplished by the denial of permits for the disposal of some materials, by the imposition of appropriate conditions on other permits and, if necessary, the designation of new disposal sites under the procedures of § 228.4. In no case may the total volume of material disposed of at any site under special or interim permits cause the concentration of the total materials or any constituent of any of the materials being disposed of at the site to exceed limits specified in the site designation.

§ 228.9 Disposal site monitoring.

(a) The monitoring program, if deemed necessary by the Regional Administrator or the District Engineer, as appropriate, may include baseline or trend assessment surveys by EPA, NOAA, other Federal agencies, or contractors, special studies by permittees, and the analysis and interpretation of data from remote or automatic sampling and/or sensing devices. The primary purpose of the monitoring program is to evaluate the impact of disposal on the marine environment by referencing the monitoring results to a set of baseline conditions. When disposal sites are being used on a continuing basis, such programs may consist of the following components:

(i) Trend assessment surveys conducted at intervals frequent enough to assess the extent and trends of environmental impact. Until survey data or other information are adequate to show that changes in frequency or scope are necessary or desirable, trend assessment and baseline surveys should generally conform to the applicable requirements of § 228.13. These surveys shall be the responsibility of the Federal government.

(2) Special studies conducted by the permittee to identify immediate and short-term impacts of disposal operations.

(b) These surveys may be supplemented, where feasible and useful, by data collected from the use of automatic sampling buoys, satellites or in situ platforms, and from experimental programs.

(c) EPA will require the full participation of permittees, and encourage the full participation of other Federal and State and local agencies in the development and implementation of disposal site monitoring programs. The monitoring and research programs presently supported by permittees may be incorporated into the overall monitoring program insofar as feasible.

§ 228.10 Evaluating disposal impact.

(a) Impact of the disposal at each site designated under section 102 of the Act will be evaluated periodically and a report will be submitted as appropriate as part of the Annual Report to Congress. Such reports will be prepared by or under the direction of the EPA management authority for a specific site and will be based on an evaluation of all data available from baseline and trend assessment surveys, monitoring surveys, and other data pertinent to conditions at and near a site.

(b) The following types of effects, in addition to other necessary or appropriate considerations, will be considered in determining to what extent the marine environment has been impacted by materials disposed of at an ocean disposal site:

(1) Movement of materials into estuaries or marine sanctuaries, or onto oceanfront beaches, or shorelines;

(2) Movement of materials toward productive fishery or shellfishery areas;

(3) Absence from the disposal site of pollution-sensitive biota characteristic of the general area;

(4) Progressive, non-seasonal, changes in water quality or sediment composition at the disposal site, when these changes are attributable to materials disposed of at the site;

(5) Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the disposal site, when these changes can be attributed to the effects of materials disposed of at the site;

(6) Accumulation of material constituents (including without limitation, human pathogens) in marine biota at or near the site.

(c) The determination of the overall severity of disposal at the site on the marine environment, including without limitation, the disposal site and adjacent areas, will be based on the evaluation of the entire body of pertinent data using appropriate methods of data analysis for the quantity and type of data available. Impacts will be categorized according to the overall condition of the environment of the disposal site and adjacent areas based on the determination by the EPA management authority assessing the nature and extent of the effects identified in paragraph (b) of this section in addition to other necessary or appropriate considerations. The following categories shall be used:

(1) *Impact Category I:* The effects of activities at the disposal site shall be categorized in Impact Category I when one or more of the following conditions is present and can reasonably be attributed to ocean dumping activities:

(i) There is identifiable progressive movement or accumulation, in detectable concentrations above normal ambient values, of any waste or waste constituent from the disposal site within 12 nautical miles of any shoreline, marine sanctuary designated under Title III of the Act, or critical area designated under section 102(c) of the Act; or

(ii) The biota, sediments, or water column of the disposal site, or of any area outside the disposal site where any waste or waste constituent from the disposal site is present in detectable concentrations above normal ambient values, are adversely affected by the toxicity of such waste or waste constituent to the extent that there are statistically significant decreases in the populations of valuable commercial or recreational species, or of specific species of biota essential to the propagation of such species, within the disposal site and such other area as compared to populations of the same organisms in comparable locations outside such site and area; or

(iii) Solid waste material disposed of at the site has accumulated at the site or in areas adjacent to it, to such an extent that major uses of the site or of adjacent areas are significantly impaired and the Federal or State agency responsible for regulating such uses certifies that such significant impairment has occurred and states in its certificate the basis for its determination of such impairment; or

(iv) There are adverse effects on the taste or odor of valuable commercial or recreational species as a result of disposal activities; or

(v) When any toxic waste, toxic waste constituent, or toxic byproduct of waste interaction, is consistently identified in toxic concentrations above normal ambient values outside the disposal site more than four hours after disposal.

(2) *Impact Category II:* The effects of activities at the disposal site which are not categorized in Impact Category I shall be categorized in Impact Category II.

§ 228.11 Modification in disposal site use.

(a) Modifications in disposal site use which involve the withdrawal of designated disposal sites from use or permanent changes in the total specified quantities or types of wastes permitted to be discharged to a specific disposal site will be made through promulgation of an amendment to the disposal site designation set forth in this Part 228 and will be based on the results of the analyses of impact described in § 228.10 or upon changed circumstances concerning use of the site.

(b) Modifications in disposal site use promulgated pursuant to paragraph (a) of this section shall not automatically modify conditions of any outstanding permit issued pursuant to this Subchapter H, and provided further that unless the EPA management authority for such site modifies, revokes or suspends such permit or any of the terms or conditions of such permit in accordance with the provisions of § 228.2 based on the results of impact analyses as described in § 228.10 or upon changed circumstances concerning use of the site, such permit will remain in force until its expiration date.

(c) When the EPA management authority determines that activities at a disposal site have placed the site in Impact Category I, the Administrator or the Regional Administrator, as the case may be, shall place such limitations on the use of the site as are necessary to reduce the impacts to acceptable levels.

(d) The determination of the Administrator as to whether to terminate or limit use of a disposal site will be based on the impact of disposal at the site itself and on the Criteria.

§ 228.12 Delegation of management authority for interim ocean dumping sites.

(a) The following sites are approved for dumping the indicated materials on an interim basis pending completion of baseline or trend assessment surveys and designation for continuing use or termination of use. Management authority for all sites is delegated to the EPA organizational entity under which each site is listed. The sizes and use specifications are based on historical usage and do not necessarily meet the criteria stated in this Part. This list of interim sites will remain in force for a period not to exceed three years from the date of final promulgation of this Part 228, except for those sites approved for continuing use or disapproved for use by promulgation in this Part during that period of time.

Approved interim dumping sites

Location (latitude, longitude)	EPA region	Primary use
43°33'00" N., 69°58'00" W., 1 nautical mile radius	I	Industrial wastes.
42°25'42" N., 70°35'00" W., 1 nautical mile radius	I	Do.
40°22'30" N. to 40°25'00" N., 73°41'30" W. to 73°45'00" W	II	Municipal sewage sludge.
40°18'00" N. to 40°20'00" N., 73°36'00" W. to 73°40'00" W	II	Acid wastes.
38°40'00" N. to 39°00'00" N., 72°00'00" W. to 72°30'00" W	II	Industrial wastes.
40°3'00" N., 73°49'00" W., 0.6 nautical mile radius	II	Cellar dirt.
40°10'00" N., 73°42'00" W., 0.8 nautical mile radius	II	Wrecks.
19°10'00" N. to 19°20'00" N., 66°35'00" W. to 66°50'00" W	II	Industrial wastes.
38°30'00" N. to 38°35'00" N., 74°15'00" W. to 74°25'00" W	III	Acid wastes.
39°20'00" N. to 39°25'00" N., 74°10'00" W. to 74°20'00" W	III	Municipal sewage sludge.
31°46'00" N., 80°30'00" W., 31°47'00" N., 80°30'30" W., 31°45'00" N., 80°30'30" W., 31°46'30" N., 80°32'00" W.	IV	Industrial wastes.
27°12'00" N. to 27°28'00" N., 94°25'00" W. to 94°41'00" W	VI	Do.
25°00'00" N. to 25°10'00" N., 89°15'00" W. to 89°30'00" W	VI	Do.

DREDGED MATERIAL SITES

(All dredged material sites will be retained under EPA Headquarters management until formally approved for continuing use or otherwise assigned for Regional management prior to such designation.)

LOCATION (LAT., LONG.)

Marblehead, MA—42°25'42" N., 70°34'00" W. (2 N. Mi. diameter).

Boston, MA—41°49'00" N., 70°25'00" W. (1 N. Mi. diameter).

Portland, ME—43°32'18" N., 70°06'06" W. (1 Mi. diameter).

Cape Arundel, ME—43°17'45" N., 70°27'12" W. (500 yds. diameter).

Absecon Inlet—39°21'07" N., 74°23'40" W.; 39°21'18" N., 74°23'53" W.

Cold Spring Inlet—38°55'41" N., 74°53'05" W.; 38°58'33" N., 74°53'23" W.

Manasquan Inlet—40°06'22" N., 74°01'46" W.; 40°06'38" N., 74°01'39" W.

East Rockaway—40°34'36" N., 73°40'00" W.; 40°35'06" N., 73°47'06" W.; 40°34'10" N., 73°48'36" W.; 40°34'12" N., 73°47'17" W.

Jones Inlet—40°34'32" N., 73°39'14" W.; 40°-34'32" N., 73°37'06" W.; 40°33'48" N., 73°-37'06" W.; 40°33'48" N., 73°39'14" W.

Fire Island—40°38'49" N., 73°23'50" W.; 40°-37'12" N., 73°21'30" W.; 40°36'41" N., 73°-21'20" W.; 40°36'10" N., 73°23'40" W.

Mud Dump—40°23'48" N., 73°51'28" W.; 40°-21'48" N., 73°50'00" W.; 40°21'48" N., 73°-51'28" W.; 40°23'48" N., 73°50'00" W.

Shark River—40°12'48" N., 73°59'45" W.; 40°12'44" N., 73°59'06" W.; 40°11'36" N., 73°59'28" W.; 40°11'42" N., 74°00'12" W.

Rockaway Inlet—40°32'30" N., 73°53'00" W.; 40°32'30" N., 73°54'00" W.; 40°32'00" N., 73°54'00" W.; 40°32'00" N., 73°55'00" W.

San Juan Harbor—18°30'10" N., 66°08'29" W.; 18°30'10" N., 66°09'31" W.

Mayaguez Harbor—18°14'30" N., 67°13'29" W.; 18°15'30" N., 67°14'31" W.

Arecibo Harbor—18°30'00" N., 66°42'45" W.; 18°31'00" N., 66°43'47" W.

Ponce Harbor—17°55'30" N., 66°38'29" W.; 17°54'30" N., 66°39'31" W.

Dam Neck—36°50'06" N., 75°53'17" W.; 36°46'28" N., 75°53'17" W.; 36°46'28" N., 75°-54'19" W.; 36°50'05" N., 75°54'19" W.

Wilmington Harbor, NC—Hopper dredge disposal in area east of a line beginning 33°-50'00" and 78°02'30" to 33°48'45" and 78°-04'00" to 33°45'00" and 78°05'00".

Morehead City Harbor—Maintenance dredging hoper dredge disposal area 3 miles x 3 miles; aproximate latitude and longitude, bounded north 34°40'00", south 34°38'30", east 76°41'00", west 76°43'00".

Georgetown Harbor—33°11'18" N., 79°07'20" W.; 33°11'18" N., 79°05'28" W.; 33°10'38" N., 79°07'31" W.; 33°10'38" N., 79°05'24" W.

Charleston Harbor—32°18'06" N., 79°41'57" W.; 32°40'42" N., 79°47'30" W.; 32°39'04" N., 79°48'21" W.; 32°36'28" N., 79°43'48" W.

Port Royal Harbor—32°10'11" N., 80°36'00" W.; 32°10'06" N., 80°36'35" W.; 32°06'41" N., 80°35'49" W.; 32°06'38" N., 80°36'23" W.

Port Royal Harbor—32°05'46" N., 80°35'30" W.; 32°05'42" N., 80°36'27" W.; 32°04'27" N., 80°35'18" W.; 32°04'22" N., 80°36'16" W.

Brunswick Harbor—Atlantic outlet, Ga., St. Simons Sound, Brunswick Harbor Bar Channel, maintenance dredging disposal area 1 nautical mile wide by 2 nautical miles long adjacent to the channel located on the south side of the entrance and being 6.6 nautical miles from shore at a point of beginning at 31°02'35" N. and 81°17'40" W., thence due east to 31°02'35" N. and 81°16'30" W., thence due south to 31°00'-30" N. and 81°16'30" W., thence due west to 31°00'30" N. and 81°16'30" W., thence due north to the point of beginning.

Savannah River—Atlantic outlet, Ga., Savannah River Bar Channel, maintenance dredging disposal area 2 nautical miles wide by 2 nautical miles long adjacent to the channel, located on the southeast side and being 6 nautical miles from shore at point of beginning at 31°57'55" N. and 80°46'58" W., thence due east to 31°57'55" N. and 80°44'20" W., thence due south to 31°55'53" N. and 80°46'48" W., thence northward to the point of beginning.

Canaveral Harbor—28°19'53" N., 80°31'08" W.; 28°18'50" N., 80°29'40" W.; 28°17'35" N., 80°30'52" W.; 28°18'38" N., 80°32'20" W.

Fort Pierce Harbor—27°28'30" N., 80°12'33" W.; 27°28'30" N., 80°11'27" W.; 27°27'30" N., 80°11'27" W.; 27°27'30" N., 80°12'33" W.

Jacksonville Harbor—30°21 30 " N., 81°18'34" W.; 30°21'30" N., 81°17'26" W.; 30°20'30" N., 81°17'26" W.; 30°20'30" N., 81°18'34" W.

Miami Beach—25°45'30" N., 80°03'54" W.; 25°45'30" N., 80°02'50" W.; 25°44'30" N., 80°02'50" W.; 25°44'30" N., 80°03'54" W.

Palm Beach Harbor—26°46'10" N., 80°02'00" W.; 26°45'54" N., 80°02'06" W.; 26°45'54" N., 80°02'13" W.; 26°46'10" N., 80°02'07" W.

Port Everglades Harbor—26°07'00" N., 80°04'30" W.; 26°07'00" N., 80°03'30" W.; 26°06'00" N., 80°03'30" W.; 26°06'00" N., 80°04'30" W.

St. Augustine Harbor—29°51'33" N., 81°15'24" W.; 29°51'33" N., 81°15'00" W.; 29°50'33" N., 81°15'00" W.; 29°50'33" N., 81°15'24" W.

St. Augustine Harbor—29°55'04" N., 81°17'04" W.; 29°55'13" N., 81°16'11" W.; 29°54'30" N., 81°15'58" W.; 29°54'19" N., 81°16'51" W.

St. Lucie Inlet—27°09'58" N., 80°09'30" W.; 27°09'58" N., 80°08'42" W.; 27°09'52" N., 80°08'42" W.; 27°09'52" N., 80°09'30" W.

Charlotte Harbor—26°37'36" N., 82°19'55" W.; 26°37'36" N., 82°18'47" W.; 26°36'36" N., 82°18'47" W.; 26°36'36" N., 82°19'55" W.

Tampa Harbor—27°38'08" N., 82°55'06" W.; 27°38'08" N., 82°54'00" W.; 27°37'08" N., 82°54'00" W.; 27°37'08" N., 82°55'06" W.

Tampa Harbor—27°37'28" N., 83°00'09" W.; 27°37'34" N., 82°59'19" W.; 27°36'43" N., 82°53'13" W.; 27°36'37" N., 83°00'03" W.

Fernandina Harbor—30°42'00" N., 81°19'05" W.; 30°42'00" N., 81°17'55" W.; 30°41'00" N., 81°17'55" W.; 30°41'00" N., 81°19'05" W.

Ponce de Leon Inlet—29°06'05" N., 80°55'50" W.; 29°06'10" N., 80°55'40" W.; 29°05'34" N., 80°55'10" W.; 29°05'28" N., 80°55'20" W.

Ponce de Leon Inlet—29°04'46" N., 80°53'40" W.; 29°04'36" N., 80°53'40" W.; 29°04'36" N., 80°54'26" W.; 29°04'46" N., 80°54'26" W.

Palm Beach Harbor—26°46'00" N., 79°58'55" W.; 26°46'00" N., 79°57'47" W.; 26°45'00" N., 79°57'47" W.; 26°45'00" N., 79°58'55" W.

Largo Sound—25°06'06" N., 80°24'42" W.; 25°05'58" N., 80°24'05" W.; 25°05'50" N., 80°24'10" W.; 25°05'58" N., 80°24'47" W.

Key West—24°27'24" N., 81°45'38" W.; 24°27'24" N., 81°44'32" W.; 24°26'20" N., 81°44'32" W.; 24°26'20" N., 81°45'38" W.

Anclote, FL—28°09'00" N., 83°51'48" W.; 28°09'00" N., 83°50'54" W.; 28°08'30" N., 83°50'54" W.; 28°08'30" N., 83°51'48" W.

Pithlachascotee River, FL—28°17'02" N., 82°46'21" W.; 28°17'02" N., 82°45'12" W.; 28°16'25" N., 82°45'00" W.; 28°16'42" N., 82°45'00" W.; 28°16'42" N., 82°46'21" W.

Withlacoochee River, FL—29°59'54" N., 82°47'14" W.; 29°00'28" N., 82°46'06" W.; 29°00'14" N., 82°45'58" W.; 28°59'40" N., 82°47'06" W.

Withlacoochee River, FL—28°59'08" N., 82°48'48" W.; 28°59'32" N., 82°47'40" W.; 28°59'18" N., 82°47'32" W.; 28°58'54" N., 82°48'40" W.

Cedar Keys, FL—29°08'43" N., 83°07'53" W.; 29°08'43" N., 83°07'03" W.; 29°08'33" N., 83°07'03" W.; 29°08'33" N., 83°07'53" W.

Cedar Keys, FL—29°04'08" N., 83°04'06" W.; 29°04'01" N., 83°03'54" W.; 29°03'28" N., 83°04'12" W.; 29°03'35" N., 83°04'24" W.

Horseshoe Cove, FL—29°25'23" N., 83°17'53" W.; 29°25'18" N., 83°17'43" W.; 29°25'09" N., 83°17'49" W.; 29°25'14" N., 83°17'59" W.

Horseshoe Cove, FL—29°25'58" N., 83°17'32" W.; 29°25'53" N., 83°17'22" W.; 29°25'44" N., 83°17'28" W.; 29°25'49" N., 83°17'38" W.

Mobile, AL—30°10.0' N., 88°07.7' W.; 30°10.4' N., 88°05.2' W.; 30°09.4' N., 88°04.7' W.; 30°08.5' N., 88°05.2' W.; 30°08.5' N., 88°08.2' W.

Pascagoula, MS—30°11.9' N., 88°33.1' W.; 30°11.9' N., 88°32.3' W.; 30°11.6' N., 88°32.4' W.; 30°11.6' N., 88°32.1' W.; 30°10.5' N., 88°33.2' W.; 30°10.6' N., 88°34.0' W.

Gulfport, MS—30°12.0' N., 89°00.5' W.; 30°12.0' N., 88°59.5' W.; 30°11.0' N., 89°00.0' W.; 30°07.0' N., 80°56.5' W.; 30°06.6' N., 88°57.0' W.; 30°10.5' W., 89°00.6' W.

Gulfport, MS—30°11.3' N., 88°58.4' W.; 30°11.2' N., 88°57.5' W.; 30°07.6' N., 88°54.4' W.; 30°07.4' N., 88°54.8' W.

Pensacola, FL—30°16.8' N., 87°19.0' W.; 30°16.7' N., 87°18.3' W.; 30°16.3' N., 87°18.2' W.; 30°16.0' N., 87°19.4' W.; 30°16.5' N., 87°19.4' W.

Panama City, FL—30°07.1' N., 85°45.9' W.; 30°07.2' N., 85°45.4' W.; 30°06.9' N., 85°45.1' W.; 30°06.7' N., 85°45.6' W.

Port St. Joe, FL—29°50.9' N., 85°29.9' W.; 29°51.3' N., 85°29.5' W.; 29°49.2' N., 85°28.2' W.; 29°49.0' N., 85°28.8' W.

Port St. Joe, FL—29°53.9′ N., 85°31.8′ W.; 29°54.1′ N., 85°31.8′ W.; 29°52.2′ N., 85°30.1′ W.; 29°52.2′ N., 85°30.8′ W.

SABINE-NECHES WATERWAY, TEXAS

Disposal Area No. 1—Beginning at lat. 29°28′03″, long. 93°41′14″; thence to lat. 29°26′11″; long. 93°41′14″; thence to lat. 29°26′11″, long. 93°44′14″; thence to point of beginning.

Disposal Area No. 2—Beginning at lat. 29°30′41″, long. 93°43′49″; thence to lat. 29°28′42″, long. 93°41′33″; thence to lat. 29°28′42″, long. 93°44′49″; thence to lat. 29°26′11″, long. 3°44′11″; thence to point of beginning.

Disposal Area No. 3—Beginning at lat. 29°34′24″, long. 93°48′13″; thence to lat. 29°32′47″, long. 93°46′16″; thence to lat. 29°32′06″, long. 93°46′29″; thence to lat. 29°31′42″, long. 93°48′16″; thence to lat. 29°32′59″, long. 93°49′48″; thence to point of beginning.

Disposal Area No. 4—Beginning at lat. 29°38′09″, long. 93°49′23″; thence to lat. 29°35′53″, long. 93°48′18″; thence to lat. 29°35′06″, long. 93°50′24″; thence to lat. 29°36′37″, long. 93°51′09″; thence to lat. 29°37′00″, long. 93°50′06″; thence to lat. 29°37′46″, long. 93°50′26″; thence to point of beginning.

GALVESTON HARBOR AND CHANNEL, TEXAS

Disposal Area No. 1—Beginning at lat. 29°18′00″, long. 94°39′30″; thence to lat. 29°15′54″, long. 94°37′06″; thence to lat. 29°14′24″, long. 94°38′42″; thence to lat. 29°16′54″, long. 94°41′30″; thence to point of beginning.

FREEPORT HARBOR, TEXAS

Disposal Area No. 1—Beginning at lat. 28°54′42″, long. 95°17′38″; thence to lat. 28°54′-3″; long. 95°16′54″; thence to lat. 28°53′48″, long. 95°17′27″; thence to lat. 28°54′21″, long. 95°18′03″; thence to point of beginning.

MATAGORDA SHIP CHANNEL

Disposal Area No. 1—Beginning at lat. 28°24′31″, long. 96°18′48″; thence to lat. 28°23′27″, long. 96°17′38″; thence to lat. 28°23′15″, long 96°17′54″; thence to lat. 28°24′18″, long. 96°19′03″; thence to point of beginning.

CORPUS CHRISTI SHIP CHANNEL

Disposal Area No. 1—Beginning at lat. 27°49′34″, long. 97°01′51″; thence to lat. 27°48′28″, long. 96°59′49″; thence to lat. 27°48′18″, long. 96°59′56″; thence to lat. 27°49′23″, long. 97°01′58″; thence to point of beginning.

PORT MANSFIELD CHANNEL

Disposal Area No. 1—Beginning at lat. 26°34′09″, long. 97°15′52″; thence to lat. 26°34′09″, long. 97°15′18″; thence to lat. 26°33′57″, long. 97°15′18″; thence to lat. 26°33′57″, long. 97°15′52″; thence to point of beginning.

Disposal Area No. 1-A—Beginning at lat. 26°34′17″, long. 97°16′12″; thence to lat. 26°34′18″, long. 97°15′55″; thence to lat. 26°33′59″, long. 97°15′52″; thence to lat. 26°33′58″, long. 97°16′11″; thence to point of beginning.

BRAZOS ISLAND HARBOR

Disposal Area No. 1—Beginning at lat. 26°04′38″, long. 97°07′52″; thence to lat. 26°04′38″, long. 97°06′42″; thence to lat. 26°04′05″, long. 97°06′42″; thence to lat. 26°04′05″, long. 97°07′52″; thence to point of beginning.

Mississippi River, Gulf Outlet, La.—Breton Sound and Bar Channel. Maintenance dredging disposal area 0.5 mile wide by 12.5 miles long, parallel to the channel and located on the south side. Beginning at 29°32′23″ N. and 89°12′20″ W., following channel centerline (azimuth 308°47′) in Breton Sound to 29°29′15″ N. and 89°07′06″ W., following centerline (azimuth 300°36′) of the gulf entrance channel to 29°25′06″ N. and 88°59′54″ W., thence to 29°24′45″ N. and 89°00′09″ W., thence to 29°28′53″ N., and 89°08′08″ W., thence to 29°31′41″ N. and 89°12′09″ W., thence to the point of beginning.

Mississippi River, Baton Rouge to the Gulf of Mexico, La.—South Pass. Maintenance dredging disposal area 0.5 mile square, parallel to the channel and located on the west side. Beginning at 28°58′33″ N. and 89°07′00″ W., following channel centerline (azimuth 295°41′) of the gulf entrance channel to 28°58′24″ N. and 89°06′30″ W., thence to 28°57′54″ N. and 89°06′42″ W., thence to 28°58′06″ N. and 89°07′18″ W., thence to the point of beginning.

Mississippi River, Baton Rouge to the Gulf of Mexico, La.—Southwest Pass. Maintenance dredging disposal area 2 miles square, parallel to the channel and located on the west side. Beginning at 28°54′24″ N. and 89°26′03″ W., following channel centerline (azimuth 0°09′) of the gulf entrance channel to 28°52′18″ N. and 89°26′03″ W., thence to 28°52′18″ N. and 89°27′48″ W., thence to 28°54′24″ N. and 89°27′48″ W., thence to the point of beginning.

Mississippi River Outlets, Venice, La.—Tiger Pass. Maintenance dredging disposal area 0.5 mile wide by 1.5 miles long, parallel to the channel and located on the north side. Beginning at 29°08′18″ N. and 89°25′45″ W., following channel centerline (azimuth 63°54′) of the gulf entrance channel to 29°07′36″ N. and 89°26′51″ W., thence to 29°07′48″ N. and 89°27′00″ W., thence to 29°08′36″ N. and 89°25′57″ W., thence to the point of beginning.

Waterway from Empire, La. to the Gulf of Mexico—Bar channel. Maintenance dredging disposal area 0.5 mile wide by 1 mile long, parallel to the channel and located on the west side. Beginning at 29°15′06″ N. and 89°36′30″ W., following channel centerline (azimuth 11°08′) of the gulf entrance channel to 29°14′30″ N. and 89°36′36″ W., thence to 29°14′36″ N. and 89°36′48″ W., thence to 29°15′12″ N. and 89°36′42″ W., thence to the point of beginning.

Barataria Bay Waterway, La.—Bar channel. Maintenance dredging disposal area 0.5 mile wide by 2 miles long, parallel to the channel and located on the east side. Beginning at 29°16′18″ N. and 89°56′12″ W., following channel centerline (azimuth 312°07′) of the gulf entrance channel to 29°14′42″ N. and 89°54′36″ W., thence to 29°14′30″ N. and 89°54′24″ W., thence to 29°16′06″ N. and 89°56′24″ W., thence to the point of beginning.

Bayou Lafourche and Lafourche—Jump Waterway, La.—Bell Pass. Maintenance dredging disposal area 2,000 feet wide by 1.5 miles long, parallel to the channel and located on the west side. Beginning at 29°05′00″ N. and 90°13′45″ W., following Bell Pass centerline (azimuth 12°55′) in the gulf entrance channel to 29°03′51″ N. and 90°14′06″ W., thence to 29°03′57″ N. and 90°14′21″ W., thence to 29°05′06″ N. and 90°14′03″ W., thence to the point of beginning.

Houma Navigation Canal, La.—Cat Island Pass. Maintenance dredging disposal area 0.5 mile wide by 5 miles long, parallel to the Cat Island channel and located on the west side. Beginning at 29°04′45″ N. and 90°34′48″ W., following Cat Island centerline (azimuth 358°41′) of the gulf entrance channel to 29°03′42″ N. and 90°34′34″ W., following Cat Island centerline (azimuth 354°00′) of the gulf entrance channel to 29°00′24″ N. and 90°34′12″ W., thence to 29°00′21″ N. and 90°34′36″ W., thence to 29°03′42″ N. and 90°34′58″ W., thence to 29°04′48″ N. and 90°35′18″ W., thence to the point of beginning.

Atchafalaya River—Morgan City to the Gulf of Mexico, La. and Atchafalaya River and Bayous Chene, Boeuf and Black, La.—Bar channel. Maintenance dredging disposal area 0.5 mile wide by 12 miles long, parallel to the bar channel and located on the east side. Beginning at 29°20′50″ N. and 91°24′03″ W., following channel centerline (azimuth 37°57′) of the gulf entrance channel to 29°11′35″ N. and 91°32′10″ W., thence to 29°11′21″ N. and 91°31′37″ W., thence to 29°20′36″ N. and 91°23′27″ W., thence to the point of beginning.

Freshwater Bayou, La.—Bar channel. Maintenance dredging disposal area 2,000 feet wide by 3.5 miles long, parallel to the channel and located on the west side. Beginning at 29°32′00″ N. and 92°18′48″ W., following channel centerline (azimuth 09°25′) of the gulf entrance to 29°28′24″ N. and 92°19′30″ W., thence to 29°28′25″ N. and 92°19′42″ W., thence to 29°32′01″ N. and 92°19′00″ W., thence to the point of beginning.

Mermentau River, La. Maintenance dredging disposal areas 0.5 mile wide and 1.5 miles long, parallel to the entrance channels in the Lower Mermentau River and in the Lower Mud Lake, both located on the west side:

Disposal Area "A", Mermentau River, La. Beginning at 29°44′48″ N. and 93°07′12″ W., following channel centerline (azimuth 256°59′) of the gulf entrance to 29°43′39″ N. and 93°07′36″ W., thence to 29°43′42″ N. and 93°07′48″ W., thence to 29°44′51″ N. and 93°07′24″ W., thence to the point of beginning.

Disposal Area "B", Mermentau River, La. Beginning at 29°43′24″ N. and 93°01′54″ W., following channel centerline (azimuth 359°50′) of the gulf entrance to 29°42′33″ N. and 93°02′12″ W., thence to 29°42′36″ N. and 93°02′24″ W., thence to 29°43′27″ N. and 93°02′06″ W., thence to the point of beginning.

Calcasieu River and Pass, La.—Bar channel. Maintenance dredging disposal areas A through G parallel to the channel and located on the east and west side:

Disposal Area "A", Calcasieu River and Pass, La. Maintenance dredging disposal area one mile square parallel to the bar channel on the west bank. Beginning at 29°45′09″ N. and 93°20′42″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°44′39″ N. and 93°20′36″ W., thence to 29°44′36″ N. and 93°21′33″ W., thence to 29°45′12″ N. and 93°21′42″ W., thence to the point of beginning.

Disposal Area "B", Calcasieu River and Pass, La. Maintenance dredging disposal area 1 mile square parallel to the bar channel and located on the east bank. Beginning at 29°45′27″ N. and 93°20′33″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°44′42″ N. and 93°20′24″ W., thence to 29°44′45″ N. and 93°19′30″ W., thence to 29°45′39″ N. and 93°19′36″ W., thence to the point of beginning.

Disposal Area "C", Calcasieu River and Pass, La. Maintenance dredging disposal area 1 mile wide by 5.5 miles long, parallel to the bar channel and located on the west side. Beginning at 29°44′30″ N. and 93°20′36″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°39′48″ N. and 93°19′48″ W., thence to 29°39′42″ N. and 93°20′48″ W., thence to 29°44′24″ N. and 93°21′30″ W., thence to the point of beginning.

Disposal Area "D", Calcasieu River and Pass, La. Maintenance dredging disposal area 1 mile wide by 5.5 miles long, parallel to the bar channel and located on the west side. Beginning at 29°37′48″ N. and 93°19′24″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°37′24″ N. and 93°19′24″ W., following channel centerline (azimuth 321°37′) of the second tangent gulfward in the gulf entrance channel to 29°34′12″ N. and 93°16′18″ W., thence to 29°33′06″ N. and 93°16′36″ W., thence to 29°37′24″ N. and 93°20′24″ W., thence to 29°37′48″ N. and 93°20′24″ W., thence to the point of beginning.

Disposal Area "E", Calcasieu River and Pass, La. Maintenance dredging disposal area 0.75 mile wide by 6.75 miles long, parallel to the bar channel and located on the west side. Beginning at 29°33′54″ N. and 93°16′24″ W., following channel centerline (azimuth 321°37′) of the second tangent gulfward in the gulf entrance channel to 29°31′00″ N. and 93°13′48″ W., following channel centerline (azimuth 358°56′) of the third tangent gulfward in the gulf entrance channel to 29°29′00″ N. and 93°13′42″ W. thence to 29°28′54″ N. and 93°14′24″ W., thence to 29°30′54″ N. and 93°14′24″ W., thence to 29°33′12″ N. and 93°16′36″ W., thence to the point of beginning.

Disposal Area "F", Calcasieu River and Pass, La. Maintenance dredging disposal area 0.75 mile wide by 2.5 miles long, parallel to the bar channel and located on the east side. Beginning at 29°44′42″ N. and 93°20′12″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°42′36″ N. and 93°19′48″ W., thence to 29°42′42″ N. and 93°19′06″ W., thence to 29°44′48″ N. and 93°19′24″ W., thence to the point of beginning.

Disposal Area "G", Calcasieu River and Pass, La. Maintenance dredging disposal area 1 mile wide by 0.5 mile long, parallel to the bar channel and located on the west side. Beginning at 29°44′54″ N., and 93°20′36″ W., following channel centerline (azimuth 351°50′) of the first tangent gulfward in the gulf entrance channel to 29°44′42″ N., and 93°20′36″ W., thence to 29°44′42″ N., and 93°20′48″ W., following channel centerline again to 29°44′30″ N., and 93°20′42″ W., thence to 29°44′24″ N. and 93°21′30″ W., thence to 29°44′48″ N. and 93°21′30″ W., thence to the point of beginning.

Crescent City Harbor—41°43′15″ N., 124°12′10″ W. (1,000 yd. diameter)
Crescent City 100 fathom—41°43′50″ N., 124°28′00″ W. (1,000 yd. diameter)
Humboldt Bay Harbor—40°45′44″ N., 124°15′42″ W. (500 yd. diameter)
Noyo River—39°25′45″ N., 123°49′42″ W. (500 yd. diameter)
Farallon Islands—37°31′45″ N., 122°59′00″ W. (1,000 yd. radius)
San Francisco Channel Bar—37°45′06″ N., 122°35′45″ W. (5,000 yds. x 1,000 yds.)
Moss Landing 100 fathom—36°37′53″ N., 121°49′04″ W. (500 yd. radius)
Port Hueneme—34°05′00″ N., 119°14′00″ W. (1,000 yd. radius)
Los Angeles—33°37′06″ N., 118°17′24″ W. (1,000 yd. radius)
Newport Beach—33°31′42″ N., 117°54′48″ W. (1,000 yd. radius)
San Diego—Point Loma—32°35′00″ N., 117°17′30″ W. (1,000 yd. radius)
San Diego 100 fathom—32°36′50″ N., 117°20′40″ W. (1,000 yd. radius)
Honolulu Harbor—21°14′30″ N., 157°54′30″ W. (1,000 yd. radius)
Kauai—Nawiliwili—21°55′30″ N., 159°17′00″ W. (1,000 yd. radius)
Kauai—Hanapepe—21°50′18″ N., 159°35′30″ W. (1,000 yd. radius)
Guam—Apra Harbor—13°29′30″ N., 144°34′30″ E. (1,000 yd. radius)
American Samoa—Pago Pago Harbor—14°23′00″ S., 170°39′30″ W. (1,000 yd. radius)
Mouth of Columbia River—46°14′37″ N., 124°10′34″ W.; 46°13′53″ N., 124°10′01″ W.; 46°13′43″ N., 124°10′26″ W.; 46°14′28″ N., 124°10′59″ W.
Mouth of Columbia River—46°13′03″ N., 124°06′17″ W.; 46°12′50″ N., 124°05′55″ W.; 46°12′13″ N., 124°06′43″ W.; 46°12′26″ N., 124°07′05″ W.
Mouth of Columbia River—46°15′43″ N., 124°05′21″ W.; 46°15′36″ N., 124°05′11″ W.; 46°15′11″ N., 124°05′53″ W.; 46°15′18″ N., 124°06′03″ W.
Mouth of Columbia River—46°12′12″ N., 124°09′00″ W.; 46°12′00″ N., 124°08′42″ W.; 46°11′48″ N., 124°09′00″ W.; 46°12′00″ N., 124°09′18″ W.
Mouth of Columbia River—46°12′05″ N., 124°05′46″ W.; 46°11′52″ N., 124°05′25″ W.; 46°11′15″ N., 124°06′14″ W.; 46°11′28″ N., 124°06′35″ W.
Chetco River Entrance—42°01′56″ N., 124°16′33″ W.; 42°01′56″ N., 124°16′09″ W.; 42°01′38″ N., 124°16′09″ W.; 42°01′38″ N., 124°16′33″ W.
Rogue River Entrance—42°24′16″ N., 124°26′48″ W.; 42°24′04″ N., 124°26′35″ W.; 42°23′40″ N., 124°27′13″ W.; 42°23′52″ N., 124°27′26″ W.
Coquille River Entrance—43°07′54″ N., 124°27′04″ W.; 43°07′30″ N., 124°26′27″ W.; 43°07′20″ N., 124°26′40″ W.; 43°07′44″ N., 124°27′17″ W.
Coos Bay Entrance—43°21′59″ N., 124°22′45″ W.; 43°21′48″ N., 124°21′59″ W.; 43°21′35″ N., 124°22′05″ W.; 43°21′46″ N., 124°22′51″ W.
Coos Bay Entrance—43°22′44″ N., 124°22′18″ W.; 43°22′29″ N., 124°21′34″ W.; 43°22′16″ N., 124°21′43″ W.; 43°22′31″ N., 124°22′26″ W.
Umpqua River Entrance—43°40′07″ N., 124°14′18″ W.; 43°40′07″ N., 124°13′42″ W.; 43°39′53″ N., 124°13′42″ W.; 43°39′53″ N., 124°14′18″ W.
Suislaw River Entrance—44 01′32″ N., 124°09′37″ W.; 44°01′22″ N., 124°09′02″ W.; 44°01′14″ N., 124°09′07″ W.; 44°01′24″ N., 124°09′42″ W.
Tillamook Bay Entrance—45°34′09″ N., 123°59′37″ W.; 45°34′09″ N., 123°58′45″ W.; 45°33′55″ N., 123°58′45″ W.; 45°33′55″ N., 123°59′37″ W.
Depoe Bay—44°48′33″ N., 124°03′53″ W.; 44°48′32″ N., 124°03′43″ W.; 44°48′15″ N., 124°03′45″ W.; 44°48′16″ N., 124°03′55″ W.
Depoe Bay—44°48′09″ N., 124°05′05″ W.; 44°48′09″ N., 124°04′55″ W.; 44°47′53″ N., 124°04′55″ W.; 44°47′53″ N., 124°05′05″ W.
Yaquina Bay and Harbor Entrance—44°36′31″ N., 124°06′04″ W.; 44°36′31″ N., 124°05′16″ W.; 44°36′17″ N., 124°05′16″ W.; 44°36′17″ N., 124°06′04″ W.
Port Orford—42°44′08″ N., 124°29′38″ W.; 42°44′08″ N., 124°29′28″ W.; 42°43′52″ N., 124°29′28″ W.; 42°43′52″ N., 124°29′38″ W.
Willapa Bay—46°44′00″ N., 124°10′00″ W.; 46°39′00″ N., 124°09′00″ W.
Nome—64°30′40″ N., 165°25′52″ W.; 64°29′18″ N., 165°26′04″ W.; 64°29′13″ N., 165°25′22″ W.; 64°29′54″ N., 165°24′46″ W.
Anchorage Harbor—61°14′07″ N., 149°53′56″ W.; 61°14′16″ N., 149°54′15″ W.; 61°14′45″ N., 149°53′36″ W.; 61°14′36″ N., 149°53′17″ W.

(b) The following sites are designated "Approved Ocean Dumping Sites" for continuing use, subject to the listed restrictions:

(1) Gulf Ocean Incineration Site—Region VI. Location—Latitude and Longitude—27°06′12″ N., 93°24′15″ W.; 26°32′24″ N., 93°15′30″ W.; 26°19′00″ N., 93°56′00″ W.; 26°52′40″ N., 94°04′40″ W.

Size—(square miles) 1892.

Depth—(feet) 4500.

Primary Use: At sea incineration primarily for organochlorine wastes. Incineration of other wastes will require research studies or equivalent technical documentation to determine acceptability for ocean incineration.

Period of use: Until September 15, 1981.

Restriction: Only one ship will be permitted to burn wastes at a time, except under extreme emergencies.

§ 228.13 Guidelines for ocean disposal site baseline or trend assessment surveys under Section 102 of the Act.

The purpose of a baseline or trend assessment survey is to determine the physical, chemical, geological, and biological structure of a proposed or existing disposal site at the time of the survey. A baseline or trend assessment survey is to be regarded as a comprehensive synoptic and representative picture of existing conditions; each such survey is to be planned as part of a continual monitoring program through which changes in conditions at a disposal site can be documented and assessed. Surveys will be planned in coordination with the ongoing programs of NOAA and other Federal, State, local, or private agencies with missions in the marine environment. The field survey data collection phase of a disposal site evaluation or designation study shall be planned and conducted to obtain a body of information both representative of the site at the time of study and obtained by techniques reproducible in precision and accuracy in future studies. A full plan of study which will provide a record of sampling, analytical, and data reduction procedures must be developed, documented and approved by the EPA management authority. Plans for all surveys which will produce information to be used in the preparation of environmental impact statements will be approved by the Administrator or his designee. This plan of study also shall be incorporated as an appendix into a technical report on the study, together with notations describing deviations from the plan required in actual operations. Relative emphasis on individual aspects of the environment at each site will depend on the type of wastes disposed of at the site and the manner in which such wastes are likely to affect the local environment, but no major feature of the disposal site may be neglected. The observations made and the data obtained are to be based on the information necessary to evaluate the site for ocean dumping. The parameters measured will be those indicative, either directly or in directly, of the immediate and long-term impact of pollutants on the environment at the disposal site and adjacent land or water areas. An

initial disposal site evaluation or designation study should provide an immediate baseline appraisal of a particular site, but it should also be regarded as the first of a series of studies to be continued as long as the site is used for waste disposal.

(a) *Timing.* Baseline or trend assessment surveys will be conducted with due regard for climatic and seasonal impact on stratification and other conditions in the upper layers of the water column. Where a choice of season is feasible, trend assessment surveys should be made during those months when pollutant accumulation within disposal sites is likely to be most severe, or when pollutant impact within disposal sites is likely to be most noticeable.

(1) Where disposal sites are near large riverine inflows to the ocean, surveys will be done with due regard for the seasonal variation in river flow. In some cases several surveys at various river flows may be necessary before a site can be approved.

(2) When initial surveys show that seasonal variation is not significant and surveys at greater than seasonal intervals are adequate for characterizing a site, resurveys shall be carried out in climatic conditions as similar to those of the original surveys as possible, particularly in depths less than 200 meters.

(b) *Duration.* The actual duration of a field survey will depend upon the size and depth of the site, weather conditions during the survey, and the types of data to be collected. For example, for a survey of an area of 100 square miles on the continental shelf, including an average dump site and the region contiguous to it, an on-site operation would be scheduled for completion within one week of weather suitable for on-site operations. More on-site operating time may be scheduled for larger or highly complex sites.

(c) *Numbers and Locations of Sampling Stations.* The numbers and locations of sampling stations will depend in part on the local bathymetry with minimum numbers of stations per site fixed as specified in the following sections. Where the bottom is smooth or evenly sloping, stations for water column measurements and benthic sampling and collections, other than trawls, shall be spaced throughout the survey area in a manner planned to provide maximum coverage of both the disposal site and contiguous control areas, considering known water movement characteristics. Where there are major irregularities in the bottom topography, such as canyons or gullies, or in the nature of the bottom, sampling stations for sediments and benthic communities shall be spaced to provide representative sampling of the major different features.

Sampling shall be done within the dump site itself and in the contiguous area. Sufficient control stations outside a disposal site shall be occupied to characterize the control area environment at least as well as the disposal site itself. Where there are known persistent currents, sampling in contiguous areas shall include at least two stations downcurrent of the dump site, and at least two stations upcurrent of the site.

(d) *Measurements in the Water Column at and near the Dump Site.*

(1) *Water Quality Parameters Measured.* These shall include the major indicators of water quality, particularly those likely to be affected by the waste proposed to be dumped. Specifically included at all stations are measurements of temperature, dissolved oxygen, salinity, suspended solids, turbidity, total organic carbon, pH, inorganic nutrients, and chlorophyll *a*.

(i) At one station near the center of the disposal site, samples of the water column shall be taken for the analysis of the following parameters: mercury, cadmium, copper, chromium, zinc, lead, arsenic, selenium, vanadium, beryllium, nickel, pesticides, petroleum hydrocarbons, and persistent organohalogens. These samples shall be preserved for subsequent analysis by or under the direct supervision of EPA laboratories in accordance with the approved plan of study.

(ii) These parameters are the basic requirements for all sites. For the evaluation of any specific disposal site additional measurements may be required, depending on the present or intended use of the site. Additional parameters may be selected based on the materials likely to be in wastes dumped at the site, and on parameters likely to be affected by constituents of such wastes. Analysis for other constituents characteristic of wastes discharged to a particular disposal site, or of the impact of such wastes on water quality, will be included in accordance with the approved plan of study.

(2) *Water Quality Sampling Requirements.* The number of samples collected from the water column should be sufficient to identify representative changes throughout the water column such as to avoid short-term impact due to disposal activities. The following key locations should be considered in selecting water column depths for sampling:

(i) Surface, below interference from surface waves;
(ii) Middle of the surface layer;
(iii) Bottom of the surface layer;
(iv) Middle of the thermocline or halocline, or both if present;
(v) Near the top of the stable layer beneath a thermocline or halocline;
(vi) Near the middle of a stable layer;
(vii) As near the bottom as feasible;
(viii) Near the center of any zone showing pronounced biological activity or lack thereof.

In very shallow waters where only a few of these would be pertinent, as a minimum, surface, mid-depth and bottom samples shall be taken, with samples at additional depths being added as indicated by local conditions. At disposal sites far enough away from the influence of major river inflows, ocean or coastal currents, or other features which might cause local perturbations in water chemistry, a minimum of 5 water chemistry stations should be occupied within the boundaries of a site. Additional stations should be added when the area to be covered in the survey is more than 20 square miles or when local perturbations in water chemistry may be expected because of the presence of one of the features mentioned above. In zones where such impacts are likely, stations shall be distributed so that at least 3 stations are occupied in the transition from one stable regime to another. Each water column chemistry station shall be replicated a minimum of 2 times during a survey except in waters over 200 meters deep.

(3) *Water Column Biota.* Sampling stations for the biota in the water column shall be as near as feasible to stations used for water quality; in addition at least two night-time stations in the disposal site and contiguous area are required. At each station vertical or oblique tows with appropriately-meshed nets shall be used to assess the microzooplankton, the nekton, and the macrozooplankton. Towing times and distances shall be sufficient to obtain representative samples of organisms near water quality stations. Organisms shall be sorted and identified to taxonomic levels necessary to identify dominant organisms, sensitive or indicator organisms, and organism diversity. Tissue samples of representative species shall be analyzed for pesticides, persistent organohalogens, and heavy metals. Discrete water samples shall also be used to quantitatively assess the phytoplankton at each station.

These requirements are the minimum necessary in all cases. Where there are discontinuities present, such as thermoclines, haloclines, convergences, or upwelling, additional tows shall be made in each water mass as appropriate.

(e) *Measurements of the Benthic Region.*

(1) *Bottom Sampling.* Samples of the bottom shall be taken for both sediment composition and structure, and to determine the nature and numbers of benthic biota.

(i) At each station sampling may consist of core samples, grab samples, dredge samples, trawls, and bottom photography or television, where available and feasible, depending on the nature of the bottom and the type of disposal site. Each type of sampling shall be replicated sufficiently to obtain a representative set of samples. The minimum numbers of replicates of successful samples at each continental shelf station for each type of device mentioned above are as follows:

Cores	3.
Grabs	5.
Dredge	3.
Trawl	20-min. tow.

Lesser numbers of replicates may be allowed in water deeper than 200 meters, at those sites where pollution impacts on the bottom are unlikely in the judgment of the EPA management authority.

(ii) Selection of bottom stations will be based to a large extent on the bottom topography and hydrography as determined by the bathymetric survey. On the continental shelf, where the bottom has no significant discontinuities, a bottom station density of at least three times the water column stations is recommended, depending on the type of site being evaluated. Where there are significant differences in bottom topography, additional stations shall be occupied near the discontinuity and on each side of it. Beyond the continental shelf, lesser densities may be used.

(2) *Bathymetric Survey.* Sufficient tracklines shall be run to develop complete bottom coverage of bathymetry with reasonable assurance of accurate coverage of bottom topography, with trackline direction and spacing as close as available control allows. The site itself is to be developed at the greatest density possible, with data to be collected to a suitable distance about the site as is required to identify major changes in bathymetry which might affect the site. Specifications for each bathymetric survey will vary, depending on control, bottom complexity, depths, equipment, and map scale required. In most cases, a bathymetric map at a scale of 1:25,000 to 1:10,000 will be required, with a minimum of 1–5 meter contour interval except in very flat areas. When the foregoing bathymetric detail is available from recent surveys of the disposal site, bathymetry during a baseline or trend assessment survey may be limited to sonar profiles of bathymetry on transects between sampling stations.

(3) *Nature of Bottom.* The size distribution of sediments, mineral character and chemical quality of the bottom will be determined to a depth appropriate for the type of bottom. The following parameters will be measured at all stations: particle size distribution, major mineral constituents, texture, settling rate, and organic carbon.

(i) At several stations near the center of the disposal site, samples of sediments shall be taken for the analysis of the following parameters: mercury, cadmium, copper, chromium, zinc, lead, arsenic, selenium, vanadium, beryllium, nickel, pesticides, persistent organohalogens, and petroleum hydrocarbons. These samples shall be preserved for subsequent analysis by or under the direct supervision of EPA laboratories in accordance with the approved plan of study.

(ii) These parameters are the basic requirements for all sites. For the evaluation of any specific disposal site additional measurements may be required, depending on the present or intended use of the site. Additional parameters may be selected based on the materials likely to be in wastes dumped at the site, and on parameters likely to be affected by constituents of such wastes. Such additional parameters will be selected by the EPA management authority.

(4) *Benthic Biota.* This shall consist of a quantitative and qualitative evaluation of benthic communities including macroinfauna and macroepifauna, meiobenthos, and microbenthos, and should include an appraisal, based on existing information, of the sensitivity of indigenous species to the waste proposed to be discharged. Organisms shall be sorted and identified to taxonomic levels necessary to identify dominant organisms, sensitive or indicator organisms, and organism diversity. Tissue samples of the following types of organisms shall be analyzed for persistent organohalogens, pesticides, and heavy metals:

(i) A predominant species of demersal fish;
(ii) The most abundant macroinfaunal species; and
(iii) A dominant epifaunal species, with particular preference for a species of economic importance.

(f) *Other Measurements.*

(1) *Hydrodynamic Features.* The direction and speed of water movement shall be characterized at levels appropriate for the site and type of waste to be dumped. Where depths and climatic conditions are great enough for a thermocline or halocline to exist, the relationship of water movement to such a feature shall be characterized.

(i) *Current Measurements.* When current meters are used as the primary source of hydrodynamic data, at least 4 current meter stations with at least 3 meters at depths appropriate for the observed or expected discontinuities in the water column should be operated for as long as possible during the survey. Where feasible, current meters should be deployed at the initiation of the survey and recovered after its completion. Stations should be at least a mile apart, and should be placed along the long axis of the dumping site. For dumping sites more than 10 miles along the long axis, one current meter station every 5 miles should be operated. Where there are discontinuities in surface layers, e.g., due to land runoff, stations should be operated in each water mass.

(ii) *Water Mass Movement.* Acceptable methods include: dye, drogues, surface drifters, side scan sonar, bottom drifters, and bottom photography or television. When such techniques are the primary source of hydrodynamic data, coverage should be such that all significant hydrodynamic features likely to affect waste movement are measured.

(2) *Sea State.* Observations of sea state and of standard meteorological parameters shall be made at 8-hour intervals.

(3) *Surface Phenomena.* Observations shall be made of oil slicks, floating materials, and other visible evidence of pollution; and, where possible, collections of floating materials shall be made.

(g) *Survey Procedures and Techniques.* Techniques and procedures used for sampling and analysis shall represent the state-of-the-art in oceanographic survey and analytical practice. Survey plans shall specify the methods to be used and will be subject to approval by EPA.

(h) *Quality Assurance.* The EPA management authority may require that certain samples be submitted on a routine basis to EPA laboratories for analysis as well as being analyzed by the surveyor, and that EPA personnel participate in some field surveys.

PART 229—GENERAL PERMITS

Sec.
229.1 Burial at sea.
229.2 Transport of target vessels.
229.3 Transportation and disposal of vessels.

AUTHORITY: 33 U.S.C. 1412 and 1418.

§ 229.1 Burial at sea.

(a) All persons subject to Title I of the Act are hereby granted a general permit to transport human remains from the United States and all persons owning or operating a vessel or aircraft registered in the United States or flying the United States flag and all departments, agencies, or instrumentalities of the United States are hereby granted a general permit to transport human remains from any location for the purpose of burial at sea and to bury such remains at sea subject to the following conditions:

(1) Except as herein otherwise provided, human remains shall be prepared for burial at sea and shall be buried in accordance with accepted practices and requirements as may be deemed appropriate and desirable by the United States Navy, United States Coast Guard, or civil authority charged with the responsibility for making such arrangements:

(2) Burial at sea of human remains which are not cremated shall take place no closer than three nautical miles from land and in water no less than one hundred fathoms (six hundred feet) deep and in no less than three hundred fathoms (eighteen hundred feet) from (i) 27°30'00" to 31°00'00" North Latitude off St. Augustine and Cape Canaveral, Florida; (ii) 82°20'00" to 84°00'00" West Longitude off Dry Tortugas, Florida; and (iii) 87°15'00" to 89°50'00" West Longitude off the Mississippi River Delta, Louisiana, to Pensacola, Florida. All necessary measures shall be taken to ensure that the remains sink to the bottom rapidly and permanently; and

(3) Cremated remains shall be buried in or on ocean waters without regard to the depth limitations specified in paragraph (a)(2) of this Section provided that such burial shall take place no closer than three nautical miles from land.

(b) For purposes of this Section and §§ 229.2 and 229.3, "land" means that portion of the baseline from which the territorial sea is measured, as provided for in the Convention on the Territorial Sea and the Contiguous Zone, which is in closest proximity to the proposed disposal site.

(c) Flowers and wreaths consisting of materials which are readily decomposable in the marine environment may be disposed of under the general permit set forth in this Section at the site at which disposal of human remains is authorized.

(d) All burials conducted under this general permit shall be reported within 30 days to the Regional Administrator of the Region from which the vessel carrying the remains departed.

§ 229.2 Transport of target vessels.

(a) The United States Navy is hereby granted a general permit to transport vessels from the United States or from

any other location for the purpose of sinking such vessels in ocean waters in testing ordnance and providing related data subject to the following conditions:

(1) Such vessels may be sunk at times determined by the appropriate Navy official;

(2) Necessary measures shall be taken to ensure that the vessel sinks to the bottom rapidly and permanently, and that marine navigation is not otherwise impaired by the sunk vessel;

(3) All such vessel sinkings shall be conducted in water at least 1000 fathoms (6000 feet) deep and at least 50 nautical miles from land, as defined in § 229.1(b); and

(4) Before sinking, appropriate measures shall be taken by qualified personnel at a Navy or other certified facility to remove to the maximum extent practicable all materials which may degrade the marine environment, including without limitation, (i) emptying of all fuel tanks and fuel lines to the lowest point practicable, flushing of such tanks and lines with water, and again emptying such tanks and lines to the lowest point practicable so that such tanks and lines are essentially free of petroleum, and (ii) removing from the hulls other pollutants and all readily detachable material capable of creating debris or contributing to chemical pollution.

(b) An annual report will be made to the Administrator of the Environmental Protection Agency setting forth the name of each vessel used as a target vessel, its approximate tonnage, and the location and date of sinking.

§ 229.3 Transportation and disposal of vessels.

(a) All persons subject to Title I of the Act are hereby granted a general permit to transport vessels from the United States, and all departments, agencies, or instrumentalities of the United States are hereby granted a general permit to transport vessels from any location for the purpose of disposal in the ocean subject to the following conditions:

(1) Except in emergency situations, as determined by the U.S. Army Corps of Engineers and/or the U.S. Coast Guard, the person desiring to dispose of a vessel under this general permit shall, no later than one month prior to the proposed disposal date, provide the following information in writing to the EPA Regional Administrator for the Region in which the proposed disposal will take place:

(i) A statement detailing the need for the disposal of the vessel;

(ii) Type and description of vessel(s) to be disposed of and type of cargo normally carried;

(iii) Detailed description of the proposed disposal procedures;

(iv) Information on the potential effect of the vessel disposal on the marine environment; and

(v) Documentation of an adequate evaluation of alternatives to ocean disposal (i.e., scrap, salvage and reclamation).

(2) Transportation for the purpose of ocean disposal may be accomplished under the supervision of the District Commander of the U.S. Coast Guard or his designee.

(3) Except in emergency situations, as determined by the U.S. Army Corps of Engineers and/or the District Commander of the U.S. Coast Guard, appropriate measures shall be taken, prior to disposal, by qualified personnel to remove to the maximum extent practicable all materials which may degrade the marine environment, including without limitation, (i) emptying of all fuel lines and fuel tanks to the lowest point practicable, flushing of such lines and tanks with water, and again emptying such lines and tanks to the lowest point practicable so that such lines and tanks are essentially free of petroleum, and (ii) removing from the hulls other pollutants and all readily detachable material capable of creating debris or contributing to chemical pollution.

(4) Except in emergency situations, as determined by the U.S. Army Corps of Engineers and/or the U.S. Coast Guard, the dumper shall, no later than 10 days prior to the proposed disposal date, notify the EPA Regional Administrator and the District Commander of the U.S. Coast Guard that the vessel has been cleaned and is available for inspection; the vessel may be transported for dumping only after EPA and the Coast Guard agree that the requirements of paragraph (a)(3) of this Section have been met.

(5) Disposal of these vessels shall take place in a site designated on current nautical charts for the disposal of wrecks or no closer than twenty-two kilometers (twelve miles) from the nearest land and in water no less than fifty fathoms (three hundred feet) deep, and all necessary measures shall be taken to ensure that the vessels sink to the bottom rapidly and that marine navigation is not otherwise impaired.

(6) Disposal shall not take place in established shipping lanes unless at a designated wreck site, nor in a designated marine sanctuary, nor in a location where the hulk may present a hazard to commercial trawling or national defense (see 33 CFR 205).

(7) Except in emergency situations, as determined by the U.S. Army Corps of Engineers and/or the U.S. Coast Guard, disposal of these vessels shall be performed during daylight hours only.

(8) Except in emergency situations, as determined by the U.S. Army Corps of Engineers and/or the District Commander of the U.S. Coast Guard, the Captain-of-the-Port (COTP), U.S. Coast Guard, and the EPA Regional Administrator shall be notified forty-eight (48) hours in advance of the proposed disposal. In addition, the COTP and the EPA Regional Administrator shall be notified by telephone at least twelve (12) hours in advance of the vessel's departure from port with such details as the proposed departure time and place, disposal site location, estimated time of arrival on site, and the name and communication capability of the towing vessel. Schedule changes are to be reported to the COTP as rapidly as possible.

(9) The National Ocean Survey, NOAA, 6010 Executive Blvd., Rockville, MD 20852, shall be notified in writing, within one week, of the exact coordinates of the disposal site so that it may be marked on appropriate charts.

[FR Doc.77-900 Filed 1-10-77;8:45 am]

Federal Register

MONDAY, NOVEMBER 28, 1977

PART IV



ENVIRONMENTAL PROTECTION AGENCY

■

OCEAN DUMPING

Procedural Regulations

[6560-01]

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER H—OCEAN DUMPING

[FRL 777-8]

PART 223—CONTENTS OF PERMITS; REVISION, REVOCATION OR LIMITATION OF OCEAN DUMPING PERMITS UNDER SECTION 104(d) OF THE ACT

PART 226—ASSESSMENT OF CIVIL PENALTIES AND REVOCATION AND SUSPENSION OF PERMITS UNDER SECTION 105 OF THE ACT

Revision of Procedural Regulations

AGENCY: United States Environmental Protection Agency.

ACTION: Interim final revision of regulations.

SUMMARY: The United States Environmental Protection Agency (EPA) today publishes interim final revisions to its regulations for the enforcement of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq. These regulations set forth the procedures to be followed, and the criteria to be applied, in actions to modify, revoke or suspend ocean dumping permits and to assess civil penalties for violation of Title I of the Act, EPA ocean dumping regulations, or the terms and conditions of a permit.

DATES: Effective November 28, 1977. Comments are due December 28, 1977.

ADDRESS: Send comments in triplicate to: Lisa K. Friedman, Office of General Counsel (A-131), U.S. Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Lisa K. Friedman, 202-755-0433.

SUPPLEMENTARY INFORMATION: EPA's ocean dumping enforcement regulations were first published on October 15, 1973 (38 FR 28610 et seq.) and now appear at 40 CFR Parts 223 and 226. In response to the requests of several Regional Administrators that the regulations be significantly expanded and clarified, EPA published, on June 28, 1976 (41 FR 26644 et seq.), proposed revisions to Parts 223 and 226 which spelled out the rules of practice in enforcement proceedings in substantially greater detail.

Subsequent discussions with Regional enforcement personnel and the Agency's Administrative Law Judges have led EPA to conclude that the proposed revisions, while representing a substantial improvement over its earlier regulations, are still not sufficiently detailed to provide a clear, comprehensive procedural framework for ocean dumping enforcement proceedings. Accordingly, in the interim final rules of practice published today, EPA has further modified and expanded its June 28, 1976 proposed revisions to clarify both the format of these proceedings and the rights and responsibilities of the various participants.

Under the Agency's existing regulations, and its June 28, 1976 proposed revision, all procedures for the revocation, modification, suspension or limitation of permits were contained in Part 223. In a major departure from this format, the regulations published today establish two separate procedures for permit revocation, modification, and suspension under Sections 104(d) and 105(f) of the Act, respectively, to reflect the two different types of factors required to be considered in making determinations under those sections.

Section 104(d) authorizes the Administrator to deny, revoke, alter or limit a permit whenever he finds that a proposed dump cannot be carried out "consistently with the criteria and other factors required to be applied in evaluating the permit application." Because a determination to deny, revoke, alter or limit a permit under Section 104(d) requires the Administrator to consider the same factors applied in initially evaluating the permit application, the revised procedural rules for revocation, revision and limitation of permits under that Section parallel those set forth in Part 222 of the EPA's ocean dumping regulations for the evaluation of permit applications. Final revisions of Part 222 were published on January 11, 1977 (42 FR 2462 et seq.).

The rules of practice for Section 104(d) permit revocation, revision and limitation proceedings appear below as Subpart B of Part 223. They provide for written notification of any proposed revocation, revision or limitation of a permit to the permittee and the public. Any person may request a public hearing on the proposed revocation, modification or limitation, and a hearing will be ordered if it is determined that the request presents genuine issues, or that a public hearing is otherwise necessary or appropriate. Upon receipt of the Administrator's or Regional Administrator's determination following the public hearing, any person who participated in the hearing may request an adjudicatory hearing for the purpose of reviewing such determination.

Under Section 105(f) of the Act, the Administrator may revoke or suspend a permit if he finds that its terms and conditions have been violated. Since Section 105(a) requires the Administrator to make a similar finding (or a finding that the Act or the regulations have been violated) in assessing a civil penalty, the rules of practice published today adopt the same procedures for both Section 105(f) permit revocation and suspension proceedings and Section 105(a) civil penalty assessment proceedings. These regulations appear below as Part 226.

Part 226 has been modeled on the rules of practice used in proceedings to assess civil penalties under the Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 1361(a) and 1361(a)) (FIFRA), 40 CFR 168.01 et seq., and Section 211(d) of the Clean Air Act (42 U.S.C. 1857f-6c) (unleaded fuel), 40 CFR 80.301 et seq. (40 FR 39962 et seq., August 29, 1975). These rules have now been used in a number of FIFRA and unleaded fuel civil penalty proceedings, and experience has demonstrated their effectiveness. For this reason, and because both regulations were the subject of extensive public comment at the time they were proposed, and thus reflect the fine tuning resulting from two separate public rulemakings, they have been used as the basis for Section 105 (a) and (f) procedural regulations.

Both civil penalty assessment proceedings and permit revocation/suspension proceedings under Section 105(f) begin with the service of a complaint. Complaints for assessment of a civil penalty issued pursuant to these procedures must set forth, inter alia, (1) the provision of the Act, regulations, or permit which is alleged to have been violated; (2) the factual basis for the allegation; (3) the amount of the civil penalty which is proposed to be assessed; and (4) a statement as to the appropriateness of the proposed penalty as well as notice of opportunity to request a hearing. Complaints for revocation or suspension of a permit must include similar information with respect to the basis for the proposed revocation or suspension.

Within twenty (20) days after receipt of such complaint, the person charged may file an answer in which he (1) admits, denies or explains the material factual allegations contained in the complaint, (2) challenges the appropriateness of the proposed penalty or proposed revocation or suspension or (3) contends that he is entitled to judgment as a matter of law. This twenty-day period in which an answer may be filed can be extended upon motion granted by the Regional Administrator. The answer must also state (1) the circumstances or arguments which are alleged to constitute the grounds of defense, (2) the facts which the respondent intends to place at issue, and (3) whether a hearing is requested. Failure to file a timely answer to the complaint or failure to comply with prehearing orders of the Presiding Officer will constitute an admission of the allegations contained in the complaint and a waiver of the right to a hearing, and may give rise to a default order requiring payment of the proposed civil penalty or revocation or suspension of the permit without further proceedings.

Leave to intervene in a proceeding may be granted to persons who timely demonstrate real interests which (1) raise common questions of fact or law, (2) may be adversely affected by the outcome of the proceedings, (3) will not be protected absent their intervention, and (4) do not unreasonably broaden the issues or unduly prolong the proceeding. Other persons may, for good cause shown, be granted leave to participate in proceedings as amicus curiae and will be eligible to participate in any briefing following the granting of such motion.

Part 226 encourages settlement of proceedings through informal settlement conferences leading to the signing of a consent agreement by the Agency and the person charged. Prehearing conferences and prehearing correspondence may also be utilized to simplify the litigable issues, obtain stipulations to factual matters, encourage settlement, and otherwise expedite the proceeding. In addition, the Presiding Officer is authorized to render an accelerated decision at any time during the proceeding if it appears that either the complainant or respondent is entitled to judgment as a matter of law.

If settlement upon all issues is not reached or if the proceeding is not disposed of by an accelerated decision, a public hearing must be held to adjudicate all remaining issues of fact and law. Such hearing must be conducted by a Presiding Officer on the record pursuant to Part 226 with appropriate procedural safeguards. The Presiding Officer is authorized to receive all oral or written evidence which is relevant, competent, material, and not unduly repetitious. Evidence regarding trade secrets or other appropriately designated commercial or financial information may be considered *in camera*.

Following the hearing and his review of the hearing record, the Presiding Officer is required to issue an initial decision. This initial decision, or an accelerated decision, may be appealed to the Regional Administrator by any party or reviewed by him sua sponte. No matter of controversy (whether reaching conclusion by means of a consent agreement, default order, accelerated decision, or an initial decision and regardless of whether appealed or reviewed sua sponte) may be ultimately disposed of except by a final order of the Regional Administrator. Each final order must include findings of fact, conclusions regarding material issues of law, fact or discretion, the reasons therefor, and an order assessing a civil penalty or revoking or suspending a permit, as appropriate. Parties adversely affected by a final order of the Regional Administrator may move to reopen the hearing or to reargue any orders, rulings, or decisions of the Presiding Officer, or may request reconsideration of the Regional Administrator's final order.

Under the Agency's current Parts 223 and 226, it is not possible to assure that the Agency's authority to assess civil penalties under Section 105(a) and to revoke, revise, suspend, or limit permits under Sections 104(d) and 105(f) of the Act is being applied uniformly and consistently in all ocean dumping enforcement proceedings. In order to remedy this situation as promptly as possible, it is necessary that these procedural regulations take effect prior to a thirty (30)-day period following promulgation. In finalizing these regulations on an interim basis the Agency has considered both the need for immediate implementation and the fact that the regulations are based on Part 222 of its ocean dumping regulations and existing Agency civil penalty assessment procedural regulations, all of which have previously been the subject of extensive public comment.

These interim rules of practice shall become effective on November 28, 1977, and all ocean dumping civil penalty assessment or permit revocation, revision, limitation or suspension proceedings which commence on or after that date shall be subject thereto. Beginning on the effective date, the rules shall also apply to the remaining phases of any proceedings currently in process insofar as such application is feasible and equitable, provided, however, that any completed phase of a proceeding which might have been conducted differently under the rules shall not be affected.

NOTE.—The Environmental Protection Agency has determined that this document does not constitute a major regulation requiring preparation of an Economic Impact Statement under Executive Order 11821, as amended by Executive Order 11949, and under OMB Circular A-107.

The Agency will consider all written comments on these rules received prior to December 28, 1977, in promulgating final regulations. All documents should be submitted in triplicate to Lisa K. Friedman, whose address appears above. All comments received will be available for inspection and copying at the EPA Public Information Reference Unit, room 2922 (EPA Library), Waterside Mall, 401 M Street SW., Washington, D.C. 20460 and at EPA Regional Offices in Regions II and III.

Dated: November 11, 1977.

DOUGLAS M. COSTLE,
Administrator.

1. Part 223 is revised to read as follows:

Subpart A—Contents of Ocean Dumping Permits Issued Under Section 102 of the Act

Sec.

223.1 Contents of special, interim, emergency, general and research permits; posting requirements.

Subpart B—Procedures for Revision, Revocation or Limitation of Ocean Dumping Permits Under Section 104(d) of the Act

223.2 Scope of these rules.
223.3 Preliminary determination; notice.
223.4 Request for, scheduling and conduct of public hearing; determination.
223.5 Request for, scheduling and conduct of adjudicatory hearing; determination.

AUTHORITY: Secs. 102, 104, 107, 108, Marine Protection Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1412, 1414, 1417 1418)

Subpart A—Contents of Ocean Dumping Permits Issued Under Section 102 of the Act

§ 223.1 Contents of special, interim, emergency, general and research permits; posting requirements.

(a) All special, interim, emergency and research permits shall be displayed on the vessel engaged in dumping and shall include the following:

(1) Name of permittee;

(2) Means of conveyance and methods and procedures for release of the materials to be dumped;

(3) The port through or from which such material will be transported for dumping;

(4) A description of relevant physical and chemical properties of the materials to be dumped;

(5) The quantity of the material to be dumped expressed in tons;

(6) The disposal site;

(7) The times at which the permitted dumping may occur and the effective date and expiration date of the permit;

(8) Special provisions which, after consultation with the Coast Guard, are deemed necessary for monitoring or surveillance of the transportation or dumping;

(9) Such monitoring relevant to the assessment of the impact of permitted dumping activities on the marine environment at the disposal site as the Administrator or Regional Administrator, as the case may be, determine to be necessary or appropriate; and

(10) Any other terms and conditions determined by the Administrator, or Regional Administrator, as the case may be, to be necessary or appropriate, including, without limitation, release procedures and requirements for the continued investigation or development of alternatives to ocean dumping.

(b) General permits shall contain such terms and conditions as the Administrator deems necessary or appropriate.

(c) Interim permits shall, in addition to the information required or permitted to be included in the permit pursuant to paragraph (a) of this section, include terms and conditions which satisfy the requirements of §§ 220.3(d) and 227.8.

Subpart B—Procedures for Revision, Revocation or Limitation of Ocean Dumping Permits Under Section 104(d) of the Act

§ 223.2 Scope of these rules.

(a) These rules of practice shall govern all proceedings under Section 104(d) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1414(d)), to revise, revoke or limit the terms and conditions of any permit issued pursuant to section 102 of the Act. Section 104(d) provides that "the Administrator * * * may limit or deny the issuance of permits, or he may alter or revoke partially or entirely the terms of permits issued by him under this title, for the transportation for dumping, or for the dumping, or both of specified materials or classes of materials, where he finds that such materials cannot be dumped consistently with the criteria and other factors required to be applied in evaluating the permit application."

(b) In the absence of specific provisions in these rules, and where appropriate, questions arising at any stage of the proceedings shall be resolved at the discretion of the Presiding Officer, the Regional Administrator, or the Administrator, as appropriate.

§ 223.3 Preliminary determination; notice.

(a) *General.* Any general, special, emergency, interim or research permit

issued pursuant to Section 102 of the Act shall be subject to revision, revocation or limitation, in whole or in part, as the result of a determination by the Administrator or Regional Administrator that:

(1) The cumulative impact of the permittee's dumping activities or the aggregate impact of all dumping activities at the dump site designated in the permit should be categorized as Impact Category I, as defined in § 228.10(c).(1) of this subchapter; or

(2) There has been a change in circumstances relating to the management of the disposal site designated in the permit; or

(3) The dumping authorized by the permit would violate applicable water quality standards; or

(4) The dumping authorized by the permit can no longer be carried out consistent with the criteria set forth in Parts 227 and 228.

(b) *Preliminary determination.* Whenever any person authorized by the Administrator or Regional Administrator to (1) periodically review permits pursuant to Section 104(d) of the Act or (2) otherwise assess the need for revision, revocation or limitation of a permit makes any of the determinations listed in paragraph (a) of this section with respect to a permit issued pursuant to Section 102 of the Act, and additionally determines that revision, revocation or limitation of such permit is warranted, the Administrator or Regional Administrator, as the case may be, shall provide notification of such proposed revision, revocation or limitation to the permittee named in the permit, if any, the public, and any cognizant Federal/State agencies pursuant to paragraph (c) of this section.

(c) *Form of notification.* Notice of any proposed revision, revocation or limitation of a permit shall be sent to the permittee by certified mail, return receipt requested, and shall be published and otherwise disseminated in the manner described in § 222.3(b)–(h).

(d) *Contents of notice.* The notice of any proposed revision, revocation or limitation of a permit issued pursuant to paragraph (b) of this section shall include, in addition to any other materials, the following:

(1) A brief description of the contents of the permit, as set forth in § 223.1;

(2) A description of the proposed revision, revocation, or limitation;

(3) A statement of the reason for such proposed revision, revocation, or limitation; and

(4) A statement that within thirty (30) days of the date of dissemination of the notice, any person may request a public hearing on the proposed revision, revocation or limitation.

§ 223.4 Request for, scheduling and conduct of public hearing; determination.

(a) *Request for hearing.* Within thirty (30) days of the date of the dissemination of any notice required by § 223.2(b), any person may request the Administrator or Regional Administrator, as appropriate, to hold a public hearing on the proposed revision, revocation or limitation by submitting a written request containing the following:

(1) Identification of the person requesting the hearing and his interest in the proceeding;

(2) A statement of any objections to the proposed revision, revocation or limitation or to any facts or reasons identified as supporting such revision, revocation or limitation; and

(3) A statement of the issues which such person proposes to raise for consideration at such hearing.

(b) *Grant or denial of hearing; notification.* Whenever (1) a written request satisfying the requirements of paragraph (a) of this section has been received, and the Administrator or Regional Administrator, as appropriate, determines that such request presents genuine issues, or (2) the Administrator or Regional Administrator, as the case may be, determines in his discretion that a public hearing is necessary or appropriate, the Administrator or Regional Administrator, as the case may be, will set a time and place for a public hearing in accordance with paragraph (c) of this section and will give notice of such hearing by publication in accordance with § 223.3(c). In the event the Administrator or the Regional Administrator, as the case may be, determines that a request filed pursuant to paragraph (a) of this section does not comply with the requirements of paragraph (a) or that such request does not present genuine issues, he shall advise, in writing, the person requesting the hearing of his determination.

(c) *Time and place of hearing.* Any hearing authorized pursuant to this Section by the Administrator or Regional Administrator, as the case may be, shall be held in the city in which the Environmental Protection Agency Regional Office which issued the permit is located, whenever practicable, and shall be set for the earliest practicable date, but in no event less than thirty (30) days after the receipt of an appropriate request for a hearing or a determination by the Administrator or the Regional Administrator, as the case may be, to hold such a hearing without such a request.

(d) *Presiding Officer.* Any hearing convened pursuant to this Part shall be conducted by a Presiding Officer, who shall be either a Regional Judicial Officer or a person having the qualifications of a Judicial Officer assigned by the Administrator or Regional Administrator, as appropriate. Such person shall be an attorney who is a permanent or temporary employee of the Agency, who is not employed by the Region's or Headquarter's Water Programs Division, Surveillance and Analysis Division, or Enforcement Division, and who has had no connection with the preparation or presentation of evidence for any hearing in which he participates as Judicial Officer.

(e) *Conduct of the public hearing.* The Presiding Officer shall be responsible for the expeditious conduct of the hearing. The hearing shall be an informal public hearing, not an adversary proceeding, and shall be conducted so as to allow the presentation of public comments. When the Presiding Officer determines that it is necessary or appropriate, he shall cause a suitable record, which may include a verbatim transcript, of the proceedings to be made. Any person may appear at a public hearing convened pursuant to this section whether or not he requested the hearing, and may be represented by counsel or any other authorized representative. The Presiding Officer is authorized to set forth reasonable restrictions on the nature or amount of documentary material or testimony presented at a public hearing, giving due regard to the relevancy of any such information, and to the avoidance of undue repetitiveness of information presented.

(f) *Recommendations of Presiding Officer.* Within 30 days following the adjournment of a public hearing convened pursuant to this section or within such additional period as the Administrator or the Regional Administrator, as the case may be, may grant to the Presiding Officer for good cause shown, and after full consideration of the comments received at the hearing, the Presiding Officer will prepare and forward to the Administrator or to the Regional Adminis? trator, as the case may be, written recommendations relating to the revision, revocation or limitation of the permit and the record of the hearing, if any. Such recommendations shall contain a brief statement of the basis therefor, including a description of evidence relied upon (1) to support any finding made pursuant to § 223.3(a); (2) to justify any proposed revision, revocation or limitation of the permit; and (3) to justify any proposed revision, revocation or limitation which differs from that set forth in the notice issued pursuant to § 223.3(b). Copies of the Presiding Officer's recommendations shall be provided to any interested person on request, without charge. Copies of the record will be provided in accordance with 40 CFR Part 2.

(g) *Determination of the Administrator or Regional Administrator.* Upon receipt of the Presiding Officer's recommendations or, where no hearing has been held, upon termination of the thirty (30)-day period for requesting a hearing provided in paragraph (a) of this section, the Administrator or the Regional Administrator, as the case may be, shall make a determination with respect to the modification, revocation or suspension of the permit. Such determination shall include a description of the permit revision, revocation or limitation, the basis therefor, and the effective date. A copy of such determination shall be mailed to the permittee and each person who registered his attendance at the hearing by providing his name and mailing address.

§ 223.5 Request for, scheduling and conduct of adjudicatory hearing; determination.

Within ten (10) days following the receipt of the Administrator's or Regional Administrator's determination issued pursuant to § 223.4(g), any person who participated in the public hearing held pursuant to § 223.4 may request that an adjudicatory hearing be held for the purpose of reviewing such determination or any part thereof. Such request shall be submitted and disposed of, and any adjudicatory hearing convened shall be conducted in accordance with the procedures set forth in §§ 222.10 (a), (b), (d), and (e) and 222.11.

2. Part 226 is revised to read as follows:

Subpart A—General

Sec.
226.1 Scope of these rules.
226.2 Use of number and gender.
226.3 Definitions.
226.4 Powers and duties of the Regional Administrator, Regional Judicial Officer and the Presiding Officer; disqualification.
226.5 Filing, service and form of pleadings and documents.
226.6 Filing and service of rulings, orders, and decisions.
226.7 Computation and extension of time.
226.8 Ex parte discussion of proceeding.
226.9 Examination of documents filed.

Subpart B—Parties and Appearances

226.10 Appearances.
226.11 Intervention.
226.12 Consolidation and severance.

Subpart C—Prehearing Procedures

226.13 Issuance of complaint; docket number.
226.14 Contents of the complaint.
226.15 Motions.
226.16 Answer to the complaint.
226.17 Failure to answer the complaint; default order.
226.18 Informal settlement and consent agreement.
226.19 Prehearing conference.
226.20 Accelerated decision.

Subpart D—Hearing Procedure

226.21 Scheduling the hearing.
226.22 Evidence.
226.23 Objections and offers of proof.
226.24 Burden of presentation; burden of persuasion.
226.25 Filing of transcripts.
226.26 Filing of briefs, proposed findings of fact and conclusions of law, and proposed order.
226.27 Initial decision.

Subpart E—Appeals and Administrative Review

226.28 Appeal from or review of interlocutory orders or rulings.
226.29 Appeal from or review of initial decisions.

Subpart F—Final Order

226.30 Final Order.

Subpart G—Motion to Reconsider

226.31 Motion to reopen hearings, to rehear or reargue proceedings, or to reconsider a final order.
226.32 Procedure for disposition of motions.

AUTHORITY: Secs. 105, 107, 108, Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1415, 1417, 1418).

Subpart A—General

§ 226.1 Scope of these rules.

(a) These rules of practice shall govern all proceedings conducted for (i) the assessment against any person of any civil penalty pursuant to the provisions of section 105(a) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, (33 U.S.C. 1415(a)) or (ii) the revocation or suspension of a permit pursuant to the provisions of Section 105(f) of the Act (33 U.S.C. 1415(f)). Section 105(a) provides that any person who violates any provision of Title I of the Act, its implementing regulations or any ocean dumping permit "shall be liable to a civil penalty of not more than $50,000 for each violation to be assessed by the Administrator." Section 105(f) provides that if the provisions of a permit issued under Section 102 of the Act are violated, "the Administrator * * * may revoke the permit or may suspend the permit for a specified period of time."

(b) In the absence of specific provisions in these rules, and where appropriate, questions arising at any stage of the proceeding shall be resolved at the discretion of the Presiding Officer or of the Regional Administrator, as appropriate, pursuant to the provisions of § 226.15(c) hereof.

§ 226.2 Use of number and gender.

As used in these rules of practice, words in the singular shall be deemed to import the plural and words in the masculine gender shall be deemed to import the feminine and vice versa, as the case may require.

§ 226.3 Definitions.

(a) The term "Act" means the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1401 et seq.) and any other legislation supplementary thereto and amendatory thereof.

(b) The term "Administrative Law Judge" means an Administrative Law Judge appointed pursuant to 5 U.S.C. 3105 (see also 5 CFR Part 930, as amended by 37 FR 16787). Such term is synonymous with the term "Hearing Examiner" as used in Title 5 of the United States Code.

(c) The term "Administrator" means the Administrator of the United States Environmental Protection Agency.

(d) The term "Agency" means the United States Environmental Protection Agency.

(e) The term "Complainant" means the Agency acting through any person authorized by the Regional Administrator to issue a complaint to persons alleged to be in violation of specific provisions of Title I of the Act, the regulations, or a permit. The complainant shall not be the Regional Judicial Officer or the Regional Administrator.

(f) The term "Complaint" or "Complaint and Notice of Opportunity for Hearing" means a written communication issued by the complainant to a person alleging one or more violations of specific provisions of Title I of the Act, or the regulations promulgated thereunder, or a permit issued pursuant thereto. The required contents of the complaint are set forth in § 226.14.

(g) The term "Consent Agreement" means any written document containing stipulations of fact, conclusions regarding material issues of law, fact, or discretion, and a specified proposed penalty or proposed revocation or suspension acceptable to both the complainant and respondent.

(h) The term "Default Order" means an order issued pursuant to § 226.17 disposing of a matter of controversy between the respondent and the Agency upon (1) the failure of the respondent to file a timely answer to the complaint, or (2) motion of the complainant to the Regional Administrator or the Presiding Officer, as appropriate, pursuant to § 226.15(c) because of the respondent's failure to comply with an order of the Regional Administrator or Presiding Officer.

(i) The term "Final Order" means an order issued by the Regional Administrator disposing of a matter of controversy between any respondent and the Agency. No matter of controversy which reaches conclusion upon the (1) default of the respondent; (2) ratification of a consent agreement; (3) completion of a hearing; or (4) rendering of an accelerated decision pursuant to § 226.20 may be disposed of except by a final order of the Regional Administrator.

(j) The term "Hearing" means a hearing open to the public and conducted pursuant to these rules of practice.

(k) The term "Initial Decision" means the decision issued by the Presiding Officer based upon the record of the hearing out of which it arises or upon the rendering of an accelerated decision pursuant to the provisions of section § 226.20.

(l) The term "Party" means any person, group, organization, agency, or department that participates in a hearing as complainant, respondent, or intervenor.

(m) The term "Permit" (1) in actions for the revocation or suspension of a permit, refers to any permit issued under Section 102 of the Act and (2) in actions for the assessment of a civil penalty, refers to any permit issued under Title I of the Act.

(n) The term "Person" includes any individual, partnership, association, corporation, and any trustee, assignee, receiver or legal successor thereof; any organized group of persons whether incorporated or not; and any officer, employee, agent, department, agency or instrumentality of the Federal Government, of any State or local unit of government, or of any foreign government.

(o) The term "Presiding Officer" refers to the Administrative Law Judge, Regional Judicial Officer, or person having the qualifications of Regional Judicial Officers designated by the Regional Administrator to serve as Presiding Officer.

(p) The term "Regional Administrator" means the Administrator of any Regional Office of the Agency or any officer or employee thereof to whom authority is duly delegated to act in his stead. Where the Regional Administrator has authorized the Regional Judicial Officer to act, the term "Regional Administrator" shall include the "Regional Judicial Officer."

(q) The term "Regional Hearing Clerk" means an individual duly authorized by the Regional Administrator to serve as hearing clerk for a given Region. Correspondence may be addressed to the Regional Hearing Clerk, United States Environmental Protection Agency (address of Regional Office).

(r) The term "Regional Judicial Officer" means an officer or employee of the Agency duly authorized by the Regional Administrator to serve as the Judicial Officer for the region as provided in these rules of practice.

(s) The term "Respondent" means any person proceeded against in the complaint.

(t) The term "Regulations" means any regulations set forth in this Subchapter H.

(u) Terms defined in the Act and not explicitly defined herein are used herein with the meanings given in the Act.

§ 226.4 Powers and duties of the Regional Administrator, Regional Judicial Officer and the Presiding Officer; disqualification.

(a) *Regional Administrator.* The Regional Administrator shall exercise all powers and duties as prescribed or delegated under the Act and these rules of practice.

(b) *Regional Judicial Officer*—(1) *Office.* One or more Regional Judicial Officers may be designated by the Regional Administrator to perform the functions hereinafter provided within the Region of their designation.

(2) *Qualifications.* A Regional Judicial Officer shall be an attorney who is a permanent or temporary employee of the Agency and who may perform other duties within the Agency. Such Regional Judicial Officer shall not be employed by the Region's Water Programs Division, Surveillance and Analysis Division, or Enforcement Division, and shall have had no connection with the preparation or presentation of evidence for any hearing in which he participates as Regional Judicial Officer. He may be a member of the staff of the Regional Counsel.

(3) *Functions.* The Regional Administrator may delegate to the Regional Judicial Officer all or part of his authority to act in a given proceeding. The Regional Administrator may separately delegate to the Regional Judicial Officer his authority to make findings of fact and draw conclusions regarding material issues of law, fact or discretion in a particular proceeding. This delegation shall not, however, preclude the Regional Judicial Officer from referring any motion or case to the Regional Administrator when such referral is appropriate.

(c) *Presiding Officer.* It shall be the duty of the Presiding Officer to conduct a fair and impartial hearing, assure that the facts are fully elicited, adjudicate all issues, and avoid delay. With respect to the cases assigned to him, between the time he is designated and the time he issues his decision, the Presiding Officer shall have authority to:

(1) Conduct administrative hearings held pursuant to Sections 105 (a) and (f) of the Act and these rules of practice;

(2) Rule upon motions, requests, and offers of proof, dispose of procedural requests, and issue all necessary order;

(3) Administer oaths and affirmations and take affidavits;

(4) Examine witnesses, receive documentary or other evidence;

(5) For good cause, upon motion or sua sponte, order a party, or an officer or agent thereof, to produce testimony, documents or other non-privileged evidence and failing the production thereof without good cause being shown, may draw adverse inferences against such party;

(6) Admit or exclude evidence;

(7) Hear oral argument on facts or law;

(8) Hold conferences for the settlement or simplification of the issues, or the expediting of the proceedings; and

(9) Do all other acts and take all measures necessary for the maintenance of order and for the efficient, fair and impartial adjudication of issues of fact and law arising in proceedings under Section 105 (a) or (f) of the Act.

(d) *Disqualification, withdrawal.* The Regional Administrator, Regional Judicial Officer or Presiding Officer may not perform functions provided for in these rules of practice regarding any matter in which he (1) has a financial interest; (2) has any relationship with a party or with the subject matter which would make it inappropriate for him to act; or (3) is unable for any reason to act. Any party may at any time by motion made to the Regional Administrator request that the Regional Judicial Officer, or Presiding Officer, be disqualified from the proceeding. The Regional Administrator shall then rule upon such motion. Any party may at any time by motion to the Administrator request that the Regional Administrator be disqualified from the proceeding. The Administrator shall then rule upon such motion. The Regional Administrator, Regional Judicial Officer or Presiding Officer may at any time withdraw from any proceeding in which he deems himself disqualified or unable to act for any reason.

(e) *Effect of disqualification or withdrawal.* In the event the Regional Administrator, Regional Judicial Officer, or Presiding Officer is disqualified or withdraws from the proceeding, a qualified individual who has none of the infirmities listed in paragraph (d) of this section shall be assigned to replace him. "Delegation of the Regional Administrator's or Regional Judicial Officer's responsibilities in these proceedings" shall be made by the Administrator or the Regional Administrator, respectively. Assignment of a new Presiding Officer shall be made by the Chief Administrative Law Judge if the original Presiding Officer was an Administrative Law Judge, or if the Chief Administrative Law Judge is available as a replacement, the Regional Administrator shall designate the new Presiding Officer. In all cases of disqualification or withdrawal, upon designation of a replacement, the proceeding shall continue without abatement unless otherwise ordered to facilitate the proceeding and to protect the interests of the parties.

§ 226.5 Filing, service and form of pleadings and documents.

(a) Filing of pleadings and documents prior to the filing of an "answer to the complaint." Documents filed after the complaint is issued and prior to the filing of an answer to the complaint shall be served directly upon all other parties to the proceeding. The file of the complainant shall be the official file of the proceeding prior to the filing of an answer to the complaint. No file of a proceeding shall be maintained by the Regional Hearing Clerk prior to the filing of an answer to the complaint. Each document shall contain the docket number assigned pursuant to § 226.13. A certificate of service shall accompany each document served or filed.

(b) *Filing of pleadings and documents after the filing of an answer to the complaint.* (1) After the filing of an answer to the complaint, the complainant shall prepare and shall file with the Regional Hearing Clerk the original and one copy of each document in the official file of the proceedings. The original shall be included in the file maintained by the Regional Hearing Clerk and the duplicate shall be forwarded by the Regional Hearing Clerk to the Presiding Officer assigned to preside over the proceeding pursuant to § 226.21. The Presiding Officer shall promptly notify the parties that he has been assigned to preside over the proceeding.

(2) Thereafter, the original of any document served in the proceeding shall be forwarded directly to the Regional Hearing Clerk by the party serving the document and a duplicate copy shall be forwarded to the Presiding Officer. Except as otherwise provided, a party filing documents with the Regional Hearing Clerk shall serve copies thereof upon all other parties at the same time. Each document filed shall contain the docket number assigned pursuant to § 226.13. A certificate of service shall accompany each document filed.

(3) When the Presiding Officer corresponds directly with the parties, the original of such correspondence shall be sent to the Regional Hearing Clerk and a duplicate copy shall be maintained by the Presiding Officer in the duplicate file. Parties who correspond directly with the Presiding Officer shall in addition to serving all other parties send a duplicate copy of all such correspondence to the Regional Hearing Clerk. A certificate of service shall accompany each document served under this subsection.

(c) *Service of Complaint.* (1) Service of the complaint may be made personally on the respondent (or his representative), or by certified mail, return receipt requested.

(2) Service upon a domestic or foreign corporation or upon a partnership or other unincorporated association which is subject to suit under a common name shall be made by personal service or certified mail, as prescribed by subparagraph (1) of this paragraph, directed to an officer, a managing or general agent, or to any other agent authorized by appointment or by Federal or State law to receive service of process.

(3) Service upon an officer or agency of the United States shall be made by delivering a copy of the complaint to such officer or agency. If the agency is a corporation, the complaint shall be served in the manner prescribed in subparagraph (2) of this paragraph.

(4) Service upon a State or local unit of government, or a State or local officer, agent, department, agency, corporation or other instrumentality shall be made by serving the complaint in the manner prescribed by the law of the State for the service of process on any such persons, or:

(i) If upon a State or local unit of government, or a State or local department, agency, corporation or other instrumentality, by delivering a copy of the complaint to the chief executive officer thereof;

(ii) If upon a State or local officer or agent, by delivering a copy to such officer or agent.

(5) Proof of service of the complaint shall be made by affidavit of the person making personal service, or by properly executed return receipt. Such proof of service shall be filed with the complaint immediately upon completion of service.

(d) *Service of documents other than complaint.* All documents other than the complaint may be served personally or by first-class mail. Copies shall be served upon all parties to a proceeding unless otherwise ordered by the Presiding Officer. A certificate of service setting forth the date and manner of service and the names of all persons served shall accompany each document served.

(e) *Record address.* The initial document filed by any person shall contain his name, address and telephone number. Any changes in such information shall be communicated promptly to the Hearing Clerk, Presiding Officer and all parties to the proceeding. A party who fails to furnish such information shall be deemed to have waived his right to notice and service under these rules.

(f) *Form of documents.* (1) Except as provided herein, or by order of the Presiding Officer or Regional Administrator, there are no specific requirements as to the form of documents. Every pleading, letter or other document shall contain on the first page a caption identifying the complainant and respondent, and including the docket number.

(2) The original of any pleading, letter or other document (other than exhibits) shall be signed by the party filing or by his counsel or other representative. Such signature constitutes a representation by the signer that he has read the pleading, letter or other document, that to the best of his knowledge, information and belief, the statements made therein are true, and that it is not interposed for delay.

(3) The Regional Administrator, Presiding Officer or Regional Hearing Clerk may refuse for filing any document which does not comply with this paragraph.

§ 226.6 Filing and service of rulings, orders, and decisions.

All rulings, orders, decisions, or other documents made or signed by the Regional Administrator, the Regional Judicial Officer or the Presiding Officer, as appropriate, pursuant to § 226.15(c) shall be filed with the complainant if made prior to the filing of an answer to the complaint and thereafter with the Regional Hearing Clerk except as provided in § 226.5(b)(3). Such rulings, orders, decisions or other documents shall be served directly upon all parties by the Regional Administrator, Regional Judicial Officer, or Presiding Officer, as appropriate.

§ 226.7 Computation and extension of time.

(a) *Computation.* In computing any period of time prescribed or allowed in these rules of practice, except as otherwise provided, the day of the act, event, or default from which the designated period begins to run shall not be included in computing the time allowed for the filing of any document or paper. Saturdays, Sundays, and Federal legal holidays shall be included in computing the time allowed for such filing, unless the period of time prescribed is five (5) days or less, in which event intermediate Saturdays, Sundays, and legal holidays shall be excluded from the computation. When such time expires on a Saturday, Sunday or legal holiday, such period shall be extended to include the next following business day.

(b) *Extensions of time.* A prescribed period of time within which a party is required or permitted to do an act shall be computed from the time of service. Extensions of time for the filing of any pleadings, document, or motion shall be granted sua sponte or upon timely motion of a party to the proceeding only for good cause shown and after consideration of prejudice to other parties. Motions for an extension of time shall be filed in advance of the date on which the pleading, document or motion is due to be filed, unless the failure of a party to make timely motion for extension of time was the result of excusable negligence. Such motion shall be decided in accordance with the provisions of § 226.15(c).

(c) *Service by mail.* Service shall be deemed complete upon mailing. However, where service of a pleading or document is by mail, three (3) days shall be added to the time allowed by these rules for the filing of a responsive pleading.

§ 226.8 Ex parte discussion of proceeding.

At no time after the issuance of the complaint shall the Regional Administrator, Regional Judicial Officer, or Presiding Officer discuss ex parte the merits of the proceedings with any person who is connected with the proceeding in an advocative, investigative, or expert capacity, or with any representative of such person. The Regional Administrator, the Regional Judicial Officer, or the Presiding Officer may discuss the merits of the case with any such person only if all parties to the proceeding, or their representatives, have been given reasonable notice and opportunity to be present. Any memorandum or other communication addressed to the Regional Administrator, Regional Judicial Officer or the Presiding Officer, during the pendency of the proceeding, and relating to the merits thereof, by or on behalf of any party, shall be regarded as argument made in the proceeding and shall be served upon all other parties. Nothing in this section shall limit discussion between the respondent and complainant for the purpose of exploring settlement of the case.

§ 226.9 Examination of documents filed.

(a) Subject to the provisions of law restricting the public disclosure of confidential information, any person may, during Agency business hours, inspect and copy any document filed in any proceeding. Such documents may be made available by the complainant if the request to inspect is made prior to the filing of an answer to the complaint, and by the Regional Hearing Clerk if the request to inspect is made after the filing of an answer to the complaint.

(b) The cost of duplicating documents filed in any proceeding shall be borne by the person seeking copies of such documents filed.

Subpart B—Parties and Appearances

§ 226.10 Appearances.

(a) *Representatives.* Any party may appear in person or by counsel or other representative; a partner may appear on behalf of a partnership and an officer may appear on behalf of a corporation. Persons who appear as counsel or other representative must conform to the standards of conduct and ethics as required of practitioners before the courts of the United States. Withdrawal of appearance of any counsel or representative may be effected by filing a written notice of withdrawal.

(b) *Failure to appear.* Any party in the proceeding, who, after being duly notified and without good cause being shown, fails to appear at any prehearing conference shall be subject to whatever orders or determinations the Presiding Officer may make in his discretion. The failure of a party to appear at a hearing shall constitute a waiver of the right to present evidence at such hearing. Where

the respondent fails to appear at a hearing, the Presiding Officer shall require the presentation by the complainant of such evidence as the Presiding Officer deems necessary to develop a prima facie case against the respondent. Upon conclusion of the hearing, the Presiding Officer shall cause a copy of the initial decision to be served upon the respondent.

§ 226.11 Intervention.

(a) *Motion.* Any person may file a motion for leave to intervene in any proceeding conducted under these rules of practice. Such motion must set forth the grounds for the proposed intervention, the position and interest of the movant in the proceedings, and the likely impact that such intervention will have on the expeditious progress of the proceeding. Any person already a party to the proceeding may file an answer to a motion to intervene, making specific reference to the factors set forth in the foregoing sentence and paragraph (c) of this section, within ten (10) days after service.

(b) *When filed.* A motion for leave to intervene in a proceeding must ordinarily be filed prior to the first prehearing conference or, in the absence of a prehearing conference, prior to the initiation of correspondence pursuant to § 226.19(d), or if there is no such correspondence, prior to the setting of a time and place for a hearing. Any motion filed after that time must include, in addition to the information set forth in paragraph (a) of this section, a statement of good cause for the failure to file in a timely manner. Such motion for leave to intervene shall be granted only upon a finding that (1) extraordinary circumstances justify the granting of the motion; and (2) the intervenor agrees to be bound by any agreements, arrangements and other matters previously made in the proceeding.

(c) *Disposition.* Leave to intervene will be granted only insofar as the movant demonstrates that (1) there exist common questions of fact or law; (2) he may be adversely affected by a final order of the Regional Administrator; (3) there are no other means whereby the movant's interest may be protected, including the representation of his interest by other parties; and (4) his presence in the case would not unreasonably broaden the issues as already presented, or unduly prolong or otherwise prejudice the adjudication of the rights of the original parties. If leave is granted, the movant shall thereby become a party to the proceeding upon such terms as the Presiding Officer shall determine. Any party, or the movant if leave is denied, may request that the ruling on any motion for leave to intervene in a proceeding conducted under these rules of practice be certified on interlocutory appeal to the Regional Administrator as provided in § 226.28.

(d) *Amicus curiae.* Persons not parties to the proceeding who wish to file briefs therein may, upon good cause shown, so move the Presiding Officer or the Regional Administrator, as appropriate, pursuant to § 223.15(c). Such motion for leave to file briefs shall identify the interest of the applicant and shall state the reasons why the proposed amicus brief is desirable. In the event such motion is granted, the Presiding Officer or Regional Administrator shall issue an order setting the time for filing such brief. An amicus curiae shall be eligible to participate in any briefing following the granting of his motion, and shall be served with all briefs, reply briefs, motions and orders relating to the issues to be briefed.

§ 226.12 Consolidation and severance.

(a) *Consolidation.* The Presiding Officer may, by motion or sua sponte, consolidate any or all matters at issue in two or more proceedings docketed under these rules of practice in his Region where there exist common parties, common questions of fact and law, and where such consolidation would expedite or simplify consideration of the issues. Consolidation shall not prejudice any rights granted parties to proceedings conducted under these rules of practice and shall not affect the right of any party to raise issues that could have been raised if consolidation had not occurred.

(b) *Severance.* The Presiding Officer may, by motion or sua sponte, for good cause shown, order any proceedings severed with respect to some or all parties or issues.

Subpart C—Prehearing Procedures

§ 226.13 Issuance of complaint; docket number.

(a) *Issuance of complaint for assessment of civil penalty.* If the complainant has reason to believe that a person has violated any provision of the Act, the regulations, or a permit, he may institute a proceeding for the assessment of a civil penalty by issuing a complaint.

(b) *Issuance of complaint for revocation or suspension of permit.* If the complainant has reason to believe that a permittee has

(1) Violated any term or condition of the permit; or

(2) Misrepresented or inaccurately described any material fact in the permit application or failed to disclose all relevant facts in the permit application; or

(3) Failed to keep the records and to notify appropriate officials of dumping activities, as required by §§ 224.1 and 223.2, he may institute a proceeding for the revocation or suspension of such permit.

(c) *Docket number.* Prior to the service of any complaint for either the assessment of a civil penalty or revocation or suspension of a permit, the complainant shall consult with the Regional Hearing Clerk for the assignment of a docket number. Thereafter, each document filed in the proceeding shall bear such assigned docket number.

§ 226.14 Contents of the complaint.

(a) *Complaint for assessment of civil penalty; derivation of proposed penalty.* Each complaint for assessment of a civil penalty shall include (1) a statement that the complaint is issued pursuant to Section 105(a) of the Act and Part 226 of Title 40 of the Code of Federal Regulations; (2) specific reference to each proviston of the Act, regulations, or permit which the respondent is alleged to have violated; (3) a concise statement of the factual basis for alleging such violation; (4) the amount of civil penalty which is proposed to be assessed; (5) a statement indicating the appropriateness of the proposed penalty; (6) if the alleged violation has not been remedied or the respondent has not brought himself into compliance with the provisions of the Act, regulations or permit allegedly violated, a statement that the respondent's efforts to achieve rapid compliance after receipt of the complaint may affect the ultimate determination of the amount of the penalty; and (7) notice of the respondent's right to request a hearing on any material fact contained in the complaint, or on the appropriateness of the amount of the proposed penalty. The dollar amount of the civil penalty which is proposed to be assessed in the complaint shall be determined on the basis of (1) the gravity of the violations; (2) the respondent's prior violations which have resulted in a final order under this Part, if any; and (3) the demonstrated good faith of the respondent in attempting to achieve rapid compliance after notification of a violation.

(b) *Complaint for revocation or suspension of permit.* Each complaint for revocation or suspension of a permit shall include (1) a statement that the complaint is issued pursuant to Section 105(f) of the Act and Part 226 of Title 40 of the Code of Federal Regulations; (2) specific reference to each term or condition of the permit which the respondent is alleged to have violated, to each alleged inaccuracy or misrepresentation in respondent's permit application, to each fact which the respondent allegedly failed to disclose in his permit application, to the records which the respondent allegedly failed to keep pursuant to § 224.1 or to the officials which the respondent failed to notify of his dumping activities under § 224.2; (3) a concise statement of the factual basis for such allegations; (4) a statement as to whether it is proposed that the permit be revoked or suspended, and, if suspended or revoked in part, the terms and conditions of such proposed suspension or partial revocation; (5) a statement indicating the basis for recommending the revocation, rather than the suspension, of the permit, or vice versa, as the case may be; and (6) notice of the respondent's right to request a hearing on any material fact contained in the complaint, or on the appropriateness of the proposed revocation or suspension.

(c) *Amendment of the complaint.* At any time prior to the filing of an answer to the complaint, the complainant may amend the complaint as a matter of right. The respondent shall have twenty (20) additional days from the date of service of the amended complaint in which to file his answer. At any time after the filing of an answer to the complaint, the complaint may be amended only upon motion granted by the Presiding Officer.

§ 226.15 Motions.

(a) *General.* All motions, except those made orally on the record during a hearing, shall (1) be in writing; (2) state with particularity the grounds therefor; (3) set forth the relief or order sought; and (4) be accompanied by any affidavit, certificate or other evidence relied upon. Such motions shall be served in accordance with the provisions of § 226.5.

(b) *Response to motions.* Except as otherwise provided by the Presiding Officer or the Regional Administrator, as appropriate, pursuant to paragraph (c) of this section, any party may file a response in support of or in opposition to any written motion within ten (10) days after service of such motion. Such response shall be accompanied by an affidavit, certificate, or other evidence relied upon. If no response is filed within the designated period, the parties shall be deemed to have waived any objection to the granting of the motion. The Presiding Officer or Regional Administrator, as appropriate, pursuant to paragraph (c) of this section, may set a shorter time for response, or make such other orders concerning the disposition of the motion as he deems appropriate.

(c) *Decision.* The Regional Administrator shall rule upon all motions filed or made prior to the filing of an answer to the complaint or after the filing of an initial decision. The Presiding Officer shall rule upon all motions filed or made after the filing of an answer to the complaint and prior to the filing of his initial decision. Oral argument on motions will be permitted where the Presiding Officer or the Regional Administrator deems it necessary or desirable.

§ 226.16 Answer to the complaint.

(a) *General.* Where the respondent (1) contests any material fact alleged in the complaint to constitute a violation of the Act, regulations or a permit, a misrepresentation, inaccuracy or failure to disclose all relevant facts in his permit application or a failure to keep the records and notify the appropriate officials of his dumping activities pursuant to §§ 224.1 and 224.2; (2) contends that the amount of the penalty proposed in the complaint or the proposed revocation or suspension, as the case may be, is inappropriate; or (3) contends that he is entitled to judgment as a matter of law, he shall file a written answer to the complaint with the Regional Hearing Clerk. Any such answer to the complaint must be filed with the Regional Hearing Clerk within twenty (20) days after service of the complaint. The initiation of informal conferences with the Agency pursuant to § 226.18 does not enlarge this twenty (20) day period. The time period in which to file an answer may be extended upon motion granted by the Regional Administrator.

(b) *Contents of the answer.* The answer shall clearly and directly admit, deny or explain each of the factual allegations contained in the complaint with regard to which the respondent has any knowledge. Such answer shall also state (1) the circumstances or arguments which are alleged to constitute the grounds of defense, (2) the facts which the respondent intends to place at issue, and (3) whether a hearing is requested.

(c) A hearing upon the issues raised by the complaint and answer shall be held upon request of the respondent in the answer. In addition, a hearing may be held at the discretion of the Presiding Officer, *sua sponte*, or upon the grant of a request therefor by any party other than the respondent. Any request for hearing filed by a party other than the respondent shall state with particularity his objections to the complaint and the issues which such party intends to raise during the hearing.

(d) *Failure to answer specifically.* Failure of the respondent to plead specifically to any material factual allegation contained in the complaint shall constitute an admission of such allegation.

(e) *Withdrawal of the complaint.* At any stage in the proceeding where, on the basis of new information or evidence, the complainant concludes that no violation of the Act, the regulations, or a permit has occurred or that the issuance of the complaint was otherwise inappropriate, the complainant may withdraw the complaint once without prejudice.

(f) *Amendment of the answer.* The respondent may amend the answer to the complaint upon motion granted by the Presiding Officer.

§ 226.17 Failure to answer the complaint: Default order.

(a) *Default.* The respondent may be found to be in default upon his (1) failure to file a timely answer to the complaint; or (2) failure to comply with a prehearing or hearing order of the Regional Administrator or the Presiding Officer, as appropriate, pursuant to § 226.15(c). Default of the respondent shall constitute an admission of all facts alleged in the complaint and a waiver of the respondent's right to a hearing of such factual allegations. If the complaint is for assessment of a civil penalty the penalty proposed to be assessed in the complaint shall become due and payable by the respondent without further proceedings upon the issuance by the Regional Administrator of a final order issued upon default. If the complaint is for revocation or suspension of a permit, the terms and conditions of revocation or suspension proposed in the complaint shall become effective without further proceedings on the date designated by the Regional Administrator in his final order issued upon default.

(b) *Procedures upon default.* (1) Where a default results from the respondent's failure to file a timely answer to the complaint, the complainant shall prepare and transmit to the Regional Administrator a proposed final order to be issued upon default.

(2) Where the Presiding Officer finds a default to have occurred after the filing of an answer to the complaint, the Presiding Officer may render a proposed default order to be issued against the defaulting party. For the purpose of appeal pursuant to § 226.29, such order shall be deemed to be the initial decision of the Presiding Officer.

(c) *Contents of a final order issued upon default.* A final order issued upon default shall include findings of fact, conclusions regarding all material issues of law, fact, or discretion, and the penalty which is therein assessed or the terms and conditions of permit revocation or suspension, as appropriate. An order issued by the Regional Administrator upon the default of the respondent shall constitute a final order in accordance with the terms of § 226.30.

§ 226.18 Informal settlement and consent agreement.

(a) *Settlement policy.* The Agency encourages settlement of the proceeding at any time after the issuance of a complaint if such settlement is consistent with the provisions and the objectives of the Act and the regulations. Whether or not the respondent requests a hearing, he may confer with the complainant concerning the facts stated in the complaint, or, as the case may be, the proposed permit revocation or suspension or the amount of the proposed civil penalty. If a settlement is reached, the terms of any settlement shall be expressed in a written consent agreement. Conferences with the complainant concerning possible settlement shall not affect the requirement to file a timely answer pursuant to § 226.16.

(b) *Consent Agreement.* A written consent agreement signed by the parties shall be prepared by the complainant and forwarded to the Regional Administrator whenever settlement or compromise is proposed. The consent agreement shall state that for the purpose of this proceeding, the respondent (1) admits the jurisdictional allegations of the complaint; (2) admits the facts as stipulated in the consent agreement or neither admits nor denies specific factual allegations contained in the complaint; and (3) consents to the proposed permit revocation or suspension or assessment of a given proposed civil penalty, as the case may be. The consent agreement shall include (i) the terms of the agreement; (ii) any appropriate conclusions regarding material issues of law, fact or discretion as well as reasons therefor; and (iii) a proposed final order of the Regional Administrator.

(c) *Final order.* No settlement or consent agreement shall be dispositive of any action pending under section 105(a) or (f) without a final order of the Regional Administrator. In preparing such final order, the Regional Administrator may require that any or all of the parties to the settlement appear before him to answer inquiries relating to the proposed consent agreement.

§ 226.19 Prehearing conference.

(a) *Purpose of prehearing conference.* When it appears that such procedure will expedite the proceeding, the Presiding Officer, at any time prior to the commencement of the hearing, may request the parties and their counsel or other representative to appear at a conference before him to consider:

(1) The possibility of settlement of the case;

(2) The simplification of issues and stipulation of facts not in dispute;

(3) The possibility of reducing oral testimony to exhibit form;

(4) The necessity or desirability of amendments to pleadings;

(5) The possibility of obtaining admissions or stipulations of fact and of documents which will avoid unnecessary proof;

(6) The limitation of the number of expert or other witnesses;

(7) The setting of a time and place for the public hearing, giving consideration to the convenience of all parties and witnesses and to the public interest; and

(8) Any other matters which may expedite the disposition of the proceedings.

(b) *Exchange of witness lists and documents.* Unless otherwise ordered by the Presiding Officer each party shall at the prehearing conference make available to all other parties the names of the expert and other witnesses he intends to call, together with a brief narrative summary of their expected testimony. Copies of all documents and exhibits which the party intends to introduce into evidence shall be marked for identification as ordered by the Presiding Officer. Thereafter, witnesses, documents, or exhibits may be added and narrative summaries of expected testimony amended only upon motion of a party.

(c) *Record of the prehearing conference.* No transcript of any prehearing conference shall be made unless ordered upon motion of a party or *sua sponte* by the Presiding Officer. The Presiding Officer shall prepare and file for the record a written summary of the action taken at such conference. Such summary shall incorporate any written stipulations or agreements made by the parties, all rulings upon matters considered at such conference, and appropriate orders containing directions to the parties. Such summary shall direct the subsequent course of the proceeding, unless modified by the Presiding Officer, on motion or *sua sponte*, to prevent manifest injustice.

(d) *Location of Prehearing Conference.* The prehearing conference shall be held in the city in which the Environmental Protection Agency Regional Office is located unless the Presiding Officer determines that there is good cause for it to be held at another location in the Region.

(e) *Unavailability of a prehearing conference.* Where circumstances render a prehearing conference unnecessary or impracticable, the Presiding Officer, on motion or sua sponte, may request the parties to correspond with him for the purpose of accomplishing any of the objectives set forth in this section. The Presiding Officer shall include such correspondence and his written summary of any stipulation or agreements reached by means of such correspondence as provided in paragraph (c) of this section in the record.

§ 226.20 Accelerated decision.

(a) *General.* The Presiding Officer or the Regional Administrator, as appropriate, pursuant to § 226.15(c), upon motion or sua sponte, may at any time render an accelerated decision in favor of the complainant or respondent as to all or any portion of the proceeding without further proceedings or upon such limited additional evidence (such as affidavits) as he may require under any of the following conditions:

(1) A party has failed to state a claim upon which relief can be granted;

(2) There is no genuine issue of any material fact and a party is entitled to judgment as a matter of law;

(3) A party is directly or collaterally estopped from asserting a fact or conclusion of law; or

(4) Such other and further reasons as are just.

(b) *Effect.* (1) In the event an accelerated decision is issued by the Presiding Officer, the decision shall be treated for the purpose of these rules of practice in the same manner as an initial decision of the Presiding Officer rendered after completion of a hearing under § 226.27.

(2) In the event an accelerated decision is issued by the Regional Administrator, the Regional Administrator shall proceed to issue a final order disposing of all or part of the case, as may be appropriate, under § 226.30.

Subpart C—Hearing Procedure

§ 226.21 Scheduling the hearing.

(a) *Assignment of Presiding Officer.* Upon the filing of an answer, the Regional Administrator shall assign the Presiding Officer. The Regional Administrator may, however, request that the Chief Administrative Law Judge assign an Administrative Law Judge as Presiding Officer. If the Chief Administrative Law Judge finds that such an assignment can be made without impairing the ability of his office to timely discharge its other responsibilities, he shall make the assignment. Otherwise, he shall notify the Regional Administrator making the request that he is unable to make such an assignment. In such event, the Regional Administrator shall appoint a Regional Judicial Officer or a person having the qualifications of a Regional Judicial Officer to serve as Presiding Officer.

(b) *Notice of hearing.* In the event that a hearing is requested by the respondent in his answer, or is ordered by the Presiding Officer pursuant to the provisions of § 226.16(c), the Presiding Officer shall, after consideration of the convenience of the parties, forthwith serve upon the parties a notice of a hearing. This notice may set a time and place for such hearing and may contemplate a future prehearing conference. Unless otherwise agreed upon by all parties, the parties shall be notified of the date set for the hearing at least twenty (20) days prior to such date.

(c) *Postponement of hearing.* Except for good cause shown, no request for postponement of a hearing will be granted. Such request must be received in writing at least three (3) days in advance of the time set for the hearing. In case of postponement, the hearing shall be rescheduled for the earliest practicable date.

(d) *Location of hearing.* The hearing shall be held in the city in which the Environmental Protection Agency Regional Office is located unless the Presiding Officer determines that there is good cause for it to be held at another location in the Region.

§ 226.22 Evidence.

(a) *General.* The Presiding Officer shall admit all evidence which is relevant, competent and material, and is not unduly repetitious. Relevant, competent and material evidence may be received at the hearing although such evidence may be inadmissible under the rules of evidence applicable to judicial proceedings. The weight to be given all evidence shall be determined by its reliability and probative value. In the presentation, admission, disposition, and use of evidence, the Presiding Officer shall preserve the confidentiality of trade secrets and other privileged commercial and financial information. The confidential or trade secret status of any evidence shall not, however, preclude its being introduced into evidence. The Presiding Officer may make such orders as may be necessary to consider such evidence in camera, including the preparation of a supplemental initial decision to consider questions of fact and conclusions regarding material issues of law, fact or discretion which arise out of that portion of the evidence which is confidential or which includes trade secrets.

(b) *Examination of witnesses.* Except as otherwise provided in these rules of practice or by the Presiding Officer, witnesses shall be examined orally, under oath or affirmation. Parties shall have the right to cross-examine a witness who appears at the hearing provided that such cross-examination is not unduly repetitious.

(c) *Verified statements.* The Presiding Officer may admit and insert into the record as evidence in lieu of oral testimony, statements of fact or opinion prepared by a witness. The admissibility of the evidence contained in such statement shall be subject to the same rules as if such testimony were produced under oral examination. Before any such statement is read or admitted into evidence, the witness shall deliver a copy of the statement to the Presiding Officer, the reporter, and each opposing party. The witness presenting the statement shall swear to or affirm the statement and shall be subject to oral cross-examination on the contents thereof. Such statements shall not be admitted when it appears to the Presiding Officer that the memory or the demeanor of the witness is of importance.

(d) *Exhibits.* Except where the Presiding Officer finds it impracticable, an original and one copy of each exhibit shall be filed with the Presiding Officer for the record and a copy shall be furnished to each party. A true copy of an exhibit may be substituted for the original. Each exhibit offered in evidence shall be numbered and shall identify the party by whom it is offered.

(e) *Official notice.* Official notice may be taken of any matter judicially noticed in the Federal courts, and of other facts within the specialized knowledge and experience of the Agency. Opposing parties shall be given adequate opportunity to show that such facts are erroneously noticed.

§ 226.23 Objections and offers of proof.

(a) *Objection.* Any objection concerning the conduct of the hearing, the admission or rejection of evidence, the limitation of the scope of any examination or cross-examination, or a ruling by the Presiding Officer shall be made orally or in writing, accompanied by a short statement of the grounds for the objection. The transcript shall include all argument or debate on the objection, and the ruling thereon and the reasons therefor given by the Presiding Officer. An exception to each objection overruled shall be automatic and is not waived by further participation in the hearing

(b) *Offer of proof.* Whenever evidence is excluded from the record, the party offering such evidence may make an offer of proof, which shall be included in the transcript. The offer of proof for excluded oral testimony shall consist of a brief statement describing the nature of evidence excluded. The offer of proof for excluded documents or exhibits shall consist of their insertion in the record, appropriately marked. Where the Regional Administrator decides that the ruling of the Presiding Officer in excluding the evidence was both erroneous and prejudicial, the hearing may be reopened to permit the taking of such evidence, or, where appropriate, the Regional Administrator may evaluate such improperly excluded evidence in preparing his final order. In the event that the Regional Administrator in the preparation of his final order relies in whole or part upon any evidence excluded at the hearing by the Presiding Officer, he shall explicitly identify in the final order any such excluded evidence relied upon and his reasons therefor.

§ 226.24 Burden of presentation; burden of persuasion.

In establishing that the violation occurred as set forth in the complaint and that the proposed revocation, suspension or civil penalty, as the case may be, is appropriate, the complainant has the burden of going forward with and of proving an affirmative case. Following the establishment of a prima facie case, the respondent shall have the burden of presenting and of going forward with any defense to the allegations set forth in the complaint. Each matter of controversy shall be determined by the Presiding Officer upon a preponderance of the evidence.

§ 226.25 Filing of transcripts.

The hearing shall be transcribed verbatim. Promptly following the taking of the last evidence, the reporter shall transmit to the Regional Hearing Clerk as many copies of the transcript of testimony as are called for in the reporter's contract with the Agency, and shall transmit to the Presiding Officer the original transcript. A certificate of service shall accompany each copy of the transcript. The Regional Hearing Clerk shall promptly furnish all parties with a copy of the transcript of the hearing without cost. Any person not a party to the proceeding may receive a copy of such transcript upon payment of the costs of reproduction of such transcript.

§ 226.26 Filing of briefs, proposed findings of fact and conclusions of law, and proposed order.

Unless otherwise ordered by the Presiding Officer, each party may, within twenty (20) days after service of the transcript of a hearing as provided in § 226.25, file with the Regional Hearing Clerk and serve upon all other parties proposed findings of fact, conclusions regarding material issues of law, fact or discretion, a proposed order based solely upon the record, and a brief in support thereof, together with references to relevant pages of the transcript and to relevant exhibits. Within ten (10) days thereafter each party may file a reply brief concerning matters contained in opposing briefs and containing alternative findings of fact, conclusions regarding material issues of law, fact or discretion and proposed orders. Oral argument may be had at the discretion of the Presiding Officer on motion of any party or sua sponte.

§ 226.27 Initial decision.

(a) *Contents of initial decision.* The Presiding Officer shall, as soon as practicable after the conclusion of the briefing period, evaluate the record before him and prepare and file his initial decision with the Regional Hearing Clerk. The initial decision shall contain his findings of fact, conclusions regarding all material issues of law, fact or discretion as well as reasons therefor, a recommended civil penalty assessment (if the proceeding is for assessment of a civil penalty) and a proposed final order assessing a civil penalty or revoking or suspending a permit, as appropriate. The Regional Hearing Clerk shall, in accordance with the provisions made for service in § 226.5(d), serve upon each of the parties a copy of the initial decision, and shall also serve one copy upon the Regional Administrator.

(b) *Evaluation of proposed civil penalty in proceedings for assessment of civil penalty.* In determining the dollar amount of the recommended civil penalty assessed in the initial decision, the Presiding Officer shall consider (1) the gravity of the violation; (2) prior violations which have resulted in a final order under this part, if any; and (3) the demonstrated good faith of the respondent in attempting to achieve rapid compliance after notification of a violation. The Presiding Officer may at his discretion increase or decrease the assessed penalty from the amount proposed to be assessed in the complaint.

(c) *Effect of initial decision.* The initial decision of the Presiding Officer shall become the final order of the Regional Administrator within thirty (30) days after transmission thereof by the Regional Hearing Clerk to the Regional Administrator and without further proceedings unless (1) an appeal to the Regional Administrator is taken from it by a party to the proceedings, or (2) the Regional Administrator elects, sua sponte, to review the initial decision.

Subpart E—Appeals and Administrative Review

§ 226.28 Appeals from or review of interlocutory orders or rulings.

(a) *Request for interlocutory appeal.* Except as provided in this section, appeals to the Regional Administrator shall obtain as a matter of right only from an initial decision of the Presiding Officer. Appeals from other orders or rulings shall lie only if the Presiding Officer, upon motion of a party, certifies such orders or rulings to the Regional Administrator on appeal. Requests to the Presiding Officer for such certification shall be filed in writing within five (5) days of notice of the ruling or service of the order and shall state briefly the grounds to be relied upon on appeal.

(b) *Availability of interlocutory appeal.* The Presiding Officer may certify a ruling for appeal to the Regional Administrator when (1) the order or ruling involves an important question of law or policy concerning which there are substantial grounds for difference of opinion; and (2) either (i) an immediate appeal from the order and ruling will materially advance the ultimate termination of the proceeding, or (ii) review after the final order is issued will be inadequate or ineffective.

(c) *Decision.* If the Regional Administrator determines that certification was improvidently granted, or if he takes no action within thirty (30) days of the certification, the appeal shall be deemed dismissed. When the Presiding Officer declines to certify an order or ruling of the Regional Administrator on interlocutory appeal, it may be reviewed by the Regional Administrator only upon appeal from the initial decision, except when the Regional Administrator determines, upon motion of a party and in exceptional circumstances, that to delay review would be deleterious to the public interest. Such motion shall be made within five (5) days of service of an order of the Presiding Officer refusing to certify a ruling for interlocutory appeal to the Regional Administrator. Ordinarily, the interlocutory appeal will be decided on the basis of the submissions made by the Presiding Officer. The Regional Administrator may, however, allow further briefs and oral argument.

(d) *Stay of proceedings.* The Presiding Officer may stay the proceedings pending a decision by the Regional Administrator upon an order or ruling certified by the Presiding Officer for in interlocutory appeal, or upon the denial of such certification by the Presiding Officer. Except in extraordinary circumstances proceedings will not be stayed. A stay of more than thirty (30) days must be separately approved by the Regional Administrator.

§ 226.29 Appeal from or review of initial decision.

(a) *Exceptions.* (1) Within twenty (20) days after service of the Presiding Officer's initial decision, any party may take exception to any matter set forth in such decision or to any adverse order or ruling to which he objected during the hearing and may appeal such exceptions to the Regional Administrator. Appeal shall be made by filing exceptions in writing with the Regional Hearing Clerk. Such exceptions shall contain alternative findings of fact, conclusions regarding material issues of law, fact or discretion and a proposed order together with references to the relevant pages of the record and initial decision. A copy of each such document taking exception to the initial decision shall be served upon every other party and each amicus curiae. Within the same period of time each party filing exceptions and each amicus curiae shall file with the Regional Hearing Clerk and shall serve upon all parties a brief concerning each of the exceptions being appealed. Each such brief shall include page references to the relevant portions of the record and to the Presiding Officer's initial decision.

(2) Within ten (10) days of the service of exceptions and briefs under paragraph (a)(1) of this section, any other party or amicus curiae may file and serve a reply brief responding to exceptions or arguments raised by any party or amicus curiae, together with references to the relevant portions of the record, initial decision, or opposing brief. Reply briefs shall not, however, raise additional exceptions.

(b) *Sua sponte review by Regional Administrator.* Whenever the Regional Administrator determines sua sponte to review an initial decision, notice of such intention shall be served upon the parties by the Regional Hearing Clerk within thirty (30) days after the date of service of the initial decision. Such notice shall include a statement of issues to be briefed by the parties and a time schedule for the service and filing of briefs.

(c) *Scope of appeal or review.* The appeal of the initial decision shall be limited to the issues raised by the appellant, except when the Regional Administrator determines that additional issues should be briefed and or argued. If the Regional Administrator determines that briefing or argument of additional issues is warranted, the parties shall be given reasonable written notice of such determination to permit preparation of adequate argument.

(d) *Argument before the Regional Administrator.* The Regional Administrator may, upon request by a party or sua sponte, set a matter for oral argument. The time and place for such oral argument shall be assigned after giving consideration to the convenience of the parties.

Subpart F—Final Order

§ 226.30 Final Order.

(a) *Contents of the final order.* As soon as practicable after service upon the Regional Administrator of the initial decision of the Presiding Officer, the Regional Administrator shall issue his final order. Such final order shall include findings of fact, conclusions regarding material issues of law, fact or discretion as well as reasons therefor, and an order assessing a civil penalty or revoking or suspending the permit, as appropriate. Such final order may accept or reject all or part of the initial decision of the Presiding Officer.

(b) *Evaluation of civil penalty in proceedings for assessment of civil penalty.* The final order of the Regional Administrator shall consider the appropriateness of the penalty proposed to be assessed in the consent agreement (§ 226.18(b)), default order (§ 226.19(b), or the initial decision (§ 226.20 or § 226.27) out of which the final order originates.

(1) In evaluating the appropriateness of such proposed penalty, the Regional Administrator must consider (i) the gravity of the violation, (ii) prior violations which have resulted in a final order under this Part, if any; and (iii) the demonstrated good faith of the respondent in attempting to achieve rapid compliance after notification of a violation.

(2) The Regional Administrator may, at his discretion, increase or decrease the assessed penalty from the amount recommended to be assessed in the initial decision.

(c) *Payment of a civil penalty in proceedings for assessment of civil penalty.* (1) Except as otherwise provided in conjunction with (i) motions made pursuant to § 226.31 or § 226.32 or (ii) petitions seeking judicial review of a final order of the Regional Administrator, payment of the full amount of the civil penalty assessed in the final order shall be made within sixty (60) days of service upon the respondent of the final order. Such payment shall be made by forwarding to the Regional Hearing Clerk a cashier's check or certified check in the amount of the penalty assessed in such final order. Such check shall be payable to the United States of America.

(2) Failure to make timely payment of the penalty assessed in the final order shall result in reference of the matter to the Attorney General, who shall recover such amount by action in the appropriate United States District Court pursuant to Sections 105 (d) and (e) of the Act.

Subpart G—Motion to Reconsider

§ 226.31 Motion to reopen hearings; to rehear or reargue proceedings; or to reconsider a final order.

(a) *Filing and service.* A motion to reopen a hearing to take further evidence, to rehear or reargue any matter related to such proceeding, or to reconsider any final order (including remission or mitigation of any civil penalty assessed) must be made by motion to the Regional Administrator, in accordance with § 226.15(a) and filed with the Regional Hearing Clerk. Every such motion must state the specific grounds upon which relief is sought.

(b) *Motion to reopen hearing.* A motion to reopen a hearing for the purpose of taking further evidence may be filed at any time after the service of the initial decision of the Presiding Officer and prior to the issuance of the Regional Administrator's final order. Each such motion shall state briefly the nature and purpose of the evidence to be adduced, shall show that such evidence is not cumulative, and shall set forth a good reason why such evidence was not adduced at a hearing.

(c) *Motion to rehear, reargue or reconsider.* Motions to rehear or reargue any matter related to a hearing or to reconsider the final order shall be filed within ten (10) days after the date of service of the final order. Every such motion must state specifically the matters claimed to have been erroneously decided and the nature of any alleged error. Where a party moves for the remission or mitigation of any civil penalty assessed in the final order, such motion shall also include a specific statement of the facts which warrant such action, such as newly discovered facts which were not known at the time of or prior to the issuance of the final order and could not have been readily ascertained by the exercise of due diligence.

§ 226.32 Procedure for disposition of motions.

Within ten (10) days following the service of any motion provided for in § 226.31 any other party to the proceeding may file with the Regional Hearing Clerk and serve on all other parties an answer thereto. As soon as practicable thereafter, the Regional Administrator shall announce his intent to grant or to deny such motion. Unless the Regional Administrator determines otherwise, implementation of the final order shall not be stayed pending the decision to grant or to deny the motion. The conduct of any proceeding which may be required as a result of the granting of any motion allowed in this section shall be governed by the provisions of the applicable section of these rules.

[FR Doc.77-34018 Filed 11-25-77;8:45 am]

APPENDIX C

TOMS RIVER HEARING OFFICER'S REPORT

ON RELOCATING SEWAGE SLUDGE DUMP SITES

SEPTEMBER 22, 1977

Public Hearing on Relocating Sewage Sludge
Ocean Dumping Sites

Toms River, N.J.
May 31-June 1, 1977

Report of the Hearing Officer

September 22, 1977

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A. Summary of Statements

Opening Statement

Dr. Breidenbach opened the hearing, pointing out that the purpose of this hearing was to consider the desirability of relocating the dumping of municipal sewage sludge to sites other than those presently used. This hearing was solely for that purpose and did not deal with individual dumping permits or the implementation of land-based alternatives by present municipal dumpers.

Members of Congress

All statements by Members of Congress urged EPA to stop ocean dumping of sewage sludge as rapidly as possible.

Representative Edwin Forsythe (N.J.), in whose House District the hearing was held, objected to any move of the dumpsite. His position was that there was no evidence of any beach or shellfish damage due to sludge dumping, that the cost of moving sludge dumping to new sites would be high, would not result in any environmental benefits, and might be environmentally detrimental.

Representative James J. Howard (N.J.), strongly supported moving New York area sludge dumping to the 106-mile site. His position was that dumping at the present site is a hazard to human and marine life and that continued dumping could only lead to further fishkills; he also stated sludge dumping was the single largest source of nutrients to the Bight. Mr. Howard was asked by the Panel to submit supporting data for the record, but none has been received.

Representative William Hughes (N. J.), asked that EPA disapprove dumping at any site which has not been contaminated. He stated that moving sludge dumping from the present New York Bight site would have little beneficial effects on the Bight, moving to the 60-mile site would contaminate a new area, and there are many unknowns regarding the 106-mile site. Mr. Hughes urged that there be close, continuing monitoring of the New York Bight area and that EPA prepare an EIS on the 106-mile site as a basis for further action.

Representative Robert Bauman (Md.) stated that dumping should be in an area in which dumping would have minimal environmental impact, and that the Philadelphia site does not meet that test. He regards the closing of the site to shellfishing as showing that the effects of the dumping are not temporary or reduced to acceptable levels before reaching a fishing area. He favors the 106-mile site because it is deeper, larger, and farther from shore.

Representative Thomas Evans (Del.) regarded the Philadelphia site as being dangerously close to beaches and wetland areas and wants the site move farther from shore.

Senators Paul Sarbanes and Charles Matthias urged that the dumping of sludge at the Philadelphia site be stopped, and that Philadelphia be moved to the 106-mile site. They cite the environmental degradation of the site which resulted in closing of the site to shellfishing as the reason.

Representative John Wydler (NY) stated that the main criterion for moving the site must be the health and well being of our citizens. His information indicates the chance of debris closing the beaches is increasing daily, and the dumpsites should be moved; he favors the 106-mile site.

Other Elected Officials

Mr. Warren Wolf, Ocean County Freeholder stated that the sludge dumping site should be moved from the New York Bight to the 106-mile site because of the threat to the beaches.

Environmental Protection Agency

Mr. Peter Anderson presented a statement on behalf of Region II in which he reviewed the history of sewage sludge dumping at the present site and the efforts made by Region II to phase out ocean dumping of sewage sludge as rapidly as feasible. Recognizing that upgrading of sewage treatment in the New York Metropolitan Area would result in increased volumes of sludge which would have to be ocean dumped during the interim period until land-based alternatives could be implemented, Region II asked NOAA to designate some areas for study as potential alternate sludge dumping sites. This was done in 1974; and Region II, in cooperation with NOAA, began the studies necessary for preparation of an EIS on the alternate sites and on the present site.

The major conclusion of the Draft EIS, which was released in February, 1976, was that relocating sludge dumping to one of the alternate sites was unnecessary and might be even more environmentally damaging than taking no action whatsoever. However, moving to the 106-mile site was not considered in the draft EIS. Region II found that continued use of the existing site posed no present or predicted threat to public health and that water quality at the existing site would not improve if sludge dumping were moved elsewhere because pollution from other sources would continue. The Region also recommended an expanded monitoring program for the present site and designation of an alternate dump site that could be used if necessary to accommodate increased volumes of sludge. These recommendations were endorsed by the vast majority of the Federal, State, and local agencies who commented on the EIS.

The extensive fish kill off the coast of New Jersey and the washup of "floatables" on Long Island beaches in 1976 were invesgated by Region II in cooperation with other agencies. After intensive investigation and review of the pertinent information a consensus was reached that sludge dumping was nothing more than a minor contributing factor. Moving the sludge dumping site would not prevent a recurrence of such incidents in the future.

Mr. George Pence presented a statement for Region III which summarized the history of sludge dumping by Philadelphia and Camden and described the field survey program conducted by Region III at the Philadelphia dumpsite. A voluminous amount of data was submitted for the record. The overall conclusion

reached by Region III based on these data was that the observations indicate a transition away from an ecologically healthy environment towards a polluted environment. The Region regards their data as adequate to place this dump site in Impact Category I according to EPA ocean dumping regulations, which would require termination of dumping at the site as soon as feasible. They also regard the closure of the site to shellfishing as being sufficient to place the site in Impact Category I.

Other Federal Agencies

The National Oceanic and Atmospheric Administration (NOAA) presented four statements. Dr. Donald Martineau presented the overall NOAA position which was that moving the present sludge dumping in the New York Bight would have no beneficial effects and would not prevent a recurrence of the beach damage and fishkill incidents of 1976. NOAA feels that dumping of sewage sludge at the 106-mile site should be allowed only if it can be demonstrated that the adverse effects of dumping at the 106-mile site are less than at present sites.

Dr. Joel O'Connor presented information on the beach damage to Long Island in 1976 and concluded that sewage sludge dumping was a relatively minor factor in the washing up of floatables on the beaches. A NOAA report on the incident was entered into the record.

Dr. John Pearce presented a statement concerning the anoxic conditions in the New York Bight during 1976 and the resulting fish kill. Several reports on the subject were entered for the record. He concluded that sludge dumping was not a major factor in the development of the anoxic condition.

Dr. Merton Ingham summarized the work NOAA has done on the 106-mile dump site. The NOAA cruises up to the present have dealt strictly with liquid industrial wastes dumped at the site, not with sewage sludge. Studies on sewage sludge at this site will begin this summer.

Commander Mullen presented a statement in behalf of the Third U.S. Coast Guard District. He pointed out the difficulties of surveillance at both the 60-mile and 106-mile sites from the Coast Guard viewpoint. Use of these sites, particularly the 106-mile site, would require a large increase in the number of shipriders and that surveillance of dumping would not be as effective as at present until new shipriders could be acquired. They would anticipate monitoring only 10 percent of the sewage sludge dumps. The implementation of the new Ocean Dumping Surveillance System would mitigate this problem.

State Agencies

Dr. Glenn Paulson presented a statement for the New Jersey Department of Environmental Protection (NJDEP). The NJDEP favors a gradual move to the 106-mile site after a careful analysis,

including an EIS, demonstrates that the use of this site is the most satisfactory alternative location for sludge dumping. The NJDEP regards sludge dumping as one of the contributing factors to the fish kill, and moving dumping offshore will reduce the risk of a recurrence of the problem. Such a move should be non-discriminatory, i.e., it should involve all dumpers. A shift to the 60-mile site would do no good since it is still in the impact area of the 1976 algae bloom.

Ms. Sandra Ayres presented a statement for the New Jersey Public Advocate's Office. The statement charged that EPA's mandate requires that the 106-mile site be designated for any necessary ocean disposal of sludge since the Act says that "off-the-shelf" sites shall be utilized where feasible. The fish kill in 1976 was attributed to sludge dumping and the environmental benefits of dumping at the 106-mile site were stated. The statement did not reference any supporting documentation for the statements made, and Ms. Ayres agreed to supply supporting documentation. None was received.

Mr. Warren Rich presented a statement in behalf of the State of Maryland Attorney General's Office. The statement charged EPA with not complying with the Act in designating the Philadelphia dump site. Damage to the site from sludge dumping was listed, and a move to the 106-mile site was recommended. A number of statements concerning conditions at the 106-mile site and the

economic feasibility of using the site were made. Mr. Rich agreed to supply supporting documentation for the record, but none was received.

Mr. John Doyle, a member of the General Assembly of the State of New Jersey, expressed concern about what impact sludge dumping at the 12-mile site might have on the tourist industry because of public reaction to sludge dumping so close to shore, and he recommended moving to the 106-mile site because of this.

County Agencies

Mr. Seymour Lubetkin presented a statement in behalf of the Passaic Valley Sewage Commissioners. The statement pointed out that the ocean dumping of sewage sludge is an emotional issue in which the scientific aspects are frequently lost in emotional reaction. He stated that ocean dumping of sewage sludge may not have adverse effects if properly done since sewage sludge is primarily a natural material. He objected to moving to the 106-mile site on the basis that the enivornmental impacts are unknown and the environmental benefits of moving to the 106-mile site, if any, would not be great enough to offset the economic costs.

Mr. Sol Seid presented a statement in behalf of the Middlesex County Sewerage Authority. The statement objected to moving sludge dumping to the 106-mile site on the basis that it would not be cost effective and that the environmental tradeoffs had not been adequately weighed. The Authority is moving toward land-based alternatives by 1981 and the additional cost of barging would be an unreasonable burden.

Mr. Francis Padar presented a statement in behalf of the Nassau County Commissioner of Health. The statement recommended retention of the present sludge dumping site conditional upon the implementation of an adequate monitoring program to detect movement of sludge from the site, and the designation of an alternate site to be used as needed.

Ms. Leslie Bennett presented a statement in behalf of the Ocean County Planning Board. The statement recommended that sludge dumping be moved to the 106-mile site. The recommendation was made on the presumption that sludge dumping was a contributing factor to the 1976 algae bloom.

City Agencies

Mr. Charles Samowitz presented a statement in behalf of the City of New York. The statement objected to any move from the present site on the basis that the cost would not be balanced by any environmental benefits, based on studies by NOAA and others. The increase in cost would be about 30 million dollars per year to go to the 106-mile site.

Mr. Carmen Guarino presented a statement for the City of Philadelphia. The statement concluded that a move to the 106-mile site would cost Philadelphia an additional 5 million dollars between now and 1981, when ocean dumping is to be stopped, and that this cost might divert funds needed to implement alternatives. The

analysis of EPA data by Philadelphia indicates there is no discernible environmental benefit to be achieved by moving the site. The statement concludes that the EPA studies indicate there are no unusual buildups either in sediment or animal or fish life, and studies of sites now discontinued show that any discernible damage is temporary and is dissipated after dumping is discontinued. It was also stated that there has been no damage to the Maryland or Delaware shore, no decline in tourism, and no loss to the fishing industry. Mr. Guarino was asked to submit additional information for the record to support his statements, and additional information was received.

Environmental Groups

Mr. Ken Kamlet presented a statement for the National Wildlife Federation. The statement presented a detailed analysis of the advantages and disadvantages of relocating the sludge dumping sites. As a result of his analysis, Mr. Kamlet reached these conclusions:

(1) Neither sludge dumpsite should be relocated at the present time.

(2) Existing phase-out schedules and deadlines should be strictly enforced.

(3) An EIS should be prepared which fully addresses the circumstances under which relocation to both the 60-mile site and the 106-mile site would be justified.

(4) Monitoring and survey work should continue and be intensified.

(5) Efforts to reduce the hazard potential of ocean dumped sludge should be given a high priority.

(6) EPA should take steps to insure that sludge dumping can be relocated rapidly if it becomes necessary.

(7) EPA should move expeditiously to remove other sources of pollution to the New York Bight.

Mr. Lee Ward of the American Littoral Society presented a film on the fish kills of 1976 and recommended moving sludge dumping to the 106-mile site.

Mr. Eugene Geer, also of the American Littoral Society, described his experiences SCUBA diving after the 1976 fish kill. He attributed the fish kill to sludge dumping.

Private Citizens

Mr. Thomas Glover of the Hydronautics Underwater Salvage Company described his experiences diving in the area. He reported seeing garbage and human feces at some of the wrecks.

Mr. Henry Sandkuhl of Energy Systems brought a working model of a nuclear sewage treatment device and described its operation. The device used radiation from Cobalt 60 to kill living organisms in sewage.

Mr. Joseph Bogan of the United Boatmen's Association supported moving sludge dumping to the 106-mile site. He described the fish kill of 1976 and said that he thought sludge dumping had something to do with it.

Mr. Pete Meyer described the appearance of the ocean bottom near the New Jersey shore and said it looked similar to how it looked just before the fish kill in 1976.

Mr. Paul Mulshine supported moving sludge dumping to the 106-mile site because it would be more expensive for the dumpers.

Captain John Larsen made a statement in behalf of the Eastern Diving Boat Association. He stated that sludge dumping was damaging the ocean and recommended moving sludge dumping out to sea.

Mr. Swede Lovgren made a statement in behalf of the National Sea Clammers Association. He stated that sludge dumping was a factor in the fish kill and that the kill devastated the clamming business. He recommended moving sludge dumping to the 106-mile site.

Mr. Lou Panetta stated that until sludge dumping could be stopped it should be moved to the 106-mile site. He felt that sludge dumping was a major factor in the 1976 fish kill.

Dr. Carol Litchfield of Rutgers University spoke as a professional marine microbiologist on the question of how rapidly wastes dumped at the 106-mile site might decompose. Based on research done on decomposition of organic materials under different marine environmental conditions, she concluded that rates of decomposition of

organic material at the 106-mile site would be decreased significantly at the depths and temperatures existing at that site, and that conditions at that site might actually enhance the survival of pathogens in sewage sludge. Her conclusion was that there might be greater accumulation of dumped organic materials at the 106-mile site than at shallower sites on the Continental Shelf.

B. Analysis of the Hearing Record

1. Introduction

During the two days of this hearing, many opinions were expressed, and a voluminous amount of data was presented for the record. The purpose of the hearing, as expressed in the Hearing Officer's opening statement, was to solicit data and information to assist EPA in making a determination as to whether or not sewage sludge dumping should be relocated from the present sites to more desirable locations.

Nearly all statements expressed the desire to end ocean dumping of sewage sludge as soon as possible, and the majority of the statements deal with the expressed purpose of the hearing, either by merely voicing an opinion on whether or not sludge dumping should be relocated, or by presenting documentation to support a specific recommendation.

Analysis of these statements shows that the major areas of concern in regard to relocating the sludge dumping sites are the following:

(a) Whether or not sludge dumping at the present New York Bight site was the cause of or a major factor in the beach damage and fish kills in the New York Bight during 1976.

(b) The nature and extent of present and potential impacts of sludge dumping at the present sites.

(c) The benefits that would ensue from cessation of dumping at the present sites.

(d) The adverse impacts of dumping on new sites.

(e) The balance between the cost of using more distant sites and the benefits that would result.

(f) The need for an EIS to support any relocation of sludge dumping sites.

(g) The statutory requirement that sites off the Continental Shelf shall be utilized where feasible.

The succeeding sections of this report address each of these issues.

2. Present Sewage Sludge Dumping Activity

Since 1924 communities in the New York-New Jersey Metropolitan Area have been dumping sewage sludge at a site approximately 11 nautical miles offshore in the New York Bight Apex (Figure 1). Between 1960 (the year in which accurate records had begun to be kept) and 1973 the volume of the sludge dumped annually at the site fluctuated between 4.4 million wet tons and 6.3 million wet tons. Since the Marine Protection, Research, and Sanctuaries Act (hereafter, "the Act") became effective, there has been an increase of from 4.2 million wet tons to 4.4 million wet tons with the projected volume for 1977 estimated at 4.6 million wet tons. This volume is expected to reach 15 million wet tons annually by 1981. (S. 6, p. 4-6; H. R. p. 51-52.)

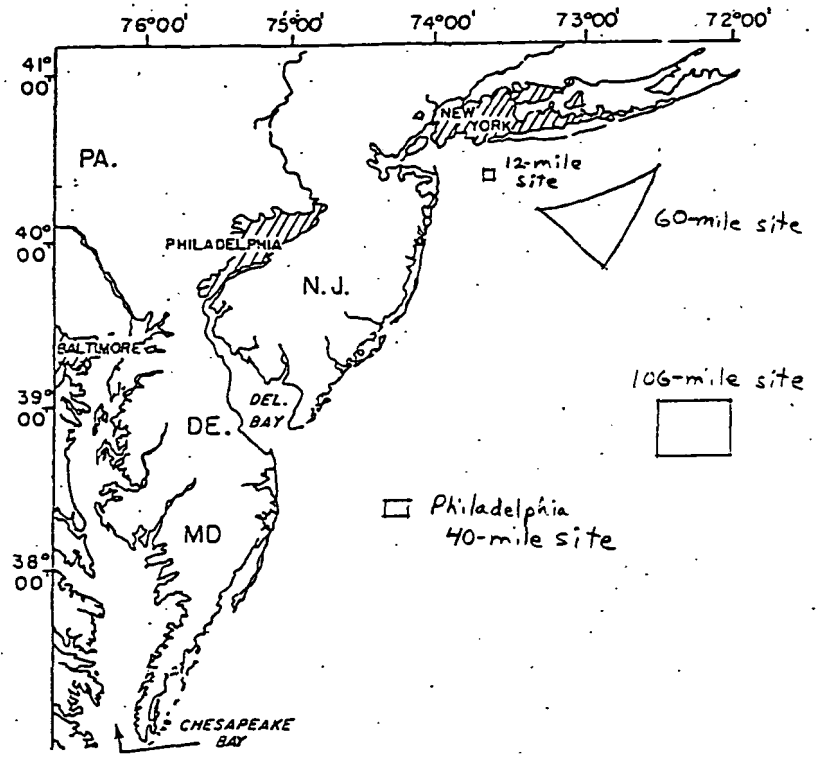


FIGURE 1

Existing and Alternate Dumpsites

In the early 1960's the City of Philadelphia began dumping a portion of the sludge generated at its three sewage treatment plants at an ocean site located approximately 12 miles off the mouth of the Delaware Bay. In 1966, when its sludge incineration facility became inoperative, the City of Camden, New Jersey, also began dumping its sludge at the same site. In 1973, when the Act became effective, both dumpers were moved to a site 40 miles off the coast due east of the Maryland-Delaware border. In March, 1977, Camden was moved to the 106-mile site until its ocean dumping is phased out in late 1977 (S. 7, p. 1-3; H.R. 84, 85, 89). Philadelphia is presently dumping over 70,000 tons of sludge annually at this site, and these volumes will decrease annually until phase out. The projected volumes to be dumped are (HR, 490, 501):

6/77 - 6/78	47,500 Tons
6/78 - 6/79	35,000 Tons
6/79 - 6/80	20,000 Tons
6/80 - 1/81	5,000 Tons.

Summary:

Dumping of sewage sludge at the New York Bight Apex site has been done since 1924 by communities in the New York Metropolitan Area. Between 1960 and now volumes have fluctuated between 4.2 and 6.3 million wet tons. This volume is expected to reach 15 million wet tons by 1981. Philadelphia is currently dumping over 70,000 wet tons of sludge annually at the 40-mile site, and this will gradually decrease to zero by 1981.

3. Relationship Between Sludge Dumping and the 1976 Beach Damage and Fish Kills

The record contains a large amount of data and testimony concerning both of these incidents. The scientific data available on these incidents has been analyzed and the results presented in several reports which were submitted for the record (E-5-6-l, E-5-6-m, E-5-6-n). In addition, detailed statements on the incidents were presented by Dr. Martineau, Dr. Pearce, and Dr. O'Connor of NOAA (HR, 121-148, 151-179). The statement of Mr. Anderson of EPA Region II summarizes the studies made in investigating these incidents and the results of these investigations;

"Several studies were conducted on the fish kill -- so many that a steering committee, composed of EPA, NOAA, the New Jersey Department of Environmental Protection, the American Littoral Society, and the academic community, was formed to coordinate them. Not one of the studies found that sludge dumping was anything more than a minor contributing factor.

"The consensus of opinion is that the 1976 fish kill was basically a natural phenomenon brought on by atypical atmospheric and hydrographic conditions in the New York Bight. The root cause of the fish kill was the unusually warm weather early last spring that prematurely raised the surface water temperature of the Bight. Deeper waters can receive oxygen only by mixing with the upper waters, which are in contact with the air. In 1976, the difference in temperature between the upper and lower waters became so strong

so early in the year that the colder, denser bottom waters could not mix with the warmer, lighter surface waters, and therefore could not receive oxygen from them. Without sufficient oxygen, the bottom-dwelling fish and shellfish in the Bight could not survive.

"To be sure, the pollutants in the Bight waters aggravated the problem by providing nutrients, mainly phosphorus, which allowed a massive algal bloom. The algae, which are tiny aquatic plants, eventually died and used up more oxygen as they decomposed. But sewage sludge is not among the major sources of plant nutrients; indeed this is why it has little inherent value as a fertilizer. All of the major nutrients and trace elements must be added to sludge to make it comparable to commerical fertilizers.

"Weather conditions are uncontrollable: another fish kill is likely to occur whenever similar atmospheric and hydrographic conditions arise. Moving the sludge dumping operations to an alternate site will not prevent a recurrence.

"Unusual weather conditions also played a major part in the washup of "floatables" on Long Island's beaches in May and in mid-to-late June 1976, although this time pollution from generally identifiable sources was also a major factor. But, once again sewage sludge was not one of the major contributors.

"When the beach pollution on Long Island was first reported, a Federal task force, composed by EPA, NOAA, and the U.S. Coast Guard, and the National Park Service, was created to determine the sources of the pollution and the reasons why it had reached Long Island's beaches. State and local agencies also were involved

in studying the washups, and on June 17, representatives [illegible] than 20 Federal, State, and local Agencies met to discuss the problem.' They confirmed the present of floatables on the [illegible] but concluded, contrary to several press reports, that there [illegible] no evidence of fecal matter on the beaches.

"The materials found during the first incident in May were grease/tar balls, which are generally a mixture of oil and grease from petroleum and kitchen oil sources combined with other floatable organic matter and plastics. The materials found during the incidents in mid-to-late June were grease/tar balls, plastics, rubber, charred wood, and general trash -- such as cigarette and cigar tips, paper, bread wrappers, soda cans, and vegetable wastes. These materials are called floatables for the simple reason that they will float.

"The major sources of the floatables were raw sewage discharges, inadequately treated wastewater discharges, combined sewer overflows, urban runoff, and solid waste barging operations in New York harbor. Minor contributions were made by discharges from vessels in the area, ocean dumping of sludge and dredged materials, sanitary landfill operations, and beach litter. These floatable materials, which are always present to some extent in the New York Bight, were propelled onto Long Island's beaches by relatively strong and persistent winds from the southwest."

Dr. Paulson, of the New Jersey Department of Environmental Protection, disagreed with this overall conclusion in that he felt that sludge dumping was one of the inter-related, indirect causes of the fish kill. (HR, p. 205) He admitted, however, that the algae bloom leading to the fish kill would probably have occurred without the sludge dumping (HR, p. 206).

Some Members of Congress and the public did not agree with the conclusions reached from the scientific evidence. Representative Howard stated:

> "The degree to which the sludge dump site was responsible for the fish kill has been debated extensively, but the members of our Coalition concurred that it is the single largest source of plant nutrients which fed the algae which in turn was a cause of the oxygen depletion and the fish kill." (HR, p. 22-23)

The Coalition consists of 18 men and women, including clammers, lobstermen, divers, party boat captains, and other commercial fishermen. (HR, p. 22)

There were several statements by divers and party boat captains which described conditions they observed in the offshore areas during this year and last year. A green slime (apparently some type of algae), garbage, and human feces were observed. (HR, p. 325-344, 540-583)

Conclusion:

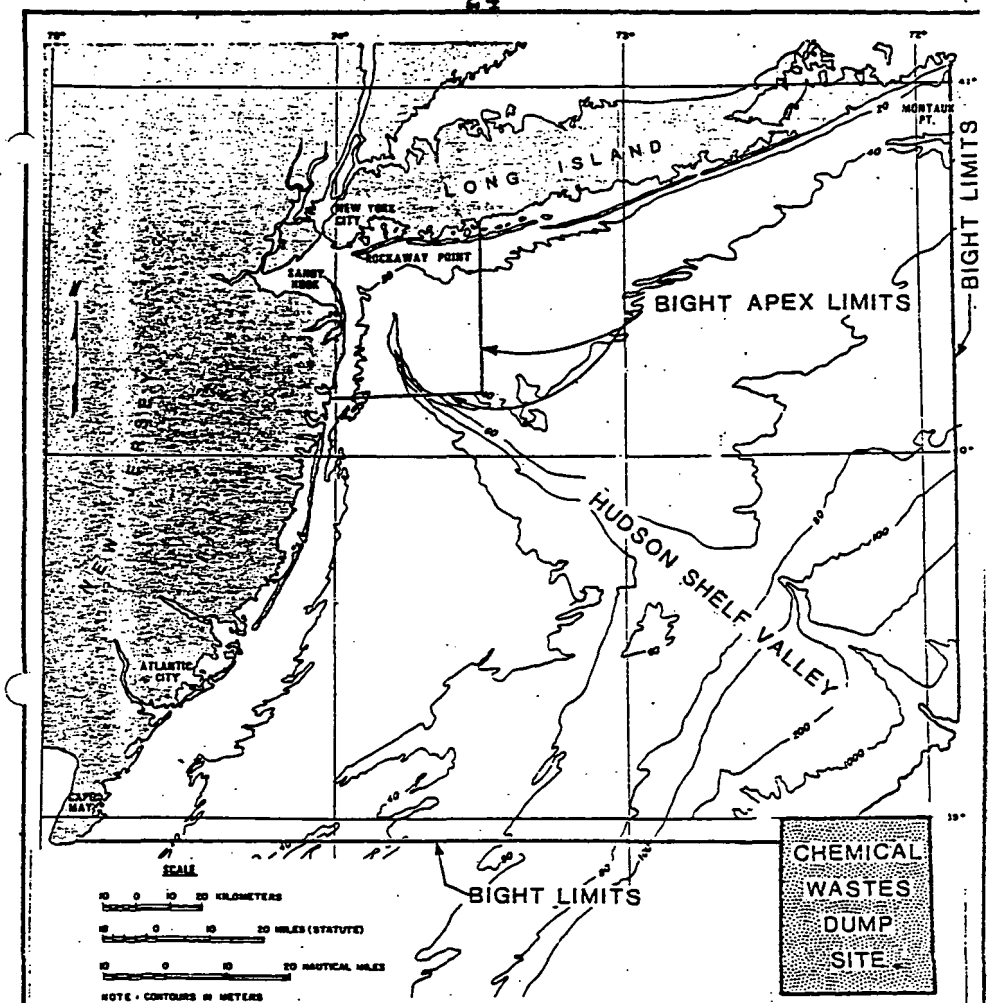
The scientific evidence is clear that sludge dumping was not a significant factor in the beach damage . The scientific evidence and its interpretation is cloudy regarding the degree to which sludge dumping was a factor in the fish kills of 1976. The scientists agreed it had some impact; the signicance is debated. Cessation of sludge dumping at the 11-mile site would not lessen the probability of a recurrence of similar incidents. The pollutants and other materials observed under water by divers are those which would be associated with raw sewage and garbage discharges rather than with sewage sludge dumping.

4. Present and Potential Impacts of Dumping at Existing Sites

New York Bight Apex Site

The record contains reports summarizing the data from which an assessment can be made of the present conditions at each of the existing sludge dumping sites. For the New York Bight site much of the data comes from the work of the NOAA/MESA project as well as of EPA and other groups and has been summarized in the EIS prepared by EPA Region II on sludge dumping in the New York Bight (E-5-6-r). Since this EIS includes in its supporting material all of the reports in this hearing record which deal with the impacts of sludge dumping at the present New York Bight sludge dumping site, the EIS will be used as the primary reference in this discussion.

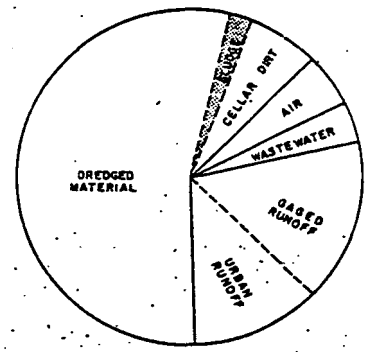
The New York Bight Apex covers an area of about 584 sq. n. mi. extending from Atlantic Beach, N.Y., to Manasquan, N.J., and generally includes that area directly impacted by land and river runoff from New York Metropolitan area, as well as that directly impacted by barging of sewage sludge and dredged material from this area (Figure 2. (EIS 23, 34). Reliable estimates of the sources of pollution entering the New York Bight Apex show that sludge dumping accounts for only about 5-6 percent of the total contamination of the Apex. These estimates consider such parameters as suspended solids, carbonaceous material, heavy metals, nitrogen and phosphorus, and microbial contamination (EIS, 35-36), and do not appear to be controversial (Figure 3).



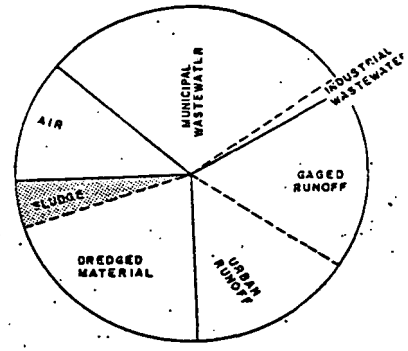
THE NEW YORK BIGHT

Figure 2

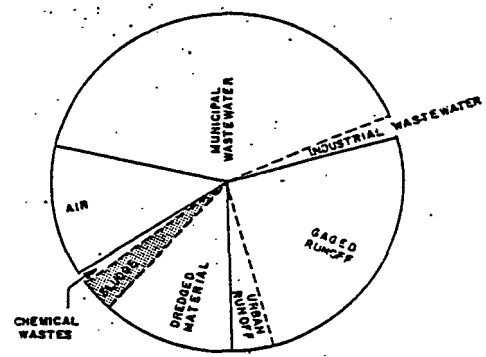
SOURCE: E-5-6-r



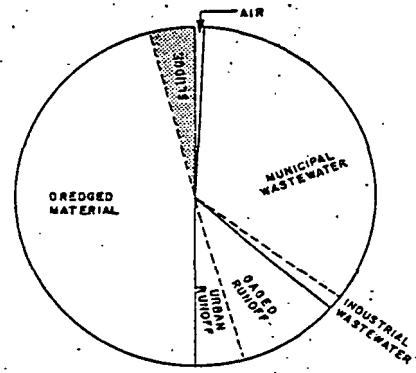
SUSPENDED SOLIDS



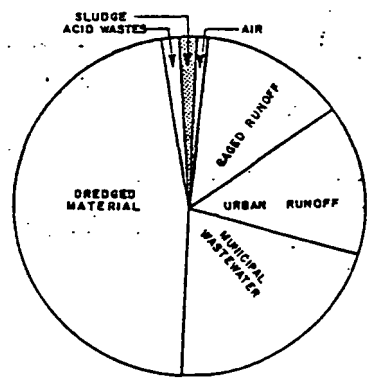
ORGANIC CARBON



NITROGEN



PHOSPHORUS



CHROMIUM

SOURCES OF POLLUTANTS IN THE NEW YORK BIGHT

Figure 3

SOURCE: E-5-6-r

Because sludge dumping is such a small contributing factor to the degree of pollution of the Apex, it is difficult to quantify the impact of sludge dumping alone. The data available on conditions in the Apex have been analyzed and reviewed by numerous agencies and scientists of wide disciplinary range, so it is unlikely that an additional independent review would be useful at this time.

a. Environmental Impacts

On the basis of two comprehensive reports by NOAA/MESA (March 1975, February 1976) there seems to be no significant accumulation of sewage sludge at the existing dumpsite, although some sludge particles may be mixing with natural fine sediments in the Christiansen Basin, northwest of the site. The area impacted by sludge dumping can be generally identified by increased levels of trace metals and organic matter in the sediments; the extent of the area thus identified indicates that a clean water and sediment zone about 5.5 to 6 n. mi. wide separates the leading edge of sludge impact from the coast (EIS, 63).

There do, however, appear to be significant local effects due to sludge dumping. The catch of groundfish appears to be reduced in areas with high-carbon sediments, such as the area of the existing sludge dump site. Furthermore, it is apparent that very few surf clams reach commercial size within the area now impacted by sludge dumping. Although some fish in the Bight Apex are afflicted with fin rot, this disease is not thought

to be solely or primarily attributable to sludge dumping. The NOAA/MESA reports do not indicate any shoreward movement of coliform contamination as a result of sludge dumping, but they do note the apparent persistence of coliform bacteria in the vicinity, especially in bottom sediments (EIS, 64).

The observed conditions at the present New York Bight site reflect the results of 50 years of dumping at that site. Since 1960, the volume dumped at the site has fluctuated between 4.3 and 6.3 million wet tons per year. It is anticipated that the annual volume ocean dumped will triple between 1977 and 1981 because of increased sewage treatment in the area (HR, 51-52). While the present volume can apparently be accommodated at the site on a continuing basis without other than some localized damage, there is considerable doubt as to whether this will be true for three times the present volume of sewage sludge.

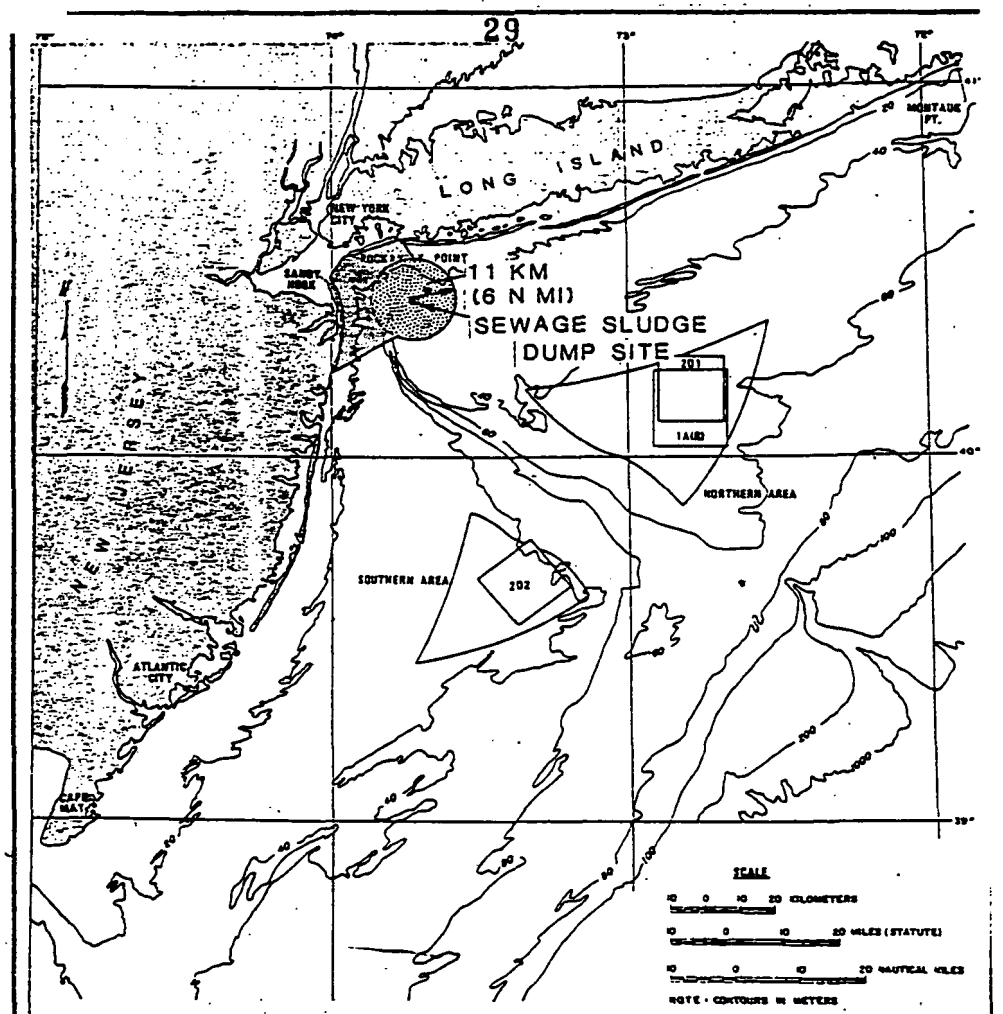
The primary concern has been that increased dumping at the site might result in potential environmental problems along the Long Island and New Jersey coastlines (HR, 53). The potential danger to public health that might occur if sludge from the site reached beaches and shorelines is a matter that requires the fullest consideration (EIS, 1,2). The position finally taken by EPA Region II was that, since it is not possible to predict whether or not the present site can accommodate the increase in sludge, it was safe to continue dumping at the present site,

but that a comprehensive monitoring program should be implemented to guard against future danger. The results of this monitoring program would be used to assess the probability of damage, and dumpers would be moved to another site if necessary to protect public health or welfare (EIS, 2, 63).

b. Other Impacts

The major economic and public health impacts (of sludge dumping at the present site) are the possible contamination of shellfish by pathogens in sewage sludge and the possible contamination of the beaches and shorelines from the same sources. In an effort to prevent harvesting of contaminated shellfish, the Food and Drug Administration has closed an area surrounding the dumping site and also closed much of the Bight Apex near the shore (Figure 3). (EIS, 42; S-42, 4). It is noted, however, that municipal wastewater discharges appear to be the major source of microbial contamination (84 to 91 percent) in the Bight. Barging is regarded as an insignificant source of fecal contamination in the New York Bight (EIS, 36). Thus, even if sludge dumping at the existing site were stopped altogether, it is unlikely that the area could be reopened to shellfishing.

The catch of groundfish in the general area of the sludge dumping site seems to be reduced. (EIS, 63, 64). However, this entire area is heavily polluted by other sources of pollution, and there is no evidence that cessation of sludge dumping at this site would result in improvement in fin fisheries (EIS, 64; HR, 54, 131).



AREA CLOSED TO SHELLFISHING IN VICINITY OF SEWAGE DUMP SITE

KEY:
CLOSED TO SHELLFISHING
1970
1972

SOURCE: FDA, 1973. (E-5-6-r) Figure 4

This situation could change, of course, if all other sources of pollution of the present sludge dumping site were stopped. While this may be feasible over a long period of time, it is unlikely to occur before 1981; therefore, it must be concluded that continued sludge dumping at the present site would have only minimal adverse impact of exploitation of fishery and shellfishery resources.

The effect of sludge dumping on recreational use of the area, particularly the beaches, is a matter of considerable economic and public health concern. The EIS on sludge dumping in the New York Bight discusses this problem in considerable detail (EIS, Chapters II and IV). Dumping the present volumes of sludge at the existing site has been shown to have no impact on the beaches; there is, however, a serious question about whether or not the existing site can accommodate the increased volumes of sludge that must be dumped between now and 1981. The intensified monitoring program proposed by EPA Region II is intended to provide advance warning of any potential damage so that appropriate steps can be taken.

In spite of the convincing scientific evidence to the contrary, there appears to be some public opinion that sludge dumping was responsible for the 1976 beach closures and anoxic conditions, as well as for most of the problems in the Bight Apex (HR 221-222, 325-344, 584-593, 550-556). The responses to the questions asked by the Panel indicate that the phenomena

observed by divers and fishermen are related to the general problems associated with the discharge of raw sewage and over-fertilization from a wide variety of nutrient sources including from sludge dumping.

Summary:

The scientific data concerning the impacts of sludge dumping at the New York Bight site have been thoroughly reviewed by a large number of individuals, agencies, and groups. There is general agreement among the scientific community that the impacts of sludge dumping are small compared to the impacts of other sources of pollution, and that cessation of dumping at the present site would result in no significant environmental, economic, or public health benefits for the amounts presently being dumped. There is, however, considerable doubt as to whether or not the present site can accommodate the three-fold increase in sludge dumping expected between now and 1981. The monitoring program recommended by EPA Region II should, however, provide advance warning of any adverse trend in time to permit corrective action to be taken.

Philadelphia Dump Site

In contrast to the situation in the New York Bight, the only source of pollution of sewage origin at the Philadelphia dump site (40 mile site) is the dumping of sewage sludge. In May, 1973, Philadelphia and Camden were moved from their dumping site 12 miles off the Delaware Bay to the present site (HR, 85).

Simultaneously with this action EPA Region III began a series of oceanographic cruises to assess the impacts of dumping at the new site. Since May 1973, thirteen cruises have been completed, and the data have been analyzed and presented in a series of technical reports published by EPA Region III and at public hearings (HR, 91-93). A statement was presented by the State of Maryland (HR 382-392) regarding impacts at the Philadelphia dump site, in which a list of specific impacts was given. No data were submitted for the record to support these conclusions, nor were references supplied for documentation. The assessment of impacts at this site will, therefore, rely on the EPA Region III cruises which comprise the largest and most comprehensive body of data collected on this particular site.

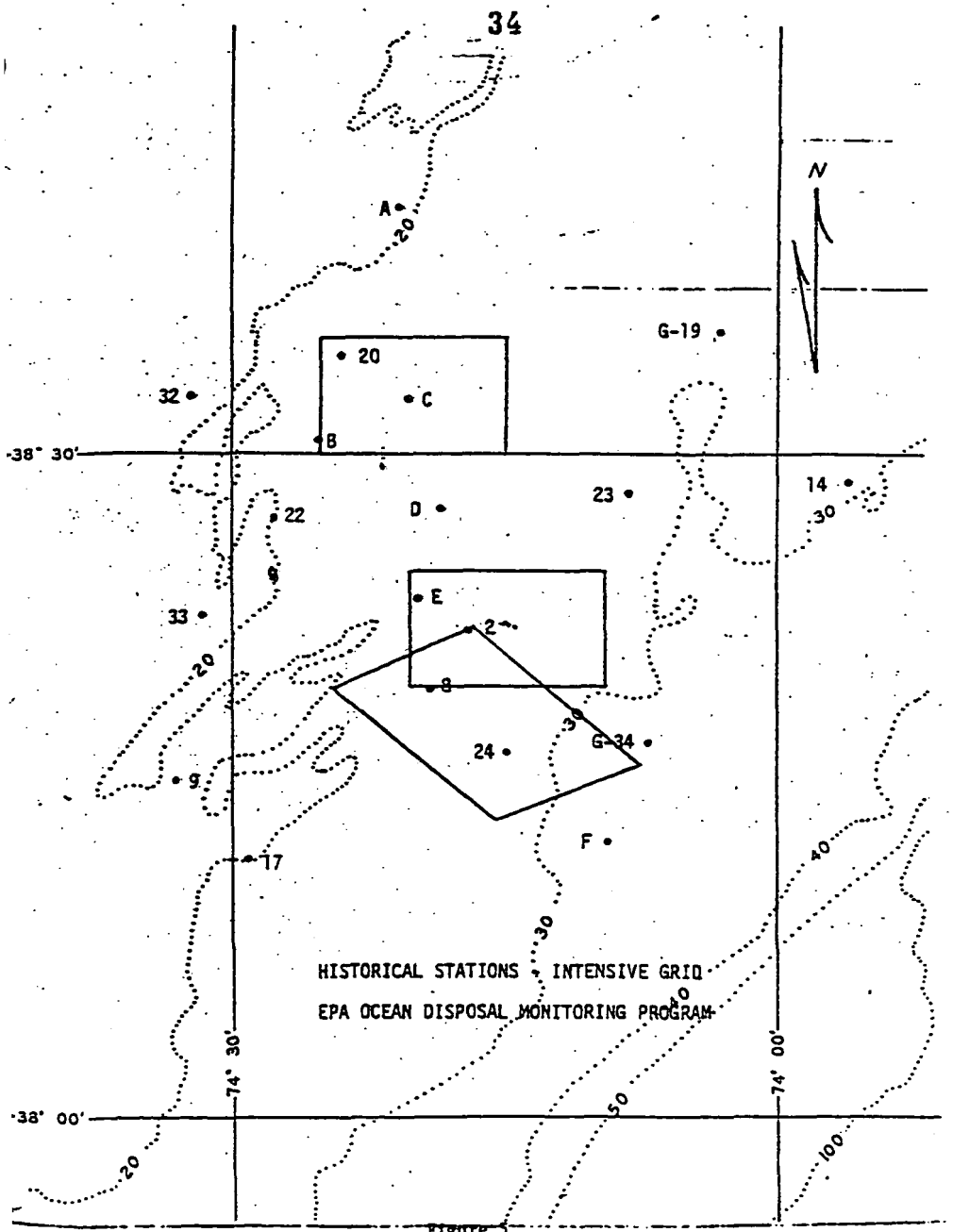
The interpretation of these data by EPA Region III has been challenged by the City of Philadelphia on numerous occasions, including the present hearing (HR, 495-497, 502, 512-517). The City of Philadelphia presented additional information for the record (E-16-26) in rebuttal of some statements made by EPA Region III concerning conditions at the dumpsite (HR, 93-99). The Philadelphia submission did not contain new data, but confined itself to challenging the interpretation of the EPA data. Because of the importance of these data to the question of whether or not sewage sludge dumping at this site should be discontinued, considerable effort was devoted to examining the documentation supplied for the record in an attempt to resolve the disagreements.

Insofar as it was possible to reach a conclusion, the results are presented in the following section on environmental impacts at the site. There is, however, an important factor to be considered in dealing with these data and reports.

There is no evidence in the data of any massive impact at or near the dumpsite, such as clearly apparent trends in metal accumulation in sediments, high mortalities in indigenous organisms, or a blanket of sludge on the bottom. The data evaluations are based on statistical manipulations designed to detect subtle effects, and, as such, are subject to different interpretation depending on the background and personal judgment of the persons doing the interpretation. It should be noted that the data and reports on the EPA Region III cruises were reviewed prior to publication only by the investigators themselves; and, as far as can be ascertained from the record, only by the City of Philadelphia after that time. It would assist EPA's future use of these data and reports if an objective scientific review by marine science experts were made.

a. Present and Potential Environmental Impacts

The area surveyed by Region III at one time covered an area of 3,200 square nautical miles, but has been more recently monitored as a grid of stations covering about two-thirds of that area (Figure 5) (HR, 94). Results from the monitoring cruises (E-6-7-e, E-6-7-f, E-6-7-g, E-18-7) do not suggest that dumping has affected areas outside the immediate vicinity of the dumpsite.



SOURCE; E-18-7

Figure 5

No evidence was presented for the record which suggests that sludge dumping has had any environmental impact on shorelines or beaches.

Within the dumpsite itself, and in adjacent areas, data from 13 cruises by EPA Region III are available as the base on which to assess the degree of environmental impact. It should be noted that not all of the data collected are presented in the reports submitted for the record; only those that were regarded by the Region as of particular significance were reported (E-18-7, p. 3). The sampling program was designed with emphasis on the longer term, more persistent effects, especially on the benthic environment, as contrasted to the more transient effects in the water column (E-18-7, p. 1).

While there is no evidence of other than transient effects on the water column, the results of the benthic sampling program do suggest that there may be some indications of impact detectable by sophisticated statistical analytical techniques even though not apparent from a gross examination of the data. Based on the results of these cruises by EPA Region III, the following conclusions can be drawn.

(1) There is no apparent accumulation of trace metals in sediments at or near the dumpsite, based on temporal trends from 1973 to 1977 (Figures 6-11) (E-18-7, p. 45-56, 124-127). The ranges of values observed fall within the ranges normally found in clean areas of the North Atlantic Continental Shelf (Tables 1, 2) (E-16-26, p. 1-2; E-5-6-j, p. 104-110; E-5-6-r, p. 110).

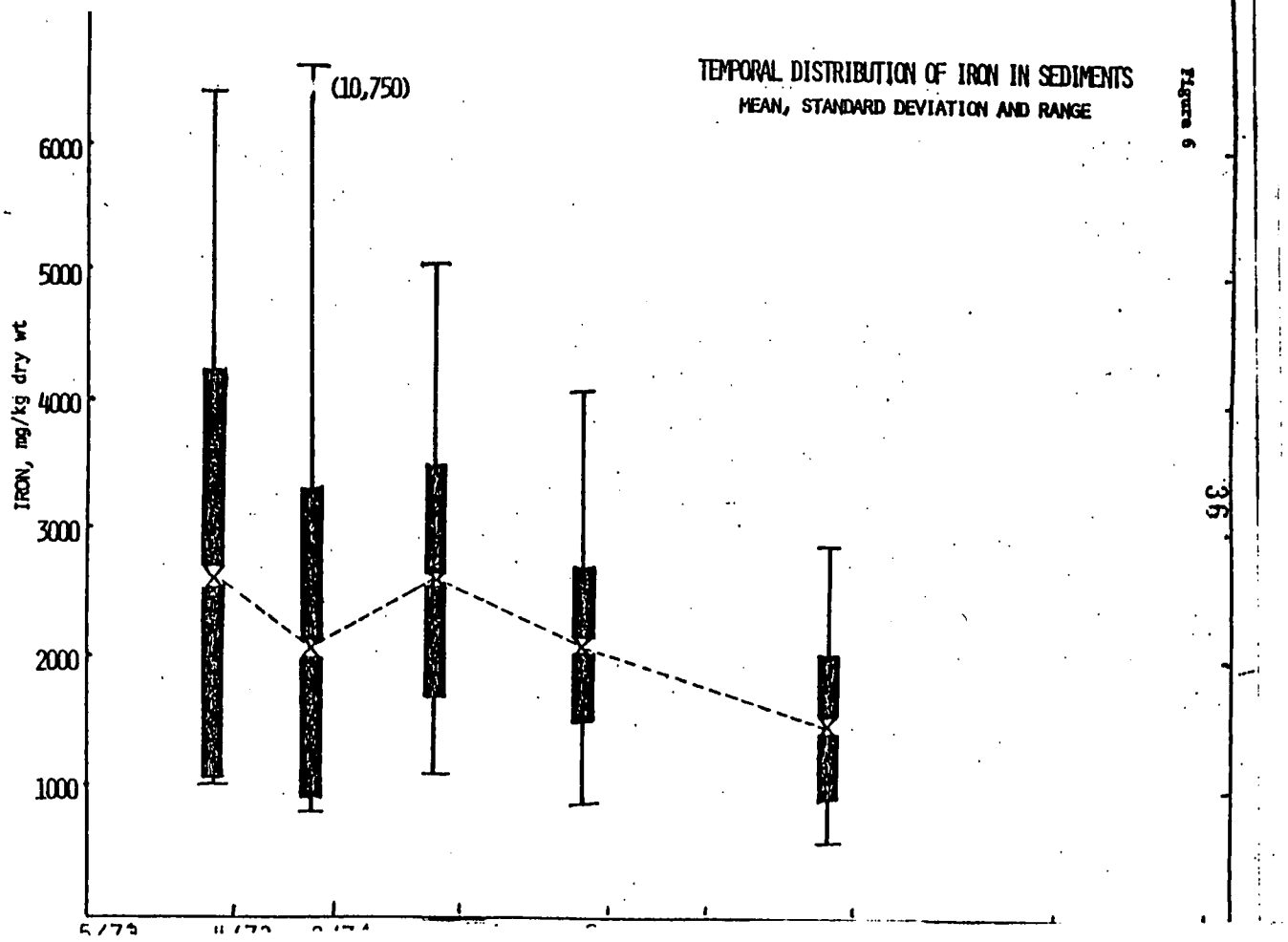


Figure 6

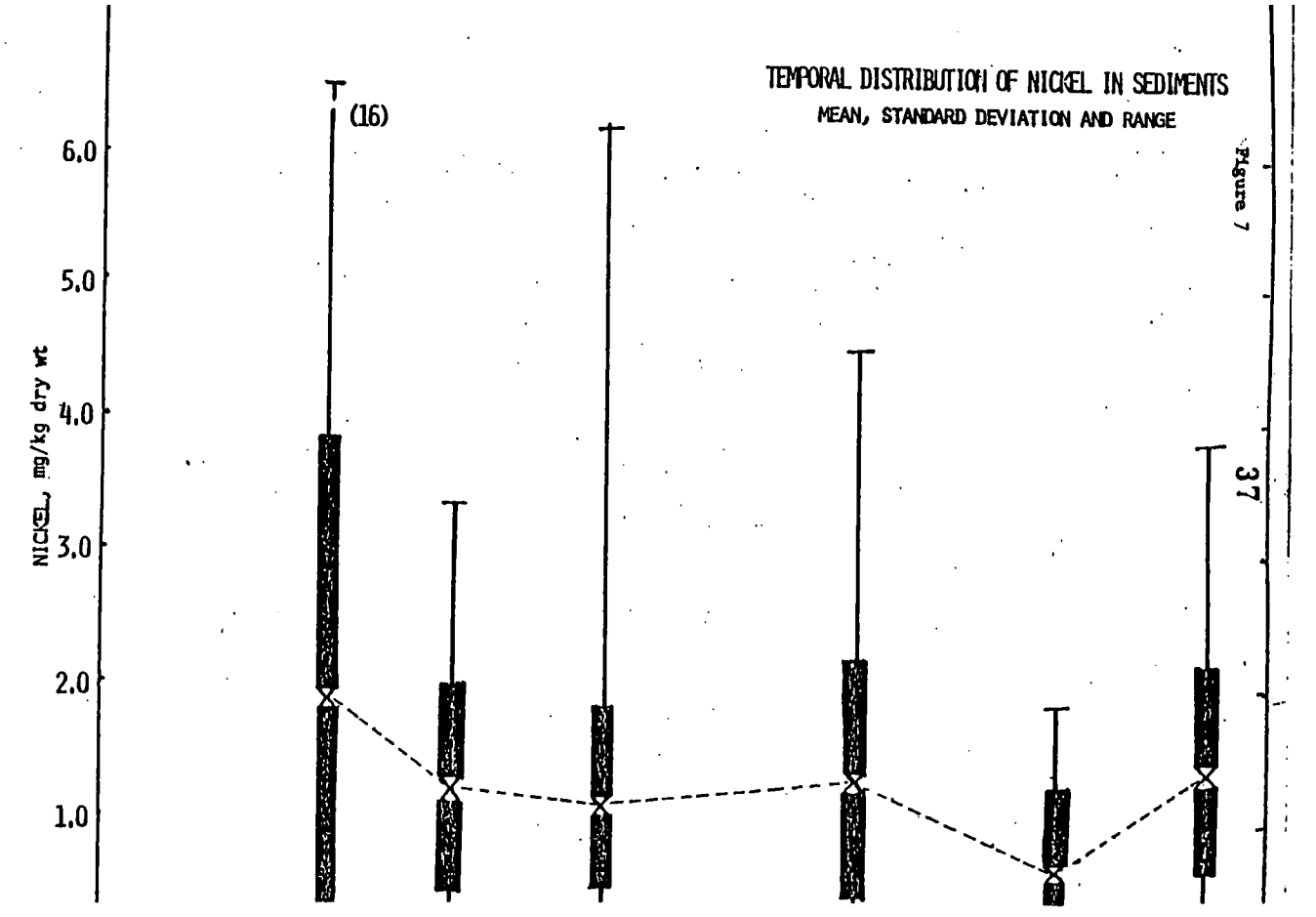
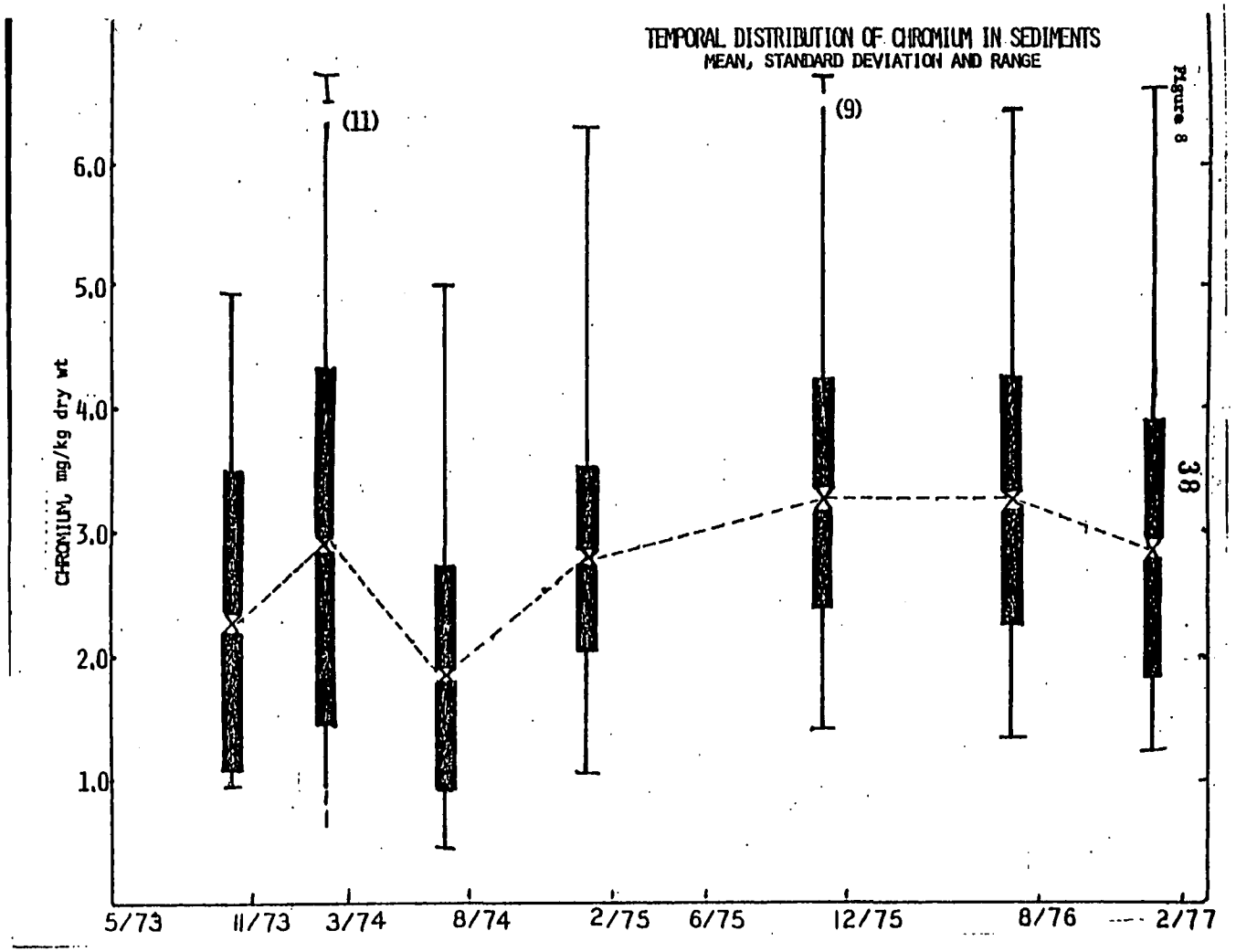
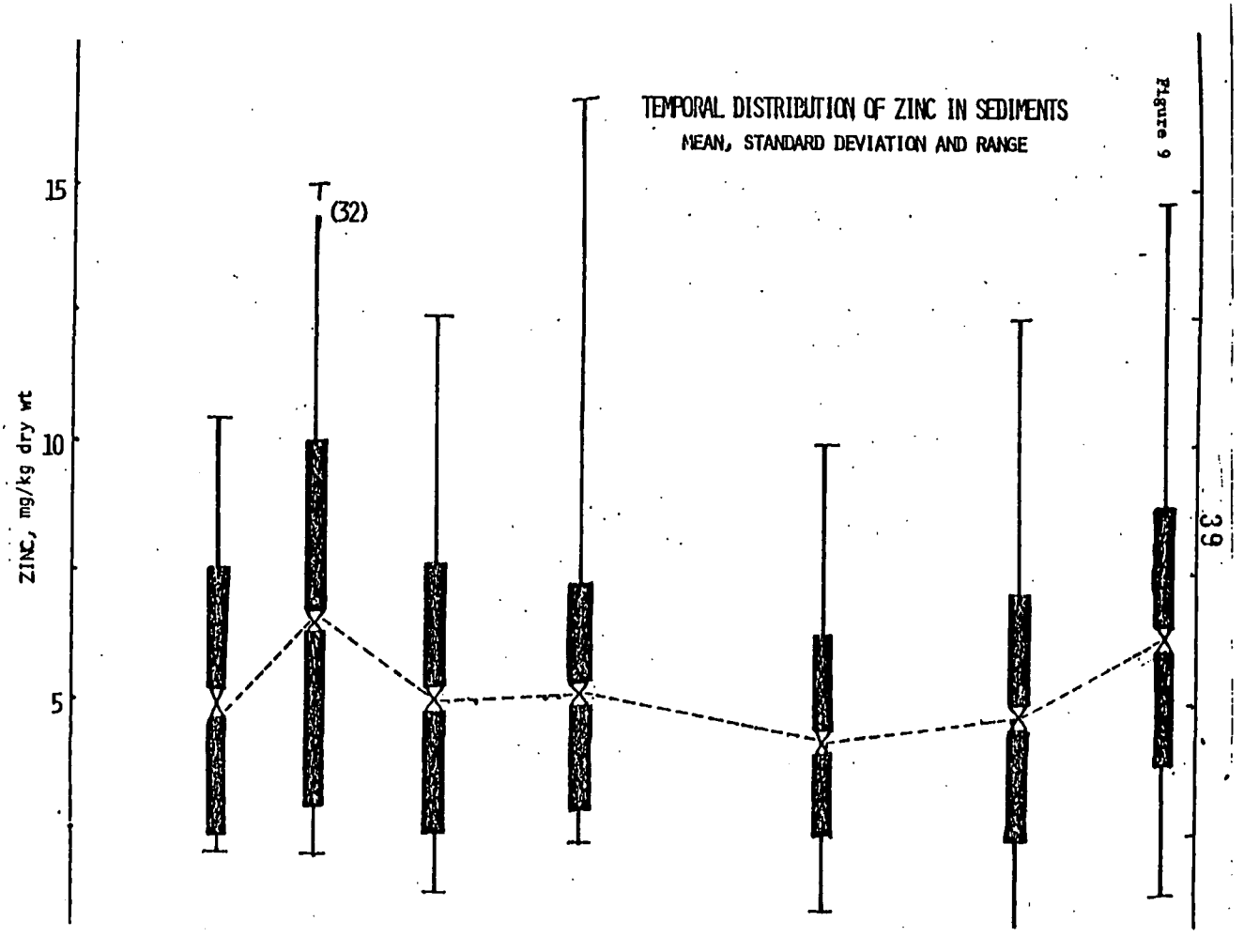
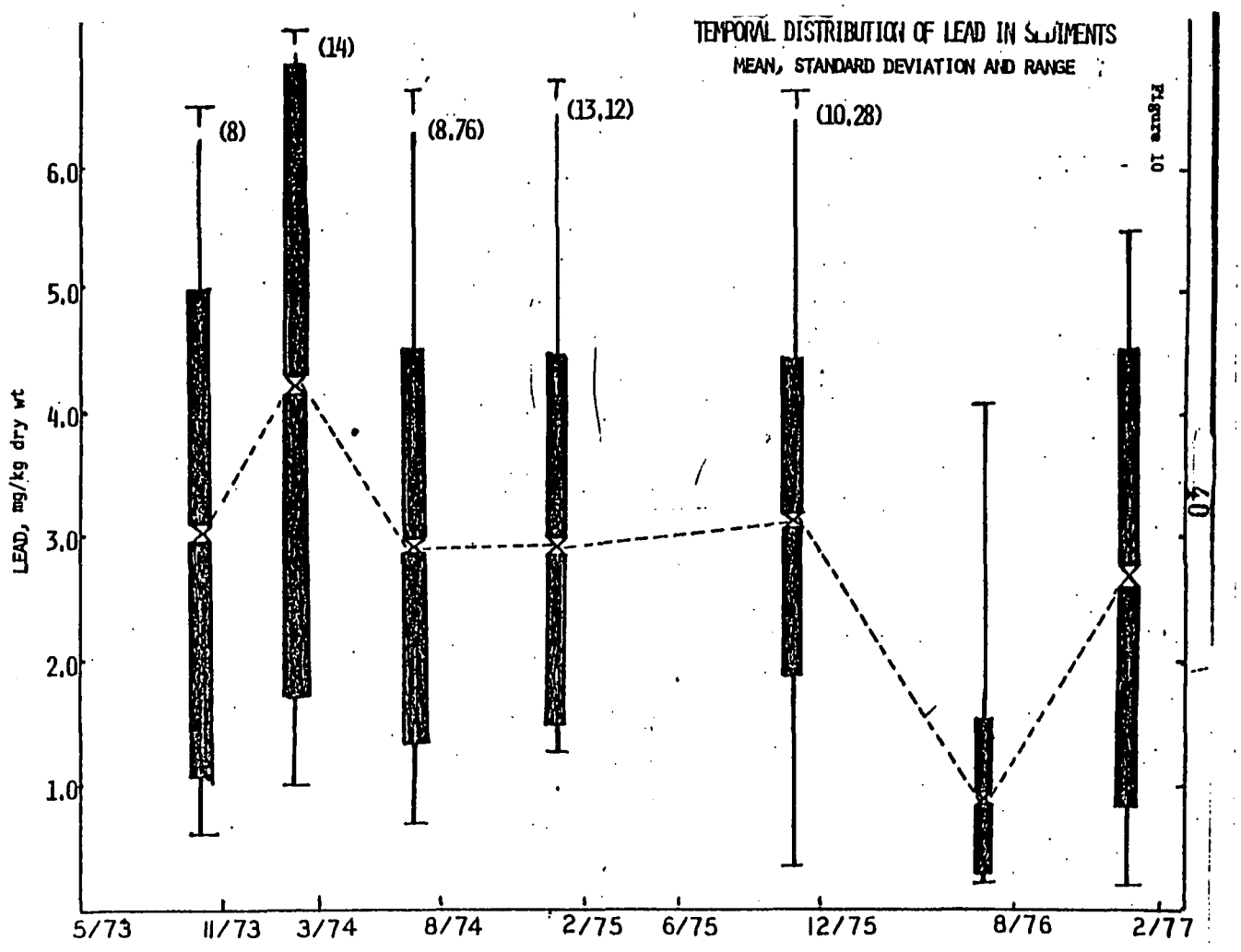


Figure 7


TEMPORAL DISTRIBUTION OF CHROMIUM IN SEDIMENTS
MEAN, STANDARD DEVIATION AND RANGE
Figure 8
(11)
(9)
CHROMIUM, mg/kg dry wt
6.0
5.0
4.0
3.0
2.0
1.0
5/73
11/73
3/74
8/74
2/75
6/75
12/75
8/76
2/77
38


TEMPORAL DISTRIBUTION OF ZINC IN SEDIMENTS
MEAN, STANDARD DEVIATION AND RANGE
Figure 9
(32)
ZINC, mg/kg dry wt
15
10
5
39


TEMPORAL DISTRIBUTION OF LEAD IN SEDIMENTS
MEAN, STANDARD DEVIATION AND RANGE
Figure 10
LEAD, mg/kg dry wt
6.0
5.0
4.0
3.0
2.0
1.0
(8)
(14)
(8.76)
(13,12)
(10,28)
5/73
11/73
3/74
8/74
2/75
6/75
12/75
8/76
2/77
4.0

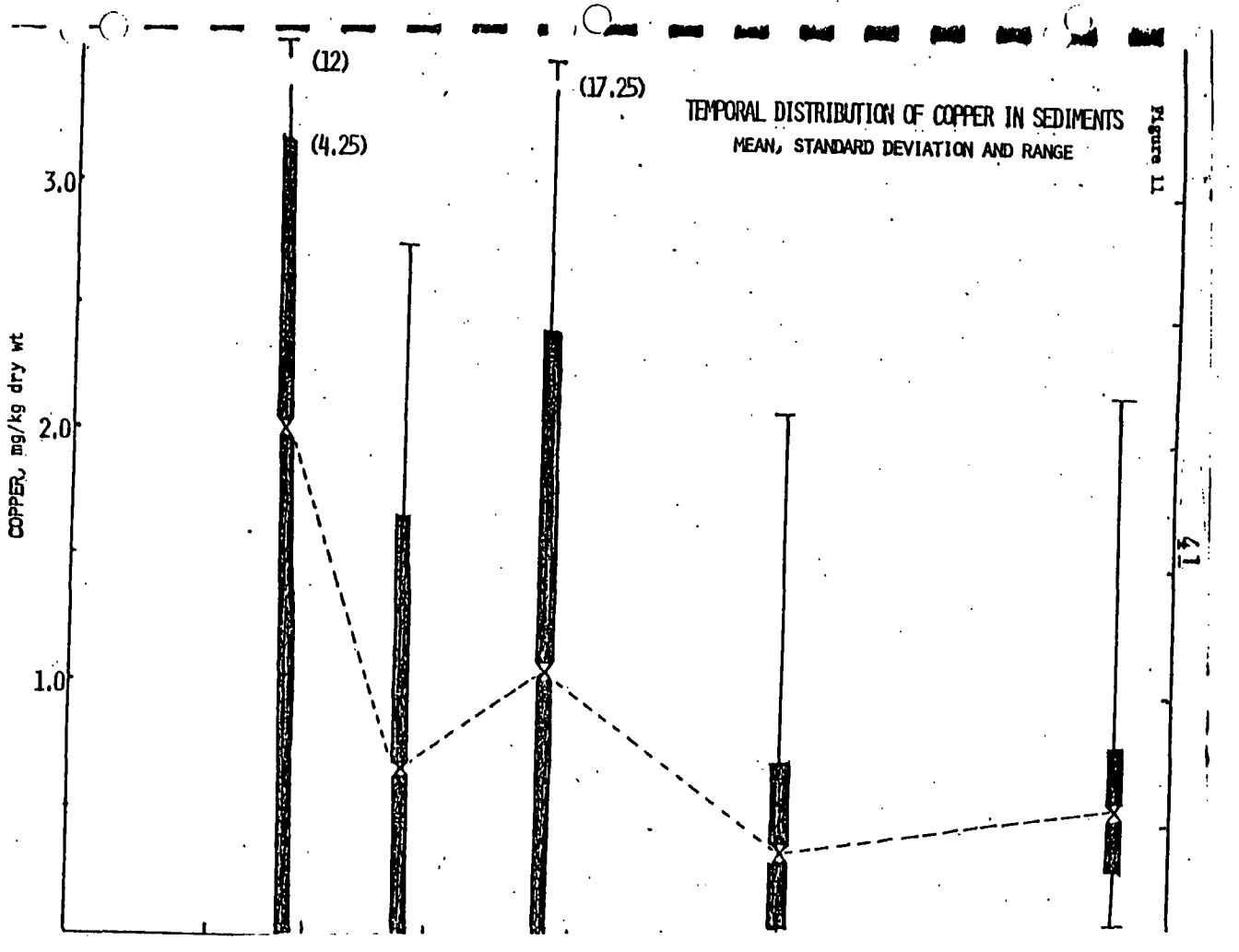

TEMPORAL DISTRIBUTION OF COPPER IN SEDIMENTS
MEAN, STANDARD DEVIATION AND RANGE
Figure 11
COPPER, mg/kg dry wt
3.0
2.0
1.0
(12)
(4.25)
(17.25)
1.4

Table 1

COMPARATIVE SEDIMENT TRACE METAL DATA
(mg/kg_{dw})

SOURCE: E-16-26

Location	Reference	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Sewage Sludge from 17 Plants	Gross, 1970	---	1450	1150	540	260	1760
Sewage Sludge Dump Site	Carmody et al. 1973	---	209	240	262	37	415
Sandy New York Bight Sediment	Carmody et al. 1973	---	6	3	12	3	18
Hempstead Survey	Udell et al. 1974						
-East Dump Site		2.5	29	42	59	8	84
-Control		<0.1	5	2	10	3	12
Acid Waste Disposal Area	Vaccaro et al. 1972						
-Station Three		1.3	34	15	37	8.2	41
-Control		0.2	5.5	1.8	7.5	1.2	7
-Hudson Canyon		2.3	130	83	110	11	170
Alternate Disposal Site	Raytheon 1976						
Stations 1-5[2]		<1	4.4[1]	<7[1]	<9[1]	<12[1]	8
Deepwater ("106") Disposal Area							
Stations A1-A6		---	25.2	28.6	26.5	25.6	55
Test Stations (on shelf)		---	6.7	3.0	7.0	3.7	14

[1]Detectable and less than values averaged for conservative mean.

[2]Mean of all stations.

42

SOURCE: 5-6-1

Table 2. *Trace metal concentrations in samples located in waters 20-35 fm, from Montauk Point, NY to Cape May, NJ.*

Station	Cd	CR	Cu	Ni	Pb	Zn
1 G1	<1.0	<4.0	<4.0	<4.0	<4.0	12.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	7.8
G3	<1.0	4.6	<4.0	<4.0	<4.0	7.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	10.8
2 G1	<1.0	<4.0	<4.0	<4.0	<4.0	15.2
G2	<1.0	5.2	3.8	<4.0	10.0	13.8
G3	<1.0	5.6	3.8	<4.0	14.0	15.2
G5	<1.0	4.0	<4.0	<4.0	<4.0	10.8
3 G1	<1.0	<4.0	<4.0	<4.0	<4.0	5.4
G2	<1.0	<4.0	<4.0	<4.0	<4.0	4.4
G3	<1.0	<4.0	<4.0	<4.0	<4.0	4.4
G5	<1.0	<4.0	<4.0	<4.0	<4.0	5.4
4 G1	<1.0	<4.0	<4.0	<4.0	<4.0	4.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	8.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	10.2
G5	<1.0	<4.0	<4.0	<4.0	<4.0	9.0
5 G1	<1.0	<4.0	<4.0	<4.0	<4.0	8.8
G2	<1.0	<4.0	<4.0	<4.0	<4.0	19.2
G3	<1.0	5.6	<4.0	<4.0	<4.0	9.2
G5	<1.0	8.0	<4.0	<4.0	<4.0	8.8
6 G1	<1.0	<4.0	<4.0	<4.0	<4.0	9.2
G2	<1.0	<4.0	<4.0	<4.0	<4.0	8.4
G3	<1.0	5.6	<4.0	<4.0	<4.0	9.2
G5	<1.0	4.0	<4.0	<4.0	<4.0	8.8
7 G1	<1.0	<4.0	<4.0	<4.0	<4.0	8.4
G2	<1.0	<4.0	<4.0	<4.0	<4.0	9.2
G3	<1.0	4.0	<4.0	<4.0	<4.0	7.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	7.4
8 G1	<1.0	<4.0	<4.0	<4.0	<4.0	7.4
G2	<1.0	<4.0	<4.0	<4.0	<4.0	7.8
G3	<1.0	4.0	<4.0	<4.0	<4.0	7.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	7.4
9 G1	<1.0	<4.0	<4.0	<4.0	<4.0	7.4
G2	<1.0	<4.0	<4.0	<4.0	<4.0	7.8
G3	<1.0	4.0	<4.0	<4.0	<4.0	7.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	7.4
10 G1	<1.0	<4.0	<4.0	<4.0	<4.0	9.6
G2	<1.0	<4.0	<4.0	<4.0	<4.0	11.4
G3	<1.0	6.0	<4.0	<4.0	<4.0	10.6
G5	<1.0	4.0	<4.0	<4.0	<4.0	10.6
11 G1	<1.0	<4.0	<4.0	<4.0	<4.0	10.6
G2	<1.0	<4.0	<4.0	<4.0	<4.0	9.4
G3	<1.0	5.2	<4.0	<4.0	<4.0	7.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	6.6
12 G1	<1.0	<4.0	<4.0	<4.0	<4.0	6.8
G2	<1.0	<4.0	<4.0	<4.0	<4.0	6.6
G3	<1.0	<4.0	<4.0	<4.0	<4.0	6.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	6.6
13 G1	<1.0	<4.0	<4.0	<4.0	<4.0	3.6
G2	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G3	<1.0	<4.0	<4.0	<4.0	<4.0	3.6
G5	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
14 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
15 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
16 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
17 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
18 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
19 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
20 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	4.2	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
21 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
22 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
23 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
24 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
25 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
26 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
27 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
28 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
29 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
30 G1	<1.0	<4.0	<4.0	<4.0	<4.0	2.0
G2	<1.0	<4.0	<4.0	<4.0	<4.0	3.2
G3	<1.0	<4.0	<4.0	<4.0	<4.0	2.8
G5	<1.0	<4.0	<4.0	<4.0	<4.0	2.0

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Table 2

Table 2. Continued

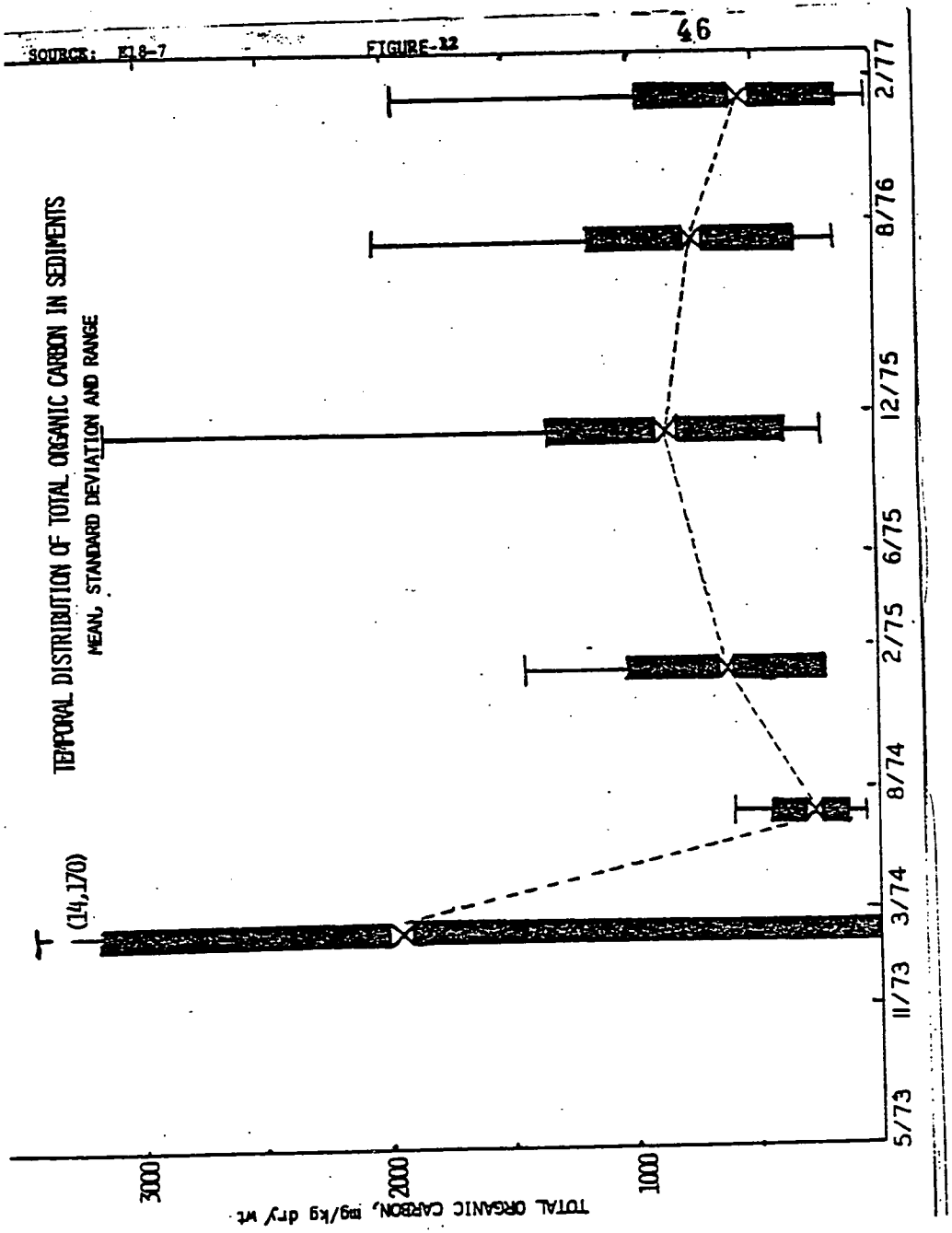
Station		Cd	Cr	Cu	Ni	Pb	Zn
31		<1.0	5.6	<4.0	<4.0	<6.0	9.2
32		<1.0	<4.0	<4.0	4.2	<6.0	12.6
33		<1.0	4.8	<4.0	<4.0	<6.0	5.4
34		<1.0	<4.0	<4.0	4.4	<4.0	9.0
35		<1.0	<4.0	<4.0	4.8	<6.0	10.0
36		<1.0	9.8	<4.0	7.4	<6.0	22.4
37		<1.0	<4.0	<4.0	<4.0	<6.0	7.8
38		<1.0	4.8	<4.0	<4.0	<6.0	4.4
39		<1.0	6.0	<4.0	4.8	<6.0	9.8
40	G1	<1.0	4.8	<4.0	<4.0	<6.0	4.8
	G2	<1.0	4.6	<4.0	<4.0	<6.0	4.0
	G3	<1.0	4.4	<4.0	<4.0	<6.0	5.4
	G4	<1.0	4.8	<4.0	<4.0	<6.0	6.4
	G5	<1.0	4.0	<4.0	<4.0	<6.0	4.8
41		<1.0	<4.0	<4.0	<4.0	<6.0	3.8
42		<1.0	<4.0	<4.0	<4.0	<6.0	2.2
43		<1.0	<4.0	<4.0	<4.0	<6.0	2.6
44		<1.0	<4.0	<4.0	<4.0	<6.0	7.6
45		<1.0	<4.0	<4.0	<4.0	<6.0	2.6
46		<1.0	<4.0	<4.0	<4.0	<6.0	5.4
47		<1.0	<4.0	<4.0	<4.0	<6.0	8.4
48		<1.0	<4.0	<4.0	<4.0	<6.0	9.0
49		<1.0	4.6	<4.0	<4.0	<6.0	9.6
50	G1	<1.0	<4.0	<4.0	<4.0	<6.0	6.8
	G2	<1.0	<4.0	<4.0	<4.0	<6.0	5.8
	G3	<1.0	<4.0	<4.0	<4.0	<6.0	7.8
	G4	<1.0	4.0	<4.0	<4.0	<6.0	9.0
	G5	<1.0	<4.0	<4.0	<4.0	<6.0	8.2
51		<1.0	<4.0	<4.0	<4.0	<6.0	7.4
52		<1.0	<4.0	<4.0	<4.0	<6.0	7.2
53		<1.0	<4.0	<4.0	<4.0	<6.0	3.4
54		<1.0	<4.0	<4.0	<4.0	<6.0	5.4
55		<1.0	4.8	<4.0	<4.0	<6.0	10.4
56		<1.0	<4.0	<4.0	<4.0	<6.0	4.0
57		<2.5	<10.0	<10.0	<10.0	<15.0	19.5
58		<1.0	<4.0	<4.0	4.2	6.0	13.4
59		<1.0	<4.0	<4.0	<4.0	<6.0	7.4
60	G1	<1.0	<4.0	<4.0	<4.0	<6.0	9.8
	G2	<1.0	<4.0	<4.0	<4.0	<6.0	13.8

(2) There has been no apparent overall accumulation of Total Organic Carbon (TOC) or Organohalogens in the sediments over the period 1973-1977 (Figure 12, Table 3) (E-18-7, p. 57-63). The ranges observed fall within the range of values associated with clean areas in other parts of the North Atlantic Continental Shelf (Table 4) (E-16-26, p. 7; E-5-6-r, p. 114-116). In December, 1975, however, an intensive sampling grid to the south of the dumpsite was established, and bands of dark coloration were found associated with depressions in the bottom sediments. These bands contained higher concentrations of TOC and trace metals than the lighter colored sands adjacent to them (E-18-7, p. 70-123); while these values are all still within normal ambient values, the distribution in proximity to the dumpsite suggests that the organic enrichment of the sediments may be caused by sludge. It should be noted, however, that the intensive sampling grid did not extend through the dumpsite into areas where an impact was unlikely, so the disappearance of the dark bands in the absence of sludge dumping has not yet been conclusively demonstrated.

(3) There are differences in the geographical distributions of metals found in organisms in individual surveys, but there is no evidence of a temporal trend which would suggest significant accumulation of metals in organisms at or near the dumpsite. Analysis of ocean quahogs and scallops for metals over a 15-month period show that average metal concentrations have not increased during this period and remain within levels found in clean areas (E-16-26, p. 2-4).

SOURCE: E18-7

FIGURE-22



SOURCE: E-18-7

TABLE-3

PCB (AROCHLOR 1242 and 1254) IN OCEAN SEDIMENTS (ppb)

Station	Midwatch 2-75 1254	Dragnet 6-75 1254	Touchstone 12-75 1254	Hotspot 8-76 1254	Mogul 2-77 1254
1					
2	2.52				
5					
8	1.39				
11					
13					
14	0.68	20.5,15.4,13.6			
17	2.19				11.1
E					8.6
A		29.2,14.8, 5.6			31.0
9					
C	2.67				
19					
24		11.1,14.1,16.0			
26					
28					
33	2.08				
M- 3	1.95				
M- 5	1.38				
M- 7	1.88				
M- 9	0.40				
M-12	0.59				
M-14	0.85				
C-12	1.20				
F	1.56	21.6,17.0,20.2			21.2
22	1.57				
C- 1	1.53				
30	2.25				
D- 1	3.33				
I-14	3.58				
27	1.36				
G-52		23.2			
G-53		15.2,22.6			
D		2.4,13.7, 9.6			
201				3.8	
212				3.2	
215				1.8	20.0
222				1.6	
223				0.7	25.4
32					
206					13.3
219					17.6
224					18.8
226					14.6
228					28.7
242					17.5
Composite	102, 103, 104, 114, 115, 117		50.0		
	136, 144, 145, 146, 151, 152		80.0		

TABLE 3 (cont.)

PCB IN OCEAN SEDIMENTS (ppb)

Station	Quicksilver 5-73		Fetch 11-73		Ides 3-74		Deep Six 8-74	
	1242	1254	1242	1254	1242	1254	1242	1254
1	26	12	5.8	9.1				
2	3	1	ND	ND	33.0	28.7	<0.2	<0.2
5	3	0.9	1.4	2.1				
8	3	0.8	0.5	0.4			<0.2	<0.2
11	3	0.6	1.9	3.1				
13	3	1						
14	2	0.6	2.5	ND			<0.2	1.1
17	23	14	5.2	0.9				
E			0.8	1.7			<0.2	1.7
A			0.3	3.5				
9			5.6	1.7	4.6	4.3		
C			6.1	5.0	1.9	4.7	<0.2	1.4
19					6.5	4.8		
24					49.0/86.0	172.4/560		
26					14.3	11.0	<0.2	1.0
28							<0.2	1.3
33							<0.2	0.9
M-3								
M-5								
M-7								
M-9								
M-12								
M-14								
C-12								
F								
22								
C-1								
30								
D-1								
I-14								
27								
G-52								
G-53								
D								
201								
212								
215								
222								
223								
32								
206								
219								
224								
226								
228								
242								
Composite	102, 103, 104, 114, 115, 117 136, 144, 145, 146, 151, 152							

SOURCE: E-16-26

TABLE 4

COMPARATIVE LEVELS OF POLYCHLORINATED BIPHENYLS IN SEDIMENTS

Location	PCB (1254)	Reference
Hyperion Sludge	92.1 $\mu g/kg_{dw}$	Schmidt et al. 1970
Los Angeles, CA	98.5 $\mu g/kg_{dw}$	
Escambia Bay		
Pensacola, FL	1.7 mg/kg_{dw}	Duke et al. 1970
Garicon Point	<0.03 mg/kg_{dw}	Duke et al. 1970
Upstream, Escambia River	486 mg/kg_{dw}	Duke et al. 1970
Escambia Bay and Escambia River	1.4-61 mg/kg_{dw}	Nimmo et al. 1971
Buzzards Bay, MA	500 $\mu g/kg_{dw}$	
Hudson Canyon (137M)	2.2 $\mu g/kg_{dw}$	Harvey, unpublished data as cited by Duce et al. 1974
Hudson Canyon (2626M)	1.7 $\mu g/kg_{dw}$	
Hudson Canyon (3785M)	1.0 $\mu g/kg_{dw}$	
Hatteras Plain (5465M)	0.3 $\mu g/kg_{dw}$	
New York Bight -- North Alternate Dumpsite	<1.0-105 mg/kg_{dw}	Raytheon 1976
Mid-Atlantic Bight		
Quicksilver (1973)	0.6-14 $\mu g/kg_{dw}$	Lear and Palmer, 1973
Fetch (1973)	0.4-9.1 $\mu g/kg_{dw}$	Lear et al. 1974
Mogul (1977)	5.4-22.8* $\mu g/kg_{dw}$	Unpublished 1977

* Total PCB (1242, 1254, 1262)

TABLE 5

TRACE METAL CONCENTRATIONS IN CLAMS

(mg/kg_{dw})*

SURVEY	CADMIUM	COPPER	NICKEL	VANADIUM
IDES (Mar 1974)	2.22** (1.48-4.01)***	8.52 (6.64-11.30)	8.74 (4.21-13.36)	10.63 (4.26-20.63)
DEEPSIX (Aug 1974)	2.15 (1.61-4.31)	9.20 (13.23-4.47)	8.42 (4.04-18.37)	2.56 (1.57-4.31)
IDWATCH (Feb 1975)	2.82 (1.06-4.09)	5.71 (4.44-7.51)	10.66 (5.42-29.29)	2.47 (1.63-3.11)
DRAGNET (Jun 1975)	2.29 (1.41-3.60)	7.32 (4.52-9.25)	8.01 (3.05-22.65)	2.09 (1.26-2.88)

* Note dryweight is approximately 10-15% of wetweight.

** Mean of all stations (excluding values at the limit of detection).

*** Range

SOURCE: E-16-26

TABLE 6

TRACE METAL CONCENTRATIONS IN SCALLOP TISSUES

(mg/kg_{dw})*

SURVEY	CADMIUM		COPPER		NICKEL	VANADIUM
	Muscle	Viscera	Muscle	Viscera	Viscera	Viscera
IDES (Mar 1974)	2.34** (0.41-8.78)***	33.89 (16.06-104.08)	3.26 (0.95-14.85)	10.02 (6.99-14.30)	4.61 (1.49-13.14)	47.30 (21.02-74
DEEPSIX (Aug 1974)	1.42 (0.46-2.64)	64.65 (26.55-121.16)	1.54 (0.80-4.43)	10.62 (8.04-20.09)	2.23 (1.18-8.77)	15.03 (6.88-35.
MIDWATCH (Feb 1975)	1.84 (0.74-3.54)	64.99 (16.14-161.77)	1.77 (1.11-6.60)	10.41 (7.91-15.85)	2.68 (1.53-7.55)	13.31 (7.76-21
DRAGNET (Jun 1975)	1.90 (0.66-3.69)	51.97 (19.33-105.33)	1.46 (0.94-2.57)	9.10 (7.25-9.61)	2.38 (1.63-3.65)	9.25 (4.55-13

* NOTE: Dryweight is approximately 10 to 15% of wetweight.

** Mean of all stations (excluding values at the limit of detection).

*** Range.

SOURCE: E-16-26

TABLE 7

TRACE METAL CONCENTRATIONS

IN SCALLOPS AND CLAMS - 60-mile site

(mg/kg_{ww})

METAL	ARCTICA	PLACOPECTEN
CADMIUM	0.38	2.54
CHROMIUM	0.70	0.59
COPPER	2.17	1.30
LEAD	1.76	1.15
NICKEL	3.49	1.71
ZINC	15.2	15.9

SOURCE: 16-26

(4) Water and sediment samples at and near the dumpsite show no evidence of contamination by fecal coliform bacteria (Tables 8, 9) (E-18-7, p. 158-166); however, several clam specimens did have detectable levels of fecal coliform bacteria in their meats. Since these bacteria are not indigenous to the marine environment, their presence at all is significant.

(5) There is no evidence to support the contention that sludge dumping has caused high mortalities of ocean quahogs ((HR, 96-97). Examination of the data (Figure 13) (E-18-7, p. 64-67) shows that the incidence of high percentages of "clappers" in dredge hauls is not a feature associated peculiarly with the dumpsite or adjacent areas. Two stations 20 miles North and East of the dumpsite (G 19, 14), (opposite to the direction of prevailing water movement), (HR, 104) show very high percentages of "clappers," while two stations in the dumpsite(E, 8) show very low percentages.

(6) While there are no gross indications of adverse changes in the benthic biota, the statistical analysis of the intensive grid sampling data leads EPA Region III to the conclusion that there are indications of adverse changes associated with the "dark bands" found in the intensive grid (HR, 97-98; E-18-7, p. 128-155). This conclusion has been challenged by the City of Philadelphia (E-16-26, p. 5-6) on the basis of a lack of adequate temporal or spatial controls to determine whether the data represent an actual impact or whether they represent natural variability. However, it is clear from the data that

TABLE 8

BACTERIOLOGICAL DATA

Operation Hotspot - August 1976

GRID STATIONS

Station	Date	Time	Depth (Fathoms)	Sample	Coliform plate cts./50 ml	F. Coliform plate cts./50 ml
201	8/08/76	1615	25	Sediment	<1	<1
202		1645	27			
203		1110	27			
204		1552	28			
205		1710	29			
206		1140	29			
207		1535	27			
208		1730	29			
209		1042	27			
210		1203	30			
211		1515	29			
212		1750	30			
213		1014	25			
214		1224	25			
215		1447	34			
216		1810	32			
217		0953	25			
218		1303	32			
219		1423	33			
220		1830	32			
221		0920	32			
222		1333	33			
223		1338	33			
224		1847	35			
225		1845	35			
226		2014	37			
232		2218	25			
235		2128	26	Sediment	<1	<1
					MPN/100 gm	MPN/100 gm
201		2240	25	Arctica	3	<3
201		2240	25	Arctica	15	6.2
201	8/08/76	2240	25	Modiolus	29	29

TABLE 9

BACTERIOLOGICAL DATA

OPERATION MOGUL

February 1977

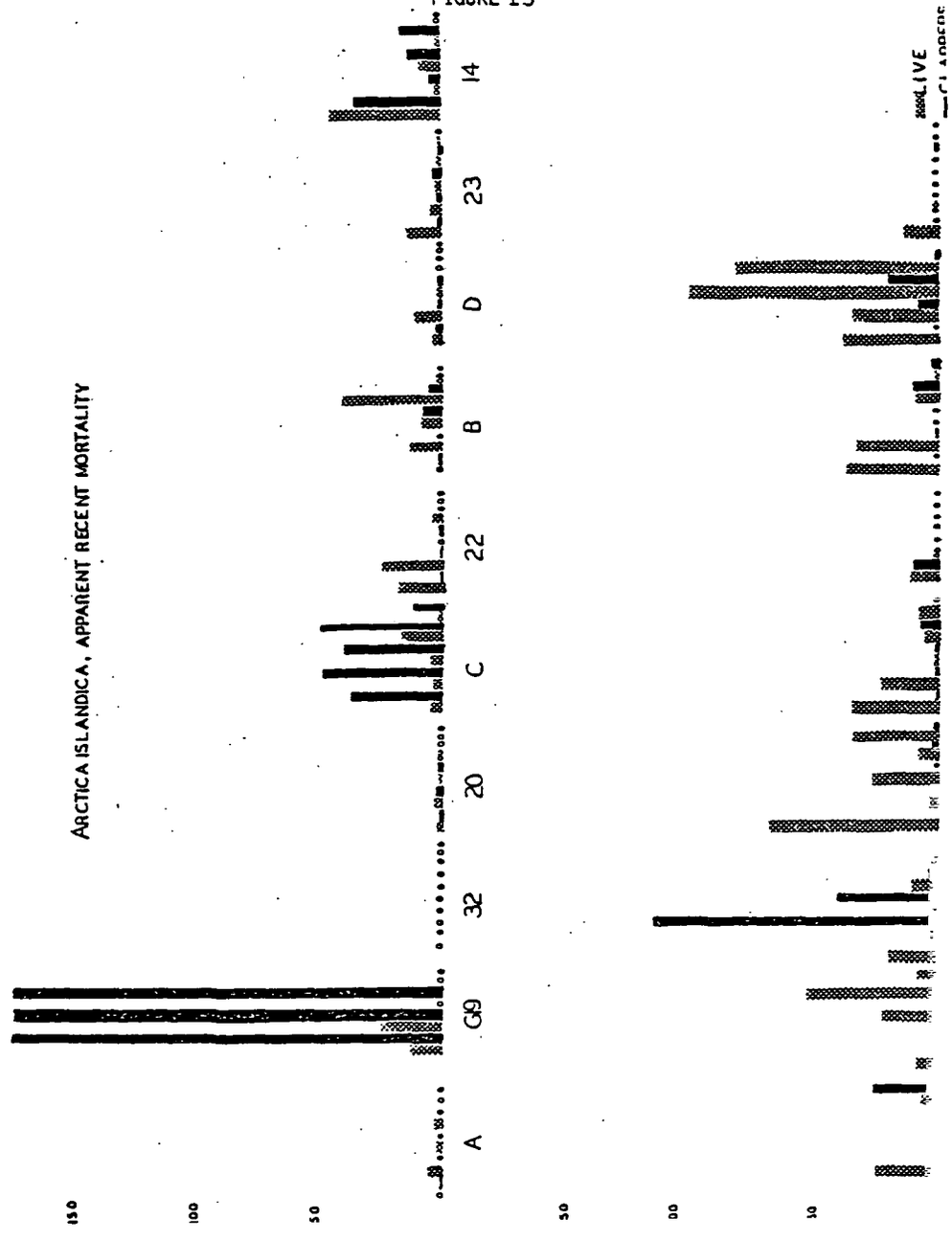
Station	Sample	MPN Total Coliforms/ 100 ml	MF Total Coliforms/ Count 100 ml	MPN Fecal Coliforms/ 100 ml	API Speciation	Date
32	Sediment	<22				2/16/77
G-34	Water	<2.2	0.6+	<1	Ent. agglomerams 4 ea	2/17
G-34	Sed.	<22				"
24-1	Clam	36		<36	Kl. pneumoniae Ent. aerogenes	"
8	Clam	2400		73	Ent. cloacae - 3 ea Kl. pneumoniae - 4 ea	"
8	Sed.	<22				"
8	Water	<2.2	<1			"
17-1	Clam	91		91	E. coli - 2 ea	"
234	Sed.	<22				"
234	Water	<2.2	<1			"
201	Sed.	<22				"
201	Water	<2.2	<1			"
236	Sed.	<22				"
236	Water	<2.2	<1			"
205	Sed.	<22				"
205	Water	<2.2	<1	1	C. freundii	"
203	Sed.	<22				"
203	Water	<2.2	<1			2/18
207	Sed.	22/<22		<22	Ps. maltophilia	"
207	Water	<2.2	0.2+	<1	Ent. Cloacae	"
227	Sed.	<22				"
227	Water	<2.2	<1			"
238	Sed.	<22				"
238	Water	<2.2	<1			"
240	Sed.	<22				"
240	Water	<5.7	<1			"

TABLE 9 (cont.)

Station	Sample	MPN Total Coliforms/ 100 ml	MF Total Coliforms Count 100 ml	MPN Fecal Coliforms 100 ml	API Speciation	Date
210	Sed.	<22				2/18/
210	Water	<2.2	<1			"
212	Sed.	<22				"
212	Water	<2.2	<1			"
213	Sed.	<22				"
213	Water	<5.7	<1			"
215	Sed.	<22				"
215	Water	<5.7	<1			"
220	Sed.	<22				2/19/
220	Water	<5.7	<1			"
221	Sed.	<22				"
221	Water	<5.7	<1			"
223	Sed.	<22				"
223	Water	<5.7	<1			"
225	Sed.	<22				"
225	Water	<5.7	<1			"
242	Sed.	<22				"
242	Water	<5.7	<1			"
218	Sed.	<22				"
218	Water	<5.7	<1			"
Grid #1 209 - 1 mile SW	Clam	230		36	Ent. cloacae - 2 ea	"
Grid #2 218 - 1 mi toward 215	Clam	36/<36		<36	Ps. aeruginosa	"
Grid #3 206 - 1 mi toward 203	Clam	2400		73	Kl. pneumoniae - 3 ea Ent. cloacae 2 ea Ent.aerogenes	"
Grid #4 237 - 1 mi toward 236	Clam	91		<36	Kl. pneumoniae Ent. aerogenes	"

SOURCE: E-18-7

FIGURE 13



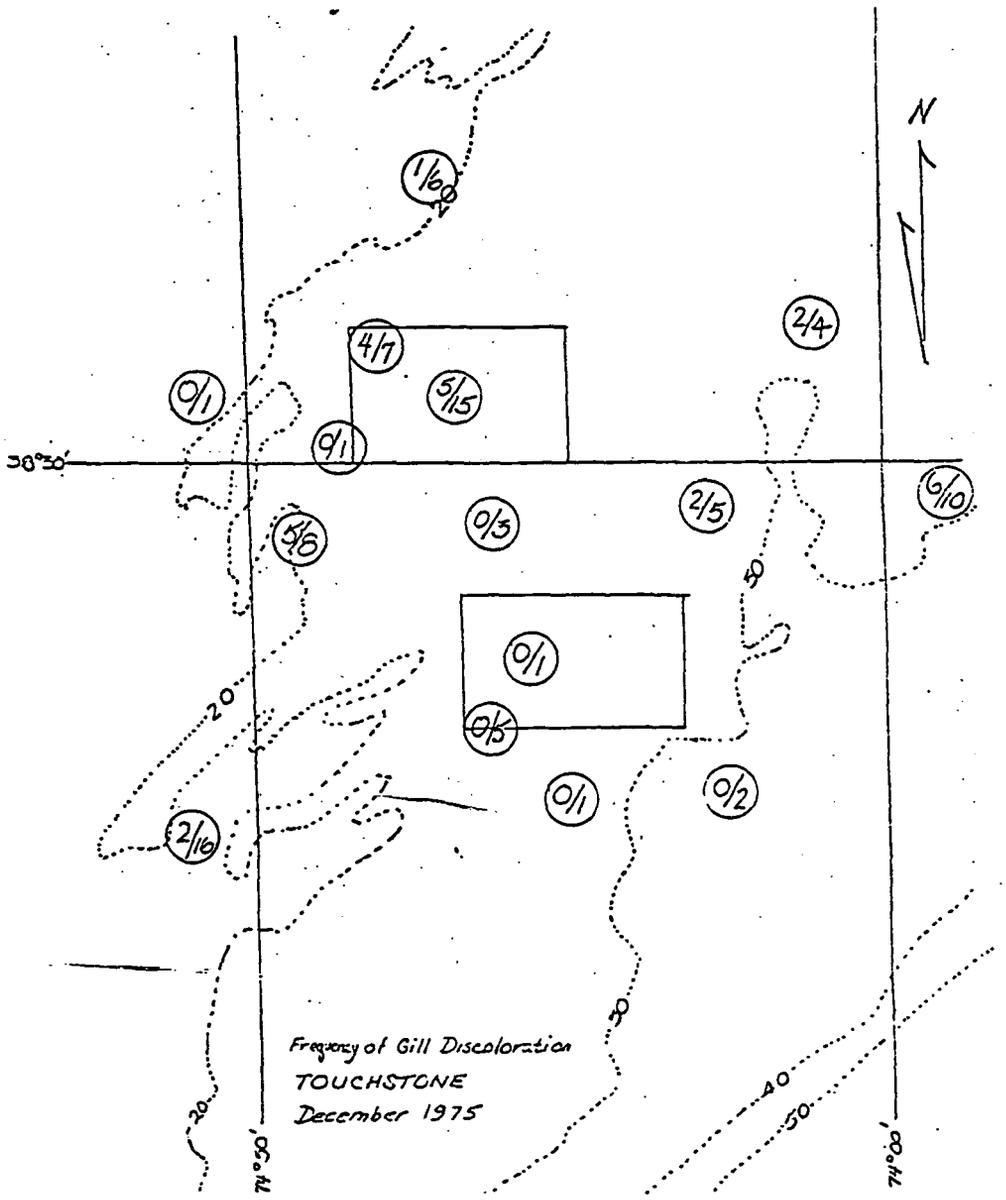
certain species are preferentially associated with the organically enriched areas, and, assuming that the organic enrichment results from sludge dumping, these data do indicate a change in the benthic infauna related to sludge dumping.

(7) There is evidence of some crab gill fouling in the vicinity of the dumpsite, and one crab with lesions was collected in the dumpsite (Figures 14, 15, 16) (E-18-7, p. 156-157; HR, 97). While these data are too sparse to draw firm conclusions, as pointed out by the City of Philadelphia (E-16-26, p. 7), the occurrence of these phenomena at all is highly suggestive of some type of impact.

(8) The EPA ocean dumping regulations establish criteria for evaluating disposal impact. The criteria are quite specific and require a quantitative determination of the level of impact before a dumpsite may be classified in Impact Category I (FEDERAL REGISTER 42, p. 2484). The criteria allow for movement of waste from the site to high value areas, quantifiable damage to important food chain species, and damage to major uses of a site by accumulation of solid material at the site or adjacent to it. The existing analyses of data presently available on the site do not show a quantifiable impact according to these criteria. The closure of the site to shellfishing by the Food and Drug Administration (FDA) would, however, be sufficient to place the site in Impact Category I (HR, 98-99) if shellfishing were a major use of the site. This point will be discussed later.

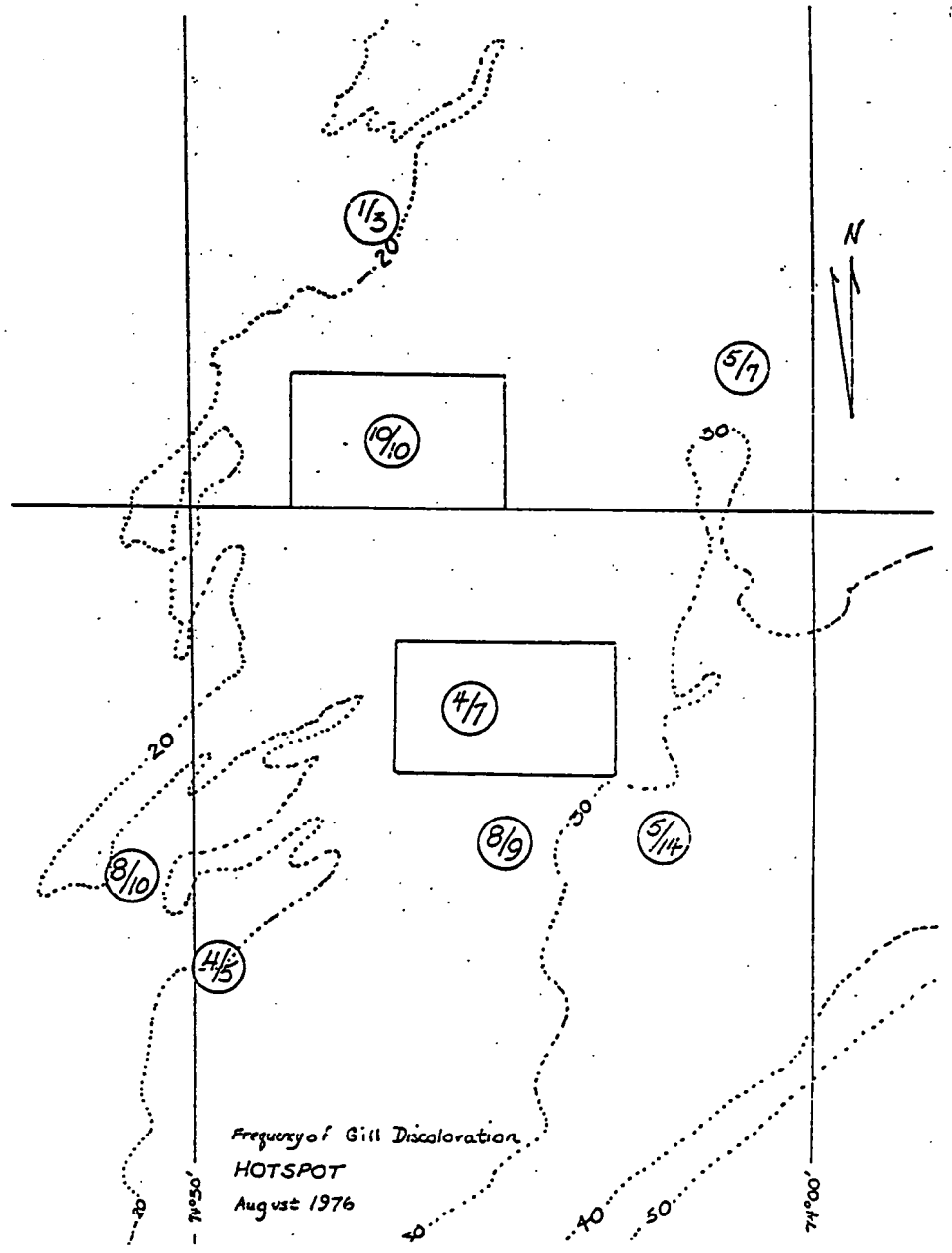
SOURCE: E-16-26

Figure 14
Spatial Distribution of Crab Gill Discoloration



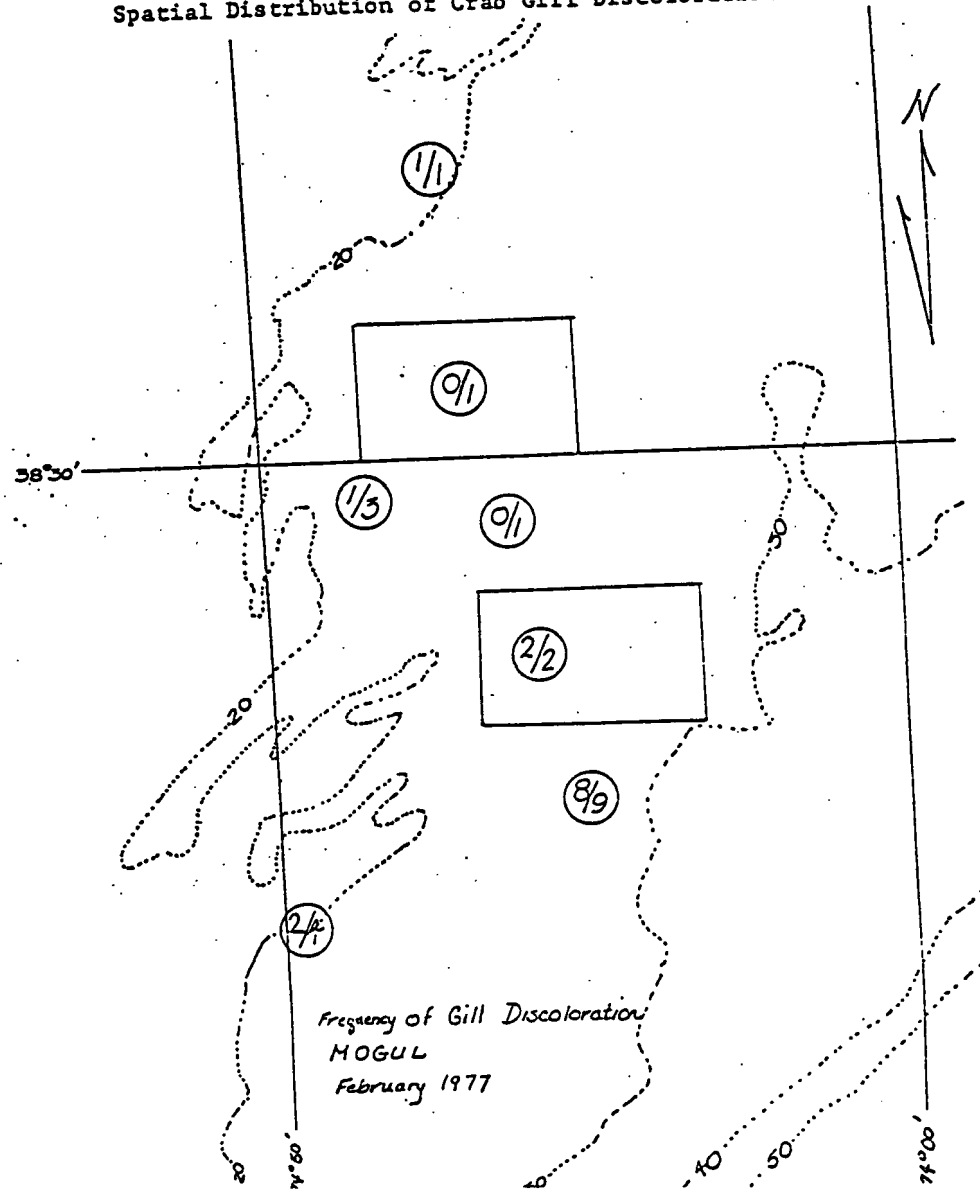
SOURCE: E-16-26

Figure 15
Spatial Distribution of Crab Gill Discoloration



SOURCE: E-16-26

Figure 16
Spatial Distribution of Crab Gill Discoloration



The lack of significant adverse trends in most of the data available on the site makes it difficult to project potential damage to the site between now and 1981. Philadelphia has been dumping at the site since 1973, a period of four years (HR, 85). From the present time until December 31, 1980, dumping will be reduced each year from the present rate of 17,710 dry Tons per six months to a rate of 4285 dry Tons per six months in the last half of 1980 (E-16-26). Thus, for the next three and a half years the amounts dumped at the site will steadily decrease. In terms of such indicators as metal accumulation in sediments, TOC in sediments, and fecal coliform bacteria in sediments and the water column, the presently available data indicate that conditions at the dumpsite will not change markedly over the next few years, particularly since the rate of dumping is decreasing. The decreasing rate of dumping should also have the effect of counteracting to some extent the adverse trends in the composition of the benthic infauna and on the accumulation of fecal coliform bacteria in clams.

There appears to be little probability that any of the observed impacts of dumping at the present site are irreversible. Philadelphia dumped its sewage sludge for 10 years, from 1963 to 1973, at a site 12 miles off the mouth of Delaware Bay (HR, 84-85). In 1973, EPA terminated use of this site for sludge dumping.

Sixteen months after cessation of sludge dumping at this site, the FDA conducted a field survey of the site, collecting samples of seawater and sediments. The data were evaluated and it was found that the environmental quality had improved sufficiently to permit reopening the area to shellfish harvesting (S-42, p. 6). Considering that by 1981, Philadelphia would have been dumping at the present site for less than eight years, and for nearly half of that time at rates significantly lower than the rates at the former site, it appears reasonable to assume that the present site would recover from the adverse effects of dumping within a few years after cessation of dumping at the site.

b. Present and Potential Economic, Public Health, and Social Impacts

On December 10, 1976, the FDA issued an advisory warning notice imposing a voluntary shellfish harvesting closure of the Philadelphia sewage sludge dumpsite (S-42, p. 7). Advisory closures restricting harvesting of shellfish on the Continental Shelf beyond three-mile state territorial boundaries are based on two criteria: 1) the presence of a shellfish resource in or adjacent to the proposed dumpsite and, 2) the actual dumping of sewage sludge, dredged material, and/or toxic wastes (S-42, p. 5). The safety zone closed is of such size that shellfish resources are not affected by the materials being dumped,

even under the most adverse hydrographic and meteorological conditions (S-42, p. 6). In the case of the Philadelphia dump site a circle of 9.5 nautical miles in diameter, or an area of 71 sq. n. mi., was closed.

This closure was made to prevent the harvesting of shellfish which may be contaminated by pathogens in sewage sludge. Several of the statements in the record point to this closure as having significant economic impact (HR, 88, 387-388, 393, S-39). On the other hand, the City of Philadelphia has stated there was little or no harvesting of shellfish at the site prior to the time Philadelphia began to dump there, and that there is no economic loss (HR, 494). The FDA states that harvesting restrictions were not considered necessary until early 1976, because sea (surf) clam resources in the area were insufficient to sustain commercial harvesting. The closure was initiated because depletion of surf clam resources has led to the emergence of the ocean quahog as a commercial species in some areas, (S-42, p. 7). The State of Maryland and the City of Philadelphia were invited to submit data on the extent of shellfishing at the dumpsite, but none were received.

The entire Continental Shelf between Cape Cod and Cape Hatteras supports a productive finfishery and shellfishery (E-5-6-j, p. 159-187; E-20-1, vol. 1, p. 63-82). The area of the Philadelphia dumpsite is generally typical of this part of Continental Shelf and is fished commercially along with areas

adjacent to it (E-11-16, 810-812). There is no indication that the dumpsite itself has unique features which make it particularly productive or valuable. Interviews with commercial fishermen fishing the area near the site do not indicate any adverse impact on finfish harvest or scallop harvests at or near the site (E-11-16, 810-134).

Surf clams are not present at the site in commercial quantities; the only shellfish species of commercial value at the site is the ocean quahog. This clam is present all along the Continental Shelf from Cape Hatteras to Cape Cod in depths of from 6 to 90 fathoms; along this coast the best catches have been made in depths of 18 to 24 fathoms (E-11-16, p. 849-850). Thus, closure of the Philadelphia dumpsite could have an adverse economic impact on ocean quahog fishermen.

An effort was made to determine the present and potential economic impact of this closure with regard to the ocean quahog fishery. At present, ocean quahogs are harvested in very small quantities; only as incidental to the harvest of surf clams and sea scallops, and in an exploratory manner by industry (E-5-6-j, p. 159). Catch statistics are not published separately by the National Marine Fisheries Service (NMFS); they are grouped with "other clams," which include a variety of species such as the cockle, geoduck, ocean quahog, rangia, razor, and sunray venus. The General Accounting Office (GAO) has recently (1976) published a report on the status of the U.S. fishing industry and its future develop-

ment (E-20-1). Catch statistics for 1975 for "other clams" on the Atlantic Coast of the U. S. show a total harvest of 3000 pounds of meats with a total value of $1000 (Table 10) (E-20-1, vol. II, p. 47). The catch reported was entirely from landings in New York. Published national statistics for 1976 were not available, but Delaware provided statistics for the record which showed no landings of ocean quahogs (Table 11) (S-43). Thus, it would appear there is not a significant adverse economic impact at present on the ocean quahog fishery because of the closure of the Philadelphia dumpsite to shellfishing.

The NMFS is making, however, an effort to encourage the harvesting of ocean quahogs as a substitute for other species which are presently overfished, such as the surf clam (E-11-16, 849-851; E-20-1, vol. II, p. 59). The GAO report mentioned above (E-20-1, vol. II, p. 59) comments on this effort in this fashion:

> "Product uses could include clam cakes, fritters, chowders, and many other dishes which can use a clam flavor. Some of the reasons why the resource has not yet been developed more fully include the quahog's flavor which is stronger than some clam species, such as the surf clam and its dark color. The availability of the successfully developed surf clam having similar product usage also appears to have limited development of the quahog. But since the surf clam has been overfished, demand for the quahog is expected to increase. NMFS and industry officials cooperatively working on quahog development are confident that its use will be substantially expanded."

The potential maximum sustainable yield (MSY) of ocean quahogs between Cape Hatteras and Canada is estimated at between 70 and 100 million pounds of meats per year (E-11-16, p. 851); E-20-1, vol. II, p. 59), if the resource were fully utilized; this volume is equal to the average landings of all types of clams in the U. S. between 1965 and 1975 (E-20-1, vol. II, p. 45). Based on catch statistics from 1965 to 1975, and assuming all "other clams" are quahogs (in 1975 less than one percent were actually quahogs), ocean quahogs were fished at from 0. 2 percent to 3 percent of the MSY with a decreasing trend since 1971 (E-20-1, vol. II, p. 45, 59). This trend may be reversed in some areas affected by the New York Bight shellfish kills in 1976 and the general depletion of surf clam stocks in other areas due to overfishing, but there is no evidence that there is likely to be a rapid increase in ocean quahog harvesting between now and 1981, when use of the Philadelphia dumpsite is scheduled to stop.

In a statement at the Philadelphia permit hearing, July 6-7, 1977, the State of Maryland Fisheries Administration presented a statement estimating the potential value of the ocean quahog resource in the area closed shellfishing. This estimate was based on a harvesting rate of 20 percent per year (twice the rate

leading to the MSY estimate of NMFS (E-11-16, p. 851)); harvesting at this rate would result in overfishing and depletion of the ocean quahog fishery as has happened with the surf clam fishery. With the ocean quahog fishery fully developed and harvested at the rate of 20 percent per year, the annual value of the fishery with the closed area would be $420,000 per year, and its capital value would be approximately $8.6 million.

The actual economic impact of the closure, however, would only be equal to the annual value of the standing crop if the fishery were fully utilized (or, as in the estimate given above, overfished). As pointed out above, the ocean quahog resource has only been used at a rate of 0.2-3.0 percent of the MSY over the past 10 years with a decreasing trend over the past five years. If it assumed that the closed area would be for ocean quahogs fished at the same rate as other areas along the Atlantic Coast, then the actual economic impact of the closure would, at most, be from 420-6,300 dollars per year. Even this range of values is probably very high for these reasons:

(a) The actual economic impact is based on catch statistics for "Other Clams," and quahogs are only one of many species inn this group.

(b) There are productive quahog beds much closer to shore (E-5-6-j, p. 164) and these would tend to be harvested preferentially.

Thus, it can be concluded that the actual economic impact of

1975 Clam Landings by State (note a)
(Meat weight excluding the shell)

States	Surf clam		Hard clam		Soft clam		Other clams		Total		Percent value
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
	(000 omitted)										
New England:											
Maine	-	-	8	17	6,547	5,692	-	-	6,555	5,709	13.9
New Hampshire	-	-	-	-	-	-	-	-	-	-	-
Massachusetts	20	9	850	1,020	750	700	-	-	1,620	1,729	4.2
Rhode Island	16	4	1,120	1,422	16	20	-	-	1,152	1,446	3.5
Connecticut	-	-	251	115	-	-	-	-	251	115	.3
Middle Atlantic:											
New York	4,580	768	8,668	14,301	63	76	3	1	13,314	15,146	37.0
New Jersey	35,550	4,720	1,620	1,651	169	141	-	-	37,339	6,512	15.9
Delaware	2,314	362	70	7	-	-	-	-	2,384	369	.9
Chesapeake Bay:											
Maryland	5,351	1,011	50	45	1,057	1,015	-	-	6,466	2,071	5.1
Virginia	39,088	5,682	1,088	1,022	-	-	-	-	40,176	6,704	16.4
South Atlantic:											
North Carolina	-	-	285	226	-	-	-	-	285	226	.6
South Carolina	-	-	176	221	-	-	-	-	176	221	.5
Georgia	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	120	132	-	-	-	-	120	132	.3
Pacific Coast:											
Alaska	-	-	-	-	-	-	11	19	11	19	-
Washington	-	-	510	255	152	76	510	255	1,172	586	1.4
Oregon	-	-	3	2	5	9	-	-	8	11	-
California	-	-	-	-	-	-	-	-	-	-	-
Total	86,919	12,556	14,827	20,436	8,759	7,729	524	275	111,029	40,996	100
Percent	78.3	30.6	13.3	49.8	7.9	18.9	.5	.7	100	100	

a/ Preliminary data

Table 11

SEAFOOD LANDINGS IN DELAWARE, 1976*

	lbs.	$
Alewives	300	12
Bluefish	11,700	1,920
Carp	22,000	1,940
Catfish	10,900	1,548
Croaker	2,600	832
Eels, common	80,900	32,594
Blackback	4,900	1,169
Fluke	3,300	990
Hake, red	5,600	189
Hake, white	800	168
Mackerel, Atlantic	300	24
Menhaden	35,300	1,404
Sea bass	150,000	45,000
Sea trout, gray	246,000	63,053
Shad	35,600	8,077
Shark, unclass.	1,200	60
Spot	8,000	1,200
Striped bass	80,600	56,069
Tautog	800	64
White perch	17,600	4,901
Whiting	8,800	1,144
Yellow perch	300	60
Total finfish	727,500	231,328
Hard blue crabs	3,565,100	1,075,093
Soft & peeler crabs	85,200	79,920
Red crab	25,000	12,750
Jonah crab	3,700	1,441
Horseshoe crab	2,000,000	25,000
Lobster, American	26,200	55,310
Hard clams	51,600	53,617
Conchs	417,000	41,965
Oysters	262,300	380,700
Snapper turtles	5,300	1,855
Total shellfish	6,441,400	1,727,651
GRAND TOTAL	7,168,900	1,958,979

*Supplied by Fishery Statistics, U. S. Department of Commerce, National Marine Fisheries Service

TABLE 12

U.S. Landings and Value of Clams by Major Species 1965-1975

(Meat weight)

Year	Hard		Soft		Surf		Other		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
	(000 omitted)									
1965	15,044	$9,943	11,308	$3,381	44,088	$ 3,197	409	$212	70,849	$16,733
1966	15,324	10,524	11,919	3,974	45,113	3,876	395	177	72,751	18,551
1967	16,182	11,981	9,823	3,936	45,054	4,352	441	217	71,500	20,486
1968	15,426	12,176	10,368	4,189	40,552	4,137	900	226	67,246	25,728
1969	16,154	13,445	13,481	5,555	49,575	5,913	1,535	326	80,745	25,238
1970	16,015	14,344	12,908	5,982	67,318	7,730	2,963	735	99,204	28,791
1971	16,666	16,918	12,652	6,798	52,535	6,890	2,636	700	84,489	31,306
1972	16,153	19,220	9,078	5,563	63,471	7,941	1,987	491	90,689	33,215
1973	14,505	17,361	8,627	6,905	82,370	9,867	2,038	525	107,540	34,658
1974 (Note a)	15,008	19,918	8,594	6,801	96,110	12,211	197	74	119,909	39,004
1975 (Note a)	14,827	20,436	8,759	7,729	86,919	12,556	524	275	111,029	40,996

a/ Preliminary data

the closure of the Philadelphia dumpsite to shellfishing is minimal based on present conditions. The total capital value of the resource is not damaged by the closure, since the resource can be utilized in the future, assuming that environmental conditions at the dumpsite will remain relatively stable through 1980. The development of the ocean quahog fishery into a major fishery will depend on many factors including availability of other stocks and consumer acceptance of the product. While growth of the ocean quahog fishery may occur over the next few years, there is no evidence to suggest that the range of probable economic impact is likely to change significantly between now and 1981.

No evidence was presented for the record which would suggest that recreational fishing or recreational use of beaches has been adversely affected by sludge dumping at the Philadelphia dumpsite. Statements by the State of Maryland (HR, 382-418), and Members of Congress from Maryland and Delaware (HR, 392-395; HR, 34-40; S-39; S-40) all spoke to impacts at the site, particularly those associated with the effect of the shellfish closure on commercial fisheries. Based on the lack of comment received from the general public and local environmental groups, it would appear that sludge dumping at the Philadelphia site is not an overriding local issue.

Summary:

The data collected on 13 monitoring cruises of the Philadelphia sludge dumping site and adjacent areas show that the levels of the following environmental indicators remain within normal ambient

values and have shown no overall increase between 1973 and 1977: Metals in sediments, metals in biota, Total Organic Carbon, Fecal coliform bacteria in water and sediments. There are indications of changes in population structure which may be related to sludge dumping, and a few clams have been found to contain detectable levels of fecal coliform bacteria. Since the rate of dumping by Philadelphia will progressively decrease between 1977 and 1980, and since impacts after four years of dumping are minimal, it is unlikely that irreversible or drastic changes are likely to occur over the next three years.

The dumpsite has been closed to shellfishing, and this could have adverse economic impact on the potential development of the ocean quahog fishery. However, this fishery is not exploited commercially on other than a very small scale, and it is unlikely that closure of this area for the next few years would have a significant economic impact on the development of this fishery.

5. Impacts of Relocating Sludge Dumping to Alternate Sites

Two sites are considered as alternative locations to the sites presently used for sludge dumping. In the New York Bight area, the 60-mile site and the 106-mile site are considered as alternate locations, and for Philadelphia the 106-mile site is considered an alternate location. No other sites were suggested during the hearing. Therefore, this discussion will deal only with the 60-mile site and the 106-mile site.

60-mile site

a. Environmental

The potential environmental impacts of sludge dumping at the 60-mile site have been studied both by EPA and NOAA, and the results are summarized in the EPA EIS on sludge dumping in the New York Bight (E-5-6-r). As summarized in the EIS (p. 3), the environmental effects would be the following:

> "Among its general effects would be a significant adverse impact on the benthos (bottom-dwelling organisms) at and near an alternate dump site. In response to sludge dumping, the benthic community would probably increase in abundance, but decrease in diversity; the remaining species would eventually be representative of a polluted bottom environment, such as that at the existing dump site in the Bight Apex.
>
> The sediments on and in which the benthic organisms dwell would be degraded. Sediment concentrations of heavy metals, organic matter, coliforms, chlorinated hydrocarbons, and possibly nutrients (nitrogen and phosphorous) would increase over background levels. Pollutant concentrations in the water column itself would vary according to the particular composition of each load of sludge, the degree of dispersion, and seasonal conditions."

b. Economic

Use of this site would not result in any site-specific economic effects. Commercial shellfishing in the area is minimal and is likely to remain so. No developable mineral resources have been identified in or near this site (E-5-6-r, p. 4, 126-136). The EIS

points out that ocean quahogs are abundant in the area, but that their resource potential in comparison to surf clams has not been defined (E-5-6-r, p. 128).

The major economic impact associated with the use of this site is the increased cost of transportation of sewage sludge for dumping at this site. The EIS presents an extensive examination of the cost factors, including capital costs for potential fleet expansion as well as operation, maintenance and repair costs (E-5-6-r, p. 137-138). It is estimated that the total cost through 1981 would be 220-298 percent more than it is at present (E-5-6-r; p. 4), from a total cost of $78 million to $249-310 million for the period 1977 to 1981. These estimates were based on current unit costs from haulers and on projected sludge volumes.

c. Public Health and Social

Use of this site would have no significant effect on the public health and welfare of beach communities or on the quality of Long Island or New Jersey coastal waters. Floatables from this site are not expected to reach these beaches under any weather conditons, including winter storms. Potential contamination of commercial shellfish would be limited to the immediate vicinity of the dumpsite (E-5-6-r; p. 126).

106-mile site

a. Environmental

The scientific community knowledgeable concerning processes in deep ocean environments is generally apprehensive about the

environmental impacts of dumping wastes containing solid materials into deep ocean waters. At a 1971 ocean disposal conference, co-sponsored by the Woods Hole Oceanographic Institute (WHOI) and the COE; the panel on biological effects stated:

"Disposal should not occur in the deep sea, i.e., beyond the continental shelf. A fundamental reason for this suggestion is the following. The deep sea is an area where biological decomposition rates are apparently very low in comparison with other ocean regions. It is an area of great constancy with respect to the physical-chemical environment and it is thought that the fauna living there is finely tuned to small environmental changes. Thus, the fauna may be quite susceptible to large environmental perturbations such as might be expected with the introduction of dredge spoils. If deleterious effects occur in the deep sea, the opportunities to alter the course of events are minimal. We, therefore, suggest that deep sea should be off limits for disposal activities at least until other information is brought to bear which would render the possible dangers non-existent.

"A similar view was expressed at a 1974 workshop at Woods Hole, sponsored by the National Academy of sciences (NAS): Data for the evaluation of the deep sea as a disposal site are inadequate. This is due to: difficulties in conducting bioassays; slow rates of mixing and diffusion potentially resulting in anaerobic conditions; slow organic degradation; and narrow tolerance ranges for sensitive assemblages of organisms. Although the area is relatively stable

- in comparison to the shelf and nearshore, the much greater scientific uncertainty, and consequently increased risk associated with off-shelf disposal, dictate that any but the most innocuous use of the area should be approached with extreme caution"(E-5-6-r, p. 65-66).

The National Oceanic and Atmospheric Administration (NOAA) has also expressed opposition to moving dumpers to the 106-mile site without knowledge of the impacts at the 106-mile site (HR, 125). NOAA points out that, in comparison to shelf waters:

"...the environmental effects of disposal in deeper waters are correspondingly more difficult to measure, and hence, to predict. This is due to factors such as the greater depths of water and distances from shore, involving cumbersome sampling techniques in many instances and problems in geographic positions, and also to the general paucity of environmental and biological information in the off-the-shore areas.

"In the case of DWD-106 this situation is further complicated by the interaction of major water masses, Shelf Water, Slope Water and Gulf Stream Eddies.

"The DWD-106 is, therefore, an exceedingly complex oceanographic area in which to assess environmental conditions and external impact upon those conditions." (HR, 132-133)

Dr. Carol Lichfield, a marine microbiologist, expressed concern about the survival in the deep ocean of micro-organisms contained in sewage sludge:

"Unfortunately, there is very little information on the survival of coliforms in deeper waters.

"It has been shown, however, that decreased temperatures aid the survival of coliform bacteria in the increased salinities and slightly increased pressures that they would encounter at the deeper dump site, therefore, automatically assuming that deeper waters will "take care of" potential pathogens more efficiently than that which occurs at the present location, could lead to a very false sense of security." (HR, 355)

The statement of the National Wildlife Federation (NWF) includes as exhibits statements and published articles of a number of highly respected marine scientists who have made significant scientific contributions to our understanding of deep ocean environments (E-11-16, p. 629-687). The NWF statement summarizes its concerns about the environmental impact of deep ocean dumping in this fashion.

"As little as we know about the marine environment for nearshore continental shelf areas, and the fate and effects of pollutants in it, we know even less for deep ocean areas off the edge of the continental shelf.

"For example:

(a) Sewage sludge organic matter may have a totally different behavior off than on the continental shelf--to the extent such organic matter finds its way into water below a few hundred feet from the surface, there is good reason to expect its rate of biodegradation to be greatly diminished.

The possible consequences of such a reduction in microbial decompostion rates are unknown. Extensive studies by Dr. Holger Jannasch and his associates at Woods Hole (see, Exhibits A-1 - A-4) have consistently demonstrated that the in situ microbial response to enrichment of deep sea water and sediments with various organic substrates was between one to three orders of magnitude lower than in the controls. (Exhibits A-3, p. 675) that the use of the deep sea as a dumping site for organic wastes is "very

inefficient" as a means of either disposing of or recycling these wastes, as well as being an approach resulting in the "rather uncontrollable" accumulation of waste materials or decomposition products on the ocean bottom.

Jannasch has also expressed the view (Exhibit A-2) - that "in the deep sea, organic wastes... could accumulate for years and years and then float up undecayed" to contaminate seas and beaches. Conversely, as expressed by Dr. Bumps of Woods Hole (see Exhibits B-4 and C-5), "There is the possibility of creating anaerobic deep sea environments from the dumping of organic materials, "depending "on the rate of introduction of organic materials and the strength of the advective processes," as well as on the rates of biodegradation.

(b) Deep sea marine organisms may be far more sensitive to ocean dumping impacts than their nearer shore counterparts--As noted by Dr. Howard Sanders of the Woods Hole Oceanographic Institution, (See, Exhibit C-1, p. 3), the ocean floor below the thermocline is "a region of remarkable stability" in which '(t)emperature, salinity, oxygen conditions, and other factors in contrast to shallower waters are essentially unvarying and have changed little over many thousand and even millions of years.'

"Under these "conditions of constancy and predictability over geological long periods of time there have evolved in the deep sea a delicately attunned, highly sensitive assemblage of organisms with a very narrow range of tolerances," which "can be expected to be most fragile". "As a consequence, a perturbation or stress

that might have little significance in the variable and less predictable shallow waters could have severe and perhaps catastropic implications in the deep sea."

This concern is shared by Dr. P.H. Wiebe of Woods Hole (Exhibit B-1, p. 1-5), although he acknowledges that "we don't (really) know that deep sea populations are fragile."

(c) The artificial transport of heavy metals and other undesirable sludge constituents into the open ocean off the edge of the shelf through ocean dumping constitutes a new major source of such constituents in these wastes, the consequences of which are unknown.

As pointed out by Dr. Ralph Vaccaro (Exhibit, B-2), "the heavy metal load transported into marine coastal areas by rivers and streams is quickly precipitated out of the column, becomes bound to the sediments and is effectively excluded from the ocean realm," making atmospheric "fall-out" the only major natural pathway for the deposition of many heavy metals in the open ocean.

The direct introduction of such metals and other chemicals, as well as of microorganisms, into this environment as a result of ocean dumping could have severe and perhaps catastrophic consequences.

(d) Sludge particles and associated contaminants could become entrained in the Gulf Stream (which impinges on the 106-mile site) and be transported to fishing grounds as far away as Newfoundland.

"(e) The nature and effects of possible interactions between sewage sludge and the various toxic chemicals presently dumped at the 106-mile site are essentially unknown." (HR, 290-294)

It should be noted, however, that in the proceedings leading to the moving of Camden to the 106-mile site, ten affidavits by EPA and FDA staff members recommended moving Camden from the Philadelphia site to the 106-mile site. These affidavits were based on the presence of fecal micro-organisms in the Camden sludge which might possibly affect shellfisheries and beaches and on the presumed greater opportunities for dilution and dispersion at the 106-mile site (E-6-7-a). None of these affidavits addressed the questions of survival of pathogens in the deep ocean, the lower rates of decomposition of materials in deep ocean environments, and the possibility of severe damage to biota accustomed to a very stable environment, which are the major concerns expressed by the marine scientists familiar with deep ocean environments.

It can be concluded from these statements that there is agreement among experienced marine scientists that deep ocean disposal of wastes, particularly wastes containing solid materials, has the potential for causing severe environmental impacts. The types of impacts that could occur could result in subtle, long-range adverse effects which might not be detectable until trends leading to severe irreversible damage had already begun. The dumping of sewage sludge at the 106-mile site would, therefore, be regarded as having high potential for causing severe, if unknown, adverse environmental impacts.

b. Economic

There are no known shellfisheries in the area of this site. However, certain wind conditions in the area could cause waste materials to drift onto the upper slope, where the developing red crab fishery would be active or even to the outer shelf where there are several seasonally active fisheries (flounder, porgy, butterfish, lobster by U.S. fishermen) (E-19-11, p. 63). There is, therefore, a potential adverse economic impact associated with the use of this site, although it is not quantifiable at the present time. The National Fisheries Institute has expressed opposition to moving dumpsites from their present locations because of increased contaminantion of other areas (S-49).

The greatest economic impact of moving sludge dumping to the 106-mile site would be in the added cost of transporting the sludge to the 106-mile site for dumping. To do this would require the addition of carrying capacity in the New York Metropolitan Area, primarily by the City of New York (HR, 243-246). There is some disagreement as to what would be the most economical way to accomplish this (HR, 247-249; 256-257) and the basis on which the estimates made by the City of New York were made. Supplementary information supplied for the record indicated an annual cost of $19,200,000 per year if no constraints were placed on the rate of discharge (E-15-15). These figures are based on amortizing the new carrying capacity over a four-year period; without this, the

total annual cost is estimated at $17,200,000. The basis on which the operating costs are estimated is consistent with the figures used by EPA Region II in estimating overall costs for barging to the 106-mile site (E-5-6-r; p. 68-69).

The cost of moving all New York Metropolitan area sludge dumping to the 106-mile site is estimated by EPA Region II at between $35.0 million and 43.8 million dollars annually, as opposed to the present $5.4 million, assuming a constant sludge volume between now and 1981 (E-5-6-r, p. 70). This estimate does not include the cost of monitoring the site or the cost of Coast Guard surveillance of dumping.

The City of Philadelphia has estimated its costs for moving to the 106-mile site at $5,210,650 over a 3.5-year period. This is an annual average cost of $1,490,000 (E-16-26). These are based on estimates provided by their present hauling contractor.

Moving sludge dumping to the 106-mile site would also have an economic impact on the cost of surveillance of dumping operations. The Coast Guard has stated that surveillance would have to be done by shiprider until their automated surveillance system becomes operational, and that this will require the use of additional personnel, with added costs for salaries and training. No estimate is available as to what these costs might be (HR, 180-193).

To develop and implement an effective monitoring program at the 106-mile site would have a significant economic impact. No information is available as to what this would be, but typical baseline cruises cost $200,000-$300,000 each, based on EPA and NOAA costs. If four seasonal cruises were regarded as an adequate monitoring program, the total cost would be about $1,000,000 per year. It should be noted, however, that baseline cruises of this nature would not be capable of detecting the types of environmental effects which have been indicated to be of importance by responsible marine scientists, as indicated in the previous section (HR, 297-198).

In summary, the available information indicates that the total additional economic burden of moving sludge dumping to the 106-mile site would be well in excess of $30 million per year. The bulk of this cost would be borne by the communities now dumping sludge. Several municipalities pointed out the difficulties they might have in obtaining the additional funds necessary to barge to the 106-mile site as well as implement alternatives by 1981 (HR, 245-246, 254-255, 448-449, 493). The NWE comments that any significant increment between now and the end of 1981 in the cost of sewage sludge disposal could as easily discourage as encourage the expedited phase-out of sludge dumping if it had the effect of diverting into continued ocean dumping limited funds which would otherwise be available to implement a dumping phase-out (HR, 278).

c. Public Health

It is unlikely that sludge dumping at the 106-mile site would have any conceivable impact on shorelines and beaches. Concern was expressed, however, concerning the increased frequency of short dumping expected to be attendant upon a move of sludge dumping to the 106-mile site, as a result of adverse weather conditions and possibly willful misconduct by haulers (HR, 304-306, 492; E-5-6-r, p. 70). The probability of such occurrences has not been estimated. Since, however, the barge paths would cross highly productive shellfish areas on the continental shelf, any short dumping could result in contamination of shellfish by pathogens. Unless these corridors were closed to shellfishing by the FDA, there could be contamination of some shellfish from time to time, and the concomitant risk of harvesting them. The results of the EPA Region III studies at the Philadelphia dumpsite suggest that fecal micro-organisms can persist in the marine environment for long enough periods of time to move great distances (E-18-7, p. 161-165). If this is the case, then there could be a hazard to public health of unknown proportions from short dumping en route to the 106-mile site.

d. Social

Concern has been expressed in several statements about the general public reaction of moving sludge dumping from the present sites to the 106-mile site. These concerns are based on the belief

that there may be an "out of sight - out of mind" reaction (HR 16, 37; S-49). It is also felt that moving sludge dumping to the 106-mile site would increase pressure to permit an indefinite continuation of ocean dumping (HR, 37, 287-289). The difficulty of detecting adverse impacts at this site as well as reduced public concern are cited as reasons that this may occur.

Summary

60-mile site

Some environmental damage to the site would be expected, but it is unlikely that there would be significant adverse effects on commercial fisheries, shorelines or beaches. There would be a significant adverse economic impact in that the cost of barging to this site would be about $8 million per year more than costs for barging to the present site.

106-mile site

There is agreement among knowledgeable marine scientists that the dumping of wastes containing solid materials, such as sewage sludge, into the deep ocean could cause severe damage to the marine environment. The primary concern is for long-range, undetectable until irreversible, adverse effects on marine biota. There is no likelihood of significant adverse effects on shorelines and beaches from dumping at this site; there is, however, some possibility of adverse impact on Continental Slope and Shelf fisheries, and

possible contamination of shellfish during short dumping. Barging of sludge to this site by the communities now dumping impose additional costs in excess of $30 million per year.

6. Benefits of Relocating Sludge Dumping to Alternative Sites

60-mile site

a. Environmental

The environmental benefits associated with moving sludge dumping from the present dumpsite in the New York Bight to the 60-mile site would be those resulting from improvement in the quality of the present dumpsite. As discussed earlier, the present dumpsite is so badly polluted by sources other than sludge dumping that no improvement in the environmental quality of this site would be expected (E-5-6-j; E-5-6-k). Thus, there would be no significant environmental benefits resulting from movement of sludge dumping to the 60-mile site.

b. Economic

The effects of other sources of pollution at the present site are so great that moving sludge dumping to the 60-mile site would not result in the reopening of closed shellfish areas or significant improvement in other fisheries. Dumping at the present site has not damaged shorelines or beaches and would not prevent reoccurrences of the beach damage and fish kills of 1976 (E-5-6-r).

c. Public Health

A major concern in continuing use of the present site through 1981 is the potential for contamination of beaches because of the increased volumes of sludge to be ocean dumped in this interim period. While no impact on the beaches or on nearby water quality has been found up to the present time, the potential danger to public health is significant and must be considered an important factor in reaching a decision. Region II has recommended designation of this site as an alternate sludge dumping site because of this potential danger (E-5-6-r).

d. Social

There is some feeling among the general public that sludge dumping at the present site was the cause of the beach damage and fish kills during 1976 and that sludge dumping in general has been responsible for many of the problems in the New York Bight Apex (HR, 20-23, 41-44, 221-226, 325-344, 369, 527, 540-627, S-37, S-44, S-47, S-48). Moving the dumpsite from its present location would allay this concern; it should be noted, however, that most of those expressing this viewpoint favored the 106-mile site.

106-mile site

a. Environmental

The environmental benefits of moving sludge dumping to the 106-mile site would be caused by improvement in environmental quality

at the presently used dumpsites as the result of cessation of dumping. As pointed out above, there would be some, albeit slight, improvement in the environmental quality of the New York Bight Apex if sludge dumping at the present site were stopped, because of the overriding influence of other sources of pollution.

The data accumulated by EPA Region III from 1973 to 1977 indicate that the conditions at the dumpsite are representative of normal ambient values for the Northeast Atlantic Coast Continental Shelf, although there are some indications of changes in the benthic biota and a few clams near the dumpsite contained bacteria of sanitary significance (E-18-7, p. XV). The minimal nature of the impacts observed up to the present time at the Philadelphia dumpsite, combined with the projected rate of decrease of sludge dumping by Philadelphia, suggests that there would be no significant improvement in environmental quality of the Philadelphia dumpsite if all sludge dumping were terminated before 1981.

b. Economic

As indicated above, there would be no economic benefits associated with cessation of dumping at the New York Bight Apex site. The Philadelphia dumpsite contains commercially harvestable quantities of ocean quahogs, and cessation of dumping at the site would permit reopening of this area to shellfishing. However, while attempts are being made to develop this fishery, its present utilization in this area is very low. Based on current fishing rates, an

annual benefit of about $12,000 might be gained by reopening the Philadelphia dumpsite at this time; it should be noted that Delaware reported no ocean quahog landings in 1976 (S-43). Thus, the economic benefit of moving the dumping of Philadelphia's sewage sludge to the 106-mile site is not regarded as significant, considering the short period of time dumping will continue.

c. Public Health

As pointed out in regard to the 60-mile site, the potential danger to public health from increased sludge dumping at the present New York Bight Apex site is a matter of considerable concern. A movement of sludge dumping to the 106-mile site would provide a significant potential public health benefit, but no benefit would be obtained at present.

It has not been suggested that sludge dumping at the Philadelphia dumpsite has had an adverse effect on shorelines or beaches, nor does there appear to be a potential for such an impact, considering the decreasing rate of dumping at the site and the distance from shore. Thus, there does not appear to be a significant public health benefit in moving Philadelphia to the 106-mile site.

d. Social

Moving dumping from the existing New York Bight site to the 106-mile site would allay the fears of some people about the impact

of sludge dumping on the Bight, as mentioned above. It may be presumed that moving Philadelphia to the 106-mile site would have some beneficial effects in allaying public concern, but no statements from the general public were received for the record. The statements from selected and appointed offcials dealt primarily with concern for commercial fishing and the ocean environment in general.

7. Need for an EIS on the Relocation of Sludge Dumping Sites

There was considerable comment on the need for an environmental evaluation prior to making a final decision, as well as some comment directly on the question of whether or not an EIS should be prepared.

There was general agreement that, if sludge dumping must continue over the next few years, it should be in an area where it would have minimal environmental impact. Even among those who favored an early move of sludge dumping to the 106-mile site, there was concern expressed that this should be done only after a careful evaluation had shown that this was the most environmentally acceptable thing to do. Dr. Glenn Paulson, New Jersey Department of Environmental Protection, stated:

> "Again summarizing the analysis and conclusions in our January Report, we continue to urge serious consideration of gradual shift to the 106-mile site for all sludge on an interim

basis, so long as EPA does not discriminate against New Jersey authorities by favoring New York and Philadelphia.

"Equally important, such a choice should be made by EPA only after a careful analysis (which meets both the procedural and substantive requirements of the National Environmental Policy Act) demonstrates that the use of this site is the most environmentally satisfactory alternative location for sludge dumping." (HR, 202)

Ms. Sandra Ayres, New Jersey Department of Public Advocate, criticized the Draft EIS on the New York Bight for not evaluating an off-the-Shelf site and stated that EPA should follow the NEPA and collect the information necessary for the EIS. (HR, 221, 234).

Mr. Warren Rich, Maryland Attorney General's Office, stated that the State of Maryland sought to accomplish two goals:

"(1) To hasten alternative methods of sludge disposition, which are environmentally beneficial, and

"(2) To make sure that if ocean dumping occurs, it is only on an interim, short-term basis and is carried on at sites where the environmental harm is minimized." (HR, 384)

Mr. Rich criticized EPA for not doing an environmental assessment on the Philadelphia site prior to designation (HR, 385), and, in response to questions from the Panel, stated, "... I think your basic job is to look at the environmental consequences." (HR, 409)

Members of Congress also expressed concern that any decision be based on an evaluation of the environmental effects of any relocation. Congressman Edwin Forsythe (N. J.):

"A decision regarding the location of municipal sewage sludge dumping is a critical resource management problem. Since the environmental and fiscal resources at stake are extremely valuable, our decision making must be based on rationality. Attempts to sensationalize the issue, and politically expedient pressure to move the problem 'out of sight,' 'out of mind' must be resisted." (HR, 15)

"Scientific data, rather than political expediency, must direct our decision-making." (HR, 18)

Senator William Roth (Del.):

"As I said, my layman's reaction is to endorse this change, but since I am not a chemical oceanographer, a physical oceanographer, or a marine biologist, I will not personally attempt to assess the environmental risks associated with the various possible dump sites.

"The selection of a particular site is best left to those technically qualified to evaluate the numerous considerations." (HR, 37)

Congressman William Hughes (N. J.):

"Unfortunately, we are not in a position to resolve those issues because the EPA has not prepared an environmental impact statement on the 106-mile site to give us an idea of the consequences of dumping there. Nor has NOAA completed baseline studies on the area.

"I strongly urge the EPA and NOAA to complete their studies on the 106-mile site, as soon as possible, so that we can answer some of these troubling questions and reach an informed decision. It is disappointing to me that 5 years after enactment of the Ocean Dumping Act no evaluation of the 106-mile site is available, although the Act mandates a clear preference for dump sites off the Continental Shelf.

"If the results of such studies indicate that the 106-mile site would be less disruptive of the Act's purposes than other sites, then the 40-mile site should be phased out in favor of the 106-mile site." (S-38, p. 4)

The National Wildlife Federation (NWF) strongly supported the preparation of an EIS:

"EPA should immediately initiate the preparation of an Environmental Impact Statement which fully addresses the circumstances under which relocation to both the 60-mile site and the 106-mile site would be justified and the environmental pros and cons of such a course of action." (HR, 309)

Thus, the record contains some strong statements about the need for a thorough evaluation of the environmental consequences of any relocation of dumping sites. Some responsible organizations and individuals have recommended doing this in the context of an EIS on the relocation.

There are further considerations which increase the desirability of preparing an EIS on this issue. The data and information presented for the record do not represent the complete body of knowledge that should be evaluated. While Region III has had a contractor collect the information pertinent to the Philadelphia dumpsite, this body of data has not yet been analyzed and evaluated. Nor have conditions at any of the sites been compared to other ocean areas except in a qualitative sense.

Certainly, a thorough environmental evaluation of all the data available should be made to guide future actions regarding dumpsite relocation. In particular, criteria need to be set to provide a guide for moving dumping to other locations, particularly, in the case of the present New York Bight site.

Once an environmental evaluation is made and reviewed by the scientific community, there would not be a large amount of additional effort necessary to put this in the format of an EIS. Whether or not an EIS is legally required or not, the public review procedures built into the NEPA process would assist EPA in making and defending any decision.

Summary

Responsible organizations and individuals have recommended that any decision be based on an evaluation of the environmental consequences of the decision. The New Jersey Department of Environmental Protection, the New Jersey Department of Public Advocate, and the National Wildlife Federation have all recommended an EIS. Additional information would be required for such an evaluation, and the results could be presented most effectively as an EIS.

8. Feasibility of Dumping off the Continental Shelf

The Marine Protection, Research, and Sanctuaries Act, as amended, states in Section 102(a):

"(I) In designating recommended sites, the Administrator shall utilize wherever feasible locations beyond the edge of the Continental Shelf."

This provision of the Act is regarded by the New Jersey Public Advocate's Office as requiring EPA to designate the 106-mile site for sewage sludge dumping (HR, 219-220). The NWF pointed out that "feasibility" should be determined in terms of each of the following:

"(a) incremental cost relative to existing practices,

(b) ability to properly evaluate, monitor, and control dumping occurring at this site, and

(c) effect of such a move on the ultimate phase-out of sewage sludge dumping." (HR, 268)

EPA has taken the position that the determination as to whether or not the use of a particular site is feasible for the dumping of certain wastes must be based on several factors.

a. Environmental acceptability

Section 102(a) of the Act authorizes EPA to issue permits for ocean dumping of materials which will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. EPA has published criteria for site selection which are based on the statutory considerations of Section 102(a) and the factors listed in Annex III of the International Ocean Dumping Convention. The general criteria on which site selection is based are given in Section 228.5 of the EPA Ocean Dumping Regulations (FR 42, 2483) and are as follows:

"Section 228.5 General criteria for the selection of sites.

"(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

"(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

"(c) If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sec. 228.5-228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

"(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring

and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

"(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used."

These criteria emphasize that two key environmental factors in site selection are: (1) the minimization of any chance for impacts that might affect other uses of the ocean either directly or indirectly, and (2) the feasibility of monitoring a site so as to detect and control both short and long-range impacts.

As has been discussed earlier the preponderance of informed scientific opinion urges extreme caution in dumping wastes in the deep ocean, particularly wastes containing solid materials, because of the many unknowns about this part of the environment. There is a strong feeling among marine scientists that it would be possible to start long-range trends which would be undetectable until it was too late to take corrective measures (HR, 290-295).

Specific concerns with the dumping of sewage sludge in the deep ocean are the possible persistence of pathogens for long periods of time, the accumulation of biodegradable materials which could ultimately float up undecayed to contaminate seas and beaches, the development of anaerobic deep sea environments, and the damage to deep sea organisms which are used to extremely stable conditions

(HR, 291-292). Based on this informed scientific opinion, it is concluded that dumping of sewage sludge at the 106-mile site has a potential for irreversible, long-range, and therefore unreasonable degradation of the marine environment, and that the use of this site for this purpose would be contrary to the intent of the Act and the Convention.

This situation is exacerbated by the difficulty of monitoring deep ocean sites effectively when there are settleable solids being dumped as well as liquids. A working group convened by EPA, chaired by Dr. E.D. Goldberg, and including among others, Drs. Dean F. Bumpus, Gilbert T. Rowe, and David Menzel, concluded that, although off-Shelf dumpsite locations " would be amenable to mixing of liquids, it is not possible to predict the effect and fate of solids at great depths and it would be difficult to monitor their effects." (HR, 297). Other investigators have also pointed out difficulties in monitoring deep ocean sites so as to obtain useful information on effects and trends (S-36).

Thus, dumping sewage sludge at the 106-mile site would not only have unknown environmental consequences, but experts in the field feel it would be difficult, if not impossible, to find out what those consequences would be. It is concluded, therefore, that it would not be feasible to design an effective monitoring program to evaluate the impacts of sludge dumping at this site.

b. Surveillance of Dumping

It must be feasible to monitor the dumping operations at any site. Sites farther from shore create more problems in surveillance as pointed out by the Coast Guard (HR, 180-195), but there is no indication that surveillance of dumping at the 106-mile site would not be feasible.

c. Economic Burden

The cost of moving to site farther offshore is also a factor in determining feasibility of using off-Shelf sites. Certainly, if the cost is too high to be met by the dumpers through any conceivable funding mechanism, then such a site could not be regarded as feasible.

In this case, none of the municipalities stated that they could not meet the added costs, but they did point out that there would be difficulties in funding, and that these costs might have to come from funds presently allocated for implementing alternatives (HR, 245-246, 452, 493). The total cost for moving sludge dumping to the 106-mile site would be in excess of $30 million per year. This is a significant economic burden which would have to be justified in terms of the environmental benefits to be obtained.

d. Logistics

The question of availability of suitable marine equipment to reach an off-Shelf site is a factor in determining feasibility, as is the time it would take to obtain such equipment and the additional funds necessary to employ it. There was general agreement that some additional carrying capacity would be needed, although there was some disagreement

as to the amount and type that would be most economical (HR, 209, 244-245, 247-250, 503-507). The New Jersey Department of Environmental Protection felt that budgeting requirements would require scheduling in calendar year 1978 or later (HR, 203). The City of Philadelphia stated that there might be a one to three year delay in obtaining a suitable vessel (HR, 493). While these statements were not challenged at the hearing, it would appear that, at least for Philadelphia which will steadily be decreasing its volume, these estimates might be generous. It is concluded that logistically, it would be feasible to use the 106-mile site for sludge dumping, although delays of several months at least would probably be necessary for implementation.

Summary

Feasiblity of using an off-the-Shelf site for dumping sewage sludge is based on five factors: (1) Environmental impact, (2) monitoring feasibility, (3) surveillance feasibility, (4) economic burden, and (5) logistical feasibility. The surveillance and logistics in the case of the 106-mile site would be difficult, but could be managed. The economic burden would be very large. The environmental hazards associated with dumping sewage sludge at the site are believed to be extreme, based on responsible scientific opinion.

C. Conclusions and Recommendations

1. Conclusions

This hearing had its genesis in Congressional and public concern about the environmental impacts of sewage sludge dumping at the present locations and the feeling that moving sludge dumping farther offshore would provide significant environmental benefits. The hearing was held to provide an opportunity for concerned citizens to express their views and to provide a mechanism for anyone to provide pertinent information for consideration in making a decision.

A total of 48 statements were made at the hearing or received for the record. There was considerable divergence of opinion in these statements. Among those statements favoring moving dumping from the present locations immediately, two major concerns were expressed:

a. The beach damage and fish kills in 1976 along the Long Island-New Jersey shoreline and the past and future relationship of sludge dumping in the New York Bight Apex to these incidents.

b. Environmental damage to the Philadelphia dump site and the impact of dumping on commercial fishing in the area because of the closure of the Philadelphia site to shellfishing.

Those expressing this view included some Members of Congress, the New Jersey Public Advocate's Office, the Maryland Attorney General's Office, some local New Jersey elected officials, the Delaware Department of Natural Resources and Environmental Control, the American Littoral Society, and representatives of eight local water users associations (divers, boaters, clammers).

There were also those who favored no move at all, or a move only if it could be shown that the environmental benefits to be achieved were significant. These included some Members of Congress, the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, the New Jersey Department of Environmental Protection, representatives of some permittees, several marine scientists, and the National Wildlife Federation.

After evaluating the statements and the data and information submitted for the record, the following conclusions are reached:

a. There is convincing scientific evidence collected by different groups that sludge dumping at the present New York Bight Apex site was not a major factor in the fishkills and beach damage in this area during 1976.

b. The present New York Bight Apex sludge dumpsite is so badly affected by other sources of pollution that only slight improvement in environmental quality would occur if sludge dumping were terminated at this site at this time, nor could

the area be reopened to shellfishing. Therefore, there would be some, albeit minor, environmental benefit and no economic benefit to be achieved by relocating sludge dumping from this site.

c. There is a potential public health hazard of beach contamination by sludge dumped at the New York Bight Apex site as volumes increased between now and 1981. Steps must be taken to safeguard public health if sludge dumping continues at the present location.

d. Sludge dumping at the 60-mile site would have adverse environmental impacts, but should be considered if necessary to protect public health from sludge dumping at the present New York Bight site.

e. Data collected by EPA Region III show that the adverse environmental impacts of sludge dumping at the Philadelphia dump are so slight that significant improvement in environmental quality will not result from termination of sludge dumping at this site.

f. Closure of the Philadelphia dumpsite to shellfishing has a potential for economic damage since the general area contains commercially harvestable quantities of ocean quahogs. This fishery is, however, not developed commercially in this area as yet, although it is developed to a small extent in New

England. It is unlikely that closure of this area to shellfishing for three additional years will have a significant adverse economic impact on the development of this fishery off the Delmarva shore.

g. Present commercial fisheries are not adversely impacted by sludge dumping at the Philadelphia dumpsite.

h. Sludge dumping at the Philadelphia dumpsite has no adverse effect on public health or upon the use of shorelines and beaches.

i. The views of reputable marine scientists lead to the conclusion that there is a potential for irreversible adverse environmental impacts from dumping materials such as sewage sludge into deep ocean waters beyond the edge of the Continental Shelf, such as the 106-mile site.

j. Sludge dumping at the 106-mile site could have an adverse effect on developing fisheries of the Continental Slope and existing fisheries of the Shelf.

k. A small, but real, danger to public health due to random contamination of shellfish beds by short dumping would result from using the 106-mile site.

l. Moving sludge dumping to the 106-mile site would cost the dumpers in excess of $30 million per year and would not result in significant environmental, economic, or public health benefits, and would have the potential for causing possibly severe damage to deep ocean environments.

m. Moving sludge dumping in the New York area to the 60-mile site would cost about $8 million more per year and cause damage at the 60-mile site, without significant environmental or economic benefits. This move would, however, provide a public health benefit by reducing the likelihood of beach contamination.

n. Sludge dumping at the 106-mile site is not feasible because of the unknown but potentially adverse environmental consequences and the inability to monitor the site effectively.

o. the present and potential impacts of sludge dumping at the present sites should be evaluated in detail using all of the data obtainable, and criteria should be set for moving sludge dumping from the present sites. The results of this evaluation should be presented as an Environmental Impact Statement.

2. Recommendations

The following course of action is recommended:

a. Neither of the present sludge dumpsites should be relocated at the present time.

b. Existing phase-out schedules and deadlines should be strictly enforced.

c. Preparation of an Environmental Impact Statement on the issue of relocating the sludge dumpsites to the 106-mile site should begin immediately. The EIS regarding the 60-mile site should be up-dated. The EIS should

include specific criteria for relocating the sludge dumpsites.

d. Monitoring of the impacts of dumping, particularly at the New York Bight Apex site, should be intensified.

e. The 60-mile site should be designated as an alternate sludge dumping site immediately.

APPENDIX D

USEPA-HEADQUARTERS

DECISION ON PROPOSALS

TO RELOCATE SEWAGE SLUDGE SUMP SITES

MARCH 1, 1978

DECISION ON PROPOSALS TO RELOCATE SEWAGE SLUDGE DUMPING IN THE MID-ATLANTIC BIGHT

I. BACKGROUND

Municipal sewage sludge has been dumped in the Atlantic Ocean for over fifty years. Prior to 1972, however, there was no Federal legislation which attempted to provide comprehensive regulation of ocean dumping of sewage sludge (or any other material). In that year, Congress enacted the Marine Protection, Research, and Sanctuaries Act, 33 U.S.C. §1401 et seq. ("MPRSA") which prohibits the ocean dumping of sewage sludge and other materials, except under a permit issued by EPA in accordance with criteria established under Section 102(a) of the Act (or in the case of dredged material, under a permit issued by the Corps of Engineers under Section 103). Under Section 102(c) of the Act, EPA is authorized to "designate recommended sites or times for dumping", considering the criteria established under Section 102(a). Among other things, Section 102(a) provides that "[i]n designating recommended sites, the Administrator shall utilize wherever feasible locations beyond the edge of the Continental Shelf."

At the same time the United States was enacting domestic legislation to regulate ocean dumping, efforts were underway to develop an international convention to regulate the dumping of wastes at sea. The result of these efforts was the International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter ("Convention"), which was ratified by the United States Senate on August 3, 1973, and became effective on August 30, 1975. Among other things, the Convention requires signatories to develop criteria for the selection of ocean disposal sites based on factors enumerated in Annex III(B) of the Convention.

EPA's first ocean dumping regulations and criteria were promulgated on October 15, 1973 (38 Fed. Reg. 28612). Due in large measure to the lack of studies on existing sites and the short statutory lead time for developing ocean dumping criteria, EPA did not attempt to include guidelines for site designation in these early regulations. However, preliminary assessments of non-dredged material sites based on Annex III(B) factors were made where information was available, and on this basis some sites (such as the 12-mile Cape May sewage sludge site) were discontinued. In accordance with statutory criteria in Section 102(a) requiring EPA to consider the need to dump and alternatives to dumping in selecting disposal sites, and in the face of the practical reality that dumping could not be discontinued pending the development of site designation criteria and preparation of formal site designations, EPA authorized the continuing use of a number of sites historically utilized for ocean dumping -- including the New York Bight sewage sludge site (which had been in use since the 1920's), the 40-mile ("Philadelphia") sewage sludge site, and one of EPA's two off-the-Shelf sites, the 106-mile industrial waste site -- on an interim basis pending further study.

Over the next few years, EPA gradually developed formal guidelines for preparing ocean dumping site designation studies. On October 21, 1974, the Agency announced that, as a matter of policy, it would prepare an environmental impact statement ("EIS") on any formal site designation made under Section 102(c) of the Act. 39 Fed. Reg. 27419. On January 11, 1977, with the promulgation of final revisions to its ocean dumping regulations and criteria, a new part was added to the Agency's regulations which established substantive criteria and procedures for site designation, including the general and specific factors to be considered in site selection, dump site rulemaking procedures, development of baseline and trend assessment surveys, site monitoring, and dumping impact analysis. 42 Fed. Reg. 2462, 2482.

At the same time EPA was developing regulations for site designation, the environmental studies required for formal designation were begun at a number of dump sites, including the New York Bight site, Philadelphia site and 106-mile site. In June, 1976, for example, a draft EIS was prepared for the New York Bight site. In April, 1977, EPA contracted for the development of a final EIS's for the New York Bight site, the Philadelphia site and the 106-mile site.

A number of events in 1976 and 1977 -- including a fish kill off the New York/New Jersey Coast during the summer of 1976, the Food and Drug Administration's 1976 closure of the Philadelphia dump site to shellfishing, and the 1977 relocation of the City of Camden, New Jersey's sewage sludge dumping from

the Philadelphia site to the 106-mile site -- focused public and governmental attention on sewage sludge dumping in the Mid-Atlantic, and in particular on the issues of whether some or all sewage sludge dumping should be relocated pending final site designation and whether an off-the-Shelf site (particularly the 106-mile site) should be formally designated for the disposal of sewage sludge. On May 6, 1977, in an effort to respond to these concerns, EPA announced its intent to consider relocating ocean dumping sites for the disposal of municipal sewage sludge. 42 Fed. Reg. 23163. Public comment was solicited on four sites -- the New York Bight sewage sludge site (used by New York/New Jersey communities), the Philadelphia sewage sludge site (used by the City of Philadelphia), the 60-mile site (a future overflow site for sludge dumped at the New York Bight site), and the 106-mile industrial waste site (used by Camden since January, 1977). To further assist the Agency in gathering information and to obtain public comment on the various alternatives suggested, a public hearing was held in Toms River, New Jersey on May 31, and June 1, 1977. In addition, the issue of relocating Philadelphia sewage sludge from the Philadelphia site to the 106-mile site was addressed at a July 6-7, 1977, hearing on the renewal of the City's interim ocean dumping permit, pursuant to the order of the United States Court of Appeals for the Fourth Circuit

Maryland v. Train, 10 ERC 1351, 1352 (4th Cir. 1977). 1/

The findings and conclusions which follow represent EPA's decision on the various site relocation alternatives proposed in its May 6, 1977 notice. In reaching it, I have considered the information generated by the Toms River and Philadelphia hearings, the recommendations prepared by the respective hearing officers, and other materials pertinent to making a final determination on this issue.

II. MAJOR LEGAL AND POLICY CONSIDERATIONS

A. Feasibility of Designating an Off-the-Shelf Site for Sewage Sludge Disposal

The legislative history of the MPRSA indicates that Congress intended to give EPA broad discretion in selecting sites for ocean dumping. The grant of such discretion under the Act reflects not only traditional legislative deference to agency expertise, but also Congress's recognition of the lack of conclusive scientific data on the effects of ocean dumping various volumes and types of wastes on marine life and ecosystems. As the Senate Commerce Committee stated in its report on the bill which was later enacted as the MPRSA:

1/ This order required EPA "to make a full inquiry into whether the Cape May [Philadelphia site] should be designated as a dumping site by anyone for any purpose" at the 1977 Philadelphia permit renewal hearing. On May 20, 1977, EPA filed a motion for modification of this aspect of the Court's order to allow the Cape May issue to be considered in the Toms River hearing. No action has been taken on this motion to date.

> Only meager information exists with regard to what concentrations and which of the chemicals or toxicants have a deleterious effect on the marine ecology and what processes can best be utilized to treat or remove such materials prior to discharge to marine waters. [S. Rep. No. 451, 92d Cong., 1st Sess. 9 (1977). See also, S. Rep. at 10 (noting that "[t]here still remains much which is unknown concerning the impact of man's dumping into the ocean environment.")]

Nowhere is such Congressional deference to EPA expertise more evident than in the selection of sites off the Continental Shelf. Section 102(a)(I), it should be noted, does not require that EPA utilize off-the-Shelf sites for ocean dumping; it only provides that EPA consider the use of an off-the-Shelf site "wherever feasible".

Furthermore, the legislative history of Section 102(a)(I) indicates that Congress intended to grant EPA wide latitude in determining whether use of an off-the-Shelf site is "feasible". Section 102(a)(I) did not appear in either the Senate Commerce Committee or House Merchant Marine & Fisheries Committee versions of H.R. 9727 (the bill later enacted as the Marine Protection, Research, and Sanctuaries Act), but was introduced as a floor amendment by Senator Case. As originally proposed, the amendment would have added the following sentence to Section 102(c) of the Act (which authorizes the Administrator to designate sites, considering the criteria established under Section 102(a)):

> In designating recommended sites, the Administrator shall give preference to locations beyond the edge of the Continental Shelf. [117 Cong. Rec. 43068 (1971).]

The wording and placement of this provision was strenuously opposed by Senator Hollings, Chairman of the Senate Subcommittee on Oceans and Atmosphere, on the ground that

> it tends to diminish the discretion of the Administrator in selecting sites for ocean dumping, and because dumping beyond the edge of the Continental Shelf may, in some cases, do more damage to life in the sea and on the ocean floor than would dumping closer to shore and in shallower waters.
>
> Mr. President, written into the bill in Section 102 are stringent criteria which the Administrator must meet in reviewing permit applications.
>
> * * *
>
> These criteria undoubtedly would guide the Administrator in his designation of recommended sites for ocean dumping. But the effect of the Case amendment would be to tend to cut off his review of these criteria. And it seems to me wholly arbitrary for the Congress to give the Administrator discretion to apply criteria, based on scientific knowledge and careful monitoring, and then to nibble away at it by requiring him to give preference to sites beyond the edge of the Continental Shelf. The arbitrariness is compounded because we do not know what is beyond the edge of the Continental Shelf. And that is the only basis -- knowledge -- on which we shall be able to deal effectively with ocean pollution. The amendment would tend to perpetuate

> the "out of sight out of mind" philosophy on which we have been operating to date and should be opposed. [Id. at 43068-43069].

The Senator went on to state that he "would not mind this as a consideration . . . [but did] not want it as a mandatory provision that [the Administrator] has got to give preference to determining first whether [material] can possibly be dumped beyond the Continental Shelf." Id. at 43069.

Senator Case acceded to these objections, noting:

> it is not my desire to interfere with the work of the Administrator, or make this the sole criterion by any means . . .
>
> * * *
>
> . . . [A]s to the suggested change, I am perfectly agreeable, with the colloquy we have had. [Id.]

As result of this exchange, the proposed amendment was deleted from Section 102(c) and added to Section 102(a) as one of the factors which the Administrator is required to "consider" in selecting ocean dumping sites. At the same time, the requirement that EPA give "preference" to off-the-Shelf sites was replaced by the directive that the Agency consider use of such sites "wherever feasible".

Over the years, members of Congress have continued to express many of the same concerns about the feasibility of utilizing off-the-Shelf sites enunciated by Senator Hollings

in 1971. In 1977, for example, Congressman Forsythe, ranking minority member of the House Subcommittee on Oceanography, remarked during EPA ocean dumping authorization hearings that: 2/

> MR. FORSYTHE: I am very concerned about what you are doing in terms of this question of moving the dump site [to the 106-mile site].
>
> I know you are working on an EIS, but how broad are the considerations that you are evaluating in this area? Do they include the fisheries impact, which I believe can be very, very serious, the whole problem of moving the sewage into a new environment, and the fact that you have got a major problem of ever getting any of that sludge to 106 just from the practicality of keeping a barge afloat that long, and the weather that you can run into and the massive problem of policing such an operation.

Another member of the Subcommittee voiced similar misgivings based on EPA's professed lack of knowledge concerning the effect of dumping at the site. 3/

The comments of Senator Hollings and Congressman Forsythe suggest that, at a minimum, EPA's assessment of the feasibility of utilizing an off-the-Shelf site should include consideration of environmental impact, the feasibility of monitoring and surveillance, and logistics.

2/ Hearings Before the House Subcommittee on Oceanography on March 9, 1977, Serial No. 95-6 at 235 ("March 9, 1977 Hearing").

3/ Id. at 237.

The enactment of the 1977 amendments to the MPRSA has, in my judgment, added yet another major consideration to this list. Those amendments codify EPA regulations requiring the cessation of all ocean dumping of sewage sludge which does not meet EPA's environmental impact criteria (i.e., all municipal sewage sludge currently being dumped in the Mid-Atlantic) 4/ by December 31, 1981, by providing that such dumping be terminated

> as soon as possible after the date of enactment of this section, but in no case may the Administrator issue any permit, or any renewal thereof . . . which authorizes such dumping after December 31, 1981. [P.L. 95-153. See also H.Rep. No. 325, 95th Cong., 1st Sess. 3-4 (1977)].

The purpose of the amendments, as described by the Chairman of the House Subcommittee on Oceanography, is to "provide added assurance that the municipalities currently engaged in this activity will phase out their sewage sludge dumping by December 31, 1981." Cong. Rec. H10787 (Daily ed., October 11, 1977) (Remarks of Representative Breaux).

I think it is significant that, of the numerous aspects of EPA's ocean dumping program reviewed by Congress in 1977 -- including the relocation of sewage sludge dumping to the 106-mile site, 5/ the termination of sewage sludge dumping

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4/ 40 C.F.R. 220.3(d), 42 Fed. Reg. 2462, 2470 (January 11, 1977).

5/ March 9, 1977 Hearing at 235-237; Hearings Before the House Subcommittee on Oceanography on September 20, 1977, unprinted, Tr. at pp. 27-29, 38-43, and 55-58 ("September 20, 1977 Hearing").

was overwhelmingly the focus of Congressional attention, 6/ and the only matter to be addressed in the first major amendment to the Act since 1974.

This leads me to conclude that the question of whether a move to an off-the-Shelf site will impede or prevent realization of this objective should be given substantial weight in determining the feasibility of utilizing such a site for sewage dumping over the next four years. My conclusions are reinforced by comments made by the Chairman and the ranking minority member of the House Subcommittee on Oceanography during the Agency's 1978 ocean dumping authorization hearings: 7/

> MR. BREAUX: I have been concerned that a decision to move a dump site [to the 106-mile site] is going to involve a lot of additional cost, and different type of equipment to bring it further off-shore, etc. That might be defeat-our purpose of getting out the business by 1981 at all, by making it more difficult for the communities. They could end up spending more money just in moving it to an additional new dump site, and that is something that I know you are considering.

6/ March 9, 1977 Hearing at 240-246 and 400; Hearings Before the House Subcommittee on Oceanography on June 15, 1977, Serial No. 95-6 at 430-431 and 443-588 ("June 15, 1977 Hearing"); September 20, 1977 Hearing Tr. at pp. 13-14, 20, 25-27, and 47-49.

7/ Hearings Before the House Subcommittee on Oceanography on February 1, 1978, unprinted, Tr. at pp. 27-28 and 31 ("February 1, 1978 Hearing"). See also March 9, 1977 Hearing at 235-236.

> MR. FORSYTHE: [Y]ou well know my position on the 106 situation. The Chairman has indicated that really investing anything in that situation, it seems to me, to be draining from the potential of getting out of the ocean, almost any way you look at it now, and there are other environmental problems in that situation in addition to the money factor, which is, I think, a very substantial one. It is going to increase the cost of moving that far, the dump site.
>
> That is just money that certainly should be going in to getting the onshore game underway, and we are finding so many delays.

Accordingly, utilizing the broad discretion granted EPA under Section 102(a)(I) to determine whether utilization of an off-the-Shelf site is feasible, and considering the kinds of factors which Congress has suggested that EPA examine in making such a determination, I have decided that the feasibility of using an off-the-Shelf site for the disposal of sewage sludge should be based on a consideration of at least six major factors: known environmental acceptability; ability to monitor impact; surveillance of dumping activities; economic burden; logistics; and the effect of utilizing such a site on the ability of dumpers to meet the December 31, 1981 deadline for the termination of harmful sewage sludge dumping.

B. The December 31, 1981 Deadline

In addition to adding a new statutory consideration to EPA's assessment of "feasibility" under Section 102(a)(I), the 1977 Amendments to the MPRSA provide "added assurance"

that ocean dumping of sewage sludge will in fact terminate by December 31, 1981. They not only clarify Congress's intent under the 1972 Act that the ocean dumping of harmful sewage sludge be phased out by a date certain, 8a/ but also provide EPA with the statutory muscle necessary to effectively enforce compliance dates in sewage sludge ocean dumping permits. At the same time, the amendments put municipalities on notice that they will not be able to obtain administrative extensions of the December 31, 1981 date from EPA 8/ and that they can expect vigorous enforcement of permit phase-out schedules. EPA and the cities of Philadelphia and New York have testified before the House Subcommittee on Oceanography that the 1981 date can be met. 9/

Members of Congress have recognized that a firm phase-out date for sewage sludge dumping should, as a practical matter, affect decisions made by EPA with respect to the Agency's ocean dumping program, particularly site selection. As Congressman Forsythe noted during EPA's 1977 MPRSA authorization hearings: 10/

8a/ H.Rep. No. 325, 95th Cong., 1st Sess. 4 (1977).

8/ See June 15, 1977 Hearing at 454-458.

9/ See, e.g., June 15, 1977 Hearing at 454, 461 and 467; September 20, 1977 Hearing Tr. at pp. 12, 16, 26 and 27; February 1, 1978 Hearing Tr. at pp. 21, 54 and 57.

10/ March 9, 1977 Hearing at 235-236.

> MR. FORSYTHE. Here we are in 1977 with a 4-year end point, and we must, I think, be able to meet that. And now we are considering moving the problem, not really looking at some practical steps which can be taken to end ocean dumping.
>
> * * *
>
> To bring it back into the context of our problem today, one thing that disturbs me, if we are going to stop 4 years hence, is that we are spending money still looking at ocean dumping [at other sites].

I have similarly concluded that the statutory requirement that sewage sludge dumping be terminated as soon as possible and no later than December 31, 1981 (effectuated by the enforcement policy outlined in Section III.C of this decision) is a major factor to be considered in determining both the potential environmental impact of current dumping activities and the desirability of relocating dumpers prior to that date.

III. FINDINGS AND CONCLUSIONS

A. Relocation of New York/New Jersey Sewage Sludge Dumping to Either the 60-mile or 106-mile Site

With respect to the proposed relocation of part or all of the sewage sludge generated by the City of New York and other communities in the New York/New Jersey Metropolitan Area to either the 60-mile or 106-mile site, with the additional observations set forth in Section II of this decision, I am adopting the findings and conclusions of the Toms River

hearing officer. Accordingly, it is my determination that sewage sludge dumping by these municipalities should not be relocated at the present time; however, efforts should begin immediately to designate the 60-mile site for the disposal of New York/New Jersey sewage sludge in the event such sludge cannot be dumped at the New York Bight site for public health reasons prior to December 31, 1981.

B. Relocation of Philadelphia Sewage Sludge Dumping to the 106-mile Site

The proposed relocation of the City of Philadelphia to the 106-mile site has received more attention and has more vigorous advocates than the relocation of sewage sludge being dumped by New York/New Jersey communities. As discussed above, this issue was considered in both the Toms River hearing and the hearing on Philadelphia's permit renewal, and diametrically opposite conclusions were reached by the two hearing officers. I have reviewed both reports and hearing records and it appears that the difference in the conclusions reached by the two hearing officers are based in part on differences in their factual findings and in part on the weight they have accorded those findings in reaching a final determination. In the discussion which follows, I will attempt to resolve these factual differences and set forth in more detail the decisional framework in which they should be evaluated.

1. Feasibility of Utilizing the 106-mile Site. The MPRSA requires that sites beyond the edge of the Continental Shelf shall be utilized wherever feasible. The hearing officers disagree on whether or not sludge dumping at the 106-mile site is feasible.

The Toms River hearing officer discusses feasibility in terms of environmental impact, monitoring feasibility, surveillance feasibility, economic burden, and logistical feasibility. He concludes that the dumping of large volumes of sewage sludge at the 106-mile site is not feasible because of the unknown but potentially adverse environmental consequences and the inability to monitor the site effectively.

The Philadelphia permit hearing officer notes that almost all of the marine scientists who testified are opposed to sludge dumping at the 106-mile site because of the unknown environmental consequences. He also concludes that monitoring at the 106-mile site would be more difficult and expensive than at the present site, and recommends that assurances be obtained from the National Oceanic and Atmospheric Administration (NOAA) that monitoring of the effects of sludge dumping at the 106-mile site is feasible.

Thus, both hearing officers agree that there is cause for concern about the potential adverse environmental impact of sludge dumping at the 106-mile site.

The Toms River hearing officer concludes that these impacts cannot be monitored effectively, and that this makes

use of the site for sludge dumping infeasible. The Philadelphia permit hearing officer, however, conditions his recommendation that the site be utilized on receiving assurances from NOAA that NOAA can monitor the impacts of sludge dumping at the site. NOAA has advised EPA that it believes the impacts of sewage sludge dumping can be monitored effectively at the 106-mile site, but that such a program would cost about $2.5 million per year. 11/

Conclusion

I am impressed by the concern expressed by many reputable scientists about the potential for adverse environmental impacts from sludge dumping at the 106-mile site. Nevertheless, I would not regard these concerns as preventing use of the 106-mile site for sludge dumping if a sound predictive judgment could be made concerning the impact of dumping at the site and an effective monitoring program could be established. However, such judgments are currently highly speculative and the cost of mounting an effective monitoring program at the 106-mile site, as estimated by NOAA, is far beyond the existing resources which could be made available between now and January 1, 1981, when sludge dumping by Philadelphia will stop. I must, therefore, conclude that, in a practical sense, effective monitoring of sludge dumping at the

11/ Letter from Dr. Donald Martineau to Dr. Andrew Breidenbach, dated October 11, 1977.

106-mile site cannot be achieved between now and 1980, and that we would have to accept the chance of unknown, but potentially severe, environmental damage to the oceans if large quantities of sewage sludge were dumped at the 106-mile site.

2. Impact of Dumping on Shellfishing at the Philadelphia Site. In 1976, an area encompassing the Philadelphia sewage sludge dumping site was closed to shellfishing by the Food and Drug Administration (FDA). It is anticipated that this area can be reopened about two years after sludge dumping at the site stops. The Toms River and Philadelphia hearing officers disagree on the economic significance of this closure.

The Philadelphia permit hearing officer suggests that there is a real potential for development of the ocean quahog fishery in this area as surf clam stocks become depleted, and that continued sludge dumping at the present site will significantly delay the commercial development of this shellfish resource. He estimates that the value of the potential annual catch from the area would be approximately $420,000. The Toms River hearing officer points out that these estimates are based on harvesting the site at a rate of 200 percent of the Maximum Sustainable Yield (MSY), when in fact ocean quahog is now harvested at only 0.2-3.0 percent of the MSY, and to this extent only in the New England area. He concludes that the actual economic impact of the closure would, at most, be

from $420-$6,300 per year if the site were fished at the same rate as other areas off the Atlantic Coast, and that closure of this small area for an additional three years is unlikely to have a significant impact on the development of the Delmarva quahog fishery.

Conclusion:

The two hearing officers disagree here only in their estimates as to the rate at which the ocean quahog fishery will develop in this area over the next few years. One hearing officer assumes that the fishery will develop to 200 percent of the MSY over a two year period immediately after the dumpsite is reopened, whereas the other assumes the extent of development will be approximately the same as that in other geographical areas where depletion of surf clam stocks has led to commercial harvesting of the ocean quahog.

Predicting the future growth of an industry is, of course, fraught with speculation and must be based on assumptions about which there might reasonably be disagreement. In this particular case, I regard the historical development of the ocean quahog fishery in other areas as being the best guide for predicting its development in this area, and I therefore conclude that the economic impact of the closure of the present site to shellfishing for an additional three years is not significant, considering that the site can be reopened to

shellfishing by the end of 1982, and that this site represents only a very small fraction of the ocean quahog resources available to fishermen in the Delmarva region. Certainly, if there were any possibility that the City of Philadelphia would be dumping its sewage sludge at this site for a longer period of time, my conclusion might be very different.

3. Impact of Sewage Sludge Dumping on the Marine Environment at the Philadelphia Site. Since 1973, EPA has studied the Philadelphia dumpsite and the surrounding area on a quarterly basis. The results of these studies have been presented by EPA Region III in a series of technical reports and at public hearings. Both hearing officers agree that the data collected show evidence of adverse impact from sludge dumping, but they disagree on the extent of the impact and the significance which should be attributed to these observed impacts.

The Toms River hearing officer based his conclusion on the entire body of data collected over three and one-half years of study of the dumpsite and the surrounding area. He found that, while the data did show some impacts which could be reasonably attributed to sludge dumping, the adverse effects did not appear to become more severe with time and that most of the key indicators measured were still within normal ambient levels for this part of the Continental Shelf. He concluded that because the observed levels of these indicators at and near the site were within normal ambient conditions for unpolluted areas of this part of the Continental Shelf and

because the data did not show significant temporal trends over the three and one-half years of sampling, significant improvement in overall environmental quality as measured by these key indicators could not be expected as a result of the termination of sludge dumping at this site. However, he notes that in addition to these data, recent cruises have produced evidence of crab gill fouling and of coliform bacteria in ocean quahogs, both of which are highly significant indicators of pollution from sludge dumping, but he does not feel these impacts are irreversible, based on the history of recovery of the former Philadelphia sludge dumping site from similar impacts.

The Philadelphia permit hearing officer bases his conclusions on testimony presented at the permit hearing reporting on the most recent studies of the dumpsite by EPA Region III. He finds that the distribution of trace metals in organisms, the presence of coliform bacteria in ocean quahogs, and the presence of crab gill fouling demonstrate that sludge dumping has had an adverse impact on marine biota at and near the site. He does not assess the severity of the impact, but he does conclude that the observed impacts are reversible in that the site can be reopened to shellfishing within a few years after dumping has terminated.

Conclusion

Both hearing officers agree that there is clear evidence of degradation of the marine environment due to sludge dumping at the Philadelphia dumpsite, that the impacts are reversible,

and that the dumpsite can be reopened to shellfishing after dumping has been terminated. A key question that must be addressed in this context is: What additional degradation of the dumpsite area is likely to occur between now and the end of 1980 if Philadelphia is permitted to continue using the present dumpsite? The Philadelphia permit hearing officer does not address this point. The Toms River hearing officer, however, feels that massive additional degradation will not occur, considering the historical trends at the site and the decreasing rate of dumping by Philadelphia over the next few years. I concur with this conclusion.

4. Comparison of Risks and Benefits Resulting from Utilization of the 106-mile Site and the Philadelphia Site. The hearing officers differ in their assessments of the environmental benefits and risks associated with the continued use of the Philadelphia dumpsite as compared with those associated with use of the 106-mile site.

The Philadelphia permit hearing officer regards the 106-mile site as preferable because: (1) the greater depths and distance from shore would arguably provide for much greater dispersion and dilution of wastes; (2) there are no commercial shellfisheries at the site; (3) the area is much lower in biological productivity; (4) the danger of contaminated solids reaching the ocean bottom and adversely affecting shellfish and other bottom organisms is is minimized; and (5) the risk of human consumption of contaminated shellfish is minimized.

The Toms River hearing officer does not address each of these points specifically, but he does conclude that: (1) the present dumpsite is far enough from shore to eliminate any danger of sludge reaching shorelines or beaches; (2) the present dumpsite has not been used as a commercial shellfishery in the past, and the potential development of the ocean quahog fishery in the general area is unlikely to be significantly delayed if sludge dumping continues through 1980; (3) the organisms at the 106-mile site are acclimated to a very stable environment and are likely to be more sensitive to pollutants than organisms inhabiting the Continental Shelf; (4) settleable solids would be dispersed over a much wider area and could adversely impact developing fisheries and nursery areas of the Continental Shelf and Slope; and (5) there would be a small, but real, risk of contamination of commercial shellfish beds due to short dumping.

The Toms River hearing officer attaches much importance to the concerns expressed by experienced marine scientists about the unknown impacts of sludge dumping on deep ocean environments. The Philadelphia permit hearing officer notes these concerns but regards them as being of less importance than the factors listed above.

Conclusion:

The points made by both hearing officers are well-taken, and I am sure the significance of these and other similar considerations could be debated at length by the scientific community. The differences in the assessments of the hearing officers emphasize the many ecological unknowns surrounding the dumping of large volumes of sewage sludge at the 106-mile site and strengthens my conviction that sludge should be dumped at that site only if predictive judgments as to the impact of dumping can be improved and utilization of the site can be accompanied by an effective monitoring program.

5. Philadelphia Hearing Officer's Characterization of Philadelphia Site as Impact Category I. The Philadelphia hearing officer determined that the closure of the Philadelphia dumpsite to shellfish harvesting by the Food and Drug Administration warranted categorizing the site as Impact Category I within the meaning of Section 228.10(c)(1)(iii) of EPA regulations. The Toms River hearing officer, however, disagreed with this categorization on the basis that shellfishing is not a major use of the site, and that there was, therefore, no impairment of a major use, as is required under Section 228.10(c)(1)(iii). Having already determined that shellfishing is not and will not in the immediate future be a major use of the site (see Section III.B.2 above), I concur in the findings of the Toms River hearing officer. I additionally note that the record

does not support a finding of Impact Category I under Section 228.10(c)(1)(ii) of the regulations for the reasons discussed in the Toms River hearing officer's report at pp. 33 through 63.

However, even assuming that the Philadelphia hearing officer's assessment is correct, the categorization of an ocean dumping site as Impact Category I does not require that the use of a site be automatically discontinued, but only that EPA "place such limitations on the use of the site as are necessary to reduce the impacts to acceptable levels." Section 228.10(c). Such restrictions might include limitations on the volume of material dumped at the site, eventual discontinuance of the use of a site, and restrictions on the nature of the wastes which may be dumped at the site.

The current Philadelphia permit incorporates a number of provisions designed to the reduce impact of dumping to acceptable levels. All dumping is to be terminated by January 1, 1981. Phila. Permit, p. 9. Prior to that date, the volume of solids dumped annually will be reduced according to the following schedule (Phila. Permit, pp. 9-10):

Permit Year	Volume (in pounds)
6/76-6/77	140,000,000
6/77-6/78	95,000,000
6/78-6/79	70,000,000
6/79-6/80	40,000,000
6/80-1/81	10,000,000

The City has been required to conduct a heat disinfection pilot study of its digesters to determine the feasibility of further reducing viruses and pathogens in its sludge, and, if full scale conversion is deemed feasible, to submit a schedule for implementation of full thermophilic digestion. Id. at p. 12. The City is also required to continue efforts to analyze and control the introduction of heavy metals into treatment plant influent. Id. at p. 9. The stringent enforcement policy announced today in Section III.C. of this decision should assure that these goals are achieved.

For these reasons, I conclude that the existence of an Impact Category I situation, either in and of itself or when weighed with other factors discussed above, would not require immediate discontinuance of dumping by the City of Philadelphia at the present site.

6. Decision: My major goal in reaching a decision on the proposed relocation of the City of Philadelphia is that the City's ocean dumping of sewage sludge be terminated at the earliest possible time. It is, therefore, my determination that for the immediate future the City of Philadelphia should continue to dump sewage sludge at its present ocean dumpiste. In reaching this conclusion, I have considered carefully the records of both hearings and the conclusions and recommendations of both hearing officers. With the qualifications stated above, I adopt the

findings and conclusions of the Toms River hearing officer; however, I consider the following factors to be of overriding importance:

a. Environmental Considerations.

i. The present dumpsite has been degraded by sewage sludge dumping, but present trends do not indicate that the area will be irreversibly damaged by the end of 1980, especially in light of the fact that the rate of dumping will rapidly decrease during the interim period.

ii. At the present time, there is insufficient data on which to base an accurate predictive judgment as to the environmental impact of dumping large volumes of sewage sludge on marine biota and marine ecosystems at the 106-mile site. Additionally, I do not believe that, as a practical matter, an effective monitoring program for the site can be implemented before January 1, 1981. For these reasons, I conclude that it would be preferable to continue using a site

which is already degraded but capable of recovery rather than risk unknown and potentially irreversible environmental impacts at a new location.

b. Public Health Considerations

There is no indication that continued dumping at the present site would affect shorelines or beaches, or would in any other manner present a danger to public health.

c. Economic Considerations

i. The development of a commercial ocean quahog shellfishery along the Delmarva coast will not be significantly impaired by the additional three-year closure of the Philadelphia dump site.

ii. It would cost Philadelphia about $5,000,000 to dump at the 106-mile site through 1980. Considering the lack of significant environmental or public health benefits that would be obtained from moving to this site, it would be preferable, in my opinion, to use this money to develop and implement land-based alternatives to ocean dumping which would enable Philadelphia to meet its compliance schedule rather than spend it for increased barging costs.

7. EPA Decision to Relocate Camden, New Jersey Sewage Sludge Dumping. On December 7, 1976, following the denial of the City of Camden's application for an interim ocean dumping permit by EPA Regions II and III, a United States District Court for the District of New Jersey issued an order in United States v. City of Camden, Civ. No. 76-0424, requiring EPA to issue a ninety-day emergency permit to the City to dump sewage sludge at the Philadelphia site. The Department of Justice, at EPA's request, and based on the Agency's preliminary assessment of the probable relative environmental impacts of Camden's dumping at the two sites, subsequently moved for a modification of that order to allow EPA to issue the permit for the 106-mile site.

The Government's request was granted, and in January, 1977 a permit was issued to the City of Camden to dump at the 106-mile site.

It has been suggested that EPA's decision to recommend relocation of Camden from the Philadelphia site to the 106-mile site in United States v. City of Camden necessarily requires that identical action be taken with respect to the City of Philadelphia. 12/ While there may be some superficial similarities between the two situations, a close examination of EPA's Camden decision indicates that that determination was not

12/ See, e.g., pleadings filed by the State of Maryland in Maryland v. Train, No. 76-1887 (4th Cir. 1977); September 20, 1977 Hearing Tr. at pp. 55-58.

intended to nor does it logically require such a result.

The affidavit of the Assistant Administrator for Water and Hazardous Materials filed in support of the Government's motion for modification of the New Jersey District Court's December 7, 1976 order explicitly states that EPA's decision to recommend the relocation of Camden was not intended to serve as a binding precedent for all dumpers at the Philadelphia site: 13/

> The decision by EPA to recommend that the site be moved from the Philadelphia site to the 106 site is based on our analysis of this particular problem; it is not intended either to encourage or preclude use of the 106 site for future dumping. Such decisions will be made on their merits. [Emphasis added.]

Furthermore, a comparison of the "problems" posed by Camden and Philadelphia dumping demonstrates that they are not, as a factual matter, identical.

A major (if not the major) consideration in urging the relocation Camden sludge dumping to the 106-mile site was that the dumping would be of "limited duration and quantity." 14/

13/ Affidavit of Andrew W. Breidenbach, Assistant Administrator for Water and Hazardous Materials, dated December 31, 1976, at ¶ 6 ("Breidenbach Affidavit"). See also Affidavit of Russell E. Train, Administrator, dated December 10, 1976 at ¶ 6 ("Train Affidavit").

14/ Breidenbach Affidavit at ¶¶ 5(d) and 6. See also Train Affidavit at ¶¶ 6 and 7; Testimony of Thomas C. Jorling, Assistant Administrator for Water and Hazardous Materials, September 20, 1977 Hearing Tr. at p. 58.

In contrast to the approximately 5,000,000 pounds of sewage sludge solids scheduled to be dumped by the City of Camden over approximately a year under its emergency and interim permits, the City of Philadelphia is currently scheduled to dump up to 170,000,000 pounds of sewage sludge solids over the next three years.

Furthermore, a significant factor influencing EPA's decision to move Camden was the FDA's finding that fecal coliform contamination of shellfish at the Philadephiia dumpsite was "caused principally by the raw [untreated] sewage being dumping by the City of Camden, New Jersey." 15/ The City of Philadelphia does not dump raw sewage sludge. Philadelphia sludge receives secondary treatment and mesophilic digestion which destroys up to up to 90% of viruses and pathogens. 16/ Furthermore, in its 1977-1978 permit, Philadelphia has been required to undertake studies to determine whether further

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15/ Affidavit of Captain James L. Verber, Northwest Technical Services Unit, Food and Drug Administration at ¶ 5 (emphasis added). The bacterial and pathogenic contamination of shellfish and beaches resulting from the dumping of untreated sewage sludge is also discussed in Affidavit of William C. Muir, Oceanographer, Environmental Impact Branch, EPA Region III, dated December 29, 1976, at ¶¶ 9-12; Affidavit of Dr. Gerald Berg, Chief, Biological Methods Branch, Environmental Monitoring and Support Laboratory at ¶¶ 2-7 ("Berg Affidavit"); Affidavit of George D. Pence, Jr., Chief, Environmental Impact Branch, EPA Region III, dated December 29, 1976, at ¶¶ 7 and 8.

16/ Decision of the Regional Administrator, In the Matter of the City of Camden, New Jersey, dated October 2, 1976, at p. 10; Berg Affidavit at ¶ 7.

reduction of viruses and pathogens can be achieved through thermophilic digestion. 17/

Finally, the record in the Camden case does not indicate that the City's efforts to develop and implement land-based alternatives to ocean dumping would have been significantly impeded as a result of the increased costs of barging sludge to the 106-mile site. As suggested above, the incremental cost of transporting Philadelphia sludge to the 106-mile site may have such an effect on Philadelphia's ability to terminate its sludge dumping by January 1, 1981.

In addition to all these considerations, it should be noted that the Camden decision was issued in response to a Court order and was based on a rather rapid analysis of information then readily available concerning the potential impacts of Camden's dumping at both sites. Today's decision, on the other hand, represents a more thorough and extensive assessment of the problem in light of information not available to the Agency in 1976, public comment, and amended legislation.

In short, EPA's 1976 decision to relocate the City of Camden's sewage sludge dumping was not intended to establish a precedent for all sewage sludge dumping at the Philadelphia site, nor is the factual context in which that decision was

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17/ Phila. Permit, p. 12.

issued identical to that currently presented by Philadelphia sludge dumping. The decision issued today, like the Camden decision, "is based on our analysis of this particular problem", and, as such, is not inconsistent with that earlier determination.

C. Establishment of Ocean Dumping Enforcement Policy

Because my decision today is based in part on the premise that compliance schedules in current ocean dumping permits will be met and that, consistent with the 1977 amendments to the MPRSA, ocean dumping of harmful sewage sludge will be terminated as soon as possible and in no event later than December 31, 1981, I am today announcing the following enforcement policy to effectuate those goals.

1. Reporting Requirements. Effective today, any failure to meet any compliance date in any interim permit for the ocean dumping of sewage sludge shall be reported to me by the Regional Administrator who issued the permit (or his designate) within ten (10) days of his receipt of information indicating such non-compliance. The report shall state the compliance date missed, the municipality's justification(s), if any, for such non-compliance, whether the Region anticipates that subsequent compliance dates will be met, and what action the Region intends to take as a result of such non-compliance.

2. Development of Regional Enforcement Strategies. The Regional Administrators of Regions II and III shall develop and transmit to me a detailed plan for enforcing compliance schedules in ocean dumping permits which shall include consideration of, but shall not be limited to, the enforcement activities discussed in paragraph 3 below. In developing these plans, the Regional Administrators should proceed on the premise that every incident of non-compliance should be followed up by an enforcement action appropriate to the violation unless there is good sufficient reason not to do so (i.e., the non-compliance results from factors beyond the permittee's control or it is demonstrably clear that subsequent compliance dates will be met). Additionally, the Regional Administrators should consider the extent to which planning and grant activities under Title II of the Federal Water Pollution Control Act, as amended, can be utilized to assure that land-based alternatives to sewage sludge dumping are developed and implemented within the time frames set forth in the compliance schedules in ocean dumping permits under their jurisdiction.

3. Enforcement Activities. In developing enforcement plans under paragraph 2 of this section and in determining, in each instance where a violation of a compliance schedule has occurred, what specific enforcement action shall be taken, the Regional Administrators of Regions II and III shall, where practicable, adhere to the following general guidelines:

a. Administrative actions for the assessment of a civil penalty should seek the maximum permitted by statue.

b. Where there have been repeated violations of compliance schedules, action should be instituted to either:

i. Modify the permit to move up interim and/or final compliance dates; or

ii. Revoke the permit.

c. Where there have been repeated violations of compliance schedules, the case should be referred to the Department of Justice with the recommendation that a court action be instituted under Section 105(d) of the Act seeking:

i. An injunction against further violations of the compliance schedule;

ii. A court-ordered compliance schedule; and

iii. Where appropriate, a court-appointed overseer to manage the permittee's implementation plan pending final cessation of dumping.

d. Where there have been willful and knowing violations of compliance schedules, the case should be referred to the Department of Justice for criminal prosecution of responsible municipal officials under Section 105(b) of the Act.

D. Need For An Environmental Impact Statement

Much comment was received in the course of the Toms River hearing concerning the need to prepare an Environmental Impact

Statement ("EIS") prior to relocating sludge dumping to the 106-mile site or the 60-mile site (especially on anything more than a temporary basis). The Toms River hearing officer recommended that EIS's be prepared on sewage sludge dumping at the New York Bight site, the Philadelphia site, the 60-mile site and the 106-mile site, and that criteria be established for determining the circumstances under which sewage sludge dumping should be relocated.

While I do not, as a practical matter, forsee any change in conditions at the existing dumpsites which would require relocation of sewage sludge dumping prior to the 1981 deadline, I also recognize that my decision not to move dumpers to the 106-mile site at the present time is based in part on the general lack of information concerning the effects of dumping large quantities of sewage sludge at that site. So as to leave no stone unturned in determining the "feasibility" of utilizing this site for the disposal of sewage sludge, I am directing that the EIS's now being prepared on existing sludge dumping sites and the 60-mile site include, in their consideration of alternatives, an assessment of utilizing the 106-mile site. I am also directing that the EIS on the 106-mile site, which is now designed to cover only the disposal of industrial waste, be expanded to include the dumping of sewage sludge.

Thomas C. Jorling
Assistant Administrator for
Water & Hazardous Materials

March 1, 1978

APPENDIX E

USEPA-REGION II

CRITERIA FOR RELOCATION

OF SEWAGE SLUDGE SUMPING

IN THE NEW YORK BIGHT

CRITERIA FOR RELOCATION OF SEWAGE SLUDGE
DUMPING IN THE NEW YORK BIGHT

Background

In July 1974, EPA Region II proposed that a new ocean dump site be designated for use until sewage sludge dumping in the New York-New Jersey metropolitan area could be replaced by environmentally, technically, and economically viable land-based disposal methods. Region II took this step as a precaution against any possible public health effects that might result from overtaxing the existing dump site located 12 miles from Long Island and New Jersey coastal beaches.

In order to determine whether such a precaution was necessary, and if so, whether the proposed action was the best possible way of preventing public health hazards and coastal water quality degradation, an in-depth evaluation of the proposed action and the alternatives to it was undertaken. The conclusion of this in-depth evaluation, contained in Region II's Draft EIS entitled "Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight", was that EPA's proposed action was environmentally unnecessary and might, in fact, be more environmentally damaging than taking no action.

Based on the information reported in the Draft EIS, Region II made a preliminary decision not to go ahead with the proposed action. Instead, Region II recommended (1) continued use of the existing site, (2) development and implementation of a comprehensive monitoring program for the existing site, and (3) designation of an alternate dump site that can be used if and when the monitoring program indicates that the existing site cannot safely accommodate any more sewage sludge.

On May 31 and June 1, 1977, EPA conducted a public hearing in Toms River, New Jersey, to gather information and to obtain public comment on the possible relocation of sewage sludge dumping farther offshore (42 FR 23163). The findings and conclusions of this hearing were issued by EPA on March 1, 1978. This decision included the following determination:

> "...efforts should begin immediately to designate the 60-mile (alternate) site for the disposal of New York/ New Jersey sewage sludge in the event such sludge cannot be dumped at the New York Bight (existing) site for public health reasons prior to December 31, 1981."

In order to implement this decision, criteria are established herein for determining the circumstances under which sewage sludge dumping should be relocated.

Relocation

Criteria developed for relocation of sewage sludge dumping in the New York Bight are a two-pronged assessment of ambient water quality conditions during peak summer months. The assessment includes sampling and evaluation of microbiological parameters and dissolved-oxygen depletion rates, both of which can be related to existing and legally enforceable federal and state water-quality standards. The EPA Regional Administrator may, at his discretion, require the assessment of additional water quality parameters as conditions warrant.

A network of 22 sampling stations (Fig. 1) has been established. Stations are located in transects perpendicular to the coast and shoreward of the existing sludge dump site. Three perpendiculars were established from the Long Island coast and three from the New Jersey coast. Locations of sampling sites are tabulated in Table 1.

The primary-indicator tool in the assessment of shoreward movement of ocean dumped materials from the sludge dump site is the total and fecal coliform bacteria group. Sampling is conducted weekly during the period May 15 to September 15. Surface, middepth, and bottom water samples are collected, preferably during incoming tidal conditions.

The second element of the alert system is an assessment of the annual oxygen depression rates (net) in the vicinity of the sludge dump site. Sampling is accomplished twice weekly from May 15 to July 1. Intensive surveys of dissolved-oxygen uptake in bottom waters are conducted. An ongoing rate assessment is performed using predictive modeling directed towards projecting the time of occurrence of anoxic conditions.

This 22-station network is an integral part of a more comprehensive monitoring program to evaluate ambient water-quality conditions in the New York Bight. Data collected under the comprehensive program by EPA, NOAA, Nassau County Department of Health, New Jersey Department of Environmental Protection, and others will provide information on additional parameters and will supplement and augment the relocation criteria evaluation.

Continual review and evaluation of data inputs resulting from the 22-station sampling program is utilized to determine future regulatory action according to the following alert scheme:

1. Initial Review - Should the bacterial data show greater density than 1000 per 100 ml total coliform or 200 per 100 ml fecal coliform at ten percent of the stations monitored during any one sampling period, or should the predictive modeling

indicate that anoxic conditions would occur prior to September 15, the appropriate First Alert system will immediately be implemented.

2. First Alert - Either (a) an intensive 5-day survey of bacteriological quality within the contiguous zone (3 to 12 miles offshore) will be conducted to assess the movement of dump site material toward coastal beaches. Should the results of this intensive survey demonstrate an excursion at any one station (i.e., geometric mean of all samples collected at a single depth equal to or greater density than 1000 per 100 ml total coliform or 200 per 100 ml fecal coliform), a Second Alert will immediately be implemented; or

   (b) an intensive diurnal study of dissolved-oxygen uptake at a minimum of two areas where maximum rates are evidenced will be performed over a 3-day period. Should the prediction of anoxic conditions be confirmed, a Second Alert will immediately be implemented.

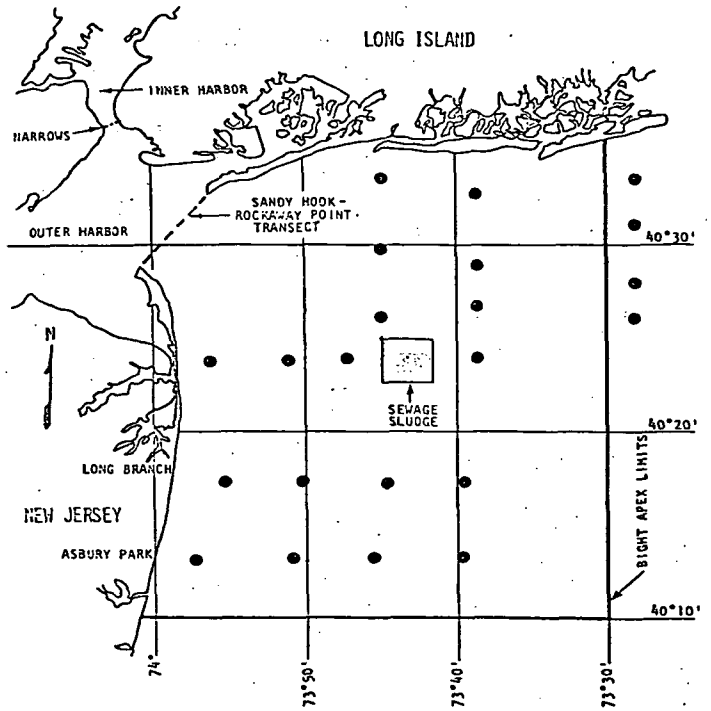
3. Second Alert - All permittees will be notified by telegram that contingency plans to prepare for a transfer of dumping activities to a designated ocean dump site farther offshore should be activated.

   A second intensive study (bacterial or oxygen uptake, as appropriate) will be conducted.

   Members of an Ad Hoc Advisory Committee (Table 2) would convene to assess the results of the two intensive surveys. Upon completion and evaluation of the survey results, the Committee will prepare and submit to the Regional Administrator its findings and recommendations. The Committee may invite public participation before submitting such findings and recommendations.

   The Regional Administrator, after consultation with the Assistant Administrator for Water and Waste Management, shall make his final determination within five days of receipt of the Advisory Committee Report. This determintion shall be transmitted to the permittees by telegram and shall be published in a New York City newspaper as soon as possible.

Figure 1



BIGHT APEX AND EXISTING DUMP SITE

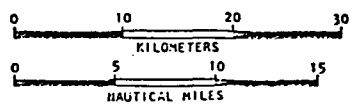


Table 1

Sampling Station Network Utilized in Determining the Circumstances Under Which Sludge Dumping Would be Relocated

Station	Latitude	Longitude
New Jersey Transects		
NYB20	40°23'54"	73°56'03"
NYB22	40°23'54"	73°51'00"
NYB24	40°23'54"	73°47'30"
JC14P	40°17'30"	73°55'40"
JC14A	40°17'30"	73°50'10"
JC14B	40°17'30"	73°44'45"
JC14C	40°17'30"	73°39'15"
JC27P	40°13'00"	73°56'50"
JC27A	40°13'00"	73°51'00"
JC27B	40°13'00"	73°45'32"
JC27C	40°13'00"	73°39'50"
New York Transects		
NYB40	40°33'36"	73°45'00"
NYB42	40°29'42"	73°45'00"
NYB44	40°25'54"	73°45'00"
LIC09P	40°32'45"	73°38'20"
LIC09A	40°29'10"	73°38'20"
LIC09B	40°27'08"	73°38'20"
LIC09C	40°24'21"	73°38'20"
LIC14P	40°33'30"	73°28'00"
LIC14A	40°30'55"	73°28'00"
LIC14B	40°28'15"	73°28'00"
LIC14C	40°26'00"	73°28'00"

Table 2

Agency Membership on Ad Hoc Advisory Committee on Relocation of Sludge Dumping in the New York Bight

Environmental Protection Agency, Region II - Chairman

Environmental Protection Agency, Office of Water and Waste Management

National Oceanic and Atmospheric Administration

New Jersey State Department of Environmental Protection

New York State Department of Health

APPENDIX F

USEPA-REGION II

MUNICIPAL SEWAGE SLUDGE ENFORCEMENT STRATEGY

MUNICIPAL SEWAGE SLUDGE ENFORCEMENT STRATEGY
EPA - REGION II

I. GOALS AND OBJECTIVES

The goal of the municipal sludge enforcement strategy for EPA Region II is to provide for the ultimate disposition of municipal wastewater treatment sludge in a manner that will protect public health and the environment by ensuring that ocean dumping of sewage sludge will cease by December 31, 1981. This goal is made clear in the language of three legislative mandates, the Resource Conservation and Recovery Act of 1976, the Clean Water Act (CWA) of 1977, and the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972.

The sludge management provisions of these legislative mandates emphasize a secondary goal; the conservation of resources through the beneficial utilization of municipal wastewater treatment sludge, where practicable.

In order to meet these goals, it is necessary to establish a series of program objectives to be addressed by both EPA and the states of New Jersey and New York. These are:

1. to assure that the ocean dumping of harmful sewage sludge generated in Region II is eliminated by December 31, 1981 through phased reduction;

2. to assure that sludge management practices are cost effective and meet the environmental criteria established in EPA guidelines and regulations;

3. to ensure the implementation of pretreatment programs in order to reduce the presence of toxic materials in sludge;

4. to encourage the beneficial utilization of a sludge where environmentally and economically feasible; and

5. to establish an effective federal/state/local partnership in implementing the program.

The purpose of this document is to lay out precise plans for achieving these goals, along with the activities that must be carried out in order to implement each element of the strategy.

Formulation of the strategy involved four steps. First, the problem was identified and assessed. Next, all past and present programs affecting the problem were summarized. In light of the findings made in the first two steps, a strategy was formulated. Finally, the programmatic activities needed to implement the strategy were specified.

II. PROBLEM IDENTIFICATION

The CWA provides federal grants for the construction of publicly-owned wastewater treatment facilities to upgrade the quality of the nation's navigable waters by removing contaminants from wastewater. Contaminant removal produces a residual material known as sewage sludge. In municipal or publicly-owned wastewater treatment plants, the sludge produced is largely organic, although it also contains measurable quantities of metals and minerals.

As more wastewater treatment facilities are put on line, greater quantities of sludge are produced requiring additional disposal capacity. Further, the more complex the treatment system, the more sludge that is produced. Also, untreated industrial wastes are discharged into most municipal systems. These wastes often contain heavy metals and other toxic materials which are then concentrated in the municipal treatment plant sludge.

Currently, four basic methods are used for the disposition of municipal sludges:

- Ocean dumping
- Landfill
- Surface land application
- Incineration

Each of these disposal options has a number of substantial environmental impacts.

The need to develop and utilize alternative sludge management options is heightened by the fact that by December 31, 1981 ocean dumping of harmful sewage sludge must cease, thus eliminating the major disposal option currently used in the New York-New Jersey metropolitan area. Congress, through the MPRSA, declared that its policy was to regulate ocean dumping to prevent or strictly limit the dumping of harmful materials. In November 1977, Congress amended this Act to require the cessation of all ocean dumping of harmful sewage sludge by December 31, 1981. That date is fixed in EPA's ocean dumping regulations (40 CFR 220-229), and in Interim ocean dumping permits issued by Region II. Although convinced that the 1981 deadline can be met, Region II realizes that some dumpers will not comply unless given sufficient incentive.

III. PROBLEM ASSESSMENT

In 1975 the Interstate Sanitation Commission (ISC) estimated that 10,000 wet tons of sewage sludge per day, about 80 percent of the sludge produced by municipal wastewater treatment facilities in the New York-New Jersey metropolitan area, are barged into the New York Bight and dumped at a site approximately 12 miles offshore. The remainder of the sludge is disposed of mainly

through landfilling, incineration of dewatered sludge followed by landfilling of ash residue, and direct application to land as a soil conditioner. Further, ISC estimated that by the year 2000 these sludge quantities would increase by approximately a factor of four, to 40,000 wet tons per day. Much of this increase will occur prior to 1980 due to the upgrading of existing wastewater treatment plants from primary to secondary treatment.

EPA estimates that 5.0 million wet tons of sludge will be dumped in 1978 into the New York Bight from 49 publicly-owned wastewater treatment facilities operating under permits issued by Region II. Over the past five years, the annual volume dumped under the EPA permit program has been:

1973	4.6 million wet tons
1974	4.2 " "
1975	4.3 " "
1976	4.4 " "
1977	4.5 " "

In April 1975, when Region II initiated its permit program, sludge from approximately 250 facilities was being dumped into the New York Bight. Since then, the number of plants practicing sludge dumping has been substantially reduced through EPA's strict compliance schedules or permit denial. For example, in 1976 93 plants in New Jersey were denied permits because alternatives to ocean dumping were available. It should be noted also that no permit has been issued for sewage sludge generated by other than those who had been dumping prior to 1973.

While Region II has made progress in cutting the number of sludge generators dumping sludge, it has not made any substantial progress in reducing the quantity of sludge being dumped. This is largely due to increases in the amount of sludge being generated as a result of upgrading. The sources of the sewage sludge being dumped into the New York Bight and the phase out dates for all permittees as of July 10, 1978, are given in Table 1.

The permit conditions requiring cessation reflect an early recognition by Region II that sewage sludge dumping could cause degradation of the marine environment and should be phased out as soon as viable alternatives could be found. As early as 1971 and continuing through the present, EPA has had a sludge management program. This program drew upon the authority and funds contained in Sections 102 and 106 of MPRSA and Section 201 of CWA. The program initiated studies of the environmental and economic feasibility of alternative sludge disposal methods.

A study funded by EPA and performed by ISC provided an assessment of the technical alternatives to ocean disposal of sludge in the New York-New Jersey metropolitan area.

Based on the results of these studies, EPA sought to impose a compliance schedule for the cessation of dumping through ocean dumping permits, utilizing those alternatives identified, such as composting, land application, incineration, and pyrolysis. All permits issued in August 1976 required the implementation of one or more alternative disposal methods by December 31, 1981. Where alternatives could be implemented sooner, which is the case with several small New Jersey municipalities, an earlier date was imposed. However, five permittees (New York City, Nassau County, Westchester County, Passaic Valley, and Middlesex County) during the May 25, 1976 public hearings on new permit applications indicated that they could not submit an alternative disposal facility plan*, due December 31, 1977, and requested time extensions for the date of this submission. These extensions were granted in permits effective in February 1978.

Several permittees have selected a two-phase approach in selecting and implementing alternatives to ocean dumping. This two-phase approach generally utilizes one sludge management alternative which will be implemented before the December 31, 1981 deadline as a short-term solution, and a second long-term sludge management alternative which cannot be implemented by the 1981 deadline. The long-term management alternatives tend to be those that utilize the resource value of the sludge to the maximum extent possible, but cannot be implemented by 1981 either due to current technological limitation in the process (i.e., pyrolysis and co-pyrolysis), available capital limitations of the sewage authority (i.e., New York City), or insufficient time available to plan, design and construct the necessary facilities.

Short-term alternatives are those solutions which, while designed to meet the 1981 deadline, either will not meet the full future capacity needs of the sludge generator or will not provide for utilization of the resource value of the sludge. In general, the short-term solutions have the prime objective of meeting only the goal of protecting public health and the environment by providing an acceptable alternative to ocean dumping, whereas long-term solutions meet both the public health and environment goal, and the resource utilization and management goal.

IV. STRATEGY

In order to provide for the ultimate disposition of municipal sewage sludge in a manner that will protect public health and the environment in the region, EPA and the states of New York and New Jersey will:

1. phase out the use of the existing sewage sludge ocean dump site by using a series of regulatory authorities and procedures; and

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* Funding was provided under a CWA Section 201 Step 1 grant.

2. encourage and facilitate the utilization of sludge as a resource by taking a regional approach to the development of alternative disposal methods.

In order to phase out the use of the existing dump site, EPA and the states must take the following steps:

- o use MPRSA ocean dumping permit authority to
  - issue new permits to applicants eligible to receive new permits
  - expeditiously review the feasibility of using dump sites farther offshore
- o vigorously enforce MPRSA permit conditions
  - administrative actions for the assessment of civil penalty should seek the maximum permitted by statute
  - where there have been repeated violations of compliance schedule, action should be instituted to either:
    - i. modify the permit to move up interim and/or final compliance dates; or
    - ii. revoke the permit
  - where there have been repeated violations of compliance schedules, the case should be referred to the Department of Justice with the recommendation that a court action be instituted under Section 105(d) of the Act seeking:
    - i. an injunction against further violations of the compliance schedule;
    - ii. a court-ordered compliance schedule; and
    - iii. where appropriate, a court-appointed overseer to manage the permittee's implementation plan pending final cessation of dumping.
  - where there have been willful and knowing violations of compliance schedules, the case should be referred to the Department of Justice for criminal prosecution of responsible municipal officials under Section 105(b) of the Act.

Four tasks have been identified as being crucial to the implementation of this strategy. The tasks, which have been accomplished, are:

- o Public announcement of permit issuance
- o Issuance of interim permits
- o Establishment of an injunctive relief procedure
- o Establishment of a review committee to determine compliance with implementation schedule, monthly status reports, and other permit conditions

TABLE 1

MUNICIPAL OCEAN DUMPING PERMITS - REGION II
(as of January 1, 1978)

Permit No.	Waste Generator	Phase Out Date
II-NJ-019	Bergen Co. Sewer Authority	December 31, 1981
II-NJ-012	Camden Dept. Public Works	* June 15, 1978
II-NY-068	Glen Cove, City of	December 31, 1981
II-NJ-022	Joint Mtg. of Essex & Union Co.	December 31, 1981
II-NJ-021	Linden-Roselle & Rahway Valley S.A.	December 31, 1981
II-NY-007	Long Beach, City of	December 31, 1981
II-NJ-008	Middlesex Co. Sewerage Authority	December 31, 1981
II-NJ-002	Middletown Twp. Sewerage Auth.	December 31, 1981
II-NY-028	Nassau Co. Dept. Public Works	December 31, 1981
	Bay Park STP Belgrave STP Cedar Creek STP Farmingdale STP Freeport STP Inwood STP Meadowbrook STP Roslyn STP W. Long Beach S. Dist.	
II-NY-009	New York City Dept. Water Resources	December 31, 1981
	Bowery Bay STP Coney Island STP Hunts Point STP Jamaica STP Newtown Creek STP Owls Head STP Port Richmond STP Rockaway STP Tallman Island STP 26th Ward STP Wards Island STP	

MUNICIPAL OCEAN DUMPING PERMITS - REGION II
(as of January 1, 1978)

Permit No.	Waste Generator	Phase Out Date
II-NJ-003	Passaic Valley Sewerage Comm.	December 31, 1981
II-NY-029	Westchester Co. Dept. Envir. Fac.	December 31, 1981
II-NJ-111	General Marine Transport Corp.	
	Domestic Septic Tank Wastes	* April 23, 1978
	Lincoln Park	July 31, 1979
	Morris Twp.	December 31, 1981
	Pequannock Twp.	December 30, 1980
	Wanaque S.A.	May 30, 1980
	West Paterson	December 31, 1980
	Wood-Ridge	December 31, 1981
II-NJ-017	Modern Transportation Co.	
	Domestic Septic Tank Wastes	December 1, 1978
	Asbury Park	December 31, 1981
	Atlantic Highlands	December 31, 1981
	Caldwell Boro	* August 20, 1978
	Cedar Grove	December 31, 1981
	Chatham	* March 2, 1978
	Kearny	December 31, 1981
	Neptune Twp. - Ocean Grove	* June 15, 1978
	Northeast Monmouth Reg. S.A.	December 31, 1981
	Oakland Boro	* June 30, 1978
	Passaic	* February 28, 1978
	Pompton Lakes	* June 30, 1978
	Roxbury Twp.	December 31, 1978
	Totowa Boro	December 31, 1981
	Washington Twp. - Morris Co.	December 31, 1981
	Wayne Twp.	* June 30, 1978
	West New York	December 31, 1981

* Phase out completed

Rev. September 1, 1978

APPENDIX G

NOAA-MESA

TECHNICAL MEMORANDUM ERL MESA-11

EVALUATION OF PROPOSED SEWAGE SLUDGE DUMP SITE AREAS

IN THE NEW YORK BIGHT

CHAPTER I: FINDINGS AND RECOMMENDATIONS

FEBRUARY 1976

I. FINDINGS AND RECOMMENDATIONS

Ocean dumping of sewage sludge in the New York Bight has been practiced since 1924. Amendments of 1972 to the Federal Water Pollution Control Act require that all sewage treatment plants in operation on 1 July 1977 provide a minimum of secondary treatment. It has been estimated that if the present practice of ocean dumping continues, this upgrading of treatment in the New York/New Jersey metropolitan area will triple the volume of sewage sludge dumped at the present sewage sludge dumpsite in the New York Bight (Environmental Protection Agency 1974). Concerned that the existing New York Bight sewage sludge dumpsite might not accommodate the anticipated three-fold increase, the Environmental Protection Agency, Region II (EPA) signed a Letter of Understanding Concerning Baseline Surveys and Evaluations of the Proposed Interim Sewage Sludge Disposal Site(s) in the New York Bight with the National Oceanic and Atmospheric Administration's (NOAA) Marine EcoSystems Analysis (MESA) New York Bight Project on May 7, 1975. NOAA's MESA New York Bight Project has studied significant features of the New York Bight environment and the two proposed alternative sewage sludge dumpsite areas.

It should be noted that NOAA's advice and policy recommending continued use of the existing sewage sludge dumpsite is contained in letters from NOAA's Associate Administrator for Marine Resources to the Administrator of the Environmental Protection Agency, Region II, dated September 17, 1974, and October 6, 1975 (Appendix A).

This section summarizes significant features of the New York Bight's midshelf environment and alternative sewage sludge dumpsite areas 1-A and 2-A (fig. 1), draws applicable conclusions about the effects of dumping sewage sludge at any interim dumpsite in this environment, and presents specific recommendations relative to dumping operations and monitoring activities (for additional information on the selection of the proposed alternative sewage sludge dumpsite areas, see Sections II-A and II-B).

A. Characteristics of the Environment

Features of the Bight's physical environment and biota that relate to the dumping of sewage sludge in the alternative dumpsite areas are summarized by disciplinary category.

Geological oceanography: Field studies within northern alternative dumpsite area 1-A and southern alternative dumpsite area 2-A indicate the following:

Seafloor sediments in both areas are predominantly clean sands of medium grain size (¼ to ½ mm), but contain small areas with over 20 percent gravel. The absence of mud deposits indicates thorough reworking of the substrate by storms, which resuspend fine sediment particles and remove them from the studied areas.

Sediment grain-size and bedform data for special survey grid area 2D1 in northern area 1-A and special survey grid area 2D2 in southern area 2-A (fig. 2) suggest a general transport of sand-sized sediment to the southwest

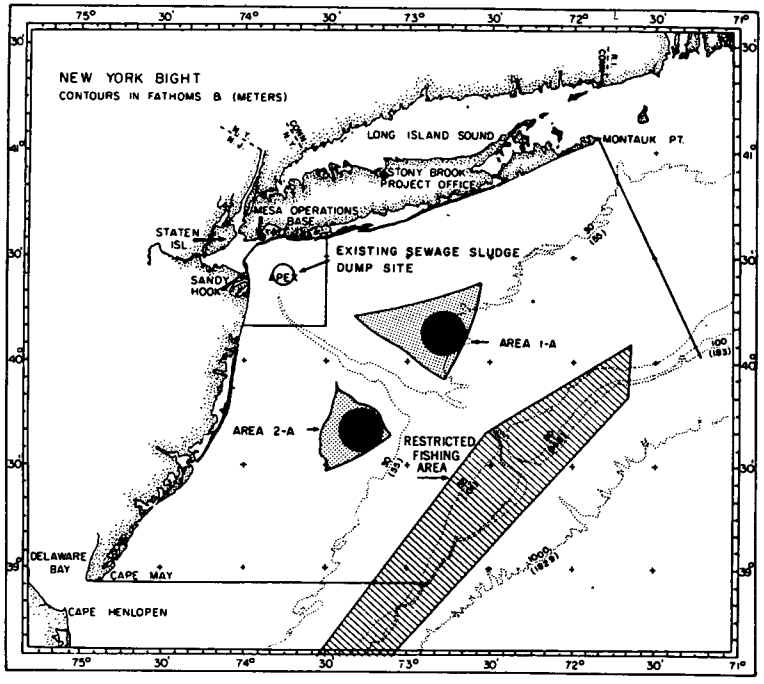


Figure 1. Existing and proposed alternative sewage dump site area (Area 1-A and Area 2-A). The shaded area along the continental shelf is a no-fishing area established by international bilateral agreements.

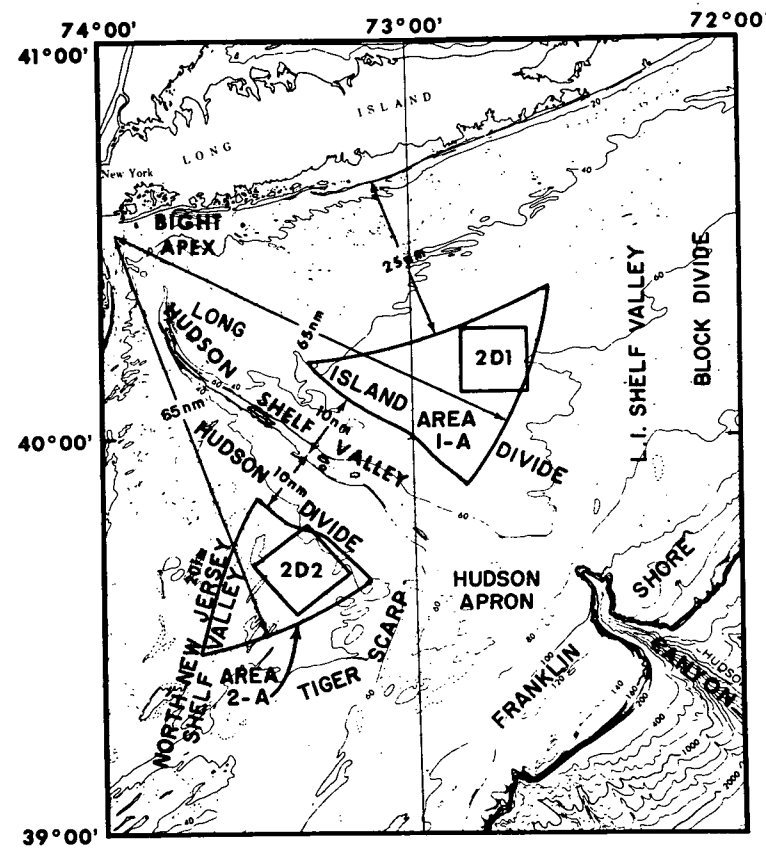


Figure 2. Proposed alternative sewage sludge dumpsite areas 1-A and 2-A in the New York Bight showing some of the major topographic features.

during seasonal storms—"northeasters," which usually occur in winter, but sometimes occur in summer. Data for northern grid area 2D1 indicate a moderate rate of southwest sediment transport over broad, low-gradient, preexisting valleys. Data for southern grid area 2D2 suggest more intense southwest sediment transport. The Hudson Shelf Valley (fig. 2) functions to some extent as a conduit for materials dumped in the Bight Apex.

Physical oceanography: Water-column characteristics and water movements over the midshelf region of the alternative dumpsite areas are predictable, in a general manner. However, sudden climatic events can disrupt general seasonal cycles, cause changes in structure of the water column, and, thereby, modify the fractionation, settling, and transport of dumped sewage sludge.

The density difference associated with the "cold bubble" that occurs in midshelf waters over the alternative dumpsite areas during summer may cause increased amounts of dumped material to reside in the surface water layer. The potential for shoreward transport of material in this surface layer, at the sea/air interface, is greater during summer. In winter, shoreward transport in the surface layer is less.

The flow of shelf waters, below the wind-driven surface layer, is generally southwestward along depth contours. This flow is highly variable and subject to intense meteorological events, particularly in winter. Midshelf water mixes with water in the Bight Apex, where currents are variable. Currents in the Apex are dominated by tidal and meteorological forcing. Wind events sometimes cause varying flow patterns for several days. The previously hypothesized, long-term, clockwise eddy motion (gyre) in the Apex has been confirmed for the intermediate water layer. However, the near-bottom flow and surface flow in the Apex do not always coincide with the flow in the intermediate water layer or with each other. Short-term current-meter records of near-bottom flow indicate that the gyre may extend to the bottom during the winter season.

Hudson Shelf Valley water, at least beneath rim depth, flows both up and down the Shelf Valley; but, the long-term flow is distinctly up-valley. This up-valley flow and the predominate southwestward flow in upper midshelf waters increase the potential for shoreward transport of sewage sludge that would be dumped in northern area 1-A northeast of the Hudson Shelf Valley.

There is a subtle shoreward bottom water flow relative to the flow higher in the water column, as shown by current meter records throughout the Bight. Though not fully understood, this movement may be caused by estuarine influences, compensation for offshore surface wind transport, and formation of a boundary layer due to friction.

Chemical oceanography: In the Bight Apex, dumped sewage sludge increases the trace metal and organic contaminant loading of sediments, and, to a lesser extent, the water column. It also adversely affects, to a lesser extent, the oxygen levels in the Apex water mass. The total influence of sewage sludge dumping upon the sediment and water column, however, is less than the influence of contaminants from other sources.

In the alternative dumpsite areas, any dumping of sewage sludge could increase chemical species in the water column at the point of introduction. However, rates of dispersal should be sufficient to reduce this effect, except in the immediate discharge plume. Observations indicate little existing contamination of the midshelf region, at least within the limits of the alternative dumpsite areas.

Dilution and dispersion of sewage sludge at the present dumpsite are not sufficient to avoid some influences on the chemistry of the ecosystem. Dilution and dispersion of sewage sludge in either alternative dumpsite area would be greater than at the present site. There probably would be only local and temporary changes in water chemistry.

Biological oceanography: Outer and mid-portions of the Bight appear relatively pristine insofar as they have been studied. General conclusions follow.

Living marine resources in the midshelf region of the alternative dumpsite areas are typical of those along the Middle Atlantic and New England continental shelf. Benthic assemblages are an essential food supply for most demersal fishes. They would be altered unpredictably, perhaps only minimally, by the dumping of sewage sludge. These assemblages are distributed fairly homogeneously, on a large scale, in response to the natural features of the region, such as sediment type and bottom relief.

Potential biological impacts of dumping sewage sludge in the alternative dumpsite areas--based on field investigations and studies in the Bight Apex--include:

1. An increase in the indicence of fin rot in offshore areas.
2. Contamination of sediments and overlying waters by pathogens of man, fish, and shellfish, some of which are resistant to certain antibiotics and heavy metals.
3. Alterations in migratory patterns of bottom-living fishes.
4. Increased concentrations of several heavy metals in fish and shellfish.
5. Modifications of food webs through introductions of detritus and bacteria; and short-term, localized effects on plankton through nutrient enrichment.

B. Factors in Selection of Area and Disposal Procedure

Certain observed phenomena that will affect the impact of dumped sewage sludge are discussed relative to choice of dumpsite and method of dumping. The following discussion is predicated on the assumption that a clear and definite need for moving the existing sewage sludge dumpsite has been demonstrated, a need which has not yet been demonstrated.

Selection of alternative dumpsite area: In selecting any dumpsite area, the Hudson Shelf Valley must be considered because: a) it serves as a migration path for certain fishes and shellfish, b) fisheries are now present in and near the Valley, and c) the deeper portion of the Valley is a winter aggregation zone for certain species. Further, water flow in the Shelf Valley is extremely complex, reverses at times, and is difficult to predict.

Current flow over the midshelf and outershelf of the Bight generally is to the southwest. Variations in this mean flow sometimes show on onshore component. Dissolved and suspended fractions of dumped material can be expected to move with the prevailing flow, and, at times to move shoreward.

The Hudson Shelf Valley is a sink for a large portion of fine particles that reach it. Material dumped in northern area 1-A is likely to concentrate in and contaminate the Shelf Valley to a greater degree than material dumped in southern area 2-A. Available data indicate that the Shelf Valley is important to living resources so that southern area 2-A is more acceptable for disposal of sewage sludge than northern area 1-A.

Selection of disposal procedure: There has been much discussion about the merits of containing versus dispersing of wastes disposed in the marine environment. Dilution over a large area has been advocated by some to minimize environmental problems, while containment of wastes within a small area has been advocated by others to preserve the remainder of the environment. In the midshelf region the argument is academic. Sewage sludge will be naturally dispersed and widely distributed, even when dumped at a point source. To extend dumping operations over a large area increases the costs. Also, development of a system to monitor effects of disposal over a large region will introduce a logistic problem that will be exceedingly expensive to solve.

C. Recommendation of Specific Dumpsite Location

It is recommended that any new sewage sludge dumpsite be located within a small portion of the southern alternative dumpsite area 2-A. Specifically, the site should include an area no more than approximately 12 nmi^2 (41 km^2), centered at latitude 39°40'N - longitude 73°18'W, where depths are approximately 40 m (22 fm). Reasons for recommending this location include projected environmental effects, development of an effective monitoring program, and, to a lesser degree, the method and economy of the sewage sludge disposal operations. This site minimizes the possibility of material being dispersed toward and into, as well as concentrated in, the Hudson Shelf Valley.

D. Monitoring New Interim Dumpsites

Development of an effective monitoring program at any new sewage sludge disposal site is essential to understanding the effects of the dumping. It is recommended that an adequately funded monitoring program be established. Monitoring of any new sewage sludge dumpsite must include an examination of the type of waste material to be disposed in context with the rationale for

dumping and the desired ultimate fate of the waste. Knowledge of the proposed site, in the context of regional oceanographic processes and the interaction of injected material with the environment, is required. Ideally, the proposed dumping situation should be modeled and independently verified. Once dumping begins at the site, the oceanographic processes and fate of dumped materials, which were hypothesized and modeled, should be verified through a monitoring effort that includes detailed field investigations of the dispersive, advective, and density fields, particularly as a function of the oceanographic climatology. If initial assumptions prove valid, then monitoring should continue routinely, utilizing only a few key parameters to check the probabilistic nature of the original predictions. These parameters should be selected on the basis of their usefulness, sensitivity, and ease and rapidity of sampling and analysis. The monitoring program should be designed to be economically reasonable. The objective of the monitoring should be a biological and chemical assessment of the capacity and growth of the site, the health of the biological community in and around the site, and the extent of movement of material away from the site. If initial assumptions concerning the oceanography in the vicinity of the site fail to withstand the rigors of the field investigations, then the new knowledge should be used immediately to identify and resolve discrepancies, and to make appropriate adjustments in dumping practices, if warranted.

A list of parameters that should be part of the monitoring effort follows. It should be emphasized that there is no unique tag for measuring the fate or effect of dumped sewage sludge in the marine environment. Time and space scales, and methods of sampling, are not defined at this time. Environmental parameters that require complex instrumentation systems, or massive data collection programs, should be avoided.

Total and fecal coliforms: The distribution and abundance of these organisms in the water column, sediments, and shellfish should be measured. Regardless of weaknesses associated with utilizing coliforms as indicators, they remain the only acceptable standard, and they are indicators of pathogens.

Turbidity: Some measure of turbidity of the water column is useful as a general measure of the advection and dispersion of dumped sewage sludge. Long-term persistence and growth of turbidity in what is now a rather pristine area would be excellent indicators of environmental degradation.

Ocean color: Remotely sensed ocean color information should be considered as a potential indicator of materials from dumped sewage sludge at and near the air/sea interface. Utilization of existing technology and either satellite or high altitude imagery should provide considerable insight into the transport and dispersion of these materials.

Characteristic materials found in sewage sludge: There are a number of byproducts representative of human, animal, and industrial wastes in sewage sludge. Physical examination of suspended material and of bottom surficial sediment samples should give, perhaps, the first indication of contamination. Examination of samples for tomato and melon seeds, human hair, fragments of rubber and plastic, and cellulose fibers is suggested.

Dissolved oxygen: Dissolved oxygen in the water column is one of the most critical parameters to monitor. The general health of the environment depends on a sufficient supply of oxygen relative to its utilization to support life and oxidize man-related and natural materials. Close examination of oxygen content is recommended.

Metals in sediments: The distribution and abundance of selected heavy metals in surficial sediments should be monitored at both sites. Atypical metal concentrations are general indicators of a degraded environment.

Benthic invertebrates: These organisms serve as long term integrators of marine environmental contamination. It is recommended that abundance of selected species be determined. In addition, coliform and heavy metal determination should be made in selected shellfish.

APPENDIX H

NOAA

BASELINE REPORT OF ENVIRONMENTAL CONDITIONS

IN DEEPWATER DUMPSITE 106

INTRODUCTION AND SUMMARY

JUNE 1977

INTRODUCTION

Public Law 92-532, the Marine Protection, Research, and Sanctuaries Act of 1972, put an end to the unregulated disposal of wastes in offshore waters of the United States. This Act was the culmination of concern by the Executive Branch, the Congress, scientists, and the public at large over the potential dangers to the environment and to public health of unrestricted ocean dumping. The National Oceanic and Atmospheric Administration (NOAA) has the responsibility under Title II of the Act to conduct monitoring and research to determine the environmental effects of the dumping of waste materials into ocean waters.

This baseline report contains the results of field studies conducted by NOAA in and about the Deepwater Dumpsite 106 (DWD-106), approximately 106 nautical miles from Ambrose Lightship and 90 nautical miles due east of Cape Henlopen, Delaware, for the purpose of characterizing the site's environment and biota. The studies were conducted in May 1974, July 1975, and February 1976 on the ships ALBATROSS IV and DELAWARE II, ALBATROSS IV and the submersible ALVIN, and OREGON II, respectively. J. F. Hebard and R. Dill were co-chief scientists for the May 1974 work, with participation by investigators from the National Marine Fisheries Service, Environmental Protection Agency, Lamont-Dougherty Geological Observatory, Virginia Institute of Marine Science, and University of Rhode Island. D. Cohen was the chief scientist for the July 1975 investigations, with participation by the National Marine Fisheries Service, Smithsonian Institution, Naval Underwater Systems Center, and Woods Hole Oceanographic Institution. M. Ingham was the chief scientist for the February 1976 investigation, with participation by the National Marine Fisheries Service, Smithsonian Institution, University of Rhode Island, Naval Underwater Systems Center, and Woods Hole Oceanographic Institution.

The results of the May 1977 survey were published in December 1975 ("May 1974 Baseline Investigation of Deepwater Dumpsite 106") as NOAA Dumpsite Evaluation Report Number 75-1. A related report was published in April 1976, entitled "Passage of Anticyclonic Gulf Stream Eddies Through Deepwater Dumpsite 106 During 1974 and 1975", as Report Number 76-1.

It was found that report 75-1 describing the 1974 baseline study contributed substantially to an understanding and description of the environmental conditions in DWD-106. However, instead of producing individual reports for the other baseline field studies, it was decided to produce a single document addressing the results of all the baseline work in the dumpsite and its vicinity.

The concept underlying NOAA's efforts in the investigation of this dumpsite area was that obtaining an adequate baseline should constitute an important first step, in order to compare subsequent monitoring findings with the baseline data to ascertain effects that might be ascribed to dumping.

Thus, an important objective was to define both spatial and temporal variations. The second (July 1975) and third (February 1976) seasonal baseline efforts were combined with selected research which could contribute to knowledge on dumping effects at the same time baseline data were obtained. Included were studies into the constituents and reactions of given wastes being disposed, work on mutagenesis in fish eggs and larvae, and similar research.

Two experimental field studies including dispersal tracking of plumes were conducted in 1976 following completion of the February baseline work, one in June using the USCGC DALLAS and the submersible ALVIN, and one in August using the WHOI ship R/V KNORR. An assessment report addressing the research carried out during the period 1974-76 in the Deepwater Dumpsite 106, including the two experimental field studies, is expected to be completed within about six months of publication of this report.

A variety of wastes are disposed in DWD-106, whose dimensions enclose an area of over 700 square nautical miles, but efforts were concentrated on American Cyanimid and duPont wastes since these constituted about 80% of the total volume of material entering the area. The Environmental Protection Agency in early 1977 authorized the disposal at DWD-106 of large quantities of ferric chloride as well as sewage sludge previously dumped at nearshore sites, posing new problems in future research and monitoring.

Nearshore dumping of wastes sometimes imposes more severe and immediate environmental penalties than disposal in deeper waters because of differences in rates of dilution and dispersal than in deeper water, and possible public health hazards associated with fish spawning areas, shellfish beds, and recreational areas. However, the environmental effects of disposal in deeper waters are correspondingly more difficult to measure and, hence, to predict. This is due to factors such as greater depths of water and distances from shore and also to the general paucity of environmental and biological information in off-the-shelf areas. In the case of DWD-106 this situation is further complicated by the interactions of major water masses, Shelf Water, Slope Water, and Gulf Stream eddies. The DWD-106 is a complex oceanographic area in which to assess natural environmental conditions and the impact of man's activities upon those conditions.

This report was prepared under the overall direction of P. M. Cohen (National Ocean Survey) and M. C. Ingham (National Marine Fisheries Service). Technical assistance by NOAA's Environmental Data Service is gratefully acknowledged. Specific requests for copies of data should be addressed to Mr. Jack Foreman, D2x1, Environmental Data Service, NOAA, Washington, D.C. 20235.

SUMMARY

The purpose of this summary is to provide a synthesis of the major findings contained in the Baseline Report, particularly as they pertain to the dumping situation in DWD-106. One objective of the DWD-106 studies has been to characterize baseline conditions in the region in its present status as a receiving area for industrial wastes. Obtaining a pure pre-dumping baseline has not been possible since systematic quantitative measurements were not taken before dumping began. The Baseline Report is divided into three sections: Physical Characteristics which appear as volume 1, Biological Characteristics, volume 2, and Contaminant Inputs and Chemical Characteristics, volume 3. An Appendix, containing results too detailed for the main body of the report, is included in volume 3. Characterization results are chiefly from three baseline cruises, but also from data obtained during two summer 1976 experimental cruises, as well as from National Marine Fisheries Service sources. While emphasis has been on site characterization, inferences as to the effects of dumping have been made where appropriate. A more definitive assessment of dumping effects will be made in a dumpsite assessment report about six months after the publication of this report.

1. Physical Characteristics

The morphological and geological character of the DWD-106 ocean bottom is characteristic of lower slope-upper rise regions of the Western Atlantic. Depths vary from 1700 to 2750 meters with gradients ranging from about 4% in the shallower slopes to 1% over the deeper rise. Sediments within the dumpsite area are composed of large sand and silt fractions, with silts predominating. The slope region is covered by a soft, silty sediment of recent origin and is relatively tranquil, with little evidence of significant net current action except for some erosion by tidal currents. Near the slope-rise boundary there is very little sediment of recent origin, suggesting that current action is strong enough in the region to periodically sweep away sediment accumulation. The upper continental rise appears as a tranquil, almost current-free region, with nearly uniform sedimentation. No evidence was found of any waste material reaching the bottom within the dumpsite boundaries.

The physical oceanographic environment in DWD-106 is extremely complex and variable in all but near-bottom water. Normally the surface layer of DWD-106 is Slope Water, which lies between fresher Shelf Water to the west and more saline Gulf Stream Water to the east. Overrunning of Shelf Water occurs periodically, however, and Gulf Stream Water in the form of southward-moving Gulf Stream eddies is present about 20% of the time.

Anticyclonic (clockwise) or warm core Gulf Stream eddies and meanders within the Slope Water region can import large parcels of relatively warm and saline Western North Atlantic Water and waters from the Gulf Stream into the DWD 106 area. These large water parcels move through the Slope Water region, generally in a southwest direction, until they either dissipate or rejoin the Gulf Stream in the vicinity of Cape Hatteras. Mixing of the slope and eddy water also occurs, in association with the

continual decay process of eddies and meanders, altering the normal temperature-salinity characteristics of DWD-106 Slope Water. Two of the three baseline characerization cruises encountered an eddy in or near the dumpsite. These aperiodic eddies produce the largest changes in the water column of the dumpsite. The effects of eddies and meanders may reach depths of 800 to 1000 meters. Below these depths the temperature-salinity characteristics remain within a narrow range.

Occasionally a seaward excursion of the shelf-slope front brings highly variable Shelf Water into the upper waters of the dumpsite, often producing a very complex vertical structure consisting of thin layers of cool, low salinity Shelf Water interspersed with warm, high-salinity Slope Water. Mixing of Shelf and Slope Waters across the Shelf Water/Slope Water front may also be caused by the strong circulation of the eddies or meanders. Evidence from the February 1976 cruise supports this by showing a major injection of Shelf Water into the Slope Water due to a rather weak eddy located offshore of the Virginia Capes.

The annual meteorological cycle leads to a period of stratification from May to October, during which a seasonal thermocline develops, overlain by a mixed layer which is about 30 to 40 m deep in late summer. The top of the permanent thermocline lies at about 100 to 200 m, and between the two thermoclines is a layer of weak thermal gradients, apparently a residue from winter conditions. During the fall-spring period (October-May) the water column is nearly isothermal to about 100 to 200 m depth, although inversions of up to 6°C can occur due to the mixing of low salinity, cool Shelf Water into the upper 100 m above the high salinity, warm Slope Water. Density structure is important in the mixing and dilution of dumped waste materials; both pollutants and living organisms have a tendency to layer in stable regions just above the thermocline.

Available data reveal net current action to be toward the west or southwest at all depths, approximately parallel to local isobaths. Current reversals were associated with the passage of warm core eddies, and changes in surface current occurred in response to storm passages and other wind field changes. Surface flow in this direction would be consistent with average currents detected from navigational effects. The net current speeds recorded (maximum = 11 cm/sec) are much lower than turbulent speeds due to wind forcing (in the surface layer) or those due to passage of an anticyclonic eddy.

Observations of eddy movement, and knowledge of shelf-slope current regimes, suggest that normally no net shoreward currents exist in the Mid-Atlantic region sufficient to bring dumped material near to shore. The eventual fate of any material trapped by an eddy and transported to the Cape Hatteras region is less certain, although vertical movement and dispersion would make any significant shoreward concentrations of waste material unlikely.

The climate of DWD-106 is typical mid-latitude marine with synoptic and seasonal patterns similar to a land location but with warmer winters, cooler summers, and stronger winds than at a corresponding coastal station.

The mean temperature varies from about 4°C in February to 24°C in August. Northwesterly winds prevail from October through March, when the region is influenced by northerly pressure centers, the Icelandic low, and the North American High. Southwest winds dominate from April through September when the influence of the Bermuda High to the south prevails. Due to migrating weather systems, however, winds are quite variable in all seasons, most so in winter. The average wind is almost twice as strong (10 m/sec) in January-February as in July (5 m/sec). Waves are moderate, with an average wave height reaching a hazardous level of 3.5 m or more about 10% of the time in the winter, and around 1% in the summer. Both winds and waves increase continuously with distance from shore.

Extreme conditions can be estimated statistically from analysis of past tropical storms affecting the region. On this basis, a maximum sustained wind of 55 m/s and a maximum significant wave height of 21 m will occur within the dumpsite area once every 100 years.

2. Biological Characteristics

Biological data obtained on the baseline cruises provided limited quantitative coverage of the region. Together with other available data, this also sufficed to provide a qualitative biological overview of the region. A complete picture is not yet available, however, and distinguishing dumping effects from natural variations will continue to be a problem. Present studies are using a combination of laboratory experiments, pathobiological studies, and comparison with control areas to attempt to resolve this difficulty.

Plankton undergo large natural variations with changing water type and for this reason, assessment of the plankton of the region was difficult. Coastal waters are characterized by high nutrient concentrations and populations with wide seasonal variations in abundance and diversity. Oceanic waters have reduced nutrient levels and population densities, but photosynthetic processes extend to much greater depths. Mixing water types will produce a complex combination of these conditions.

A summer phytoplankton assessment showed an abundant coastal population near the surface (0-30 m) and a more even, lower concentration of oceanic forms over the upper 75 m. The assessment occurred in conjunction with a dump of waste materials, but no definite effects of dumping were observed. Populations were not significantly different before and after dumping of waste material; lower counts were probably attributable to dilution by barge water.

Zooplankton were assessed in winter, spring, and summer with similar results. Even for stations which could be qualitatively categorized as having a dominant water mass type, the organisms present were characteristic of all the water types affecting the region. Generally, as is normal, zooplankton counts from Shelf Water stations were distinctly higher than those from Slope Water or Gulf Stream Water stations. Gelatinous zooplankton were more numerous in oceanic water than in Slope Water and exhibited an unusually high variability, the most abundant species in July 1975

being completely absent in June and August 1976. The cause of this variability is not clear. For all planktonic forms, variability from mixing of water types tended to mask any variability due to dumping, and made any such effects much harder to detect.

The midwater fish population of DWD-106 consists mostly of Slope Water species, upon which several Northern Sargasso Sea species, presumably transported to the dumpsite by anticyclonic Gulf Stream eddies, are superimposed. Slope Water species were more abundant in all areas sampled, including eddies, and both Slope and Sargasso Sea species as well as a higher total fish population were found to be greater in the eddies than in Slope or Shelf water. The abundance of Sargasso Sea species in the DWD-106 area appears to be dependent on the size, age, and temperature of the eddies.

A large proportion of the DWD-106 mid-water fish population migrate in the evening from depths of several hundred meters or more to 0 to 200 m, then return before daylight to the greater depths. This provides a potential pathway for the transfer of pollutants from near surface to deeper waters. Catch rates in the 26 to 200 m depth range were found to be lower in samples closest to the dumpsite boundary than in those to the east, with a sharp catch increase below 500 m. Avoidance of polluted material concentrating near the thermocline could explain the lowered catch rate; however, it could also be due to the dynamics of the anticyclonic Gulf Stream eddy present during sampling, or to onshore-offshore effects. Additional sampling in future experimental and monitoring cruises will attempt to resolve this question. Total fish catches within and without the dumpsite were not significantly different, although midwater fish were most abundant outside the dumpsite. The highest rate of fishless tows occurred the night after a dump, but whether the tows were still in water affected by the dumped material is not known.

Many open-ocean predators, including sharks, swordfish, and tuna, move through DWD-106, often in association with migrations of a thousand miles or more. Thirty-one species have been identified, most of those, especially in winter, being found in association with the Gulf Stream. The Blue Shark was the most abundant species caught in the region, and appears to feed largely on squid. These predators represent the top of the food chain, and could, therefore, concentrate contaminants and heavy metals from a wide variety of sources. Their residence time in the dumpsite is short, however, and dumping effects as such were difficult to isolate.

Extensive observations of deep sea and bottom dwelling fish and invertebrates were made from a deep sea submersible; many samples were taken as well. Characteristic patchiness of distribution and decline with depth of overall fish population density and diversity were found. There was a general trend of decreasing density of bottom living organisms with increasing depth and distance from the coast, in agreement with earlier studies; bottom dwelling invertebrates seem similar in density and diversity to other regions of the mid-Atlantic slope and rise. There was no observable impact from dumping on bottom fish or invertebrates.

3. Contaminant Inputs and Chemical Characteristics

Through 1976 the major input of industrial waste to the DWD-106 consisted of by-products from duPont and American Cynamid chemical processes. The main component of the duPont waste is sodium sulfate, with less than 2% of soluble organics. The American Cyanamid waste consists of wastes and residues from a variety of chemical processes including production of nonpersistent organic insecticides, paper chemicals, mining chemicals, and water treating chemicals. Significant amounts of mercury, cadmium, lead, nickel, copper, zinc, and chromium were discharged.

Because of the importance of possible heavy metal contamination, considerable emphasis was placed on measuring concentrations of a variety of metals in the water column and in key organisms. Results of the May 1974 cruise indicate that some metals were significantly elevated compared to normal ambient concentrations. However, normal concentrations are only a very few parts per billion, and great care must be taken to avoid errors in measured values. A variety of factors can lead to misleading results, among them sample contamination during collection, storage, or analysis. More recent observations support the conclusion that heavy metal concentrations in the DWD-106 water column are typical of shelf-slope regions. Moreover, calculations show that the total amount of metals added in dumping contributes less than 1% to the total normal amount of metals in the water at the dumpsite region. None of the observations occurred near the time of or in the immediate vicinity of dumping, so that ambient concentrations would be expected to be typical of the background for the region.

Although it does not seem that addition of contaminants at DWD-106 is having an observable effect on the water column, the possibility of concentration in the food chain must also be considered, particularly for heavy metals such as mercury. Heavy metal concentrations were observed in samples of small pelagic fish, crustaceans, and large predators. In addition, heavy metal and hydrocarbon concentrations were observed in sediments. Unusually high levels of cadmium, 16.1 to 26.9 ppm, were found in three swordfish livers. Cadmium concentrations in other fin fish were lower. All of the muscle samples of fish, except lancet fish, had mercury concentrations in excess of the Food and Drug Administration action level of 0.5 ppm. The relatively small amount of cadmium and mercury added by dumping and the migratory nature of the large predators make it unlikely that dumping is a factor in the observed concentrations. Copper and manganese concentrations were low to moderate, while lead concentrations were below the level of detection. Average zinc concentrations were higher than those for other metals but were similar to concentrations to fin fish obtained from the New York Bight.

Heavy metal analyses were undertaken on samples taken in deepwater sediments both in and out of DWD-106. Although the heavy metal content appeared elevated relative to uncontaminated shelf sediments, there was little variation among stations, and the metal content could not be attributed to ocean disposal. The amount of long chain hydrocarbons in the sediments is much less than those found in dumpsites located in relatively shallow coastal waters.

4. Recommendations

Environmental studies in DWD-106 have now moved from baseline characterization to experimental studies and monitoring phases. In this context, recommended further studies are designed to focus on factors which relate directly to dumping problems.

The character of water mass and eddy movement in the DWD-106 region has an important effect on the movement and dispersion of dumped material. Many features of the water mass structure have been examined, but seasonality and space and time scales have not been adequately resolved. Continuing assessment of physical conditions through frequent standard oceanographic measurements supplemented by satellite photographs should be made. Water samples for measurement of standard chemical parameters as well as for heavy metal analysis should be taken in conjunction with the physical measurements

Those living organisms which appear to be the best potential indicators of dumping effects are zooplankton communities, fish eggs and larvae, vertically migrating fishes, and near-surface organisms in general. These have the greatest probability of being directly contacted by or passing through dumped material. A biological program encompassing zooplankton sampling and analysis, analysis of fish eggs and larvae for damage, sampling and analysis of vertically migrating fishes and near-surface organisms, and routine midwater trawling should be developed in conjunction with the physical programs Sampling should be carried out frequently and should include measurements in a coastal area so that natural variations can adequately be taken into account. It will be important to relate the biological and physical measurements to determine if particular locations, seasons, or times of day are noticeably favorable or unfavorable for dumping.

Although no impact on the sea bottom or on bottom dwelling organisms was noted, an annual or semi-annual bottom sampling program should be scheduled to verify this finding.

Waste constituents in the DWD-106 area show considerable year-to-year variation. Only about 7 kg of mercury, for example, were dumped in 1974, but over 4000 kg were dumped in 1975. Moreover, the nature of possible toxic organic constituents is not adequately understood. Continued careful and complete examination of dumped materials is a requisite to other monitoring effects.

Much of the above work will be incorporated into a comprehensive monitoring program for DWD-106 to begin in FY 1978. A significant start toward monitoring is already taking place; a program of routine, twice-monthly temperature transects and monthly plankton surveys and evaluations is underway. Also, an extensive program of laboratory and experimental investigations directed toward understanding the movement, dispersion, and effects of dumped material is being carried out. Results of these and other studies will be published in future reports.

APPENDIX I

COMMENTS OF FEDERAL AND STATE AGENCIES ON THE POSSIBLE RELATIONSHIP BETWEEN SEWAGE SLUDGE DUMPING AND THE FISH KILL AND BEACH CLOSURE INCIDENTS OF 1976

Letter from U.S. Environmental Protection Agency requesting comments - October 14, 1976.

Responses From:

- National Oceanic and Atmospheric Administration - November 11, 1976
- U.S. Coast Guard - November 9, 1976
- Food and Drug Administration - October 29, 1976
- Interstate Sanitation Commission - November 3, 1976
- U.S. Fish and Wildlife Service - November 18, 1976
- New York State Department of Environmental Conservation (with enclosure from American Littoral Society) - November 5, 1976
- New Jersey Department of Environmental Protection - November 5, 1976 and January 24, 1977

14 OCT 1976

NOAA

Mr. David H. Wallace
Associate Administrator for
Marine Resources
Department of Commerce
NOAA
Rockville, Maryland 20852

Dear Mr. Wallace:

EPA, Region II is presently reviewing comments received on the "Draft" Environmental Impact Statement (EIS) - Ocean Dumping of Sewage Sludge in the New York Bight. The "Final" EIS is scheduled to be completed for Agency review sometime in December 1976. In that during this past spring and summer, there have been several environmental episodes, mainly the wash-up of floatables and trash on Long Island and New Jersey beaches, an extensive kill of benthic organisms in the New York Bight, and considerable press and political pressure to associate dumping practices as a direct cause of these episodes, we would appreciate your comments regarding the following:

1. Does your Agency believe that dumping is the direct cause of these episodes? If so, do you have any technical evidence to support this claim?

2. Do you maintain, as you have indicated in the past, the position that sludge dumping at the existing sites should be continued? If not, what would be your position toward moving to either of the two sites studied by NOAA and located roughly 60 miles offshore? What would be your opinion to moving the dump site off the Continental Shelf to the present chemical waste site? If you believe the dump sites, on the basis of the recent incidents should be relocated, what environmental factors do you consider appropriate in that decision?

In order to have the input of your comments on the above items into our Environmental Impact Statement process, it will be necessary that we receive these comments by November 5, 1976, at the latest.

I or any member of my staff will be most happy to meet with you to review this important aspect of this Agency's ocean dumping program.

Sincerely yours,

Gerald M. Hansler, P.E.
Regional Administrator

bcc: Russell E. Train
Administrator
EPA, Washington, DC 20460

Michael Ludwig
NMFS
212 Rogers Ave.
Milford, Conn. 06460

Barbara Metzger
Ch., Environmental Impacts Br.
EPA, NY

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852

NOV 11 1976

Mr. Gerald M. Hansler, P.E.
Regional Administrator
United States Environmental
Protection Agency, Region II
26 Federal Plaza
New York, New York 10007

Dear ~~Mr. Hansler~~ Jerry:

In your letter of October 14th, you asked for our opinions as to the relationship, if any, between the current practice of sewage sludge dumping in the New York Bight and the two environmental episodes that occurred this summer, namely the wash-up of floatables on area beaches and the anoxic conditions that persisted off the coast of New Jersey. In addition, you inquired whether or not, in light of these episodes, we have modified our position with respect to relocating the sewage sludge dumpsite. The specific questions you posed and our response follow:

Question 1.

Does your agency believe that dumping is the direct cause of these episodes? If so, do you have any technical evidence to support this claim?

Response

This agency does not believe that ocean disposal of sewage sludge is the direct cause of these episodes. Available data and observations at the dumpsite do not indicate sufficient floatables to account for the quantities of materials washed ashore during the latter half of June 1976 when the beaches on the south shore of Long Island experienced successive inundations of floating litter. Also, neuston net tows behind sewage sludge dumping vessels during the period of these episodes collected but few floatables. As for the large-scale destruction of fish and shellfish off the New Jersey coast this summer, the major sources of the problem are the various sources of nitrogen and organic material in the vicinity of the New Jersey shore. Data from NOAA's MESA investigations make clear that only very small contributions

(less than 4%) of nitrogen and carbon are from sewage sludge dumping. While this dumping does sometimes result in localized reduction of dissolved oxygen concentrations, dumped sewage sludge was not a major contributive factor to the anoxic conditions that prevailed this past summer in a large area off the coast of New Jersey. Moreover it is unlikely that the relatively small contributions of nutrients from sewage sludge dumping will be of major importance in possible future episodes of this kind.

Question 2.

Do you maintain, as you have indicated in the past, the position that sludge dumping at the existing sites should be continued? If not, what would be your position toward moving to either of the two sites studied by NOAA and located roughly 60 miles offshore? What would be your opinion to moving the dumpsite off the Continental Shelf to the present chemical waste site? If you believe the dumpsites, on the basis of the recent incidents should be relocated, what environmental factors do you consider appropriate in that decision?

Response

We maintain our previously stated position that the present sewage sludge dumpsite in the New York Bight should continue to be used until either: (1) it is demonstrated that continued use presents a hazard to human health or interferes with the use of local beaches; or (2) the practice of ocean disposal of sewage sludge is terminated.

We believe that the practice of ocean dumping of sewage sludge should be eliminated by 1981, in accordance with your EPA stated goal. Relocating the existing sewage sludge dumpsite is not warranted, based on our best data at this time.

As for moving the sewage sludge dumpsite to the present chemical waste dumpsite (Deepwater Dumpsite 106) we believe that this action should be avoided, because existing data on the recent environmental incidents do not provide a basis for relocating the existing sewage sludge dumpsite, to either of the two alternative sites studied earlier or to DWD-106.

I hope this expression of our views is helpful to your efforts to

complete the EIS process concerning the disposal of sewage sludge in the New York Bight. Should you desire amplification or clarification of some of the points contained herein, please do not hesitate to contact me.

Sincerely

Dave

David H. Wallace
Associate Administrator for
Marine Resources

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
Commander (mep)
Third Coast Guard Dist.
Governors Island
New York, N.Y. 10004
(212) 264-4916

5722d

8 NOV 1976

Mr. Gerald M. Hansler, P.E.
Regional Administrator
United States Environmental Protection Agency
Region II
26 Federal Plaza
New York, N.Y. 10007

Dear Mr. Hansler:

This letter is in response to your letter of 21 October 1976 in which you requested our comments on the alleged involvement of ocean dumping in certain pollution incidents of the past summer and the advisability of shifting sewage sludge dumping to a location further offshore.

In regard to the first area (item #1 in your letter), we do not currently gather the information necessary to permit an informed analysis of the impact of ocean dumping. Consequently, we are unable to draw a conclusion on whether ocean dumping, specifically, resulted in any of the pollution incidents referenced in your letter. This is in spite of our participation in the preparation of the inter-agency task force report regarding these incidents, which, when finalized, will be probably the most authoritative review available.

In regard to the second area (items #2 and #3 in your letter), for the reason mentioned above, we also have no input regarding the environmental advisability of relocating the present dumpsite or the selection, for environmental reasons, from among the other three potential areas. Relocation of the dumpsite, would, however affect our ability to conduct surveillance of sewage sludge dumping activities, at the present, and it is to this subject area that we address the substance of our comments. For a quantitative assessment of the problems which would arise, a more complete review is required. At the present time, however, certain generalizations can be made. The following comments apply:

(1) From a surveillance standpoint alone, the current distribution of ocean dumping activities is more conducive to an effective surveillance program, given the finite extent of our surveillance resources. With the bulk of ocean dumping activities occurring in a relatively confined area, individual patrols are able to observe the greatest number of ocean dumping

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9 NOV 1976

vessels within a limited time period. By, in effect, dispersing the dumpsites, a greater commitment of Coast Guard resources would be required to maintain the same level of surveillance. On the other hand, a reduction in the traffic levels in the vicinity of the New York Harbor entrance channels, which would result from this move, would be consistent with navigational safety considerations. This would be a positive benefit from such a move, although, at present, we have no substantive indication that it may be necessary.

(2) A shift to further offshore, regardless of which of the three potential sites is selected, would foreseeably result in a change in the "kind" of surveillance that we would provide, while the selection of the individual site would affect the "degree" of commitment required. The added distances involved, coupled with operational limitations, would make less favorable the prospects for the continued use of the 82' and 95' class patrol vessels and HH-52A helicopters, which currently provide surveillance of these activities. A greater emphasis on the use of shipriders may be required, although the source of additional personnel to accomplish this, in view of the short time frame, would be uncertain.

(3) The implementation of the Ocean Dumping Surveillance System, tentatively by the end of 1977, will, hopefully, eliminate impact on our surveillance program, resulting from such a change, as an issue in discussions of this type. The design of this system is intended to permit surveillance coverage regardless of the location of the particular dumpsite.

I hope that the comments above are responsive for your purposes. I recognize the pressing nature of the issues, which you are currently facing, and the foreseeable problems, affecting our surveillance program, which I have outlined above, are not intended to be overriding. If I or my staff can be of further service to you in this matter, please feel free to contact us.

Sincerely,

W. F. REA, III
Vice Admiral, U. S. Coast Guard
Commander, Third Coast Guard District

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
FOOD AND DRUG ADMINISTRATION

REGION II
850 THIRD AVENUE
BROOKLYN, NEW YORK 11232
TELEPHONE: (212) 965-5050

CABLE ADDRESS: NYFOODRUG

cc: Crowley
Simonds
Scobrick

October 29, 1976

Mr. Gerald M. Hansler, P.E.
Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10007

Dear Mr. Hansler:

This is in response to your letter of October 14, 1976, to our Senior Regional Shellfish Specialist, Jerrold H. Mulnick, regarding our position on the Ocean Dumping of Sewage Sludge in the New York Bight.

The Food and Drug Administration has no evidence one way or the other that the sewage sludge being dumped in the New York Bight was or was not the direct cause of any of the environmental episodes that took place this past spring and summer.

We have reviewed scientific information developed by NOAA, which indicates that the primary cause of these episodes have been the estuarine discharges of the Hudson-Raritan-Passaic drainage basin, including natural, agricultural and street drainage runoff, and treated and untreated sewage.

We continue to maintain the position that to change the sludge dump sites to either of the two locations roughly 60 miles offshore would cause new problems regarding the destruction of shellfish resources, would result in additional closures by our agency, and would put an additional patrol burden on the U.S. Coast Guard. Assuming that ocean dumping of municipal sludges in the New York Bight will be discontinued by December 31, 1981, and that the capacity of the present site will not be exceeded in that time period, we see no advantage in contaminating a second site containing a harvestable shellfish resource with sewage sludge.

If it is necessary to move the sludge dumping site to another location, we would have no objection to the area of the present chemical waste site.

Sincerely,

Clifford G. Shane
Regional Director
Food and Drug Administration
Region II

INTERSTATE SANITATION COMMISSION

10 COLUMBUS CIRCLE • NEW YORK, N. Y. 10019
AREA CODE 212-582-0380

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DIRECTOR-CHIEF ENGINEER

November 3, 1976

Mr. Gerald M. Hansler, Regional Administrator
U. S. Environmental Protection Agency
- Region II
26 Federal Plaza - Room 1015
New York, New York - 10007

Dear Mr. Hansler:

This is in response to your letter of October 15, 1976, in which you raised questions pertaining to ocean disposal practices in the New York Bight.

In answer to question (1), the Commission does not believe that ocean dumping of sludge is the cause of the episodes of floatables washing up on the Long Island shore. Most of the materials that were washed up on the shore were not sludge but the type of material that collects on a bar screen entering a sewage treatment plant and also floatables that are skimmed from the settling tanks. These bar screenings and skimmings are supposed to be placed in landfills and are not permitted to be placed in sludge barges which are to be dumped at the present 12-mile dump site. We are satisfied that someone illegally placed this material in their sludge for disposal at sea. During the period of some of the episodes, there was considerable fog and the barge loads may have been released short of the proper location. This, in addition to prevailing southwesterly winds, was all that was needed to wash these floatable materials ashore.

On another occasion, the material washed ashore was of the type of skimmings that indicated they had been stored for many months and could have come from the ruptured tanks near the Bay Park Treatment Plant or storage tanks at some

.../...

other treatment plant which were cleaned and again mixed with sludge for barging to sea.

In response to question (2), based on the evidence at hand, including the Dames and Moore report prepared for the U.S. EPA, we still have not seen any evidence which would indicate that the sludge dump site should be moved farther out at this time. This could spoil another area of the ocean without any overall benefit to the environment and would be a substantial increase in cost to the operating agencies. These alternate sites should only be used if monitoring indicates that the sludge is threatening the beaches. The 106-mile site would not only be much more expensive but would also take some time to develop the capability of vessels to haul this sludge to this much farther site.

The episodes along the New Jersey coast which destroyed not only many fish but also sea clams were blamed by some on ocean disposal of sludge and we do not concur. If the lack of oxygen which killed the fish was due to algae as some reported, the amount of nutrients from the sludge dumping would be such a small percentage of nutrients that are discharged into the New York Bight that the removal of sludge dumping completely would not, in our opinion, have prevented the episodes. One of the largest sources of nutrients in the New York Metropolitan Area is from the combined sewers which discharge raw sewage during times of rain but also the accumulated sewage solids which have settled out during dry weather since the last rainfall. The digesters used by many of the treatment plants for the treatment of their sludge also contribute to the additional load of nutrients in the effluents from the treatment plant.

We recommend that the sludge management plan that the Commission has just completed be implemented expeditiously so as to meet the December 31, 1981, date to phase out ocean disposal. A real effort in enforcing pretreatment of heavy metals and toxic materials would make it possible to go to composting and remove much of the sludge in the next two to three years. During this interim period of continued sludge

.../...

disposal in the ocean, a closer surveillance should be implemented to prevent floating materials from being carried out with the sludge to the present dump site.

Very truly yours,

Thomas R. Glenn
Director & Chief Engineer

TRG:rym

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
One Gateway Center Suite 700
NEWTON CORNER, MASSACHUSETTS 02158

IN REPLY REFER TO:

NOV 18 1976

Mr. Gerald M. Hansler, Regional Administrator
U. S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

This is in response to your October 14, 1976, letter requesting our comments regarding ocean dumping of sewerage sludge in the New York Bight.

In response to your Question No. 1, we do not have technical information or data to link the reported washup of floatables and trash on New York and New Jersey beaches to sludge dumping. I am sure you are aware, however, that data collected by the Woods Hole Oceanographic Institute and the MESA Project (NOAA) indicated that the prevailing currents in the New York Bight could have caused those episodes.

In response to Question No. 2, we recommend that, as soon as possible, dumping of sewerage sludge at existing sites in New York Bight be terminated. Furthermore, we are opposed to all alternative dump sites within the Bight, even 60 miles offshore.

Disposal of the sewerage in the chemical waste site off the Continental Shelf will significantly increase the cost and might encourage illegal dumping closer to land. In addition, there is reason to suspect that microbiological degradation of sewerage sludge at sites further offshore will be substantially less. Material dumped at those distant sites could drift inshore with prevailing seasonal currents before it is degraded, thereby lowering the oxygen content near shore coastal waters. Offshore currents could spread contaminants over a wide area.

In summary, due to the uncertainties and potential consequences associated with dumping of sewerage sludge in New York Bight, we consider it more appropriate to discontinue dumping sewerage anywhere in the Bight. Rather than selecting other sites, we feel that EPA should direct its efforts towards identifying and developing other disposal methods.

Sincerely yours,

ACTING *Regional Director*

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Hansler
cc: Gooding (w. Encl)
11/16 GH

Peter A.A. Berle
COMMISSIONER

STATE OF NEW YORK
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK 12233

November 5, 1976

Dear Mr. Hansler:

This is in response to your letter of October 14, 1976 regarding the additional questions you transmitted relating to EPA Region II's review of the Draft Environmental Impact Statement--Ocean Dumping of Sewage Sludge in the New York Bight.

Following are our responses to the three questions:

QUESTION 1: Does your Agency believe that dumping is the direct cause of these episodes? If so, do you have any technical evidence to support this claim?

RESPONSE: Based on (a) our knowledge of the characteristics of sewage sludge barged to the New York Bight dumping grounds from New York State sources in New York City and Westchester County; (b) the technical report by NOAA's Mesa Project entitled "Contaminant Inputs to the New York Bight-April 1976", and (c) the minutes and report of the Interagency Steering Committee on the New Jersey Fish Kill, it is acknowledged that sewage sludge dumping is one of several direct causes contributing to the referenced environmental episodes. However, with respect to the washup of floatables (i.e., grease balls, oil balls) on Long Island southern beaches, the sewage sludge dumping contributes only 3% of the total annual oil and grease load to the New York Bight; similarly with respect to the extensive "benthic organisms" kill, sewage sludge dumping contributes only 8% of the total annual nitrogen load to the Bight.

We are reasonably certain that nutrient contribution from the New York City/New Jersey metropolitan areas are contributing vast amounts of the marine productivity limiting nutrient, nitrogen, to the primary receiving waters of Upper New York Bay and the East River. Although nitrogen concentrations in these waters are well in excess of that capable of supporting noxious algae blooms, there is an unidentified inhibitory factor which precludes these blooms from developing until dilution with the receiving waters of western Long Island Sound and the Lower New York Harbor. These waters have a long history of advancing eutrophication.

Consequently, this Department included in New York State's Municipal Needs Survey of 1974, costs to achieve 1983 goals of PL 92-500, for nitrogen removal at Long Island and New York City sewage treatment plants. Subsequently, your staff "allowed" inclusion of these costs for Long Island plants but challenged the inclusion of nitrogen removal costs for New York City plants. Additional justification was submitted by DEC to restore New York City costs which EPA unilaterally deleted from their transmittal of

New York State's package. However, this Department again included these costs in the 1976 version of the Municipal Needs Survey.

QUESTION 2: Do you maintain, as you have indicated in the past, the position that sludge dumping at the existing sites should be continued? If not, what would be your position toward moving to either of the two sites studied by NOAA and located roughly 60 miles offshore? What would be your opinion to moving the dump site off the Continental Shelf to the present chemical waste site? If you believe the dump sites, on the basis of the recent incidents should be relocated, what environmental factors do you consider appropriate in that decision?

RESPONSE: We believe it is necessary to continue sewage sludge dumping at the present site until December 1981 because of (a) the additional technical problems and costs associated with re-release of toxic compounds (PCB's, mirex, kepone, organic acids, heavy metals, etc.) via vapor emissions from either incineration or pyrolysis or leachate from wet sludge dewatering, (b) the minimal relative impact of sewage sludge dumping on the environmental episodes of this past summer, (c) the enormous costs of energy intensive alternatives and unknown funding strategies, and (d) the availability of means by which floatables in sewage sludge could be minimized.

The two sites studied by NOAA which are located 60 miles offshore have limited appeal because of the increased costs associated with longer haulage and questionable benefit to be gained in the New York Bight at the expense of befouling a new area.

Moving the dump sites off the Continental Shelf to the present chemical waste site are rejected out of hand as being impractical, unfeasible and unmanageable.

QUESTION 3: As you know, we have imposed with your concurrence upon the present municipal ocean dumping permittee, a phase out schedule ending in December 1981. What would be your position toward developing these alternatives at a faster pace or in determining more economical and less equipment intensive solutions such as landfill, trenching, composting, etc., which could be implemented pending development of the more suitable long-term solutions?

RESPONSE: Acceleration of alternatives to sludge dumping is imperative in any event if the 1981 timetable is to be met. Because of the importance of resolving the problems described in response to Question 2 above, the study of alternatives must be kept on schedule or accelerated as necessary. We are extremely receptive to "more economical and less equipment intensive solutions...which could be implemented pending development of the more suitable long term solution". However, your term "more economical" does not identify the cost benchmark to which you refer nor the funding strategies to achieve the alternative. Furthermore, the efficacy of embarking on alternatives to the sewage sludge dumping practice in the Bight is not placed in any perspective by EPA in spite of the available "materials balance" information relative to the other much more significant direct contributors to the Bight's environmental episodes of 1976. For instance, what do the "long-term solutions" have in mind for addressing the combined sewerage/urban runoff and dredge spoil dumping problems.

For your information, I am attaching a copy of a letter received from Mr. David K. Bulloch, President of the American Littoral Society relating their comments to the above questions.

The opportunity to review, comment and participate in this extremely complex and crucial problem is appreciated.

Very truly yours,

Peter A.A. Berle

Attachment

Mr. Gerald M. Hansler, P.E.
Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10007

AMERICAN LITTORAL SOCIETY

For The Study and Conservation of Aquatic Life

SANDY HOOK • HIGHLANDS, NEW JERSEY 07732 • 201-291-0055

October 26, 1976

Mr. Peter A.A. Berle, Commissioner
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

COMMISSIONER OF ENVIRONMENTAL CONSERVATION

Dear Mr. Berle:

We understand that you are preparing answers to a letter from Mr. Gerald Hansler, EPA Regional Administrator, about the relocation of the sewage sludge dumping grounds in the New York Bight, and that these comments are due by November 5.

While the Littoral Society has not been asked to make comments directly to EPA, we would like to present to you our responses to the series of three questions posed by Mr. Hansler.

1. We believe there is no question that sewage sludge dumping contributed to the ocean fish kill this past summer, but we submit a question which we believe EPA should be addressing. That is: Does proof exist that the present sludge dumping site did not contribute to the summer disaster. We think you will agree that no such proof exists. To put the question another way: Does the dumping of sewage sludge in its present location contribute to the environmental well-being of the New York Bight? Of course it does not.

2. We do not believe that the sludge site should be located at either of the alternatives outlined in EPA's draft environmental impact statement of February. If either alternative site is used, there will be an impact on local shellfish and there is no guarantee that the material will not continue to stay within the Bight's circulation system and contribute to a similar summer incident in the future. The basic question to be asked is: During the interim (all sludge dumping in the ocean will be stopped Dec. 31, 1981), where should the sludge be dumped so that its nutrients are not part of the Bight's system and thus part of the Bight's nutrient overload? The answer is to move the site far offshore to an area which is already an existing site (thus it can be done quickly). The present chemical waste site fills those criteria.

3. The 1981 phase-out deadline is a maximum amount of time; any lesser time means that much better chance that a killing nutrient overload can be avoided (leaving aside discussion of other problems -- outfalls, urban runoff, dredge spoil dumping). Some sewage plants can undoubtedly go to onshore sludge disposal quickly. They should be encouraged to do so.

This summer's ocean disaster is the best proof yet that we need action to clean up the waters of the Bight. The best, fastest first step that can be taken is to move the dumping to the 106-mile site. This would signal the start of serious action toward ending all ocean dumping. If agencies fail to get together now to act, we will only fall back to more studies, more delays, and probably, more fish kills.

Sincerely,

David K. Bulloch, President

EP-2 cc: Reisling Strogen Sachuk 11/8/76

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DAVID J. BARDIN, COMMISSIONER
P. O. BOX 1390
TRENTON, N. J. 08625
609-292-2885

November 5, 1976

Hon. Gerald M. Hansler
Regional Administrator
Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

Thank you for your letter of October 14, 1976 inviting us to review comments previously submitted to EPA Region II on the Draft Environmental Impact Statement (EIS) - Open Dumping of Sewage Sludge in the New York Bight. Assistant Commissioner Paulson and I, together with other members of the DEP staff, have reviewed the testimony submitted March 29, 1976 on that draft EIS and we will, indeed, wish to develop our position in light of last summer's disastrous experience in the Atlantic Ocean deeps. EPA and DEP have been working together all summer to analyze that disaster, to assure the complete phaseout of ocean dumping of sewage sludge by 1981 and to beat that stringent timetable wherever possible. You and I have been discussing the possibility of a temporary relocation of the dump site to the edge of the continental shelf pending the scheduled end of ocean dumping. Our staffs have been working in recent days to analyze various aspects of such a temporary shift.

As we discussed yesterday, I would like to continue that work and related discussions for a few more days before signing off on the EIS process. I appreciate the opportunity to work with you on the process, as well as the regulatory decision-making processes that will have to follow publication of the final EIS this winter.

Faithfully,

David J. Bardin
Commissioner

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APPENDIX J

ISC

REPORTS ON LAND-BASED SLUDGE DISPOSAL

IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA

PHASE 1 REPORT -- CHAPTER III, CONCLUSIONS AND RECOMMENDATIONS (1975)

PHASE 2 REPORT -- CHAPTER II, SUMMARY (1976a)

SEWAGE SLUDGE DISPOSAL MANAGEMENT PROGRAM -- SUMMARY (1976b)

III. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The important conclusions arrived at on the basis of environmental considerations, total costs, technical feasibility, and energy usage are as follows. These conclusions form the basis and backup for the recommendations that are made:

1. Sludge Conditioning and Dewatering

The two methods of sludge conditioning ahead of dewatering are by use of chemicals and by heat treatment. The cost of conditioning cannot be dealt with separately, since conditioning influences the costs of dewatering. The cost of chemical conditioning (lime and ferric chloride or polymers) and then dewatering indicates that the combined cost for the different dewatering equipment falls in the range of $30 to $38 per ton of dry solids, including capital and O&M costs. The choice of dewatering method cannot be made only on the basis of these costs, since the moisture content of the sludge cake produced varied from 80 to 60 percent, and the cost of succeeding processing methods determines which method of dewatering is most cost-effective.

The cost of heat treatment to condition the sludge plus dewatering falls in the range of $66 to $72 per ton of the original dry solids precessed. Because this method of treatment affects the total pounds of sludge remaining and its character, a decision as to which conditioning or dewatering method to use depends on the costs of succeeding processing or disposal methods. If the dewatered sludge is to be disposed of as such, then when using filter pressing, the cost of producing the cake with heat treatment is about double that with chemical conditioning.

However, the heat-treated sludge is sterile and there is about 25 percent net less solids to dispose of. Thus, the difference in the dewatered sludge weight or volume, since both can be dewatered to about 40 percent solids, is about 25 percent. To justify using heat treatment, the reduction in hauling and placement costs would have to overcome the 100 percent differential in conditioning and dewatering costs. The net electric power usage for heat treatment plus dewatering is about 360 kwhr per ton compared to 120 kwhr for chemical conditioning and filter press dewatering.

2. Incineration or Pyrolysis

Incineration of sludge or its pyrolysis are both thermal conversion processes that can permit maximum energy recovery from the heat value of the sludge solids. The two processes are compatible as far as requirements for dewatering are concerned. Also, the multiple-hearth incinerator furnaces can be adapted to pyrolysis. The capital and operating costs and energy recovery potential are comparable, with pyrolysis having a distinct advantage as far as air pollution controls are concerned, and is, therefore, the more desirable sludge processing system from the viewpoint of

potential negative environmental impact on the air resources of an area.

Pyrolysis has another advantage over incineration in that the fuels from the pyrolysis reactor, the gas and char, can be stored and thus uniform feed of a steam boiler furnace can be obtained even if the rate of sludge feed to the pyrolysis reactor is variable.

The total capital and O&M costs for a large-size incineration or pyrolysis plant with maximum heat and energy recovery are about $47 per ton of dry solids in the original sludge when processing digested sludge with a heat value of 5,000 Btu per lb. This alternative uses chemical conditioning and filter presses and a sludge of at least 40 percent solids is obtained.

This system incorporates an afterburner for raising the furnace exhaust gas temperature to 1,400 degrees F. Credit has been taken for $22.50 worth of excess electric power produced (evaluated at 5¢ per kwhr). From this credit there is subtracted $4.60 for cost of power generation equipment, leaving $17.90 per ton. Power recovery becomes practical with a large installation having standby equipment. With heat conditioning and filter pressing the total costs are $80 per ton, and there is no power recovered, although the waste heat can be used in the conditioning process. The total power usage with heat treatment and pyrolysis is 415 kwhr per ton, while with chemical conditioning it is 175 kwhr per ton and 260 kwhr are recovered leaving a net gain of 85 kwhr per ton.

If undigested sludge having a Btu value of 6,500 per lb is processed, the energy recovered is increased so that the total cost of conditioning, dewatering, pyrolysis, sidestream treatment, and including all air pollution controls falls to $31 per ton. Moreover, in this case the sidestream is considerably weaker and, therefore, its treatment becomes less costly than when digested sludge is dewatered.

Incineration or pyrolysis with proper air pollution control equipment and treatment of the liquid sidestreams will permit the control of emissions of particulates, odorous vapors, SO_2, NO_x, volatile metals such as mercury and all other heavy metals to well within all federal and local emission standards. In addition, all toxic chlorinated hydrocarbons, including PCB's, will be destroyed.

This alternative for sludge processing, when combined with chemical conditioning of the sludge, produces a liquid sidestream (even when processing digested sludge), which can be readily treated in the activated sludge process to produce an effluent of secondary treatment quality as far as BOD, COD, NH_3, and suspended solids are concerned. The potential negative impact of this liquid sidestream on water is no greater than that of ordinary treated sewage.

3. Wet-Air Oxidation

This process should not be classed with heat treatment for sludge conditioning, since the latter only accomplishes a very small amount of oxidation of the organic solids; that is, 0 to 5 percent COD reduction of the sludge. For true wet-air oxidation, the COD reduction can be as high

as 75 to 85 percent. Such a high amount of oxidation requires very high reactor pressures (1,500 to 2,000 psi), which makes the process very energy-intensive and costly. An intermediate level of oxidation (600 to 800 psi) produces a total volatile solids reduction of about 40 to 50 percent. In that respect, it is about comparable to anaerobic digestion. The total solids reduction is about 30 to 35 percent. These figures are corrected for the increase in the solids to be processed due to regeneration of solids by the biological treatment of the strong liquor that the process produces.

The intermediate wet-air oxidation process has total costs of $98 per ton of dry solids in the original sludge. If the oxidized slurry is dewatered on a vacuum filter, the additional cost is $5.30 per ton. The high-pressure system has costs of $137 per ton for wet-air oxidation and $4.20 per ton for vacuum filtration of the residue. These costs were developed for processing digested sludges. If raw sludges are processed, the cost per ton decreases somewhat, since no auxiliary fuel is required, but the sidestream produced is somewhat stronger in BOD, COD, and NH_3. The total costs remain essentially the same as given above. Thus, for processing undigested sludge the total costs, including dewatering of the residue, but not including disposal of the residue, is $103.30 as compared to $31 for the pyrolysis system, which also does not include the cost of ash disposal. The wet-air oxidation process is very energy-intensive, consuming 800 kwhr per ton for all operations, including sidestream treatment and odor control. If the power costs are less than 5¢ per kwhr, the above-indicated cost difference between wet-air oxidation and pyrolysis will be, of course, somewhat less. For example, if power costs are 3¢ per kwhr, the wet oxidation costs drop to $87 per ton and the net cost of the pyrolysis system rises to $36.50.

Wet-air oxidation generates a liquid sidestream having a BOD_5 of up to 10,000 mg/l, a COD of 20,000 mg/l, and NH_3 of 1,200 mg/l. A large portion of the COD is not biodegradable, and consists of various unknown organic complexes. This liquid sidestream presents a very serious potential negative environmental impact on our surface water resources. This sidestream also is odorous and the vapors from it must be put through odor control equipment. Also, the handling and treating of this sidestream will produce nonpoint odor sources which are difficult to control. The environmental assessment of this sludge processing system (including both the Zimpro and Barber Colman designs) indicates serious potential negative impacts on air and water resources of the area.

Other negative features of wet-air oxidation are the safety hazards associated with high-pressure reactors and serious corrosion-erosion-deposition problems in piping and heat exchangers (Department of Defense, 1973).

4. Oil-Medium Dehydration and Combustion (Carver-Greenfield System)

This system accomplishes dewatering of the liquid sludge by mixing it with No. 2 or No. 4 fuel oil in proportions of 1 part of solids to 6 - 10 parts of oil, evaporating the water in a multi-effect evaporator, and then separating the oil from the solids in a centrifuge. The use of waste oils and fat skimmings from sewage treatment plants could replace some of the fuel oil, but evaluation of this was too indefinite and was

considered not a sufficiently reliable source of oil for carrying on the process. The solids are then incinerated (or pyrolyzed) to produce the steam and power needed to run the system. This system has been used to dewater varicus homogeneous slurries in industrial processes. Some laboratory scale tests made on a heterogeneous sewage sludge (primary and waste activated) indicated that the evaporated and condensed water (liquid sidestream) contained ammonia concentrations up to 3,000 mg/l and total carbon up to 9,000 mg/l. The BOD was estimated as being up to 12,000 mg/l. It was assumed that treatment of this sidestream would have total costs and power consumption similar to that for the sidestream generated by heat treatment of sludge.

Total capital and O&M costs were estimated on basis of information supplied by the manufacturer. Total costs, including sidestream treatment and odor controls, were $106 per ton of dry solids. Information obtained on operation of multi-effect evaporators, with the associated pumps and valves, indicated very high maintenance costs. The system uses up fuel oil in order to produce sufficient steam and power for the process. Power for treatment of the high-strength sidestream must be purchased or additional fuel burned in the boiler and additional power generated for this purpose.

This process produces several negative environmental impacts. The high-strength sidestream has organics not common to domestic sewage. The condensed water (distillate) when exposed to air emits odorous vapors. The large amount of exposed fuel oil in agitated tanks into which the sludge is added produces hydrocarbon-type odors and also does present a fire hazard.

There are no installations of this system processing a heterogeneous sludge mixture. For cost, environmental, and experience reasons, this system cannot be recommended.

5. Land Application

An investigation was made of the cost of applying liquid stabilized (digested) sludge to strip-mine areas in Pennsylvania, about 100 miles from the study area. Even if the heavy metals did not limit the rate of sludge application, and using a rate of 10 tons (dry solids) per acre per year, on the basis of nitrogen limitation, the total costs for applying the area's sludge, including acquisition of land, was between $110 and $120 per ton. The application of 1,000 tons per day, that is, 50 percent of the study area sludge, would require 36,500 acres.

The present heavy metal concentration would limit the safe application rate on agricultural land to 1 to 2 tons per acre per year. If reductions in heavy metal content to one-half of present values could be achieved by enforcement of pretreatment regulations, the application rate could go up to 5 tons per acre per year. This would require double the land area previously indicated and increase the costs to $185 to $195 per ton of dry solids.

Application of either liquid or dewatered sludge to land in the study area and in southern New Jersey is severely limited due to the sandy soil

and the very real hazard of polluting the extensive groundwater resources of the area and in New Jersey. An EPA funded study being carried out by Rutgers University in Ocean County shows that longer-term breakthrough of nitrates can occur with resultant groundwater contamination (Kaplovsky, 1975). Limited quantities of dewatered and stabilized sludge could find use along roadways, grass strips in park areas, on golf courses, etc.

The conclusion arrived at is that direct application to land of a large portion of the study area's sludge is not economical and the cost would be about triple that of the incineration or pyrolysis alternative. The potential hazard of contamination of underground and surface waters with heavy metals is a serious negative environmental impact of such disposal of the study area's sludge. Sewage sludges from modern urban-industrial areas contain many materials that are not "natural" to soils, and hazardous contamination of our land resources with serious long-term effects is possible by uncontrolled and indiscriminate application of such sewage sludges to land.

6. Drying to Produce a Product as a Source for Plant Nutrients

The disposal of the study area's sludge by drying and selling the product to the organic fertilizer and soil conditioner market was given intensive consideration and study. The constraints mentioned under land application in regard to the toxic heavy metals also apply to the dried product. The total cost of drying, including dewatering after chemical conditioning is in the range of $100 to $120 per ton of dry solids, the higher cost being that of a granulated product suitable for bagging. If the product is to have a nitrogen content higher than in normal mixed primary and activated sludge (2 to 4 percent), the cost of fortifying it with, say, urea, must be added.

In comparing this alternative for sludge disposal with incineration or pyrolysis, the costs for the drying operation only should be determined since dewatering and sidestream treatment is common to both alternatives. These costs, including all air pollution controls, are at least $75 per ton of dry solids. The power and fuel costs are those used in all evaluations in this Report. The cost of incineration or pyrolysis is $30.85 per ton, including equipment for energy recovery. The value of the electrical energy recovered is $22.50 for a 5,000 Btu per lb sludge and $32 for a 6,500 Btu per lb sludge. Thus, the incineration or pyrolysis process actually costs only about 0 to $8 per ton of dry solids, or about $5 to $12 per ton of sludge processed when ash disposal is included.

On the basis of the above costs study, in order to justify drying of the sludge for disposal as a soil fertilizer-conditioner, it is necessary that the product be sold for at least $65 per ton at the sludge processing plant. On the basis of present prices for N and P in commercial fertilizers, the value of a 4-5-0-sludge is about $30 - $35 per ton, which values agree with rates presently quoted for dried sludge. Obviously, the drying of the sludge and disposing of the product as indicated is not an economical alternative.

7. Composting to Produce a Product as Source for Plant Nutrients

Composting of sludge stabilizes it by reducing the volatile solids by about 20 to 40 percent, depending on whether digested or raw primary and waste activated sludge are used. During composting a considerable amount of nigrogen is evolved as ammonia. Therefore, a compost from raw sewage sludge will never have more than about 2.2 percent nitrogen. For digested sludge, the compost nitrogen is less than 1 percent.

Composting has been cost estimated on the basis that the operation will be carried on using roofed areas such as not to be affected by the weather, and that artificial aeration will be used to control odors and prevent anaerobic conditions from developing. Composting uses less fuel and power than any other type of sludge processing except anaerobic digestion. However, it requires large land areas and has high labor costs. A large composting facility needs about 0.5 acres per ton of dry solids processed, or a 1,000-ton per day plant will require 500 acres of flat land area.

If the liquid sludge could be transported by barge or pipeline to the composting facility, the high costs of hauling a sludge cake could be avoided.

Using the above criteria, the total costs, not including the cost of land and transportation, are about $75 per ton. This includes all costs associated with dewatering and sidestream treatment. If the costs of dewatering are subtracted, the cost is about $45 per ton. This can be compared with the cost of incineration or pyrolysis with energy recovery, which was about $5 to $12 per ton, including ash disposal, as indicated in the conclusions relating to drying. Thus, to justify composting it is necessary to sell the product for at least $35 per ton. Because compost is low in nitrogen, it would require considerable fortification. If sold as produced, it is doubtful if more than $10 to $15 per ton could be obtained. The inert matter in compost will be between 40 and 50 percent. However, the product is a good conditioner for sandy soils and improves their water-holding capacity. Certainly a small portion of the study area's sludge, particularly that having lower heavy metal content, could be composted and the product used along highways, on lawns, park areas, etc.

This processing method cannot be recommended for handling the major protion of the study area's sludge because of its relative cost and the uncertainty of disposing of a large quantity of the product. Except for possible odors, the process does not generate any negative environmental impacts on air or water.

8. Anaerobic and Aerobic Digestion

Most of the New York City wastewater treatment plants have anaerobic digestion. The purpose of digestion is to reduce the total amount of solids, stabilize the solids, reduce pathogens, and produce a gas that can be burned to generate heat or power. In regard to the incineration and pyrolysis alternatives, it is noted that the cost-effectiveness is

dependent on the heat energy that can be extracted. The volatile solids that are destroyed and converted to methane and CO_2 in the anaerobic digester have a heat value of about 10,000 Btu per lb. To obtain maximum efficiency, a digester must be heated to about 90 degrees F, which is done by burning the gas produced. Also, energy for mixing is required.

The cost analysis showed that the energy recovered from the methane produced, when converted to electrical power, will pay for the costs associated with digestion. Also, analyses showed that if the volatile solids destroyed in the digestion process were pyrolyzed, since their Btu value is 10,000 per lb, the resultant energy recovered will more than pay for all costs associated with dewatering and processing these solids in a pyrolysis system. Therefore, either the digestion and pyrolysis systems, with maximum energy recovery, can pay for their processing costs as far as destruction of volatile solids is concerned.

Therefore, if incineration or pyrolysis is practiced, digestion plants probably should not be expanded or any new ones built. A further advantage is obtained if digestion is not expanded, and that is the considerable decrease in the BOD and ammonia content of the sidestream with resultant reduced costs of treatment.

Aerobic digestion did not receive serious consideration in this study because it is very energy-intensive. The power required to reduce the volatile solids by about 40 percent, using aerobic digestion, is in the range of 35 to 50 percent of that used in the activated sludge process that generated the waste activated sludge. On an average the power consumption will be about 250 kwhr per ton of solids per day , or at 5¢ per kwhr, $12.50 per ton of dry solids processed. The equipment and construction cost for a large plant is about $10 per ton (EPA Process Design Manual, Sludge Treatment and Disposal, 1974). The total cost of aerobic digestion is about $25 per ton of solids, or about twice that of anaerobic digestion when credit is taken for energy recovery from the generated gas.

9. Incineration or Pyrolysis with Solid Wastes

The benefits associated with heat-energy recovery by dewatering chemically conditioned sludge to 40 percent solids with filter presses can be also realized by incineration or pyrolysis in combination with the combustibles in solid wastes. How the sludge is to be fed with the shredded solid wastes into a solid wastes incinerator or pyrolysis unit depends on the type of furnace or reactor and the general design. It may be desirable to dry the sludge cake with heat from the solid wastes combustion, so as to permit a furnace design without providing for evaporation of the remaining water in the sludge cake. The heat-dried sludge could be blown into the furnace separately or mixed with the shredded solids waste material.

Whether this alternative would be attractive economically, over the incineration or pyrolysis of the sludge separately, depends to a large degree on whether the sludge could be dewatered and the sidestream treated at the solid waste processing facility. The hauling of sludge cake over an appreciable distance to the solid wastes facility is expensive and may not be desirable from operational and environmental considerations.

10. Miscellaneous Processing and Disposal Systems Considered

The following sludge processing and disposal systems were considered and evaluated relating to technical feasibility, costs, energy usage, and potential negative environmental impact on land, water, and air. They were considered unsuited for handling the major portion of the sludge produced in the study area for one, some, or all of the above reasons. In some cases, the environmental impact was indeterminate, but feasibility and costs made the proposed systems unsuitable.

1. Landfill of dewatered sludge cake
2. Chemical solidification and disposal in landfill
3. High chlorine stabilization and disposal on land
4. Solvent (amine) extraction and dehydration process
5. Shipping overseas of liquid or dried sludge to desert countries
6. Combustion of sludge on board ships in open seas
7. Mixing sludge with pulverized rock to produce a topsoil (Goordman system)

B. RECOMMENDATIONS FOR FURTHER STUDY

On the basis of the cost studies, technical feasibility, energy considerations, and environmental acceptability, the basic sludge disposal system recommended for the study area is pyrolysis of the sludge solids with maximum recovery of energy. Specifically, the sludge processing system would consist of:

1. Chemical conditioning with lime and ferric chloride.

2. Dewatering using filter presses to obtain a sludge cake of at least 40 percent solids.

3. Pyrolysis of sludge cake in an oxygen-deficient atmosphere to produce combustible gases and a residual char.

4. Recovery of heat energy from exhaust gases and char with a steam boiler and electric power generator.

5. Air pollution controlled by use of a high-energy water scrubber.

6. Treatment of all liquid sidestreams so that before discharge into a receiving water they will be of secondary treatment quality.

Pyrolysis equipment is compatible with incineration; however, it offers some significant advantages in reducing emissions and simplifying air pollution controls. Also, it has better overall economics. Pyrolysis plants have been built for solid wastes; nevertheless, studies should be carried on to develop design parameters specifically for sewage

sludge pyrolysis. Studies to date indicate that a multiple-hearth furnace can, with relatively simple modifications, be converted to a pyrolysis reactor.

It is estimated that it will take about one year to make the necessary small scale plant studies. After that a full-scale demonstration plant appears to be indicated, and its design, construction, and operation will take another 2 - 3 years. After about 4 years the design of actual processing facilities could be started, and they can be placed in operation in about 8 - 10 years after the initial studies are begun. It is recommended that small scale plant studies be started immediately with an equipment manufacturer who is familiar with pyrolysis technology and who builds multiple-hearth furnaces. It is recommended that such studies be funded and carried out concurrently during the Phase II program. Funding sources are being investigated by ISC and EPA.

An incinerator facility design could be started immediately if this seems desirable and pyrolysis units could be added during later expansions, or any existing multiple-hearth incinerators could be converted to pyrolysis units. Sludge dewatering, air pollution control, and energy recovery equipment, with incineration would be compatible with pyrolysis reactors.

In-depth studies in Phase II of the study program should include, in addition to the pyrolysis investigations, the following:

1. For the selected sites, problems relating to sludge transport, transfer, storage, and pumping should be more thoroughly studied. Also, the transport and disposal of residual ash must be investigated, including disposal and its possible beneficial uses.

2. Availability of fresh makeup water at the processing site.

3. On the basis of the projected sludge handling capacity at the planned sites, the total mount of pollutants of concern that will be emitted into the atmosphere per unit time by the facility should be determined and their dispersion indicated.

4. The required treatment of the dewatering and scrubber water sidestreams should be definitely established, including amount of such treated sidestreams that can be recycled. The integration of these treatment facilities with the sludge processing facility should be clearly established.

5. The complete materials handling logistics at the sludge processing facility should be worked out.

1. Incineration or Pyrolysis with Solid Wastes

The possibility of combined incineration whould be investigated in conjunction with the on-going solid wastes study for New York City, and any such resource recovery projects in New Jersey. The use of pyrolysis for heat conversion of solid wastes should be studied at the 1,000 ton per day plant that is being started up at Baltimore and the multiple-hearth furnace being studied in Contra Costa County, California.

If resource recovery systems are to be established for handling the solid wastes, the burning of the shredded combustibles with disintegrated sludge cake or with heat-dried sludge in a boiler-furnace for power production should be investigated. Answers to questions regarding how sewage sludge and solid waste combustibles could be best combined for burning with maximum energy recovery should be forthcoming from work now in progress at public power plants and industrial plants.

In considering heat conversion for energy recovery from solid wastes and sewage sludge, the incineration or pyrolysis site location with respect to the wastewater treatment plants is of considerable importance in connection with the overall economics. In studying the siting for such joint disposal, investigations should be made regarding the location of sludge dewatering facilities, as truck transport and handling of sludge cake is costly.

Obviously, any study of joint disposal of sewage sludge with solid wastes must be closely integrated with the studies relating to solid wastes. The maximum benefits of such disposal, including maximum costs recovery from power generation, will be obtained if, other things being equal, the costs of sludge dewatering, treatment of resulting sidestreams, and transport can be minimized.

2. Land Application for Limited Quantities of Sludge

In the study area there are several wastewater treatment plants that produce sludges that are more suited for land application, especially in regard to heavy metals, than the major portion of the area's sludge. These sludges should be identified and consideration given to use of such sludges, after stabilization (digestion, composting, or high lime treatment), and dewatering, on various suitable land areas such as parks, golf courses, grass strips along highways, etc. Also, it could be used to improve sandy soils where it is desirable to increase growth of natural vegetation.

Such processing of sludges from smaller treatment plants, located near the periphery of the study area, could be more economical than the transport of the sludge to a large processing facility. Proper land disposal, if done with some judgment, should not create any potential environmental hazards.

3. Drying and Composting for Use on Land

It is recommended that some additional verificaiton be obtained in regard to the marketing possibilities, with projections for at least the next 25 years, for dried sludge and also composted sludge for use as soil conditioners and as source of plant nutrients. Limited studies in regard to the costs for producing these products and their selling price at the sludge processing plant, indicate these sludge disposal methods would have net costs considerably higher than incineration or pyrolysis with energy recovery.

Any planned widespread use of the sludge produced in the study area on land, and especially on agricultural land, is contingent on the reduction, by pretreatment and other control measures, of the heavy metal content by at least one-half of present values, and the cadmium to about one-

fifth of its present average value. If this is not possible or practical, then no large-scale and long-term plans for processing this sludge for disposal on land should be made, irrespective of cost considerations.

4. Siting and Transportation

The sites identified in Chapter VI as having potential for serving as the location of sludge processing facilities should be further investigated. Considerations should include:

1. Existing plans for the site and availability
2. Access for materials and personnel
3. Effects on air and on surface and ground waters
4. Effects on neighborhoods
5. Building conditions, including topography and foundation conditions
6. Effects on natural preserves and on recreational areas

Transportation should be further investigated to refine merits of barging versus pumping.

PHASE 2 REPORT

II. SUMMARY

The purpose of this report on the phase 2 investigation is to enable ISC to develop a recommended coordinated system for processing and disposing sludge from wastewater treatment plants in the New York-New Jersey metropolitan area. Many of these plants currently dispose of sludge to the New York Bight.

This study incorporates findings from the 1975 phase 1 report on technical alternatives to ocean disposal conducted by Camp Dresser & McKee and Alexander Potter Associates. That report recommended pyrolysis for most of the area's sludge and other land-based alternatives for outlying areas. The objective of the phase 2 report is to develop a regional sludge management plan which integrates pyrolysis, land application, composting, landfilling, and ocean disposal. The plan must be environmentally sound, cost effective, and capable of political and social implementation.

Currently, the approximately 100 area treatment plants produce 700 tons/day of sludge. About 80 percent is barged to sea for disposal; the remainder is landfilled, incinerated, or disposed of by other means. Smaller wastewater treatment plants in the study area, including packaged plants, do not add significant quantities to the total sludge production.

By the year 2000, about 2,400 tons/day would be produced, divided nearly equally between New Jersey and New York plants. In New Jersey, about one half the sludge will be produced by two large wastewater treatment facilities: the Middlesex County Sewerage Authority plant and the Passaic Valley Sewerage Commissioners plant. In New York, about 800 tons/day will be produced by the New York City plants.

Sludge characteristics (including heavy-metal concentrations from several wastewater treatment plants) were obtained from EPA, based on monthly samples for 1975. There is a large variation in monthly results, compared with yearly averages.

A. Pyrolysis

Pyrolysis (thermal destruction in an oxygen-deficient atmosphere) of sludge has been studied only in pilot-scale tests. Larger-scale pyrolysis demonstrations have utilized solid wastes. The phase 1 study indicated that multiple-hearth furnaces could be built by 1981, initially operated in the incineration mode, and then converted to pyrolysis units as the technology developed. Further review during this study has shown that such furnaces could be designed and constructed as pyrolysis units during the same time frame. Therefore, incineration has been dropped from consideration.

Necessary unit operations prior to and following pyrolysis include sludge transportation, storage, conditioning, dewatering, sidestream treatment, residue disposal, and emission control. Tests funded by EPA will determine requirements for afterburner temperatures and scrubber design.

Because many wastewater treatment plants have, or plan to construct, anaerobic digesters, the value of retaining anaerobic digestion at individual plants was evaluated. It was concluded that it is cost effective to maintain existing anaerobic digesters, although new digesters should not be built, if sludge is pyrolyzed.

Fig. II-1 illustrates treatment plants which may contribute to sludge pyrolysis facilities (based on county-level operation). Regional facilities at Port Newark, for New Jersey, and Fresh Kills, for New York, were also sited, to obtain economy-of-scale. In New Jersey, it would be cost effective to process sludges from four counties at a regional facility in Port Newark. The four potential contributors include plants in Bergen, Hudson, and Union counties and the Passaic Valley Sewerage Commissioners plant in Essex County. It would not be cost effective to consolidate facilities in Passaic or Morris counties or the MCSA facility, principally because of transportation costs. The New Jersey regional plant would process about 620 tons/day.

A regional facility in New York State could be located at or near the Fresh Kills landfill on Staten Island. This facility would be an expansion of a plant proposed to serve some of the New York City plants. With the exception of sludge from the Yonkers plant in Westchester County, it would not be cost effective to consolidate other proposed facilities in New York State, primarily because of transportation costs and the fact that several of the proposed plants have capacities already taking advantage of economy-of-scale.

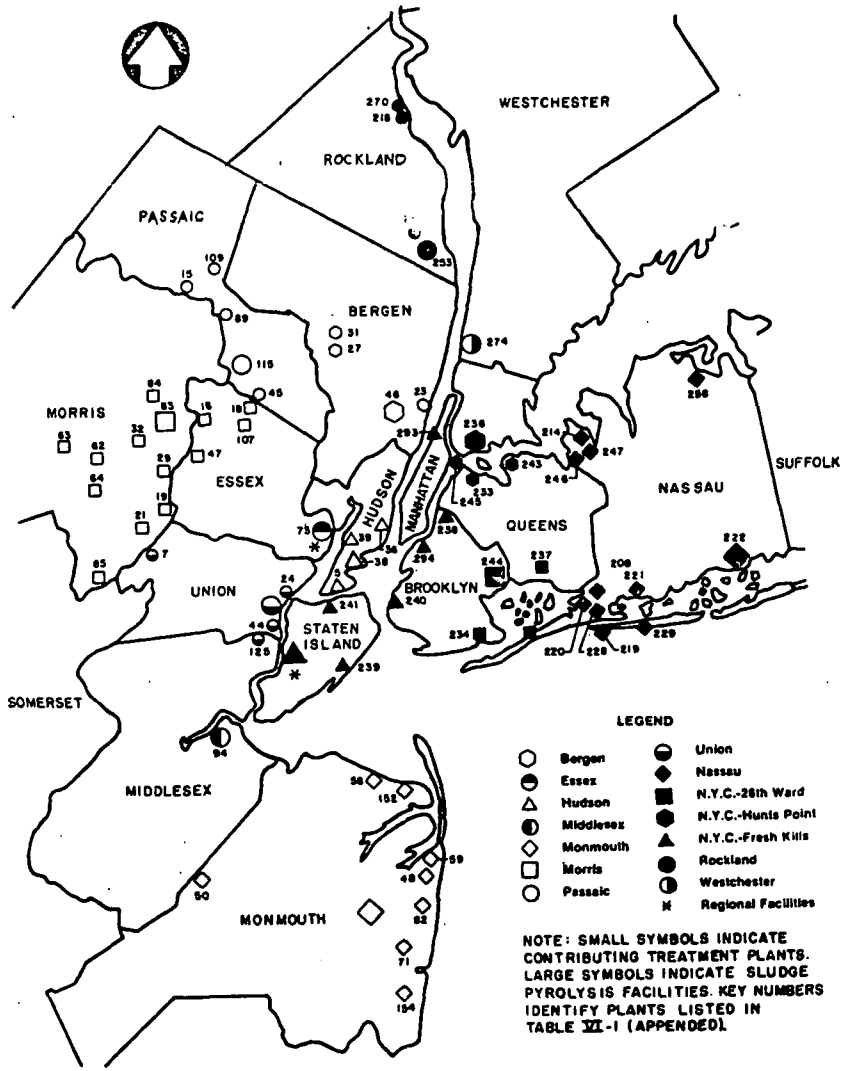


FIG. II-1 STUDY AREA - WASTEWATER TREATMENT PLANTS

B. Land Application, Composting, and Landfilling

Land application, composting, and landfilling of sludge--feasible methods of disposal--require certain ancillary facilities; stabilization by lime treatment or digestion, dewatering by vacuum filters or filter presses, and storage. Either liquid or cake can be applied to land. Factors limiting land application include heavy metals, nutrients, pathogens, and toxic organics. The severity of these constraints depends on the properties of the sludge and the application site.

Heavy-metal data obtained from the EPA for the years 1974 and 1975 indicate that sludges produced within the highly urbanized-industrialized portions of the study area are unsuitable for application to agricultural or private land. Limited heavy-metal data from plants in relatively non-industrial areas indicate that these sludges are more favorable for land application. Heavy-metal limitations pertaining to land application of sludges also apply to the use of composted sludge. Although it may be possible to dispose of limited amounts of sludge on public lands, the land application of large amounts of sludge for long periods would require the use of agricultural-type lands.

Land application and composting are viable sludge disposal alternatives for the outlying plants in the study area. These plants could form regional groups for land application or composting purposes.

Landfilling of stabilized, dewatered sludge is cost-effective for the smaller suburban wastewater treatment facilities; provided that landfill sites are available. However, landfilling should be considered as a short-term solution to be used while long-term land application or composting programs are instituted. Landfilling is not feasible for sludges produced by treatment plants in the highly urbanized portions of the study area, because of the quantity of sludge produced and the limited lifespans of available landfills.

C. Ocean Dumping

Ceasing ocean dumping will greatly increase the costs of sludge disposal, but the New York Bight will not recover because other pollutants will continue to be discharged. Nevertheless, EPA hopes to end ocean dumping by 1981. Accordingly, the proposed plan is based on other available disposal alternatives.

SEWAGE SLUDGE DISPOSAL MANAGEMENT PROGRAM

SUMMARY

Pursuant to federal law, the U.S. Environmental Protection Agency has issued permits containing conditions which call for discontinuance of ocean disposal of sludge by the end of 1981. This comes at a time when the required upgrading of the sewage treatment processes in the New York-New Jersey Metropolitan Area is producing greatly enlarged tonnages of sludge. At present, 700 tons a day require disposal. Of this amount 500 tons is dumped at sea. By the year 2000 it is estimated that daily sludge production from the Region's public treatment plants will triple.

There is no doubt that great quantities of sewage solids are in the tidal waters and in the ocean relatively close to shore. These solids come from the disposal of sludges, the solids remaining in sewage effluents even after treatment, and from the frequent overflow of combined sewers.

The problem is regional because the several portions of the metropolitan area share common waters. Since some treatment and disposal methods result in the discharge of contaminants into the outdoor atmosphere, regional effects on air quality also must be taken into account.

Ocean disposal is the least expensive method of removing sludge from our population centers. Therefore, it is vital that any plan developed in response to requirements for abandonment of the method be undertaken for sound environmental reasons and that the costs be equitably distributed over the Region.

The Phase 1 and Phase 2 technical reports secured by the Commission pursuant to contracts with consultants were technical in nature. They analyze and compare alternatives to ocean disposal actually practiced or examined in the literature and thought to be capable of application to sludge treatment and disposal in the immediate future. The methods which appear to be most feasible for use in the Region are composting followed by land spreading of the resultant materials and pyrolysis followed by carefully controlled disposal of residues in landfills.

Composting produces a substance which, under appropriate circumstances is usable as a soil conditioner. At present a difficulty is that the heavy metals and synthetic organics content of almost all the Region's sludges makes them too toxic for safe spreading on agricultural lands or even on recreational lands. However, pretreatment of industrial wastes could make many of these sludges, after treatment by composting suitable for land spreading, at least on acreages not used for crop production.

Pretreatment would also assist in those instances where pyrolysis or other combustion methods may be used. These processes leave substantial quantities of residues which must be disposed. If it will not be lawful to dump them in the ocean, the most likely means of disposal available will be in landfills. However, leaching is a problem which, although theoretically preventable, should be expected to occur at least to some extent. Thus, landfill sites must be carefully chosen, properly operated, maintained and monitored. By reducing the toxic content of sludges, pretreatment also would reduce the toxicity of the residues left by the combustion processes. Municipal sewage treatment processes do not remove appreciable quantities of heavy metals or synthetic organics. Combustion may destroy synthetic organics but does not remove heavy metals. Consequently, the most practicable way to obtain a relatively innocuous residue is to pretreat the wastes before discharge to public sewers.

Further, pretreatment is important for the reduction of toxicity in the sludges reaching the Region's waters by virtue of combined sewer overflows. These occur every time there is appreciable rainfall and result in the raw discharge of large quantities of sewage and accumulated sewage solids. These materials never reach the treatment plants. Consequently, whatever substances are in them when they leave factories, commercial establishments and homes are found in the sludges when they are discharged directly from the combined sewers. Industrial pretreatment is feasible, but pretreatment from residential facilities and from many commercial establishments is not. Product control is a means of coping with the latter problem.

The Commission's recommended management plan which follows is designed to meet effectively the immediate needs of the Region while allowing the necessary flexibility for future technological and other innovations and modifications to be implemented in a cost effective manner.

Recommended Management Plan

1) Those treatment plants now having sludge of a quality that can be composted and put on the land should make such a commitment. Information available to the Commission is that Oakwood Beach and Port Richmond (New York City), Long Beach and West Long Beach (Nassau County), and Monmouth County now have such sludges.

2) By December 31, 1977 each contributory sludge source should commit itself as to its treatment and disposal method or methods. If by that time the sludge from that source is of a quality which permits composting, it should select this method. In any other case a source should be required to commit at least one-half of its 1977 sludge tonnage and any additional tonnage due to growth through the mid 1980's to treatment by pyrolysis. The remaining half of 1977 tonnages should be committed at the sources, options either to pretreatment and composting or to pyrolysis. The objective is to abandon ocean disposal by the end of 1981 or as soon thereafter as possible. Consequently the commitment should be to institute composting and pyrolysis no later than that time.

   Five sites are recommended for pyrolysis installations. The location (name) of the site, the contributory waste treatment plants and costs are given in Table I on page xiv.

3) The remaining sewage treatment plants located for the most part in the outlying portions of the metropolitan area should follow the options and recommendations indicated for each of them contained in Chapter III of the Camp, Dresser & McKee Phase 2 report. However, as soon as the sludges become suitable, composting should be substituted for landfilling.

4) In the early 1980's each sludge source should review its situation and make a committment as to treatment and disposal methods for a further period of time. This review is meant to accord opportunity to shift additional tonnages to composting and land spreading as the circumstances warrant and to take account of any new and developing technologies.

Because capital costs are assisted by federal construction grant aid, pyrolysis which is a capital intensive method may be significantly reduced in its burden on local governments.

TABLE I

RECOMMENDED REGIONAL PYROLYSIS SITES

SLUDGE PYROLYSIS SITE	CONTRIBUTING PLANTS	DRY TONS/ SLUDGE	UNIT COSTS PER DRY TON† Pyrolysis	Composting	Ocean Disposal
Middlesex County Sewerage Authority at Sayreville	Middlesex County Sewerage Authority	247	$ 88	$73-90	$30
	Total	247			
New Jersey Regional at Port Newark	Passaic Valley Sewerage Commissioners	253	118*		
	Bergen County	26	150		
	Edgewater				
	Bergen County Sewerage Authority	17	97		
	Hudson County				
	Bayonne				
	Hoboken				
	Jersey City - East			73-90	30
	Jersey City - West				
	Secaucus				
	Union County	65	147		
	Elizabeth Joint Meeting				
	Linden Roselle Sewerage Authority (including Rahway Valley)				
	Total	361			
Cedar Creek	Cedarhurst	.4			
	Great Neck	.5			
	Inwood	2.3			
	Bay Park	66.4			
	Cedar Creek	24.5	99	73-90	30
	Lawrence	.6			
	Belgrave	.8			
	Great Neck Sewer District	2.6			
	Oyster Bay	1.0			
	Total	99			
26th Ward	Newtown Creek	31			
	Owls Head	12			
	Coney Island	18	160	73-90	30
	Jamaica	23			
	Rockaway	5			
	26th Ward	14			
	Total	103			
Hunts Point	Bowery Bay	18			
	Hunts Point	29	161	73-90	30
	Tallman Island	16			
	Wards Island	44			
	Total	107			

*This total cost is calculated on a weighted average basis using the Camp, Dresser & McKee Phase 1 Report value of $98/dry ton for wet air oxidation and the Phase 2 Report value of $34/dry ton for pyrolysis.

†These are total unit costs per dry ton. The local governments' unit cost per dry ton for pyrolysis will be considerably less because of federal and state contributions which may total as much as 87½ percent of the capital costs for this method.

Since it is generally thought desireable to encourage utilization of sludge of proper quality on the land, it is recommended that Congress consider extending sufficient aid to the composting and land spreading method to accomplish equalization of the financial burden on communities in comparison with pyrolysis.

The Commission's plan, for the most part, could be implemented by the individual local governments and interlocal sewage treatment agencies. If viewed as part of the liquid waste treatment and disposal process, sludge treatment and disposal by any of the methods suggested in the Commission's plan could be undertaken by the sewage treatment agencies under existing statutory authorizations. Arrangements would be necessary for the financing of the sludge management facilities, but this is true of any construction or purchasing of equipment and real property.

While some of the pyrolysis plants which will be needed are expected to serve a number of sewage treatment plants, the actual number of interjurisdictional arrangements contemplated is not large, and none of them cross state lines. In New York, two of the three such plants would take sludge only from New York City facilities. The third could be operated as a county undertaking and would not serve areas in any other county. However, it is true that some Nassau County plants are operated by municipalities rather than by the county itself. In New Jersey, there would be interjurisdictional service areas, but the major ones could be attached to existing joint meeting liquid waste treatment operations and could employ the legal authority and administrative structures of the present agencies. This is largely true even though they would serve some areas not included in their present districts.

The most likely purposes for interlocal agreements involving joint acquisition and operation of facilities would be to obtain a pyrolysis plant for several communities where the volumes of sludge generated by each is insufficient to justify efficient operation of such a facility or where several communities might desire to acquire and operate a joint landfill site. In New York, two statutes already make general provision for interlocal cooperation or services of the desired kind. They are the Interlocal Cooperation Act and the statute under which the Environmental Facilities Corporation functions. In New Jersey, the Consolidated Municiple Service Act provides a basis for programs of the joint meeting type. Of course, special statutes also could be used to establish desired joint operations having characteristics tailored to the particular circumstances.

Contracting for sludge management services also is available as a means of securing all or any part of the function from another county, municipality or interlocal agency. It is most likely to be a practical approach for a small community having a larger neighbor which has invested in a pyrolysis plant, landfill or other major facility. It is a possible alternative only where one of the contracting governmental entities is willing and able to incur the initial capital costs by itself, although service contract payments might be so calculated that in the long run, recipients of the services pay some share of both capital and operating costs.

While the Commission's plan has been so divided as to make it possible for most of the individual local communities and interlocal waste management agencies to accomplish the sludge management function for themselves, some matters should be viewed as being of continuing regional character. There will be some extraterritorial effects of sludge management activities. There will be a continuous need for pooling of information and experience with sludge management technology and administration, including evaluation of new and developing methods.

Land spreading of composted sludges or of other products which may be developed from sludge may also benefit from cooperative activities on a regional basis. This could be especially true if improvement in the quality of most of the Region's sludges makes possible their use in significant quantities on agricultural land. Under such circumstances, consideration of common or joint marketing arrangements could be advantageous.

The Interstate Sanitation Commission should act as a regional forum for the consideration of these matters and could function as a joint instrumentality where that proves to be appropriate in the future.

APPENDIX K

COMMENTS ON THE DRAFT EIS

TOWN OF ISLIP

rec'd 4/15

BARRY D. ANDRES
COMMISSIONER

577 MAIN STREET
ISLIP, N. Y. 11751
581-2000
EXT. 241

DEPARTMENT OF ENVIRONMENTAL CONTROL

April 12 1976

Daniel A. Sullivan, P. E.
Environmental Impact Branch
EPA Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Sullivan:

The Town of Islip borders the Atlantic Ocean in the vicinity of the Fire Island Inlet. As such, we have a genuine concern regarding offshore sewage sludge dumping sites. We are hereby commenting on the Environmental Protection Agency's Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight - Draft, February 1976.

According to the Environmental Protection Agency's Environmental Impact Statement -

1.) The dumping of sewage sludge increases the trace metal and organic contaminant loading of sediments and the water column.

2.) The potential biological impacts of ocean dumping sewage sludge based on studies in the Bight Apex include:

   a) Increased trace and heavy metal concentrations in fish and shellfish.

   b) Contamination of sediments and water column by pathogens of man, fish and shellfish.

   c) Alterations in migratory patterns of bottom-living fishes.

   d) Increase in incidence of fin rot offshore.

   e) Modification of food webs.

3.) Use of alternate dump sites will result in greatly increased travel time, transportation costs, monitoring costs and costs associated with the U. S. Coast Guard.

Printed in Islip on recycled paper

4.) The dumping of sewage sludge at an alternate area would contribute to the degradation of relatively "pristine" waters while only minimally improving surface water quality of the Inner Bight area.

5.) After comparision of the Environmental Impact Statement by the Environmental Protection Agency with that of the NOAA-MESA Evaluation of Proposed Sewage Sludge Dumpsite Areas in the New York Bight there seems to be conflicting evidence regarding bottom transport of sludge, surface transport of sludge, sludge contamination of Hudson Shelf Valley and commercial value of shellfish in the alternate proposed dump sites.

With these facts in mind, we recommend the following:

1.) The current ocean dump site be maintained.

2.) Ocean dumping be phased out completely by 1981 provided that the alternative methods of disposal are environmentally acceptable.

3.) No dumping take place at either Northern 1A or Southern 2A proposed alternate sites until both the EPA and NOAA reevaluate their conflicting data and technical information.

We do hope that our recommendations will be taken into consideration.

Respectfully submitted,

Barry D. Andres
Commissioner

BDG:kwh

D. Sullivan Rec'd 5/18

VILLAGE OF LAWRENCE

NASSAU COUNTY, NEW YORK
WILLIAM D. DENSON
MAYOR

TRUSTEES
MARTIN ROSEN
HERBERT WARSHAVSKY
C. PAYSON COLEMAN
M. ALBERT BENDES

ACTING CLERK-TREASURER
PETER W. OVERS

196 CENTRAL AVENUE
LAWRENCE, NEW YORK 11559
516 - 239-4600

May 14, 1976

Gerald M. Hansler, P.E.
Regional Administrator,
U.S. Environmental Protection Agency, Region II
26 Federal Plaza
New York, New York 10007

Att.: Mr. Daniel A. Sullivan

Re: Environmental Impact Statement
(draft) Ocean Dumping of Sewage
In the New York Bight

Dear Mr. Hansler:

I appreciate the opportunity of making this statement as Mayor of the Incorporated Village of Lawrence, New York and as an officer of the Lawrence Beach Club, Inc.

The south shore of Long Island bordering the Atlantic Ocean constitutes some of the finest bathing beaches in the world. These beaches have provided a source of enjoyment and revenue for many many decades. Anything that is calculated to jeopardize the continued material contribution to the residents of this area should be guarded against and eliminated as one would a venomous snake.

Several years ago when we became alarmed by the presence of foreign matter along our shore line extending from Rockaway Point eastward, we were very much heartened by the interest that was manifested by the Environmental Protection Agency in seeking out the cause and its apparent determination to eliminate such cause. This evidenced a governmental attitude consistent with the highest traditions of protecting our "common welfare" - a fundamental of a well ordered government.

Pursuant to that interest we were later informed that the dumping of sewage sludge and other materials in the designated area of the New York Bight appeared to be the cause, and the obvious remedy was to abandon the present dump site and move it further out in the ocean and away from the shore. Such an analysis and solution seemed compatible with reason and logic.

Now we are informed that you have departed from your prior findings and remedy and are now suggesting that the dump site remain where it is and with no abatement of the quantity of refuse being dumped. Suffice it to say it is most difficult to reconcile this "about face" on your part, particularly after one considers the data submitted by you along with the recommendation that further study is needed with respect to the impact of the ocean currents relative to the problem at hand.

The fact that you find it necessary to make a more intensive and extensive study of the ocean currents persuades me that there is sufficient certainty of contamination present as to indicate to a prudent person that the source of contamination should be moved far away from the beaches thereby reducing, if not eliminating, the havoc that will result from having to close these lovely beaches!

What balance of considerations can outweigh the need for eliminating the hazzard of contamination? Why should we be made to suffer such an outrage? Such damage to the beaches and the welfare of those entitled to use them cannot be measured in dollars and cents. This applies not only to those of us presently enjoying such pleasures, but will constitute a deprivation of right to generations of people yet to come.

Gerald M. Hansler, P.E. May 14, 1976

Please do not gamble with our future. The greatest service that you can render would be to move the dumping site sufficiently far away as to ensure for ourselves and our posterity the beauties that the good Lord so generously bestowed upon us.

Very respectfully,

William D Denson

WILLIAM D. DENSON
Mayor of Incorporated Village
of Lawrence
Vice-President of Lawrence
Beach Club, Inc.

Encl 41

STATEMENT OF THE

MONMOUTH COUNTY PLANNING BOARD

AND

MONMOUTH COUNTY ENVIRONMENTAL COUNCIL

ON THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ON THE OCEAN DUMPING OF SEWERAGE

SLUDGE IN THE NEW YORK BIGHT

APRIL 19, 1976

Gentlemen:

The Monmouth County Environmental Council would like to make some comments and raise some questions about the proposal to continue the mass dumping of sewerage sludge in the New York Bight. We would first like to discuss some of the data presented in the Draft Environmental Impact Statement.

One of the first and most prominent suggestions made in the Draft Environmental Impact Statement is that it is the EPA's intention to phase out ocean dumping of all municipal and industrial waste by 1981, providing alternates to ocean dumping are acceptable at that time. It is further stated (Page 266) that it is EPA's policy not to issue an ocean dumping permit to any municipal or industrial waste generator who is not under a schedule to develop and implement an acceptable land-based disposal alternative. With the EPA's past track record in meeting such timetables it is likely that the 1981 deadline will come and go and round upon round of extensions will be granted because "acceptable" alternative disposal sites etc. will not be developed. The waste generators know that (as in the case of other deadlines) they will not have to comply with this 1981 date.

The Monmouth County Environmental Council objects to this vague definition of "acceptable alternative" and suggests that the EPA is really thinking about 1985 or 1990 instead. We protest this type of thinking because of the quantity of sludge being dumped and the close proximity to Monmouth County that this sludge is being dumped. On page 268 in the Draft Environmental Impact Statement it is stated that sewerage volumes will increase from 5.1 million cubic meters in 1976 to 10.2 million cubic meters in 1984. The reasons for our protest over these predicted increasing amounts are manyfold.

(1) On figure 14 in the Draft Environmental Impact Statement is shown the pattern of bottom currents. These current patterns clearly show that sludge dumped at the prefered site (off Sandy Hook) will be moved towards Long Island and Sandy Hook. At Sandy Hook (of course) is the Gateway National Recreation Area which is host to millions of bathers and fishermen per year.

(2) A cold water current which moves from north to south counter to the Gulf Stream and west of the Gulf Stream, close to Long Island, would tend to carry floatables from the sludge into the Long Island Sandy Hook area and onto these barrier beaches.

(3) Further the longshore currents also will tend to move any floatables towards New York Harbor.

(4) Since sewerage sludge is high in both Nitrogen and Phosphates and it is these two types of compounds most responsible for the red tide blooms of the dinoflaggelate Gymnodinium brevis, the increasing amounts of sludge dumped into the New York Bight can only further aggrevate a red tide problem which becomes quite serious during the summers.

(5) The recent establishment of the Gateway National Recreation Area on Sandy Hook, Staten Island and Long

Island makes the necessity for clean water in the New York Bight even more critical than before. With millions of people using these facilities there is a need for responsible administration and management of the coastal waters.

For the above reasons the Monmouth County Environmental Council is against any further dumping of sewerage sludge in the New York Bight. We feel that there are presently available acceptable alternatives to the ocean dumping. These alternatives are composting, and incineration with pyralysis as recommended by the Interstate Sanitation Commission. We feel that these alternatives be implemented immediately so that by 1981 all ocean dumping of sludge can be halted. It would therefore be possible to reduce volumes year by year on a phased basis from 1976 through 1981. The way the EPA plan is stated sewerage volumes would, on the other hand, double by 1981. We feel that this proposed doubling is not acceptable to Monmouth County because of the potential health hazard from the sludge.

Another point we would like to make is one concerning the problem of cumulative environmental impacts in the Region. If we just look at sludge dumping, oil exploration, deep water ports, etc., by themselves with no consideration of other proposals we are totally missing most of the potential impacts that are cumulative. These cumulative impacts relate to air and water quality, land use, facilities siting, water supply and the like. With this in mind the Monmouth County Environmental Council would insist that future impact studies compare a given proposal to other proposals for the same area. For the New York Bight we are talking about:

(1) Outer continental shelf oil exploration
(2) Deep water port construction
(3) Regional solid waste facitlities
(4) Off-shore nuclear power plants
(5) Regional energy facility clusters (as proposed for southern New Jersey)

If all these proposals (and any others which may be in the works) are examined collectively then we will be able to effectively analyze land use, environmental and other impacts on the Region.

(Metzger/Sullivan
Metini)

RALPH G. CASO
COUNTY EXECUTIVE

OFFICE OF THE EXECUTIVE
NASSAU COUNTY EXECUTIVE BUILDING
ONE WEST STREET
MINEOLA, N. Y. 11501

April 29, 1976

Mr. Gerald M. Hansler, P.I.
Administrator - Region II
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

I am informed that current plans for managing municipal sludge dumping in the New York Bight Apex neither assure an effective monitoring program for 1976, nor an appropriate interim contingency plan for relocating the site.

While we endorse USEPA's approach as represented in your draft EIS, we cannot condone any delay in its implementation. I'm sure you will agree that we simply cannot afford to risk the consequences of a sludge excursion during the very period when we are developing plans to cope with such an eventuality.

My concerns are heightened by data which demonstrates that the worst hydrographic conditions for on-shore sludge transport occur during the summer season coincident with maximum public use of the waters and the further realization that comprehensive sampling data is not available for the summer and fall season.

The following recommendations are considered necessary to properly cope with management of the dump site during 1976:

1. USEPA assumes the responsibility to immediately organize 1976 surveillance of the sludge dumping operations, coordinating all Federal, State, and local regulatory agencies, permitees and others.

-continued-

2. Quarterly intensive sampling be conducted on an expanded grid sufficient in size to identify the influence of seasonal hydrographic patterns of the ocean on a schedule which will permit the initial cruise to be conducted in May of 1976.

3. Contingency plan for relocating the dump site be developed on an interim basis for immediate implementation if and when any threat to the public health or welfare is identified.

4. The surveillance effort be allocated among EPA, NOAA, and other agencies and institutions to effectuate the most cost-effective utilization of available expertise and resources.

5. A formula for funding the cost of the surveillance effort be implemented for the 1976 program whereby the Federal share will amount to two thirds of the total cost with the remainder to be shared by permitees in proportion to the volume of sludge dumped.

Sincerely,

Ralph G. Caso

Ralph G. Caso
County Executive

rgc:d-mh
Enclosure

NASSAU C TY DEPARTMENT OF HEALTH

240 OLD COUNTRY ROAD
MINEOLA, N.Y. 11501

RALPH G. CASO
County Executive
JOHN J. DOWLING, M.D., M.P.H.
Commissioner
FRANCIS V. PADAR, P.E.
Asst. Deputy Commissioner
Div. of Environmental Health

EVALUATION OF PLANS FOR OFF-SHORE SLUDGE MONITORING

April 28, 1976

Since the April 1 hearing on management of the sludge dumping site, there has been an effective effort on the part of the USEPA to develop appropriate expanded surveillance to begin in 1977. There appears to be no plan being pursued however, to insure adequate surveillance during 1976. An expanded monitoring program is needed this year to identify any potential problem in time to protect the public interest. We see as a minimum, comprehensive sampling cruises in May and in August of 1976.

While the environmental impact statement prepared by the USEPA called for more intensive sampling of the Bight and the development of a contingency plan for implementing a new dump site as conditions for retaining the present site, there was no specifics presented in the EIS or announced since that time. It appears that the EPA is content for 1976 to continue the present sampling program which was reported as inadequate in their EIS.

The EPA did meet with sludge dumping permitees on April 7 and instructed them to jointly develop a surveillance program in coordination with NOAA. This planning is in conjunction with new permits to become effective July 1, 1976. The monitoring program will be effective January 1, 1977. This approach does not address the 1976 monitoring requirements nor does it assure that the resulting surveillance program will satisfy the needs of public health and environmental control agencies at th State and local level. The permitees have recently elected to request NOAA to enter into discussions with EPA to develop an effective monitoring program.

NOAA has elected to remove themselves from any controversial position because like the USGS, they are a data gathering rather than a regulatory agency. Before the recent action by the permitees, NOAA advertised for proposals for surveillanc of the Bight Apex through the New York Sea Grant Institute. This program is more of a research nature and generally independent of sludge monitoring per se. NOAA will determine the scope of the study which will begin in 1977. This Department is in process of submitting an application for a grant under this progra We have proposed a sampling effort of approximately $140,000 per year for four years, covering the area south of Nassau from the shore to the dump site. Our proposal includes basic sludge monitoring aspects as well as elements of a resear nature.

The planned funding of the monitoring program is unsettled. The New York Sea Grant Institute program will fund two thirds of the study effort with remaining third to be paid by the applicant. EPA's dumping permits assign responsibility for surveillance to permitees which is assumed to include the cost. Our recommended solution is that EPA subsidize two thirds of the cost as in the formula used by the Sea Grant Institute with the remainder shared by permitees in proportion to quantity of sludge dumped.

Recommendations to resolve the issues are as follows:

1. USEPA takes the steps necessary to effectively coordinate all Federal, State, and local agency responsibilities in managing municipal sewage sludge dumping in the New York Bight Apex to include the following elements:

   a. Quarterly intensive sampling be conducted on an expanded grid sufficient in size to identify the influence of seasonal hydrographic patterns of the ocean on a schedule which will permit the initial cruise to be conducted in May of 1976.

   b. Contingency plan for relocating the dump site be developed on an interim basis for immediate implementation if and when any threat to the public health or welfare is identified.

   c. The surveillance effort be allocated among EPA, NOAA, and other agencies and institutions to effectuate the most cost-effective utilization of available expertise and resources.

   d. A formula for funding the cost of the surveillance effort be developed and implemented whereby the Federal share will amount to two thirds of the total cost with the remainder to be shared by permitees in proportior to the volume of sludge dumped.

2. The County Executive be requested to convey the above recommendations to Mr. Gerald Hansler, Administrator, New York Region, USEPA. Draft of the proposed letter is attached.

Francis V. Padar, P.E., M.C.E.
Assistant Deputy Commissioner

FVP:no

National Wildlife Federation

1412 16TH ST., N.W., WASHINGTON, D.C. 20036 Phone: 202—797-6800

April 30, 1976

Mr. Pete Anderson
Chief, Marine Protection Program
U.S. Environmental Protection Agency
Region II
Edison Water Quality Research Lab.
Edison, New Jersey 08817

Re: Suggested Addition to EIS on Sludge Disposal in the New York Bight

Dear Pete:

Based on recent conversations with Coast Guard HQ personnel, Region II's tentative determination to require sludge dumpers to increase their residence times at the dump site to five hours, and the collision earlier this week of a Colombian freighter with a barge hauling waste through the New York Bight to an ocean dump site, we wish to suggest consideration in the final impact statement of moving the sludge dump site a short distance (i.e., a few miles) to take it out of the center of the active shipping lane in which it is presently situated.

We believe that such a move (and active consideration thereof in the FEIS) makes sense from the standpoints of both environmental protection and human and shipping safety.

From the environmental standpoint, movement of the site out of the shipping lane would increase EPA's flexibility to modify dumping conditions (e.g., decrease the permitted discharge rate) so as to best protect the marine environment. Commander Costich of the Coast Guard's Marine Environmental Protection Division has indicated to us that the Coast Guard plans to oppose any effort to increase the amount of time spent by barges at the present sewage sludge dump site. The Coast Guard feels that any increase in dump time within the shipping lane increases the collision potential. Movement of the site out of the shipping lane would remove this constraint and reduce this risk.

From the safety standpoint, movement of the site out of the shipping lane would eliminate a very serious obstruction to navigation--even if there is no increase in dumping time.

Accordingly, the National Wildlife Federation respectfully urges EPA to take immediate steps (beginning with inclusion of this proposal in the final impact statement) to move the present sewage sludge dump site the short distance it would take to get it out of an active shipping lane.

Sincerely,

Ken

Kenneth S. Kamlet
Counsel

KSK:jb

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

TRENTON 08625

OFFICE OF THE COMMISSIONER

3 May 1976

Mr. Gerald Hansler
Regional Director
Environmental Protection Agency
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

The New Jersey Department of Environmental Protection has reviewed EPA's Draft Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight. The Department has identified major policy issues associated with sludge disposal and general comments on the Draft EIS in testimony given by Assistant Commissioner Glenn Paulson at your public hearing March 29 in Toms River. For the record, I am attaching a copy of that testimony.

To supplement Dr. Paulson's testimony, we have reviewed the Draft EIS for technical adequacy and minor policy questions. The following comments and questions were raised by our operating Divisions and should be addressing prior to the issuance of the Final EIS:

Short dumping - The practice of short dumping is briefly discussed on page 237 of the EIS. The potential adverse impacts on the near-shore aquatic ecology by the illegal releasing of sludge prior to reaching the dump site is summarily dismissed by EPA. In order to effectively curtail this practice and its potential environmental and health related consequences, we recommend that either EPA or Coast Guard enforcement personnel be assigned to monitor each of the 14 vessels currently transporting sludge to the ocean dump site. Anything short of full-time monitoring cannot guarantee that the temptation of illegal short-dumping will not exist.

Scientific Nomenclature " hard clams - ocean quahogs" - Page 80 and 81 states $11.7 million "hard clams (ocean quahogs)" were landed in NY/NJ. This directly contradicts page 138 which states "ocean quahogs constitute the largest underutilized clam resource in the Bight." Hard Clams, Venus mercenaria, do account for $11.7 million

in NY/NJ, these are an estuarine species and the ocean quahog, Artica islandica, which is a deep water (oceanic) species, and is presently underutilized. These are common problems using common names and the reason why scientific name must always be used.

Marine Birds - The Draft EIS only described organisms living in the sea and completely overlooked the numerous marine birds living on and above the sea surface in the area.

Fisheries - The Draft EIS does not take into consideration the associated industries and retail value of commercial fishing in estimating landing values as an evaluation of the resource. Also an evaluation should be made of the recreational fishing in both areas.

Impact upon crustaceans - Page 233 of the Draft EIS indicates that "Impacts upon crustaceans will be mitigated to some extent by their ability to move out of the effected area". While some of the displaced animals may be harvested or live to reproduce, an area of habitat will still be lost and productivity reduced proportionately at least.

Sincerely yours,

Lawrence Schmidt, Chief
Office of Environmental Review

LS:mm

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON 08625

OFFICE OF THE COMMISSIONER

Testimony of
Dr. Glenn Paulson, Assistant Commissioner
New Jersey Department of Environmental Protection
at the Public Hearing on the
Draft Environmental Impact Statement on the
Ocean Dumping of Sewage Sludge
in the New York Bight
held by the
U. S. Environmental Protection Agency
Toms River, New Jersey
March 29, 1976

Good morning. My name is Glenn Paulson; I am the Assistant Commissioner for Science in the New Jersey Department of Environmental Protection (DEP).

On behalf on Commissioner David J. Bardin, I would like to welcome the officials of the U. S. Environmental Protection Agency (EPA) to the Jersey shore; it is an appropriate setting in light of the subject of today's hearing. Thank you for the opportunity to speak out of the scheduled sequence, since my travel schedule will not permit me to stay here very long this morning.

Our Department has been in periodic contact with EPA ever since the original proposal for alternate ocean dumping sites for sewage sludge was first put forward. DEP's initial reaction was of grave concern; we will not support selection of any site that poses serious environmental risks to New Jersey's coast. Now that we have reviewed the Draft Environmental Impact Statement (EIS) on the Ocean Dumping of Sewage Sludge in the New York Bight, DEP is satisfied both with the level of

analysis of the issue and the conclusions EPA finally reached on it.

We congratulate EPA for an excellent piece of work. It is not often that the EIS process is utilized in such an objective, comprehensive, and thoughtful manner. In a sound application of the principles of the National Environmental Policy Act, EPA has used the EIS process as an integral part of its decision-making, not simply a vehicle to justify a decision which has already been made. I believe the audience will be convinced of this following the technical presentations to be made by EPA and their consultant on this effort.

The Draft EIS has provided the public with a thorough analysis of present and projected ocean dumping practices, existing environmental conditions at the current site, and a sound and comprehensive assessment of both near-term and long-term alternatives to ocean dumping. DEP concurs with the conclusions and recommendations reached in the EIS.

Specifically, we agree that disposal should continue at the existing sludge dumping site on the condition that careful monitoring be done to ensure against any possible public health effects that might result from overtaxing the existing site. We also agree that, if an alternate dump site were to be used as an interim solution for the sludge problem, the results would be, on balance, more damaging to the marine environment than

continued use of the current site, particularly after the cessation of dumping in the 1980's. We agree with the selection of the more northerly alternate site for possible contingency use in the event that the existing site cannot accept the full burden of the projected additional loading. And finally, we agree with the flaws found in using the more southerly site as an alternate.

Beyond the issue of alternate ocean dumping sites, I wish to reaffirm the State of New Jersey's commitment to work with EPA in the timely implementation on land-based sludge disposal methods. We basically agree with the conclusions reached by the Interstate Sanitation Commission (ISC) in its technical report of June 1975). The report (Phase I of a sludge management study) indicated that the most feasible alternate to ocean dumping, at least initially, would be multiple-heaith incineration with eventual conversion to pyrolysis. In the longer term, the alternate of dewatering of sludge with filter presses followed by pyrolysis appears to be environmentally acceptable. We shall continue to work with the ISC and the EPA on the technical, economic, and institutional aspects of implementing land-based sludge disposal in the New York metropolitan areas.

DEP's various divisions are presently completing their final detailed technical review of the Draft EIS; we intend to supplement this statement today with comments of a more precise

technical nature toward the end of the 45 day review period. However, our basic conclusion is clear: EPA has done a very good job in evaluating the current alternatives to the ocean dumping of sludge. We agree with their judgement that, on balance, the most environmentally acceptable interim solution is to continue the use of the current site.

June 3, 1976

Regional Administrator
Region II
U. S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10007

Dear Sir:

Find attached three (3) copies of comments on the draft Environmental Impact Statement on the ocean dumping of sewage sludge in the New York Bight.

These comments were approved for transmittal to you by the Executive Committee of the New York City Citizens Advisory Committee (CAC) formed pursuant to Section 208 of the FWPCAA - 1972.

While the impact statement provides a very useful compilation of information related to sludge disposal, the Executive Committee of the CAC expressed concern that the decision-making process employed in selecting the preferred course of action was inadequate. The impact statement leaves the impression that little long range planning is being done and that future decisions on the discharge of sewage sludge will continue to be made by a process of elimination rather than a systematic approach to the problem.

The attachment hereto provides more detailed comments on the impact statement by page number. I appologize for the tardiness in transmitting these comments and hope you will consider them in your final impact statement.

Respectfully yours,

John J. Szeligowski, Chairman
Technical Sub Committee
New York City Section 208
Citizens Advisory Committee

jjs.ap
Attach.

c/o Con Edison Company of NY
4 Irving Place, Room 1026
New York, NY 10003

1. On page 1 an overview to the action being taken is presented. Since this report is an impact statement it should be clearly stated which requirements of NEPA are being fulfilled and which of your agencies' regulations are being followed.

2. On page 2 of the Statement the following wording appears: "In 1974 EPA proposed that a new ocean dump site be designated for use until sludge dumping could be replaced by environmentally, technically, and economically viable land-based disposal methods." The Inter-State Sanitation Commission (ISC) has indicated that pyrolysis is the most promising of the feasible land-based sludge disposal alternatives but will cost about four or five times as much as ocean dumping at the present sewage sludge site. Costs of these magnitudes may not be considered <u>economically viable</u> which raises the question of whether it is actually practicable to phase out ocean dumping by 1981. An extension past 1981 may be required in order to find an "environmentally, technically and economically viable land-based disposal method."

3. On page 32 it is suggested that mass/time be tabulated as well as concentration.

4. On page 32 reference is made to an unpublished report. It is requested that the report be included in the final impact statement.

5. On page 44 it is stated that pretreatment systems for industrial effluents will be operational in 1977. It is not clear why these systems will not result in a substantial reduction in heavy metals in sludge.

6. On page 45 it appears that the Red Hook and Oakwood Beach treatment plants in New York City were omitted.

7. On page 57 what is the rational behind phasing out industrial waste dumping and continuing municiple sludge dumping.

8. On page 60 it is suggested that additional pollutants be depicted.

9. On page 96 a brief statement on the logistics of ocean transport of sludge appears. This statement is conclusory in nature and should instead be the subject of an analysis using cost benefit techniques.

10. On page 142 it is requested that the analyses leading to the conclusion that the contamination of shellfish waters is attributable to on shore sources, be presented.

11. On page 171 data is presented which is difficult to compare. It is suggested that some statistical characterisation of the data throughout the report be made (for example, confidence levels).

12. On page 198 a conclusion is reached that recreational and commercial fishing is unaffected by dumping. The basis for this conclusion should be presented.

13. On page 201 a statement is made that it will be difficult to determine impact at a site where two or more constituents are to be dumped. It appears that if the same approach used in this report were applied, little difficulty would occur in making the analysis.

14. On page 201 it is stated that imminent health hazards or degredation to water quality must occur before any alternate action is taken. This appears to be an inadequate decision making criteria. It is suggested that a more technically complete statement of when an alternate action be taken be presented in the final statement.

15. On Page 232 it is stated that the purpose of the impact statement is not to quatify impact. It is not clear how a decision can be reached on alternate courses of action when the impact of alternates are not compared on some common quantifiable basis.

16. On page 243 a cost of 75 less 48 million dollars is suggested as applicable to dumping at an alternative site. Nowhere in the report does an analysis of benefits appear in similar terms.

17. On page 266 the statement is made "It is EPA's stated intention to phase out ocean dumping of all municipal and industrial wastes by 1981, provided that the

alternative methods of disposal are environmentally acceptable, technically feasible, and economically reasonable. Similarly, on page 2 EPA remarks that the Agency "had already stated its intention to completely phase out ocean dumping of sewage sludge by 1981, provided that acceptable land-based disposal methods could be substituted."

This intention or policy of phasing out ocean dumping appears contrary to EPA's authority, as stated on page 65, "to establish a permit program for regulating the transport and dumping of waste materials, except dredged material, in ocean waters." No basis for a decision to phase out ocean dumping by 1981 is provided in the Statement, in the Marine Protection, Research, and Santuaries Act of 1972 (MPRSA) in the regulations implementing the Act or in any other available source. Such a decision should be based on a NEPA cost/benefit assessment.

18. On page 277 of the Statement EPA recommends that "an expanded monitoring program and review process should be developed to determine when and if environmental factors warrant the phasing out or abandonment of the existing dump site." This decision-making process should be directed at the protection of public health and welfare and at the prevention of coastal water quality degradation. In general, the monitoring program should include comprehensive sampling of appropriate parameters upon which a decision to phase out or abandon the existing dump site can be based. It would be helpful to know which "environmental factors" will be considered in the monitoring program and which "appropriate parameters" will play a role in the decision making process. It is unclear which basis will be used to determine the point in time that the existing dump site should be abandoned and a switchover to the alternate dump site should take place.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Ogden Reid,
Commissioner

April 19, 1976

Mr. Gerald M. Hansler
Regional Administrator
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

Draft Environmental Impact Statement
Ocean Dumping of Sewage Sludge
in the New York Bight
DEC Project No. 00200-0067

We have reviewed the above noted document and concur with the U. S. Environmental Protection Agency's recommendation for continued use of the existing dump site with the safeguards recommended on page seven of the Draft Environmental Impact Statement.

The position of the New York State Department of Environmental Conservation in this matter has been stated at the public hearing conducted by the EPA on April 1, 1976 at Mineola, N. Y. A copy of that statement is appended for reference.

Our comments on the Draft EIS follow:

I. General Comments

a. The recommended action calls for continued use of the existing dump site with a monitoring and contingency plan to move dumping offshore should conditions require. The nature of the proposed monitoring program should be described in detail. Moreover, criteria for requiring a dump site change as well as all implementing procedures for such a change should be specified.

b. One of the key assumptions used by the EPA in reaching the decision is that all sludge dumping will end by 1981. Given existing fiscal, technological, and logistical constraints, this target date is not likely to be met. If ocean dumping continues for an extended period beyond 1981, the whole set of assumptions underlying this decision may be undermined.

General Comments Contd.

The EPA should establish a realistic target date for the elimination of sludge dumping, and reevaluate the decision based on such information. It should be noted that estimates of volume of sludge to be dumped in the near future are also subject to change as a result of the impact of fiscal problems on construction of treatment facilities.

c. It is unclear whether ocean dumping permits will require pretreatment of sludge before dumping. The EIS should make clear whether such pretreatment measures as thickening, digestion, and metal removal will be required. If they will, the discussions of impact may have to be somewhat modified.

d. The statement should give more attention to the subject of chlorinated hydrocarbons.

e. There are a few apparent disagreements between the DEIS and the NOAA-NESA Technical Memorandum ERL MESA-11 dated February 1976. These matters should be discussed between the two agency staffs and resolved in the Final EIS.

f. The EIS did not indicate that information from commercial and recreational fishing interests was utilized in choosing alternate dumpsites.

g. In considering when the existing site should be abandoned, identified sludge bed movement should be one of the criteria used. However, if such movement is identified, abandonement may have a limited immediate effect. Therefore, further study is needed to determine potential movement, impacts and necessary countermeasures that can be taken if such impacts are significantly adverse. Our Department should be notified immediately of any movement of the sludge mass itself.

II. Specific Comments

Page 71, paragraph 3 - It is stated that three cases of illegal short dumping have been noted. We support the development of a positive recording system to alleviate this problem.

Page 80, paragraph 1 - Here and on p. 247 there is apparent confusion between the ocean quahog (Arctica islandica) and the hard clam (Mercenaria mercenaria). The text and the landings figures (Table 14) should be corrected to clarify this situation.

Specific Comments Contd.

Page 80, paragraph 3 - The occurrence of Atlantic salmon and trout in the New York Bight is quite rare. Other common species include bluefish, cod, scup, whiting, and winter and summer flounder.

Page 184, paragraph 3 - Information on chlorinated hydrocarbons is critical for an adequate assessment of the environmental impacts of sewage sludge dumping. Therefore, studies should be conducted as soon as possible to obtain this data.

Page 195, paragraph 2 - Any movement of the sludge mass toward the coast of Long Island should be considered to have significant adverse effects. Monitoring procedures should include the immediate notification of the Department of Environmental Conservation of any developments in the movement of the sludge mass.

Page 198, paragraph 2 - The statement that ocean dumping does not affect fishing in the Bight is contradicted by the statement in the report submitted by NOAA. Page 196, paragraph 1 of the report states that "it is evident that accumulations of sewage sludge in the inner Bight cause diseases in crustaces (NMPS 1972; Young and Pearces 1975). Observations of fin-rot disease (Ziskowski and Murchelano, 1975, etc.) support the view that sewage sludge is a cause of fin-rot.

Page 206, paragraph 1 - The statement that most of the sludge is retained in the upper layer of ocean is also contradicted in the NOAA report. Page 139, paragraph 4 of that report states that "Most sewage sludge appeared to settle rapidly after discharge, as observed from the deck of the sampling vessel." As this information is of the most critical nature, it is imperative that this contradiction be rectified.

Page 219 - Figure 40 - indicates that bottom areas in the Hudson shelf are being affected by the existing sewage sludge dump site. Page 6, paragraph 1 of the NOAA report states that "The Hudson Shelf Valley is a sink for a large portion of fine particles that reach it. Material dumped in northern area 1-A is likely to concentrate in and contaminate the Shelf Valley to a greater degree than material dumped in southern area 2-A. Available data indicate that the Shelf Valley is important to living resources so that southern area 2-A is more acceptable for disposal of sewage sludge than northern area 1-A." Since the bottom area of the Shelf Valley is currently being affected by the existing dumpsite, the above argument could be utilized to favor moving the existing site.

Specific Comments Contd.

Page 231, paragraph 4 - Concern is directed to the red crab and lobster populations in the upper and lower reaches of the Hudson Shelf Valley. Given this concern, the impacts of existing dumping practices on these resources should be more fully discussed. Figure 40 indicates that the Hudson Shelf Valley has already been contaminated by heavy metals and organic materials.

Page 252, table 31 - It is unclear whether the cost figures include costs of capital, operation, or both.

Page 253, paragraph 1 - The statement that land-based disposal will be cost-competitive with ocean disposal is in apparent contradiction with Table 31. More detail should be provided.

Page 255, paragraph 1 - Cellar dirt dumping does bury existing benthic communities. Depending on the physical-chemical nature of the material it may pose recolonization problems. This matter should be discussed more fully.

Page 264, paragraph 1 - It should be noted that the extra costs expended in offshore relocation of the dump site are attributable in large measure to energy consumption for longer transportation distance.

Page 264, paragraph 2 - Not only is long term sludge storage potentially hazardous to public health, but it is simply unreasonable in terms of cost and available space.

Page 276, paragraph 6 - It is recommended that an alternate sewage sludge dump site should be located in the Northern rather than in the Southern Area. This recommendation is in conflict with the recommendation submitted in the NOAA report (page 6, paragraph 5) which states that "it is recommended that any new sewage sludge dumpsite be located within .... the southern alternative dumpsite ...."

Page 277, paragraph 3 - It is stated that "in general, the monitoring program should include comprehensive sampling of appropriate parameters upon which a decision to phase out or abandon the existing dumpsite can be based." A detailed sampling program should be submitted as soon as possible and should include chlorinated hydrocarbon data. It should be noted that EPA has made a decision within adequate chlorinated hydrocarbon studies.

Thank you for the opportunity to review this statement. We would like to receive four copies of the Final EIS when it is available.

Very truly yours,

Terence P. Curran
Director of Environmental Analysis

Enclosure

cc: Mr. G. Colvin
Mr. D. Larkin
Mr. E. Seebald

Statement By NYSDEC On Environmental Impact Statement On Ocean Dumping Of Sewage Sludge Given At USEPA Hearing In Mineola On April 1, 1976

Mr. Chairman:

Thank you for the opportunity of allowing the Department of Environmental Conservation to make a statement on the recommendations contained in the EIS dated February 1976.

As a preface, I would state that sufficient time has not been available to review the entire document in depth and hence we may have some additional comments, and will submit additional technical comments for the record at a later time. Nevertheless, there are some thoughts which should be conveyed.

The recommendation of the EIS closely parallels the position long held by this department; that until ocean disposal is phased out, the existing sludge disposal site should not be moved unless and until specific information would dictate that there is a rapid acceleration in the degradation of the existing site, migration of the sludge or such other conditions to warrant emergency measures.

Although the movement of the site is of great concern to us, the responsibility for controlling and monitoring rests with EPA and NOAA. We would closely depend upon their inputs to protect the waters and the shores of New York, in the event that it is necessary to move the disposal area into the northern quadrant of the proposed site.

We also concur that the existing disposal site be closely monitored for any potential hazards. The responsibility for this monitoring program we feel would be most appropriate for EPA as the permitting and enforcing agency, particularly in view of the fiscal constraints of the ISC, the State, and Local Agencies. The ISC has had to withdraw from this activity due to lack of funds. We would hope that this limited water quality surveillance program being conducted along the South

Shore of Long Island by NYSDEC and the Local Agencies can provide some useful input to the EPA monitoring program.

One further comment - as the report points out, the ISC is under a grant by EPA - Region 2 to do a comprehensive study on Alternatives for Sludge Management in the New York New Jersey Metropolitan Area. This report outlines various alternatives and suggestions, and that pyrolysis may be the path to follow in the disposal of sewage sludge as it may have the least environmental impact. However, this report has not been completed and these suggestions may be modified depending upon the total consideration. Nevertheless, this alternative looks more favorable and depending upon funding we would hope that it could be implemented.

May I again thank you for the opportunity to comment on this draft EIS.

Ms. Metzger
907

LOUIS J. LEFKOWITZ
ATTORNEY GENERAL

STATE OF NEW YORK
DEPARTMENT OF LAW
TWO WORLD TRADE CENTER
NEW YORK, N.Y. 10047
TELEPHONE: 488-7561

PHILIP WEINBERG
ASSISTANT ATTORNEY GENERAL
IN CHARGE OF
ENVIRONMENTAL PROTECTION
BUREAU

May 25, 1976

Gerald Hansler, Director
U.S. Environmental Protection Agency, Region II
26 Federal Plaza
New York, N.Y.

Dear Mr. Hansler:

Attached are the comments of the New York Attorney General's office on the E.P.A. "Draft Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the Ne York Bight."

We trust that these comments will help in preparing the final statement.

Very truly yours,

LOUIS J. LEFKOWITZ
Attorney General
By

Richard G. Berger

RICHARD G. BERGER
Assistant Attorney General

and

Ethel Munson

ETHEL MUNSON
Environmental Engineer

RGB/EM:jf

cc: Daniel Sullivan

COMMENTS OF LOUIS J. LEFKOWITZ, ATTORNEY GENERAL OF THE STATE OF NEW YORK, ON THE DRAFT E.I.S. ON OCEAN DUMPING OF SEWAGE SLUDGE IN THE NEW YORK BIGHT

The Attorney General agrees with the major conclusion of the Draft Environmental Impact Statement (DEIS) that the existing sludge dump site should continue to be used, pending further studies and intensive monitoring efforts (p. 277). However, this office arrives at this conclusion in part because of certain inadequacies in the DEIS which mandate that the final EIS be augmented by the inclusion of data supporting basic assumptions.

The Decision Not to Move the Present Dump Site

Both NOAA and the DEIS advise that the sewage sludge dump site not be moved unless dsumping poses a threat to navigation or to public health. As monitoring studies have shown that use of the current dump site is not effecting coastal water quality at Long Island or New Jersey beaches, the DEIS finds no immediate threat to public health (p. 184-199). The monitoring data upon which this conclusion is based should be included in the final EIS. By merely stating the conclusion, it is impossible for an observer to evaluate the validity of the sampling. The season of the sampling, the methodology and the control measures should be set forth to suggest these conclusions.

The recommendation not to move the existing dump site stems in part from the conclusion that even if dumping were discontinued at the present site, the water quality in the Apex would not improve (p. 272-3). This conclusion is virtually unsupported in the DEIS. It is claimed that dredge soil dumping and municipal waste water runoff are much more significant sources of pollution than sludge. Yet the report admits that EPA has considered asking the Corps of Engineers to move the dredge spoil dump site as well (p. 53). If the Corps did move the dredge material dump site, the Bight Apex might regenerate. This possibility should be evaluated.

In fact a major conclusion that can be drawn from the DEIS is that it makes no sense to change the sludge site if the dredge site is not moved as well. The environmental effects upon the Apex and from these activities are inseparable. The DEIS should have considered the effect of moving all barge dumping in the Apex to new sites in assessing the regenerative possibilities of the Apex.

The possible regeneration of the Bight Apex is key to a decision to move the dump site. Even if increased dumping would not threaten coastal beaches, a shift in the dump site might be warranted if it could be shown that environmental costs at some other site would be significantly lower than the present site, and that they outweighed the additional expenditures which would be necessary to employ a new site. If the present site would, absent barge dumping, become a productive fishery and shell fishery, a change in the dumpsite may be warranted. Without a proper analysis, such a determination cannot be made.

The assumption that the Bight Apex would not regenerate is also implicitly based upon the finding that municipal waste-

water discharges are responsible for a large part of the pollutant loading in the New York Bight, much larger than sludge dumping. For the purposes of determining whether the existing site will regenerate, the effect of municipal discharges must be evaluated at the present dumpsite. If the effect is uniform through the Bight, then no preference can be assigned any site because of this contamination.

More importantly, the DEIS does not make any attempt to calculate the reduction in wastewater discharges that will result from the construction of sewage treatment plants under the Federal Water Pollution Control Act Amendments of 1972. The New York Metropolitan area should have secondary treatment for all of its wastewater discharges by 1981 (p. 44). Significant reductions in pollutants from wastewater discharges may allow the present site to regenerate if dumping were halted. Again, the DEIS fails to evaluate this possibility and the final should include such analysis. If it could be shown that the Apex might again become productive in a reasonable period of time, the decision not to move may have to be reevaluated.

Analysis of Alternatives

The section of the DEIS on land-based alternatives to the proposed action (pp. 189-193), is inadequate, and the DEIS notes that Interstate Sanitation Commission is currently conducting a complete study of land-based sludge disposal technology. Nevertheless, the section of the DEIS does not provide an adequate discussion of available alternative that are being practiced in

other communities. EPA is currently funding demonstration projects around the country which should be discussed. Most U.S. umicipalities in fact do not dispose of their waste in the ocean, evan large cities. No description is provided of how other cities deal with the problem.

The attitude of the DEIS is to dismiss one alternative technology after another as not providing the solution to sludge disposal. This approach is misleading. Most likely, the New York region will have to employ a mix of disposal techniques to cope with the large volumes generated. Land application is dismissed in the DEIS (p. 190) because of heavy metal contamination of sludge and because of the lack of sites. However, not all treatment plants produce a contaminated sludge. Suburban systems or those that have little industry, will produce sludge low in heavy metals. For those plants at least, land application is feasible. Moreover, the DEIS does not evaluate the effect that new EPA regulations on pretreatment of industrial wastes will have on the heavy metals content of sewage sludge (p. 268). Eliminating of heavy metals would make land-based alternatives significantly more attractive. The National Environmental Policy Act obligates EPA, as other federal agencies, to prepare complete and inter-disciplinary impact statements. Until the alternative analysis is supplemented, this EIS will not be adequate.

Phasing Out Ocean Dumping

The DEIS states that it is EPA's goal to implement alternatives to ocean dumping of sewage sludge of 1981 (p. 43). The Attorney General believe that EPA is less than candid in

making this remark. There is little chance of meeting such a deadline unless the EPA begins now to adopt strict compliance schedules for sewage treatment plant construction and for dumping phase-out. A proposal for such a plan is presented below.

First. however, the final EIS should address itself to the desirability of this goal. In light of what was said in the DEIS and above in these comments about dredge spoil dumping, it may make little difference to the ecologic community of New York Bight if sludge dumping is eliminated. Moreover, ocean disposal, if well planned, may be a preferred alternative to land disposal at least for some wastes. All matter on land is eventually transported to the oceans by natural erosion. The problem of ocean dumping is that unnatural concentrations are imposed upon limited areas, upsetting the ecologic balance. As one expert noted:

> Man produces large volumes of waste which must be disposed of. The question is: Where are you going to put it? If we can recognize the ocean's ability to accept enormous volumes of waste, the key decision is simplified. It becomes what types of wastes can be put in the sea safely and what must be disposed of elsewhere ...Sea disposal is highly desirable for compatible or quasi-natural wastes.
>
> Testimony of _____ _____, before U.S. Senate Commerce Committee, Hearings on Ocean Waste Disposal, Serial No. 92-11, at pp. 206-2-7

Ocean disposal of at least a portion of currently dumped wastes may be compatible with the assimilative capacity of a particular site. The Agency must realize that a particular waste disposal technique is not an all-or-nothing proposition, at least in a region as large as metropolitan New York.

The Attorney General believes that a thorough comparative analysis of different disposal technologies must be done. Yet, from studying the DEIS, one cannot derive comparative costs for ocean dumping versus land-based disposal techniques. The analysis contained in Section VII(c)(1) relates the current cost of sludge dumping against the cost of dumping at proposed sites in $/cubic meter. In Appendix B, the relative costs of land-based alternatives are estimated in $/ton of sludge. EIS should give the necessary conversion factor of how many cubic meters of sludge equal a ton. Additionally, the drastic three-fold increase in the projectec cost of sludge dumping in 1981 using the existing site should be explained (Table 30).

In any event, the cost of ocean dumping of sludge is almost certainly significantly lower than the estimated costs of alternatives. Even allowing for an increase in sludge dumping costs as predicted, ocean disposal will almost surely be significantly cheaper than land alternatives in 1981 or at any other time. And dumping at 12 miles will always be cheaper than dumping at more remote sites. Given the acute fiscal problems of New York City, New York State, and other governmental bodies, there will

be tremendouw pressure to adopt the least expensive alternative regardless of the environmental consequences. Nor does the DEIS unequivocally state the ocean dumping of sludge will end, only that,

> "It is EPA's stated goal to implement environmentally acceptable alternatives to ocean dumping of all sewage sludge in the Bight by 1981, where environmentally, technically, and economically feasible" (p. 43).

This discrepancy between ocean and land-based disposal costs is illusory, however. For all other disposal techniques beside ocean disposal, Congress had mandated that the environmental costs of any particular process which produces wastes be internalized in the cost of that process (e.g., Clean Air Act, Federal Water Pollution Control Act). Thus for the production of steel, instead of environmental costs being general costs to society, they now become reflected in the price of steel by the costs of air and water pollution control technology. While the price of steel may now be higher, Congress recognized that other costs, much higher than the incremental pollution control costs, were being paid by society in medical bills and loss of valuable resources. Similary in land-based sludge disposal, the cost of cleaning up pollution is internalized in the cost of the process. For example, the cost of incinerating sludge includes the cost of air pollution control equipment.

Only in ocean disposal are the environmental costs --

loss of fin and shell fisheries, impairment of navigation (reflected in the recent collisison between and acid waste barge and a cargo ship of Abrose Light), and the loss of recreational areas - general societal costs which are not incorporated into the cost of the disposal process. Additionally, the high cost of monitoring barge dumping and water quality are not included in the price of dumping. If these costs were properly quantified in the EIS and included in the price of ocean disposal, the cost of land-based alternatives would appear much more competitive.

The Attorney General proposes that the EPA assess the external costs of ocean dumping, including environmental and governmental costs fairly attributable to the dumping, for the three different dump sites considered. Depending upon which dump site is finally chosen, the Administrator should assess these costs to dumpers in the form of permit fees. Authority exists under 33 U.S.C. § 1414(6) for the Administrator to establish such fees "as he deems appropriate." These fees could be phased in gradually through 1981, thereby supplying an economic incentive for dumpers to phase out ocean dumping, where more desirable alternatives exist. The fees charged could be placed into a special fund to develop alternative waste disposal technology in the region where the dumping exists.

The fee system proposed above would have several advantages. It would equalize the cost of ocean disposal with land disposal by reflecting true costs. If ocean disposal is still preferable, in whole or in part, the dumper will have a

strong incentive to minimize environmental costs, not only capital and operating costs. Unless some form of cost internalization is employed for ocean dumping, it will continue, international and national laws notwithstanding, to be the most inexpensive and thus attractive waste disposal system.

Metzger/Sullivan (late)

THE PORT AUTHORITY OF NY & NJ

One World Trade Center, 72S
New York, N.Y. 10048

Planning and Development Department

Edward S. Olcott, Director
(212) 466-8633
(201) 622-6600 x8633

April 9, 1976

Mr. Gerald Hansler
Regional Administrator, Region II
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

The Port Authority of New York and New Jersey is aware that your agency held hearings on your draft "Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight" in New York City on March 24th. This is a subject of great concern to port and maritime interests in the Port of New York.

Under the Port Compact of 1921, the Port Authority is responsible for the development of port commerce and facilities in the bi-State Port of New York. These activities are shared with the City of New York, the Corps of Engineers and private industry, and often necessitate dredging. Both Federal and non-Federal construction and maintenance dredging, of course, produce bottom materials which require disposal. Without disposal facilities, or with excessively costly facilities, these port development and maintenance activities must cease, or at the very least, be severely restricted. Port-dependent industry, jobs and tax revenues would obviously be affected by such restrictions.

We recognize that the present ocean disposal of dredged material is not an environmentally ideal practice. Unfortunately, nothing has as yet been developed as a suitable alternative. The Corps, as you know, is seeking its own set of answers on a nationwide basis through a Dredged Material Research Program authorized in the River and Harbor Act of 1970. We understand that the program, expected to cost about $30 million, will be completed in 1978. We further understand that New York District Engineer has an architect engineering firm under contract to examine various disposal schemes applicable to the New York Harbor.

Dredged material is more a victim than a cause of pollution. Dredged material becomes polluted largely because we have not yet properly controlled shoreside sewage and industrial outflows and land runoffs. Therefore, if we are successful in controlling polluted outflows and runoffs, we should be equally successful in creating less polluted dredged material.

While we would all like to see ocean dumping of dredged material replaced with a more desirable practice, the new practice must also take cognizance of port economic activities, and most certainly must be predicated on consensus that ocean dumping has been indeed proven to pose serious environmental harms. We believe that this time has not yet arrived, and

THE PORT AUTHORITY OF NY & NJ

would thus urge extension of the status quo until such time. We sense that this posture is in line with that of the Environmental Protection Agency and the National Oceanic and Atmospheric Administration, which recently concluded that the present New York Harbor disposal site should not be abandoned because it presents no danger to public health or beach water quality.

We appreciate this opportunity to present our views on what we concede is a most difficult problem, yet one that must be resolved within the framework of full understanding of all the consequences involved.

Sincerely,

E. S. Olcott

Edward S. Olcott
Director of Planning & Development

cc: Col. Thomas C. Hunter

The Rochester Committee for Scientific Information

P. O. Box 5236, River Campus Station
Rochester, N.Y. 14627

March 28, 1976

Mr. Gerald M. Hansler
Regional Administrator
Environmental Protection Agency
Region II
26 Federal Plaza
New York, N.Y. 10007

Dear Mr. Hansler:

We were startled to read on Page 6 in the draft EIS on the Ocean Dumping of Sewage Sludge in the New York Bight that "the only significant irreversible and irretrievable resource commitment involved in implementing the proposed action is the cost". This kind of statemnt, particularly on the part of the EPA, makes a mockery of one of the main purposes of environmental impact analysis and that one is the preservation of irretrievable resources. We take Impact Statements very seriously, and would like to see your consulting engineers trained in the fundamentals of conservation.

Sincerely yours,

Olga Berg

Olga Berg, President
for the RCSI Board

copy to Dames and Moore

MARY LARSON
Borough Clerk

BOROUGH OF SEA BRIGHT
OFFICE OF THE BOROUGH CLERK
MONMOUTH COUNTY, NEW JERSEY

BOROUGH HALL
1099 EAST OCEAN AVENUE
SEA BRIGHT, N. J. 07760
(201) 842-0099

March 19, 1976

Mr. Gerald M. Hansler
Regional Administrator
United State Environmental Protection
Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

At the Regular Meeting of the Mayor and Council of the Borough of Sea Bright, held on March 16, 1976, a communication was read concerning the public hearings to be held on the Sludge Site Impact Statement.

I have been directed by the Governing Body to write to you and convey their opposition to locating this site twelve nautical miles off the Long Island and New Jersey coasts. The Mayor and Council wish to go on record supporting the moving of this sludge site to a location further out to sea inasmuch as they feel the existing site does present a danger to public health and beach water quality.

Very truly yours,

MARY LARSON
Borough Clerk

ML:bjc

MARY LARSON
Borough Clerk

BOROUGH OF SEA BRIGHT
OFFICE OF THE BOROUGH CLERK
MONMOUTH COUNTY, NEW JERSEY

BOROUGH HALL
1099 EAST OCEAN AVENUE
SEA BRIGHT, N. J. 07760
(201) 842-0099

April 9, 1976

Environmental Impacts Branch
Room 907
26 Federal Plaza
New York, New York 10007

Gentlemen:

Enclosed herewith is a Certified Copy of a Resolution, duly adopted by the Mayor and Council of the Borough of Sea Bright, New Jersey, at their Regular Meeting held on April 6, 1976.

I have been directed by the Governing Body to forward this Resolution to you, indicating their strong opposition to the extension of time for the dumpage of sludge off the coasts of Long Island and New Jersey.

Very truly yours,

MARY LARSON
Borough Clerk

ML:bjc
Enc.

The following Resolution was offered by Councilman Kelley, who moved its adoption, seconded by Councilman White, carried on roll call all ayes:

RESOLUTION OPPOSING EXTENSION OF TIME FOR DUMPAGE OF SLUDGE IN THE ATLANTIC OCEAN.

WHEREAS, the U.S. Environmental Protection Agency has recommended that the dumpage of sewage sludge continue at a site located 22 kilometers (12 nautical miles) off the Long Island and New Jersey coasts until 1981; and

WHEREAS, recommendations have been given to the said agency indicating that the increase in the volume of sludge to be dumped would not have an adverse effect upon the waters off the Long Island or New Jersey beaches; and

WHEREAS, the Environmental Commission of the Borough of Sea Bright has studied this problem and strongly urged the Mayor and Council of the Borough of Sea Bright to oppose the continued dumpage of sludge off the coasts of New Jersey; and

WHEREAS, the Borough of Sea Bright is greatly dependent upon the ocean waters off its coasts; and

WHEREAS, the Governing Body of the Borough of Sea Bright is gravely concerned that the dumpage of sludge off its coast does adversely effect its waters,

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Council of the Borough of Sea Bright that it go on record strongly opposing the continuation of the dumpage of sludge off the coasts of Long Island and New Jersey; and

BE IT FURTHER RESOLVED that a copy of this Resolution be forwarded to the Environmental Impacts Branch, Room 907, 26 Federal Plaza, New York, New York 10007; and

BE IT FURTHER RESOLVED that a copy of this Resolution be forwarded to the Sea Bright Environmental Commission.

ROLL CALL:

AYES: Councilmen Kelley, White, Forsman, Duffy
NAYS: None
ABSENT: Councilmen Brennan, Lane

I, Mary Larson, Clerk of the Borough of Sea Bright, New Jersey, that the foregoing Resolution was duly adopted by the Mayor and Council of the Borough of Sea Bright at their Regular Meeting held on April 6, 1976.

MARY LARSON, BOROUGH CLERK

216 Ocean Avenue
Sea Bright, N. J. 07760
March 20, 1976

Mr. Gerald M. Hensler, Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hensler:

RE: HEARINGS ON OFFSHORE OCEAN DUMP SITES

I wish to state my objections to the retention of the present ocean dump sites off the coast of Sea Bright, New Jersey.

I. Present sites for the dumping of:
   a. Harmful spoils from New York Harbor, the Hudson and Raritan Bay, dredged to maintain channels.
   b. Raw sewage
   c. Partially treated sewage from old-established sewage treatment plants, plus new huge regional plants with no other disposal facility for sludge.....

   have resulted in a 'dead sea' area which is spreading year by year. Fast! There should be an immediate halt to all dumping at these saturated sites and a reclaimation project undertaken.

II. The selected alternative sites ask to be exempted. Naturally any site compared with the present one would be comparatively pristine. In light of the statement, "there is no significant harm to the population or beaches adjacent ", should be weighed in favor of new sites.

   This present site took over 40 years of use to come to its present state. Five years (1981) in a new site would not cause significant damage and rehabilitation would be unnecessary or minimal.

III. The added cost factor is the one catalist that would stimulate the planning and adoption of alternative safe, profitable, and environmentally acceptable ways to dispose of sludge and spoils. Since 1971 has there been any conversion from the ocean dumping practice of these sewage authorities? Since 1975 when they were notified the present site wasto be closed, did any submit plans to start alternative means of of disposal? Do you believe 1981 will be any different?

)Con't.)

In business when the cost factor interfers with profits, there is action. I recommend your notice of 1975 be implemented.

IV. Despite the recent "expert testimony", other "top experts" have testified a Rehoboth Beach Hearings that ocean dumping is harmful and unacceptable.

V. As a matter of record in 1971, the Conservation Committee of Sea Bright in one week collected 3,748 signatures to support a Bill to move the dump sites out.

VI. From a purely personal point of view and from daily observation I can testify to a steady deterioration in the quality of ocean water in this area over the last forty years. I even hesitate to eat fish caught in the area because of the contamination carried in the food chain--a health hazard.

   Almost daily I can see the barges dumping their carroes. The spoils site is five miles out and that material is deadly.

VII. The "National Water Quality Standard Act of 1971" was incorporated in the approved "Federal Water Pollution Control Act Amendments of 1972." The area of the New York Bite is is included in the one National Ocean Water Quality Standard, together with the rest of the Atlantic Coast, the Gulf of Mexico, and the Pacific.

   We the citizens who live in Sea Bright, New Jersey and the thousands using the Sandy Hook National Gateway Park ask that the present dump sites be closed under the protection and provisions of this Federal Law.

Respectfully submitted,

Loretta C. Hanley

Loretta C. Hanley, Secretary
Sea Bright Conservation Committee

216 Ocean Avenue
Sea Bright, N. J. 07760

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
700 East Water Street, Syracuse, New York 13210

April 6, 1976

Mr. Gerald M. Hansler, P.E.
Regional Administrator
U.S. Environmental Protection
Agency - Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

We have reviewed the EPA edited and abridged Draft Environmental Impact Statement on the "Ocean Dumping of Sewage Sludge in the New York Bight," dated February 1976, which was referred to the Soil Conservation Service for review and comment.

The SCS has no comments to make on this statement related to its expertise and responsibilities.

We appreciate the opportunity to review and comment on this proposal.

Sincerely yours,

Robert L. Milliard
State Conservationist

cc: R. M. Davis, Administrator, SCS, Washington, D. C.
A. C. Addison, Director, NE TSC, SCS, Broomall, Pa.
Dr. Fowden G. Maxwell, Coordinator, Office of Environmental Quality Activities, Office of the Secretary, USDA, Washington
Council on Environmental Quality, Washington (5 copies)

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

May 4, 1976

Mr. Gerald M. Hansler, P. E.
Regional Administrator
Region II
U.S. Environmental Protection Agency
26 Federal Plaza
New York, N. Y. 10007

Dear Mr. Hansler:

This is in reference to your draft environmental impact statement entitled "Ocean Dumping of Sewage Sludge in the New York Bight," which accompanied your memorandum of February 27, 1976. The Department of Commerce has reviewed this statement and offers the following comments for your consideration.

General Comments

The Environmental Protection Agency (EPA) recommends continued dumping of sewage sludge in the existing dump site in the New York Bight complex after considering various alternates. As a safeguard for future hazards to public health or water quality, EPA recommends immediate designation of an alternate dump site in the "Northern Area" for future use, if necessary, close monitoring of existing dump site and nearby sensitive areas near Long Island and New Jersey for potential hazards to public health or damage of regional water quality, and requiring permitters to use the alternate dump site upon confirmation of such hazards (p. 7, 201). The "Northern Area" is located roughly 46 km (25 n mi) from the Long Island coast; it is about 1,650 sq. km (490 sq. n mi) in area and lies in 40 to 60m(132 to 198 ft.) of water.

Three stated reasons support the proposed decision.

1. Continued use of the existing dump site is not a present threat to public health or to water quality along the beaches of Long Island or New Jersey.

2. Moving the present sludge dumping operations to an alternate site without adequate justification will result in the unnecessary contamination of a relatively pristine area of the Bight.

3. Contamination of a new area will not be balanced off by recovery of the existing dump site because pollution from other sources will continue.

Since the volume of sewage sludge dumped in the New York Bight is expected to double between 1976 and 1981, threats to public health and to water quality will occur in the future. We suggest that any alternative sludge dump site be beyond the "line of divergence" and outside all navigational lanes.

Although the choice of alternative sites probably makes little difference now, we prefer the southern alternative site since the probable impact on the remaining living marine resources (whether now exploited or not) would be less than on the currently exploited shellfish (principally surf clams, Spisula solidissima) and mineral resources (sand, gravel, oil, and gas).

The statement makes only slight reference to conducting ocean dumping in waters off the continental shelf. Dumping in these deep waters might be a viable disposal alternative in the near future for specific sewage sludges and dredge materials containing very high concentrations of toxic materials, such as heavy metals. If the many unknowns associated with "off-the-shelf dumping" raises questions of "undue environmental risk," a research monitoring effort to assess these risks should be initiated as part of NOAA-MESA activities. If sludge dumping does continue beyond 1981, then "off-the-shelf dumping" may become a practical necessity despite obvious economic drawbacks.

It is stated that: "EPA intends to phase out ocean dumping in the New York Bight by 1981, provided that environmentally acceptable, technically feasible, and economically reasonable alternatives can be developed." We recommend that EPA describe in detail the regulatory procedures that it is taking to achieve this goal.

Specific Comments

I. SUMMARY

RECOMMENDED ACTIONS

Page 7. This section is deficient in two significant areas. Sufficient discussion of the significance of sludge dumping to bathing water quality has not been presented and land-based alternates have not been considered adequately. Although land-based alternatives for sludge disposal have not been fully developed, the brief discussion (p. 189-193 and Appendix B) is not convincing that "timely implementation" of land-based alternates will occur (by 1981). Some background information may be found in studies of land-based sludge disposal currently in progress by the Metropolitan Sanitary District of Greater Chicago.

II. BACKGROUND
G. OTHER ACTIVITIES IN THE NEW YORK BIGHT
1. Commercial Fisheries

Page 78. Although statistics may not be available, this section should include a discussion of foreign fishing occurring in the Bight for an accurate picture of its resource productivity.

Page 81, Table 14. When using the term "hard clam," there should be a differentiation between the venus clam (Mercenaria mercenaria) and the ocean quahog (Arctica islandia).

IV. DESCRIPTION OF THE ENVIRONMENT
B. PHYSICAL OCEANOGRAPHY
2.a Tidal Currents

Page 110, paragraph 2. The term "maximum average tidal current" is used frequently, but is not defined. Is it the average of the maximum speeds observed or the maximum of several averages?

C. BIOLOGICAL OCEANOGRAPHY
1. Benthos

Page 126 (The sand fauna...). Some research has indicated that all organisms are not capable of digging out when buried. Surf clams specifically seem to lack this ability (Ropes, John W., and Arthur S. Merrill. 1973. To What Extent do Surf Clams Move? Nautilus. Vol. 87(1), pp. 19-21.).

2. Fisheries Resources

Page 132 (Species which inhabit the Northern or Southern Area for most of all their life cycle...). The statement should be clarified to show that the New Jersey surf clam fisheries may have been overfished.

Page 137 (Figure 21) and page 138, paragraph 3. Both Figure 21 and Saila and Pratt (Saila, S.B., and S.D. Pratt. 1973. Mid-Atlantic Bight Fisheries. In Saila, S.B. (Ed.) Coastal and Offshore Fisheries Environmental Inventory: Cape Hatteras to Nantucket Shoals, Marine Publication Series No. 2, Occasional Publication No. 5. U. of R.I., Providence, R.I.) indicate that sea scallops are abundant in the alternate areas, and should be included in this section.

VI. FATE OF SEWAGE SLUDGE DUMPED AT PROPOSED AREAS
A. SETTLING AND DISPERSION IN WATER COLUMN

Page 205, paragraph 3. The statement is made that the ocean water's density structure affects the rate at which sludge settles. Yet there is no information on water density structure in Chapter IV, Description of the Environment.

B. RESUSPENSION
3. Bottom Currents

Page 213, line 11. It is inferred that sludge dumped on the eastern border of the northern area will probably be moved offshore. However, on page 120, paragraph 3, it is stated that "None of the net bottom currents for the Long Island shelf have offshore components."

VII. IMPACTS OF THE PROPOSED ACTION
B. IMPACTS ON THE ECOSYSTEM
1. The Benthos
a. Similar Areas

Page 229, paragraph 3. The statement reads "...adverse biological effects due to dumping of dredged material may be more severe than those due to dumping of sewage sludge." However, since the long-term effects of either are unknown, the statement should be amended to emphasize that the biological effects referred to are probably short-term.

2. Fisheries Resources
a. Proposed Areas

Page 233, paragraph 3. This section should include a discussion of potential adverse effects on sea scallops. Long-term use of a proposed area would substantially increase the amount of degraded area, thus potentially increasing any associated adverse effect.

XI. CONCLUSIONS AND RECOMMENDATIONS

Page 270, Table 32. The section on shellfish should discuss sea scallops.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final statement.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

2 - Jan'l 4/21

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION II
FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

OFFICE OF THE
REGIONAL DIRECTOR

April 20, 1976

Ms. Barbara Metzger
Chief Environmental Impacts Branch
Environmental Protection Agency
26 Federal Plaza
N.Y. N.Y. 10007

Dear Ms. Metzger:

Subject: Draft EIS # 099-03-76
Ocean Dumping of Sewage Sludge
in the New York Bight

Our area of concern for an action of this nature is the protection of public health from unsafe shellfish. We therefore, requested the Food and Drug Administrations (the branch of HEW responsible for the shellfish program) to review and comment on your EIS.

Their comment is as follows:

"As an alternate dump site the Northern Area would be the preferable location due to its lower surf clam and ocean quahog resource value as compared to the Southern Area. However, dumping in potential shellfish bearing waters would result in additional closures by our agency. It may put an additional patrol burden on the U.S. Coast Guard."

We thank you for the opportunity to comment on your draft EIS.

Sincerely yours,

Luther W. Stringham, for

Luther W. Stringham
Regional Environmental Officer

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
NEWARK AREA OFFICE
GATEWAY 1 BUILDING, RAYMOND PLAZA, NEWARK, NEW JERSEY 07102

REGION II
26 Federal Plaza
New York, New York 10007

March 25, 1976

IN REPLY REFER TO:
2.4SD

Mr. Gerald M. Hansler, Regional Administrator
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

Subject: Draft EIS - Ocean Dumping
of Sewage Sludge in the New York Bight
EPH-2-NY, NJ-Ocean Dumping-76

The HUD Newark Area Office has reviewed the subject Draft Environmental Impact Statement and would like to offer the following comment for your consideration.

It appears that the recommendations of the report are rather open-ended in that there are no criteria specified by which EPA will decide if and when to phase out the existing dump site and transfer disposal operations to the Northern Area. By not defining threshold values of pollutants or other factors necessary for the protection of public health and welfare and the prevention of coastal water quality degradation, we are concerned that a decision to act would become arbitrary and subject to political or economic pressures rather than being based on a concern for public safety.

Therefore, we recommend that at least a tentative set of decisionmaking criteria be developed and circulated for public comment prior to or concurrent with the issuance of the Final EIS.

Thank you for providing the Department with this opportunity for review and comment.

Sincerely,

Walter J. Johnson
Area Office Director

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT. CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK. N. Y. 10007

IN REPLY REFER TO NANOP-E

3 June 1976

Mr. Dan Sullivan, Chief
Environmental Impact Branch
Environmental Protection Agency
Region II
26 Federal Plaza - Rm 907
New York, NY 10007

Dear Mr. Sullivan:

Inclosed is the Corps of Engineers review of the EPA (Region II) EIS on the dumping of sewage sludge at two new interim dump sites approximately 65 miles out to sea in the New York Bight.

Sincerely yours,

JOHN ZAMMIT
Chief, Operations Division

Incl
Review of EIS

VANGUARD of FREEDOM
BICENTENNIAL
UNITED STATES ARMY

AMERICAN REVOLUTION BICENTENNIAL
1776-1976

REVIEW OF DRAFT E.I.S. ON THE OCEAN DUMPING OF SEWAGE SLUDGE IN THE NEW YORK BIGHT.

1. p 2, 3rd para. - The Corps of Engineers, New York District, concurs with the EPA's decision not to move the site and to monitor the present site for changes in present impacts.

2. p 5, Line 14 - It is stated that, "a polluted bottom environment, such as that at the existing dump site....". On what basis does the EPA claim that dumping of sewage sludge at the present sludge dump site caused and is causing polluted bottom conditions? This claim should be documented.

3. p 6, Line 8 - Even though the northern area is at present not extensively used for fishing and no mineral resource development is planned there, the area is nonetheless still potentially valuable and this should be noted.

4. p 6, Line 12 - This statement is true only if the alternate sludge dump sites impacted have a 100% chance of recovery after cessation of dumping.

5. p 7, Line 22 - The existing site would not be expected to significantly improve if dumping were stopped not only because other sources of pollution will continue, but also because of the sludge that has accumulated on the bottom.

6. p 24, Figure 2 - The Dredge material dumping site should not be characterized as "mud" since most of the material deposited there (approximately 80%) is sand, according to a recent (5 March 1976) testimony given by NOAA to the House Subcommittee on Fisheries and the Environment. If the word "mud" is used, it should be used in the right connotation, that is, "Mud And One Man Stone" Dumping Ground. Otherwise the term is inappropriate. The standard terminology for describing physical characteristics of sediments (coarse material, sand, silt and clay) should be used.

7. p 53, Line 7 - It is stated that there is "high pollutant loading" associated with the dumping of dredge material. Presumably this "pollutant loading" is caused by the chemical properties of this material enumerated on p51. However nothing is said about the bio-availability of these pollutants to the Bight food web. Does the EPA have proof that the heavy metals, petrochemicals, and nutrients contained in the dumped dredge material contribite to pollution in the Bight? If they do, these definite cause and effect relationships should be documented here. If proof cannot be furnished, it should not be implied in this document that because hazardous substances are found in dredged material they automatically cause degradation to the area of the dump site or the Bight in general.

8. p 59, Table II - Spelling error cadium should be cadmium.

9. p 59, to - Table II and Figure 4 - Figures are given to establish quantities of pollutants contributed by various sources including dumping in general and dredge material in particular. There should be an explanation here of how these figures were arrived at. It would be helpful if the source data (Muller and Jeris, Unpub.) were summarized in an Appendix.

10. p 58, Line 26 - It is stated that, in terms of absolute volumes, dredged material is the major source of pollutants dumped in the Bight. "The term pollutant" should be used more carefully. If the EPA considers dredge material a pollutant, it should explain exactly what it means. If there is evidence that the constituents in dredged material dumped in the Bight contributes to ecological damage to the Bight area or are a public health hazard, this data should be presented here. Is the EPA aware of studies currently being conducted at the Corps Waterway Experiment Station which indicate that constituents of dredged material under many conditions are not bio-available? It is suggested that the EPA contact the Chief of the Dredged Material Research Program at WES and make its own critical review of studies of the bio-availability of toxic constituents dredged material. If the EPA finds that the data being generated from this program is valid, all references to dredged material in this document should reflect the results of this review.

11. p 81, Table 14 - Scientific names should be included next to common names of organisms in this table and elsewhere throughout this document.

12. p 80, Line 22 - White Perch, Salmon and Trout are not commonly caught either commercially or recreationally in the New York Bight. The greatest fishing pressure both commercially and recreationally, for White Perch is in the Hudson River. Salmon and sea run Trout are almost unheard of in the New York Bight.

13. p 106, Line 5 - Spelling error verticle should be vertical.

14. p 106, Line 6 - Grammatical Error, "For most part" should be "for the most part."

15. p 106, Last Line - Arithmetic error, 24° C converts to 75.2° F, not 50° F.

16. p 126, Line 6 - This statement is incomprehensible. Also, not all organisms commonly found in sandy substrate are "capable of digging themselves out." In general the degree of success of vertical migration in sand dwelling invertebrates depends on the nature of the covering material, the volume of this material and the time period in which the material is deposited.

17. P 129, Table 19 - White and Blue Marlin and Swordfish are migratory species that inhabit deeper waters of the western Atlantic continental shelf and it is doubtful that they are not found in the northern or southern areas, even though catches of these species have decreased in recent years. Weakfish, Striped Bass and Shad are anadromous or semi-anadromous species that are most common close to shore, however it is quite possible that they occur in the north or south areas. All of the aforementioned species would be more properly placed in the "periodically inhabit" category. The only species that should be categorized under "not found" are those that require very refined environmental conditions such as soft shell clams, which basically inhabit the intertidal zone. Also, there are numerous other species that "periodically inhabit" the areas in question. They include, Pollock, Ling, Haddock, Tilefish, various species of Sharks, Blackfish, Bonito, Tuna, Blowfish, Sea Robins, Sculpins, Halibut, Bergall, Conger Eel, American Eel, Sailfish, etc. Finally, the species list under the "most or all of life cycle " category does not coincide with the statement made on page 130 (Line 1) which says," population centers of.... Little Skate, Goosefish, Silver and Red Hake, Ocean Pout, Yellowtail Flounder and Squid....lie either in or near these areas." These species should be included *IN* that category.

18. p 195, Line 19 - It is stated that a clean water and sediment zone, about 10 to 11 km, separates the leading edge of the sludge mass from the Long Island Coast. This statement assumes that sludge is accumulating on the bottom yet in the next para. it is stated that MESA found no significant accumulation of sludge.

19. p 200 (2) (d) - Other existing Dump sites - The concept of separating wastes by dump site in order to pin point the effects of each type of waste dumped is difficult in the Bight Apex due to the overlap of influence of wastes from different dump sites and background land based pollution. Cause and effect relationships cannot now be established due to the proximity of dumpsites and the"masking" effect of other pollution sources. If all wastes were dumped at the same site, it would be even more difficult to establish cause and effect relationships. Also, if the EPA is going to mention that the dredge material dump site is closer to the new Jersey coast than the sewage sludge dump site, then it should also mention that the later site is closer to Long Island beaches.

20. p 229, Line 14 - Documentation of this sentence is necessary. The next sentence is unclear. Major impact to what? When? Where?

If the EPA is going to mention that the impact of the dumping of dredged material is likely to be greater than the dumping of sludge in respect to suffocation of benthic organisms it should also mention which material, dredged or sludge, is more likely to adversely impact the benthos of the Hudson shelf (Christiansen Basin) Valley which is stated to be a contaminated area in this paragraph.

21. p 254 (D) (1) Dredged Material - It is stated that "dredged material dumping was not considered a serious problem until recently. Its effects are just now being established." What effects (other than smothering)? Why is dredged material dumping suddenly a problem? This paragraph is totally inadequate and misleading. It should be documented or deleted.

22. p 255 (d) (3) It is stated that cellar dirt material is essentially inert and non toxic to the marine environment". Why wasn't the smothering effects of this dumping emphasized as it was with dredged material dumping?

23. p 257, Line 25 - Grammatical Error - Add "oil after "upon".

24. p 230 (F) (8) it is stated that "the impact of (dredged material) dumping by the COE at the existing dredge material dump site should be studied in detail? What should be studied in detail? Apparently the EPA already has "detailed" information on the effects of dredged material dumping since it stated previously in this document (p 254, (1) (1)) that dredged material dumping is a "serious problem."

Metzger / Sullivan Rec'd 4/29

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTHEAST REGION
JOHN F. KENNEDY FEDERAL BUILDING
ROOM 2003 M & N
BOSTON, MASSACHUSETTS 02203

ER 76/219

April 26, 1976

Mr. Gerald M. Hansler
Regional Administrator
Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10007

Dear Mr. Hansler:

We have reviewed the draft environmental statement for Ocean Dumping of Sewage Sludge in the New York Bight.

RECREATIONAL VALUES

The draft statement recognizes the importance of recreation to the area (p. 80, 82). However, it does not specifically identify recreational areas, needs, visitation figures, use patterns, etc., in close proximity to the proposed dumping site. We recommend that this section be expanded to include some additional information on these matters. The New York and New Jersey Statewide Comprehensive Outdoor Recreation Plans are excellent sources for information. They should be referred to, as appropriate, in the final statement.

Any shoreward movement of sludge materials from the existing dump site would have serious adverse impacts on seashore recreation areas. However, the statement indicates on pages 194-199 that no such movement is anticipated. Further, it mentions that a comprehensive monitoring program will be instituted to determine if and when the existing site can no longer safely accommodate additional sludge. The final statement should describe the monitoring system and provide reasonable assurance that it can detect potential adverse sludge movement and contamination in sufficient time to protect the valuable seashore resources.

SPECIFIC COMMENTS

Page 22

It is stated (par. 2) that the Bight Apex covers an area of 645 square kilometers or 188 square nautical miles. Possibly this should have been given as 1,645 square kilometers or an equivalent number of square miles, as even the Northern Area is given as 1,650 square kilometers or 490 square nautical miles (p. 95, par. 1); the relative sizes of the two areas are shown on figure 8.

Page 87 and Pages 248-250

A second lease sale (proposed OCS Lease Sale #49) is tentatively planned for the Mid-Atlantic. A Call for Nominations is expected to be issued later this year. For "OCS Lease Tract #40," substitute the wording "proposed OCS Lease Sale #40."

Pages 104-123

No discussion of winds, sea states, or visibility is included in the description of the environment. Given that the proposed action will involve impacts from ships which will have to traverse open seas, possibly dump loads short of their destination due to storms, or possibly collide with other vessels due to poor visibility or storms, this ommission is significant.

Pages 147-167

No discussion is included on the Baltimore Canyon Trough. Potential stratigraphic traps may exist to the north of the Call for Nominations area for proposed OCS Lease Sale #40. Therefore, the northern alternate dump site might conflict with future Call areas for other Mid-Atlantic Lease Sales. With this as a possibility, we strongly urge that there be further coordination with the Bureau of Land Management before a final decision is made on this proposal.

Data indicates that the sand ridges described are less than 11,000 years old and rest on slightly older lagoon deposits of Holocene age or Pleistocene sediments. The USGS has obtained a radiocarbon date of 9310 years B.P. for shell material incorporated within sand waves near Wilmington Canyon. A date of 32,730 years B.P. was obtained by Field (1975) from lagoonal sediments off Ocean City, Maryland.

Page 206

The bathymetric studies conducted by Williams (Army Corps of Engineers, CERC) should be mentioned for examples of how ocean dumped material has become distributed on the ocean floor.

It is stated that "density of the sludge ranges from 1.12 to 1.75 g/cu cm" (lines 11-12). This should be changed to "density of the sludge solids . . .," because the density of the sludge had been given as ranging from 1.0007 to 1.0181 grams per cubic centimeter (p. 206, line 4).

Page 211

The environmental statement would benefit from inclusion of more complete information and arguments in support of the important conclusions regarding the ultimate fate of the bulk of sludge solids. It has been concluded variously that "most of the solids are not expected to reach the bottom" (p. 211, lines 9-10), that "only a small fraction of the dumped sludge reaches the sea floor" (p. 211, par. 3), and that "most of the sludge solids, fine, low-density organic matter, will tend to remain in suspension" (p. 206, lines 13-15). We found no mention of flocculation of the fines by contact with sea water. In the discussion of interactions with sea water, starting on page 214, it would be helpful to discuss the extent to which the finer particles are flocculated by mixing of the sludge with sea water. Although flocculated particles in the sludge were mentioned (for example, p. 206, par. 2; p. 208, par. 2), we found no discussion of whether mixing with sea water tends to flocculate the finer sludge particles. This could possibly be determined by experimentation or from theory and might provide useful information in analyzing the fate of sewage sludge solids dumped at the proposed areas.

Page 226

Discussion of impacts due to collisions of vessels is scanty. We believe more consideration should be given to existing traffic and poor weather conditions in the analysis of hazards to navigation.

Page 248

Sand and Gravel

This section should be expanded upon to indicate the degree to which the proposed action may curtail the regional availability of these resources. Such an evaluation would include a general assessment as to probable needs and known available supplies. Were the proposal's resource impacts to be a significant level then some assessment of the economic effects would appear to be necessary.

Oil and Gas

The leasing of oil and gas represents a separate issue whereas the potential of an oil spill is an uncertain possibility only. Whether an oil spill contaminates a sand and gravel deposit is also just a possibility. This should not be confused with the impact of ocean dumping which is assured should dumping take place over the deposit.

Page 259

No mention is made of possibly contaminating sand and gravel deposits in the southern Alternate Site for dumping.

Page 264

Same as above.

Page 271

Economic impacts to the northern Alternate Site for mineral resource development could include conflict with potential oil and gas leasing.

Thank you for the opportunity to comment.

Sincerely yours,

Roger Sumner Babb

Roger Sumner Babb
Special Assistant to
the Secretary

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WEP-5/73)
WASHINGTON, D.C. 20590
PHONE: 202-755-7938

B. Metzger

5922/2

3 JUN 1976

Mr. Gerald M. Hansler
26 Federal Plaza, Room 1009
New York, New York 10007

Dear Mr. Hansler:

The purpose of this letter is to provide you with Coast Guard Headquarters recommendations relative to your region's proposed alternate sewage sludge dump site, as addressed in your Draft Environmental Impact Statement of February 1976.

In lieu of the nine square nautical mile site proposed in the DEIS, the Coast Guard recommends that the alternate site designated be the approximate parallelogram whose boundaries coincide with the following Loran-C time delay lines: 9930-Y - 50625 to 50675, and 9930-Z - 70000 to 70100. These Loran-C time delay lines define an area which is approximately 18 miles long by 4 miles wide with its four corners located at 40° 16' 25"N, 72° 42' 50"W; 40° 03' 12"N, 72° 27' 35"W; 40° 01' 20"N, 72° 32' 40"W; and 40° 14' 35"N, 72° 47' 55"W.

The enlarged site should be able to accommodate any future growth in sludge dumping and allow for greater on-site dispersal. Orientation of the site with the Loran-C time delay line grid will maximize the navigational capabilities of the dump vessels allowing them to maintain adequate track separation required by environmental and maritime safety considerations.

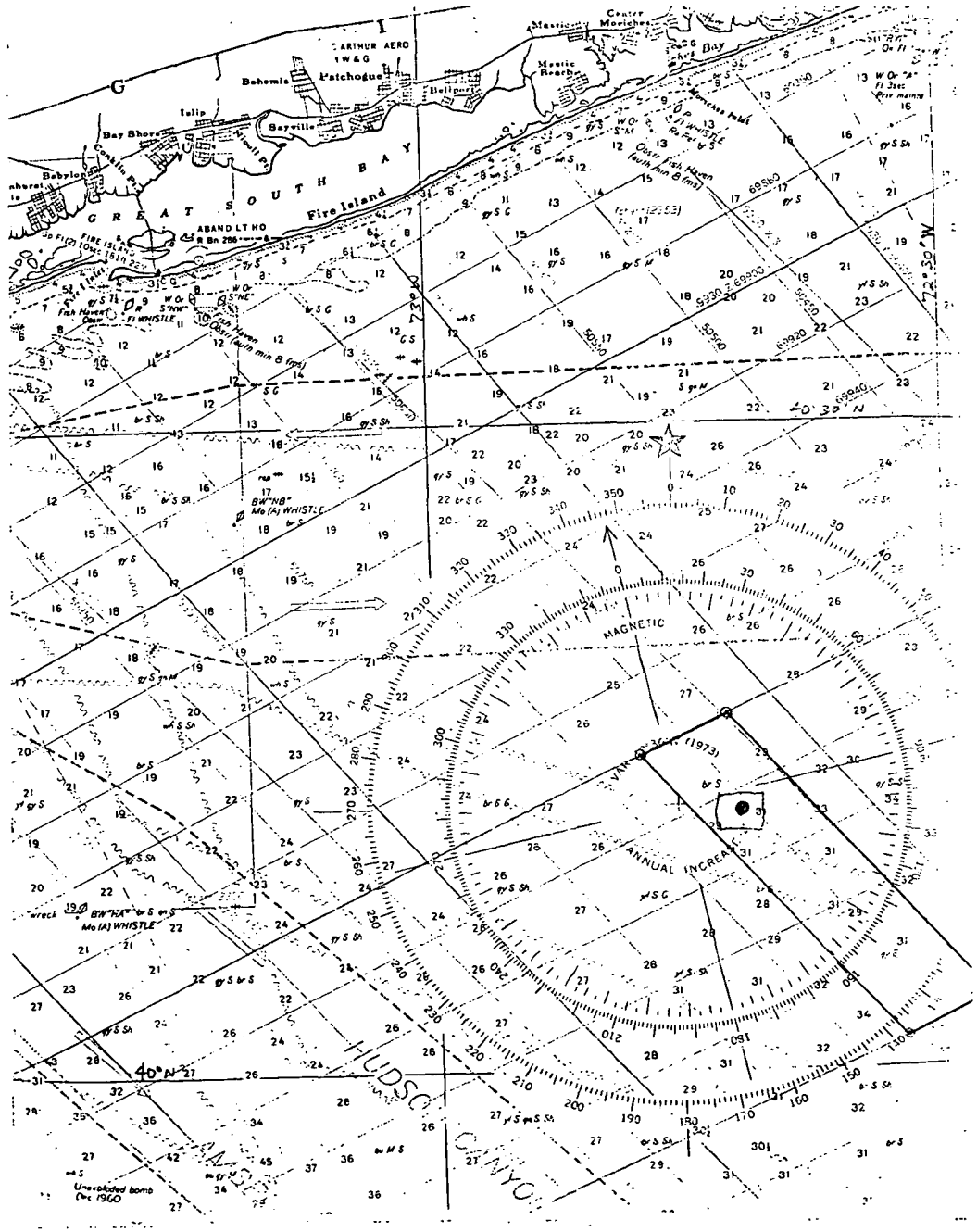
I realize that the formal comment period for the draft EIS has passed; however, through some oversight, we did not receive a copy of the draft until late May. Please give this recommendation your careful consideration.

Sincerely,

F. P. SCHUBERT
Captain, U.S. Coast Guard
Chief, Marine Environmental
Protection Division
By direction of the Commandant

Enclosure

Copy to:
Mr. Peter Anderson, EPA-II
CCGD3(mep)
EPA HQTRS (WH 548)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

RECEIVED EF 3/18

SUBJECT: Draft EIS on Ocean Dumping of Sewage Sludge in the N.Y. Bight

DATE: MAR 18 1976

FROM: Charles N. Durfor, Chief
Water Branch

TO: Barbara Metzger, Ph.D., Chief
Environmental Impacts Branch

The document examines the advisability and feasibility of moving the current dump site to one, or both, of two areas. Our basic commentary is no different from the review we submitted on the pre-draft EIS, except that the present document seems much more concise and better written. We have no argument at all with the basic conclusions of the EIS, namely:

(1) that present data do not indicate that continued dumping in the existing site will cause significant deterioration in water quality, and that this site should be retained.

(2) that the present site should not be moved unless an expanded monitoring program shows this to be warranted, and

(3) that, for the reasons listed in the EIS, the Northern Area be selected for use if monitoring shows an alternative site to be necessary.

Finally, we strongly agree with the recommendation that the dumping of dredged material by the COE be studied in a great deal more detail, to the end that ocean dumping of spoils be eliminated if possible. As the document points out, dredged spoils are the most significant pollutional source in the combined dump areas.

EPA Form 1320-6 (Rev. 6-72)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Review of EPA Draft EIS on Ocean Dumping of Sewage Sludge in the New York Bight

DATE: MAY 6 1976

FROM: Kenneth E. Biglane, Director
Division of Oil and Special Materials Control (WH-548)

TO: Regional Administrator
Region II

Attn: Dan Sullivan

The Office of Water Program Operations has reviewed the subject EIS and our comments are enclosed. If you have any questions regarding issues raised in these comments, please contact Geraldine Werdig, Chief, Environmental Evaluation Branch, 202-245-3054.

Enclosure

EPA Form 1320-6 (Rev. 6-72)

Office of Water Program Operations
Comments on
Ocean Dumping of Sewage Sludge in the New York Bight

In general, we find the environmental impact statement to be adequate in its description and analysis of the proposed action and its impacts. However, we have the following specific comments to offer.

1. Pages 44 and 46. Information presented on sludge volumes and constituents appears inconsistent on these pages. A statement is first made that sludge dumped in the interval between 1976 and 1981 will generally resemble sludge dumped at present, that heavy metal concentrations will remain about the same since secondary treatment does not remove heavy metals, and that there will be only slight inhouse reduction of industrial heavy metals discharges. However, the next page contains the statement that heavy metals from sewage sludge may decline as pretreatment and in-house industrial processes are implemented.

2. Page 189. We believe the discussion on alternatives should clearly state that land based disposal methods are not an alternative to designation of a dump site. Land based alternatives should be analyzed at the time of permit application evaluation. Therefore, the first sentence on this page should be deleted.

3. Page 213. The discussion of bottom currents indicates that there is a line of divergence of bottom drift on the continental shelf at the 60 meter isobath. If sludge were dumped at the proposed Southern Area, it would be subject to a slow, steady shoreward movement. Thus, it would seem that sludge dumped at the existing site would also be subject to this same steady shoreward drift, since the site is within the shoreward directed portion of this current divergence.

4. Page 242. The table on this page appears to need further explanation regarding one-way and round-trip distances to the dump sites. For example, the round trip distance to the existing site is six times the distance of the one-way trip, or a difference of 116 miles. The trip to Alternate areas does not seem to allow for the same 116 miles, if it is to account for travel within the New York Harbor and waterways.

5. Page 262. A statement is made that the navigational hazard of using the alternate site will increase because of more and longer trips to the dump site. Given the fact that increased sludge volumes will mean a greater number of trips to any site, we question the implication that use of an alternate site would mean more trips than use of the existing site.

6. Page 268. The statement is made "a significant reduction in the heavy metals content of the municipal sludges is anticipated after Pretreatment regulations are promulgated." This is inconsistent with other information presented in the EIS (see our comment #1) and should be clarified.

7. Page 332. The NOAA-MESA studies on physical oceanography indicate that there is a distinct up-valley flow from the Hudson Shelf Valley and that this in combination with the predominant southwestward flow in midshelf waters will increase the potential for shoreward transport of any sludge that would be dumped in the northern area. Yet on page 279, the northern area is stated as being an optimum location with very low potential for transport of contaminants to either coastal areas or the Hudson Shelf Valley.

Metzger Sullivan
(Acting)

WATER POLLUTION CONTROL FEDERATION

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April 27, 1976

reply to:
Dr. G. V. Cox
Raytheon O&ES
P. O. Box 360
Portsmouth, R. I. 02871

Regional Administrator
Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10007

Subject: Review of Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight.

Dear Sir:

The Marine Water Quality Committee of the Water Pollution Control Federation reviewed the February 1976 Draft EIS and wishes to convey the following comments:

While the committee concurs with the decision not to move to the proposed alternative site and that a monitoring program should be continued in the event that it is necessary to move the site, we did notice several things which should be brought to your attention.

1) The EIS is written in such a manner that the reader would be lead to the conclusion that sewage sludge is the major metal pollutant in the New York Bight Apex. In fact, the MESA program estimated that sewage sludge disposal contributes less than 6% of the pollution load to the New York Bight. Dredge spoil contributes 24-80% of the heavy metal input to the apex with the exception of mercury, yet this is not really highlighted in the discussion.

2) Primary sewage sludge is generally lower in heavy metals than secondary sludge and digested sludge is higher in heavy metals (and lower in bacteria) than undigested sludge. No consideration was given to the change in sludge character with increased treatment during 1976-1981 as required by PL92-500. Additionally, the study neglected the anticipated Apex water quality improvement if the mandated sewage and industrial waste treatment is implemented.

3) The sewage sludge volume increase of 100% from 1976 to 1981 should increase to the barging pollutant load to the apex, especially if the other input loads are decreased as a result of upgraded treatment. Conversely, many of the pollutants currently enter the apex in the form of dissolved and suspended solids. Upgraded treatment will capture them in the sewage sludge, and they will enter the apex in a different form, sludge, which will represent a translocation.

   The committee feels this should have been incorporated in the analysis of impact especially over the projected time until 1981.

4) Table 59 is misleading. The heading barge would cause one to believe that most of the heavy metals entering the apex could be attributed to sewage sludge, when, in fact, it is less than 6%. The bulk of metals are from barged dredge spoil, and this table should be redone to reflect this. The table on page 172 is far more accurate in this respect.

5) On page 103 a reference is made to data reduction of data collected by the Raytheon Company under an EPA contract. The current data were reduced and an analysis of the currents were presented. However, the report virtually neglects the data on two thousand species present in the 1A(R) area as well as the chemical data other than TOC in sediments. The benthic data were not discussed at all, and the plankton and other biological data were totally ignored. Both NOAA and Raytheon had substantial biological information which should have been incorporated into the assessment of the baseline case.

6) The reference to Lear, 1973 on page 230 is misleading. There was an incorrect use of statistics and improper data interpretation which was agreed to by EPA at an adjudicatory hearing in May 1975. This section should be deleted from the EIS.

7) We question the barging costs. If the sludge volume doubles and the disposal site is moved, additional vessels would be required to handle the increased volume. Costs were only presented for 1976 volumes.

Since specialized dedicated vessels would be required and, if the 1981 end to ocean dumping is valid, the commercial operators would be required to charge for the equipment in a very short period in order to recover their investment. This would represent an even greater cost than a mere expansion of costs proportionate to volume of sludge from 1976 to 1981 at either alternative site.

8) Lastly, the committee questions the premise that ocean dumping will be ended by 1981. It is highly unlikely that this goal will be achieved as a result of the present financial situation of the metropolitan region.

Should you wish additional clarification, the committee would be pleased to respond.

Sincerely yours,

Geraldine V. Cox lmk

Geraldine V. Cox, Ph.D.
Chairman,
Marine Water Quality Committee

GVC/lmk