

90-5517

1978

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Daniel J. O'Hern, Commissioner

ALTERNATIVES TO OCEAN DUMPING

ANNUAL REPORT

DECEMBER 1978

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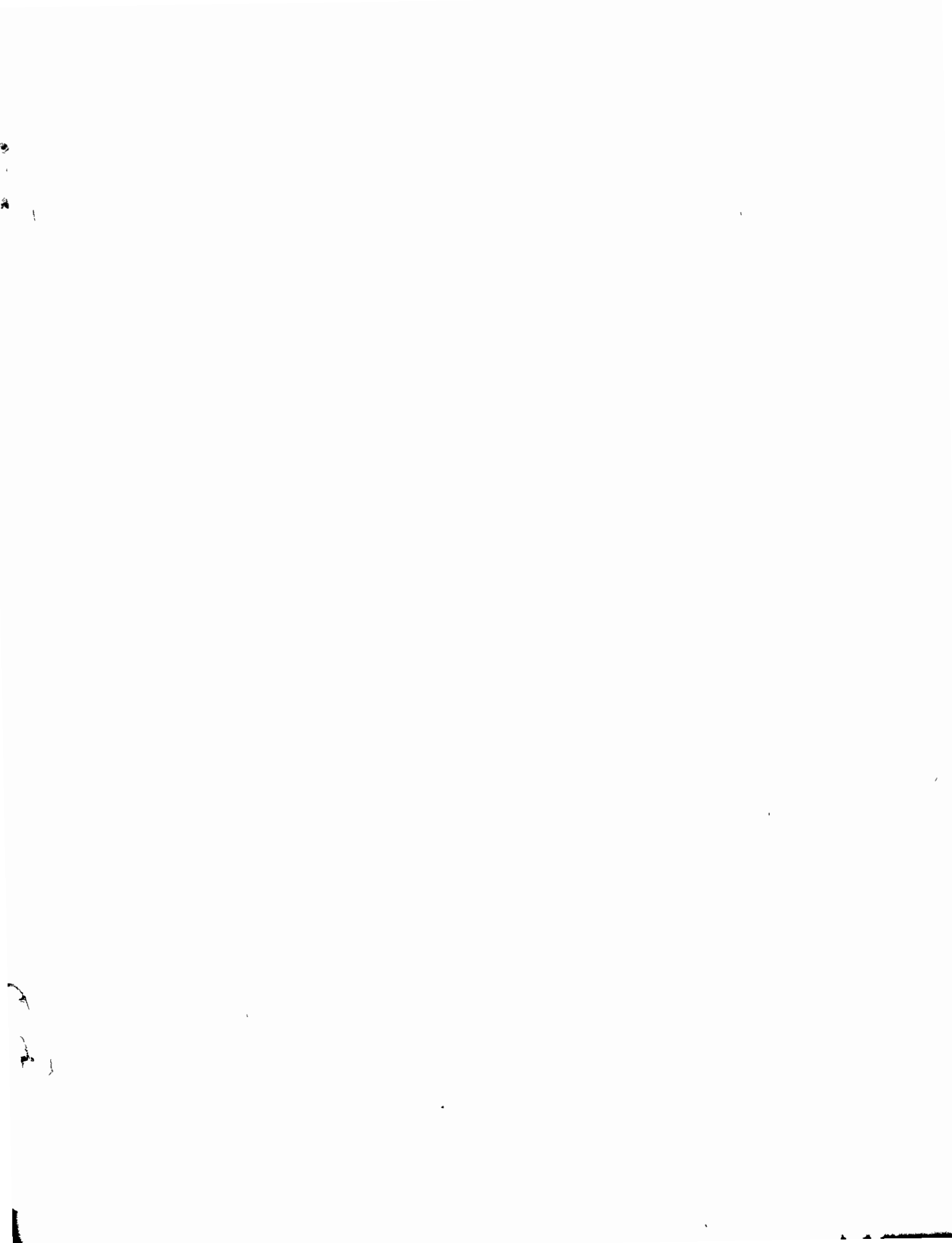
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Acknowledgement

We would like to thank the members of the Executive Staff of the Division of Water Resources for their review of the draft document, and particularly for their comments: Mr. Ian Walker, Chief, Office of Environmental Assessment and his staff; Mr. Frank Takacs of the Bureau of Water Quality Planning and Management; and from the Division of Fish, Game, and Shellfisheries, Mr. Bruce Pyle, Chief, Bureau of Fisheries Management.



ERRATA

Note: Corrected or added words and phrases are underlined twice; omitted words are in parentheses.

p.1 Paragraph 5

Line 1 to read: "In the summer of 1976, a massive fishkill (incident) riveted the attention"

p.2 Paragraph 2

Line 3 to read: "industries for their livelihood, and other private citizens expressed their"

p.3 Paragraph 1

Line 5 to read: "concentrate just below the thermocline, probably due to Ceratium's preference"

p.7 Paragraph 4

Lines 1, 2, 3, and 4 to read: "Six industries presently ocean dump their wastes. One of these will cease this practice by early in 1979; three others will change their manufacturing processes or treat their wastes to allow landfilling or incineration of residues, with municipal treatment of certain portions. The two remaining industries meet"

p.8 Paragraph 5

Line 4 to read: "uses of these wastewater residuals must avoid, to the maximum extent practicable,"

p.B1 Paragraph 3

Line 7 to read: "require air for their metabolism and produce methane gas, which must be removed"



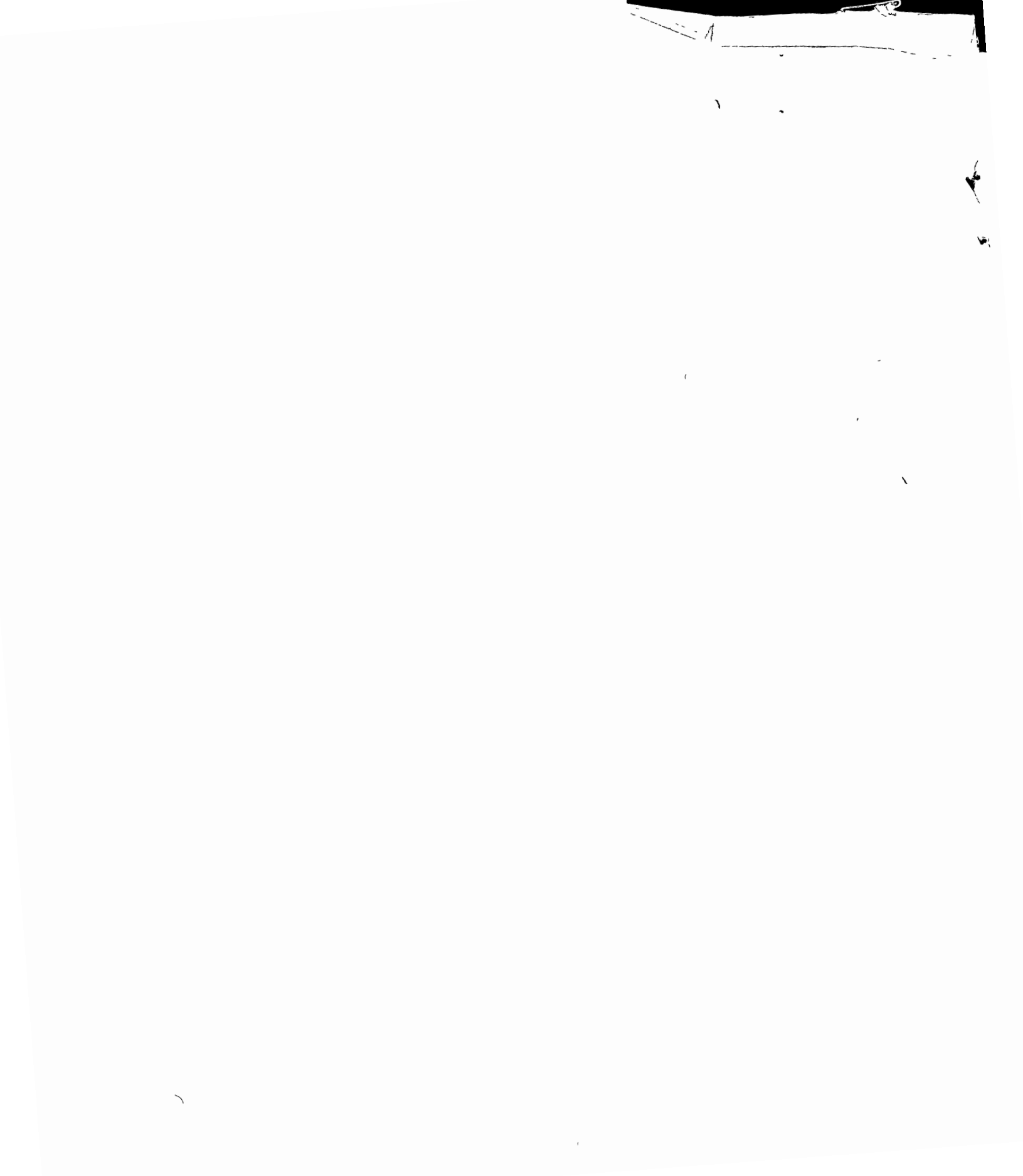
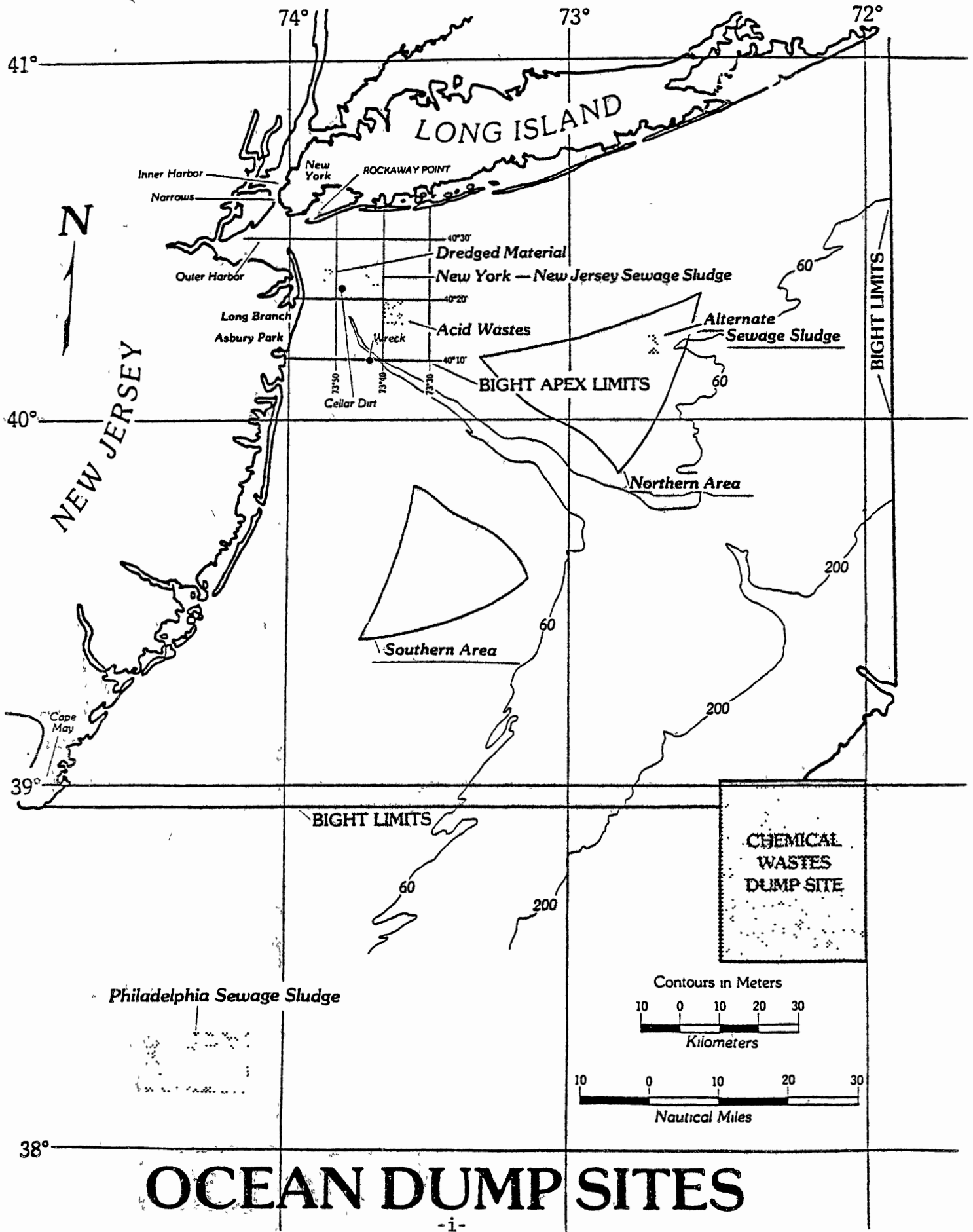
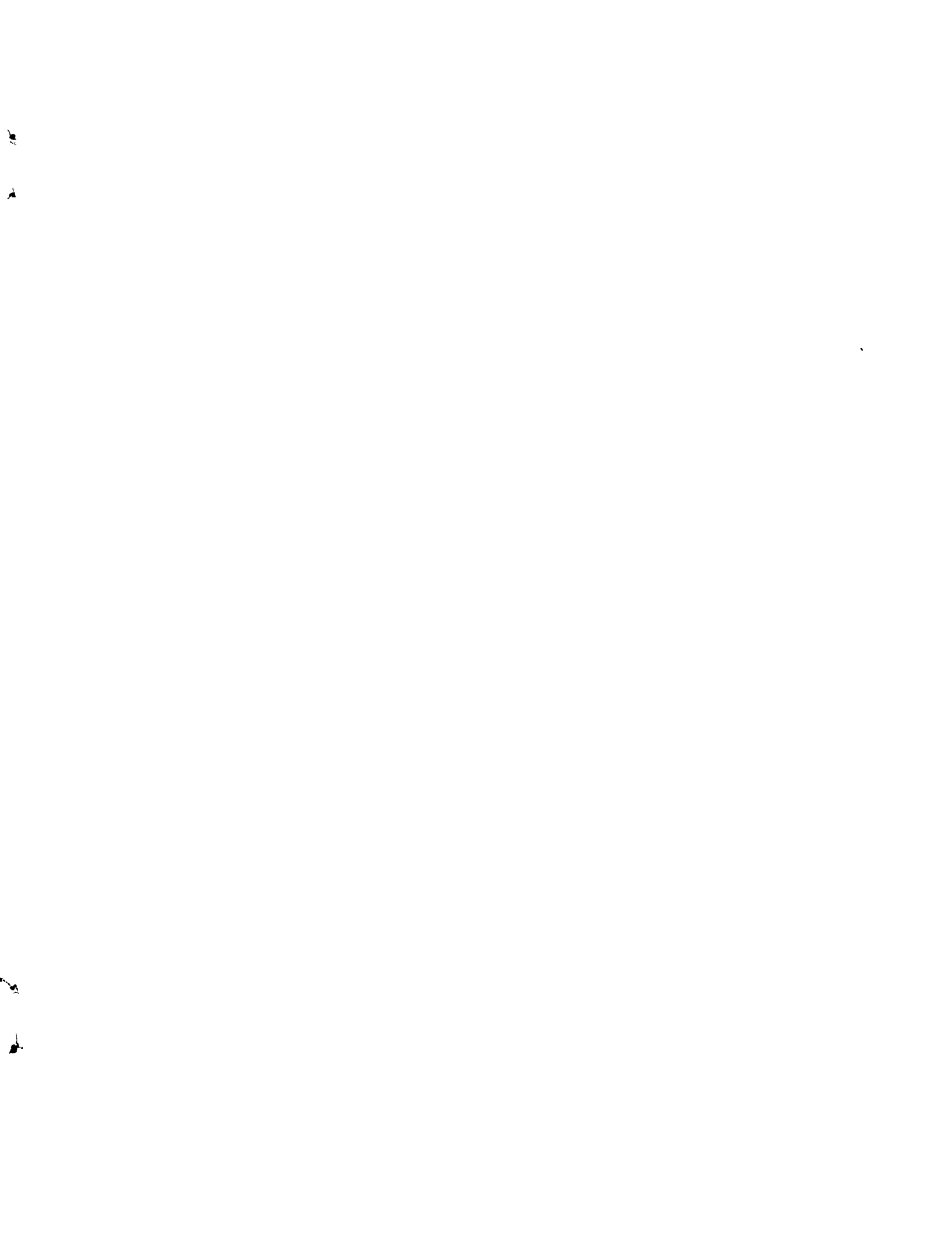


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FIGURE 1





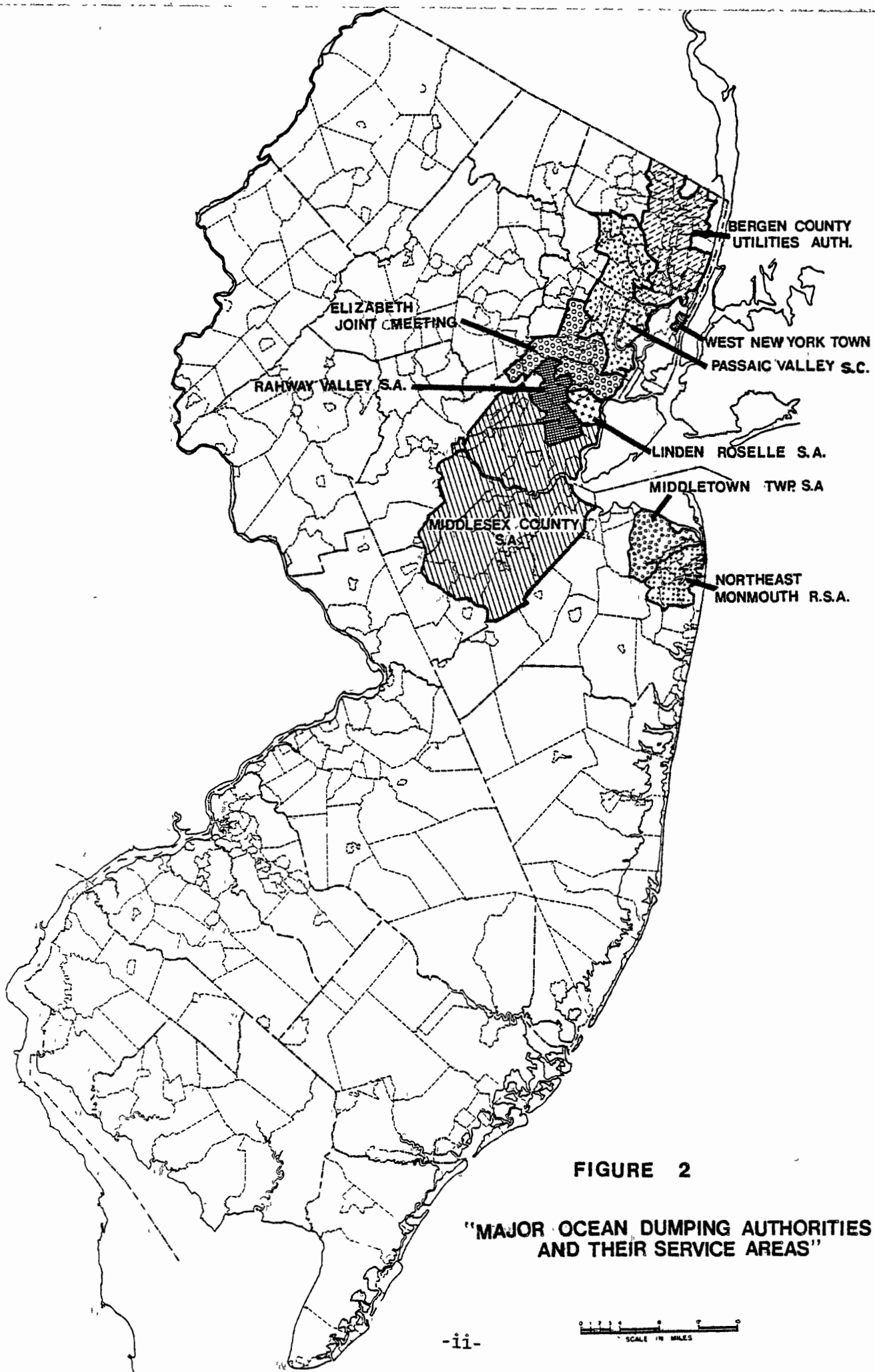
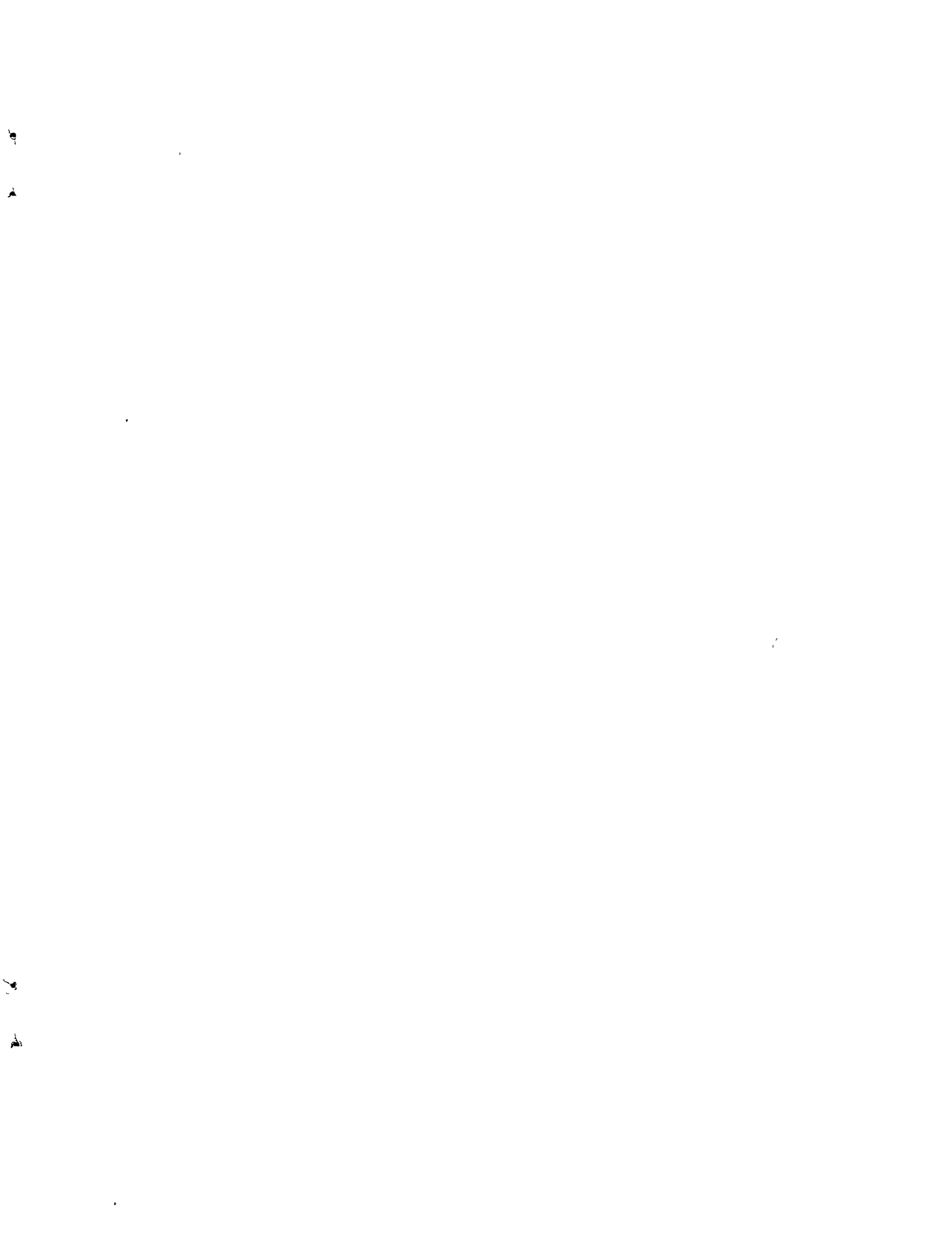


FIGURE 2

"MAJOR OCEAN DUMPING AUTHORITIES AND THEIR SERVICE AREAS"



ALTERNATIVES TO OCEAN DUMPING, 1978
ANNUAL REPORT OF N.J.D.E.P.

I. INTRODUCTION
HISTORY OF OCEAN DUMPING

INITIAL PERIOD

The present sewage sludge dumping site, located approximately 12 miles southeast of the entrance to New York Harbor, was first designated as such in 1924. The site was chosen jointly by New York and New Jersey following a settlement by the United States Supreme Court. The settlement itself resulted from a suit filed by New York City against the Passaic Valley Sewerage Commissioners (PVSC), which operates the largest sewage treatment plant in New Jersey, to stop the discharge of sewage sludge by PVSC directly into Upper New York Bay.

Early on, municipal sludges and some industrial wastes were dumped at the 12 mile site. In 1972, the Federal Marine Protection, Research, and Sanctuaries Act became law. Under its authority, other sites east of New Jersey were established for the dumping of dredged material, demolition debris (also known as cellar dirt), acid wastes, and derelict vessels. In addition, along the northeast coast, there are the 106 mile site for chemical wastes, just beyond the continental shelf southeast of the entrance to New York Harbor, and the 35 mile sludge site east of the Maryland-Delaware boundary. DEP has suggested that the 106 mile site be used as an alternative site for municipal sludge dumping.

ONSET OF PROBLEMS

Apparent disturbances in the marine ecosystem are not particularly new off the New York-New Jersey coast. The New Jersey Department of Environmental Protection (DEP) Bureau of Fisheries is aware of verbal reports since the mid-1950's (possibly even earlier) from commercial fishermen whose nets have brought up a brownish, slimy material when drawn across the ocean bottom in waters east of Monmouth County during late spring and early summer. At times, enough of this substance was present to interfere with the operation of the fishing gear. Since the late-1950's, public and private groups have reported occurrences of unusual bottom conditions such as turbidity and black sediment with concomitant death of bottom-dwelling marine organisms. These episodes typically occurred in late spring or summer. Documentation of such events, particularly off the northern New Jersey coast, in 1968, 1973, and 1974 exists in the files of DEP's Bureau of Fisheries and the U.S. National Marine Fisheries Service (NMFS).

During these episodes, low dissolved oxygen levels were found close to the ocean bottom, and turbid water at various depths below the surface was observed. In most cases, it was determined that the turbidity was caused by an extremely dense growth of algae (algal bloom).

In the summer of 1976, a massive fishkill incident riveted the attention of the metropolitan area on the Northeast coastal waters. Over the July 4th weekend, sport divers noted dead marine creatures and a layer of black or brown material covering the bottom near various ship wrecks. By late July, an area of severe oxygen depletion was identified from Sandy Hook to Avalon, a

distance of about 100 miles, and as much as 40 miles or more wide. These conditions spread slowly south, while the north gradually improved, finally affecting over 3,000 square miles of ocean bottom. Tremendous numbers of lobsters, surf clams, and bottom fish died in the oxygen-depleted waters. A few incidents of direct impact on New Jersey beaches occurred, involving dead or dying fish or the washing ashore of a brownish-black odorous material.

PUBLIC RESPONSE

Wide press coverage was given to this last, extensive disturbance in the marine ecosystem. Groups of fishermen, people dependent on shore recreational industries for their livelihood, and other private citizens expressed their concern and demanded that something be done to prevent such fishkills in the future. Many people intuitively blamed the dumping of wastes, particularly sewage sludge, in the ocean for the occurrence of such events, and petitioned for an immediate halt to ocean dumping. Others felt that the causes should be researched posthaste, and preventive measures taken as suggested by the best scientific interpretations of the results. In any case, considerable pressure was brought to bear on the public sector to seek and implement solutions to the problem.

STUDIES

Several investigations were made into the 1976 fishkill incident, both during its occurrence and afterwards. The initial reports of affected bottom life and turbid waters were made by divers to the NMFS laboratory at Sandy Hook, to the DEP Commissioner and to DEP's Division of Fish, Game, and Shellfisheries. Both the NMFS and the DEP began to systematically collect data on the location and extent of the anoxic conditions and their effects. Personnel from the New Jersey Marine Sciences Consortium and from Rutgers University joined in this work.

Researchers also considered the possible cause or causes of the fishkill, and various reports were completed during the next several months. These included a special technical report from DEP's Nacote Creek Research Station; the "Report on the Fish Kill of the New Jersey Coast and its Potential Causes and Consequences", August 2, 1976; the "Report to Commissioner Bardin for Submission to the New Jersey Senate Committee on Energy, Agriculture and the Environment on Ocean Pollution Causes and Remedies in the Atlantic Coastal Area," October 18, 1976; the "Report on the Ocean Dumping of Sludge and on Land-Base Alternatives to the Ocean Dumping of Sludge," January 1977, and a report entitled "Oxygen Depletion and Associated Environmental Disturbances in the Middle Bight in 1976." The first four documents were authored by DEP personnel, while the last reference is a report on interagency workshops held in November and December of 1976 by NMFS at Sandy Hook.

The studies traced the development of conditions leading to the fishkill and considered possible initial causes for the marine ecosystem upset. As with fishkills in previous years, an unusually dense growth of algae occurred early in the year. The 1976 algal bloom which began in February, involved a single species of dinoflagellate known as Ceratium tripos. This occurred in the waters from the Georges Bank off Nova Scotia to south of Cape May County, New Jersey and from within a few miles offshore out to the edge of the continental shelf. With the onset of warmer weather, a fairly stable layer of

warmer surface water formed over the colder, and therefore heavier water below. The boundary between such layers is called a thermocline. The formation of a thermocline is entirely normal and occurs each year. However, the thermocline this year was particularly stable. The algal bloom began to concentrate just below the thermocline, probable due to Ceratium's preference for cooler temperatures. In any mature algal population, a certain portion continually dies off, and is decomposed by bacteria as it falls, in this case, toward the ocean bottom. The decomposition itself requires oxygen. In the presence of a thermocline, the oxygen being used in the lower layer is not replenished since the surface layer does not mix with the lower layer.

There was agreement among all the reports that the extensive anoxic conditions were directly caused by the decay of Ceratium, and later of the dead bottom organisms; that the large percentage of sunny days contributed to the dense Ceratium growth; and that the absence of major storms prevented any effective breakup of the thermocline. Although these natural conditions were undoubtedly factors in the bloom and subsequent fishkill, it was believed by many observers that man's input of various wastes into the marine ecosystem contributed a portion of the nutrients needed to support such extensive algal growth. Although this contribution could not be finally, quantitatively defined, some approximation could be made of at least the relative importance among man's particular contributions of nutrients, such as nitrogen and phosphorus, which are important to algal growth. The largest such source of nitrogen is municipal wastewater. Although this source is also quite significant for phosphorus, the barging of dredged material adds more phosphorus to the ocean than does the wastewater. While sewage treatment removes most of the carbon-containing material from municipal wastewater, little is generally done to reduce the amount of nitrogen and phosphorus--the nutrients most important to plant growth. Sewage treatment plant effluents to streams and to the ocean via outfall pipes, as well as sludge dumping, contribute to this nutrient pool. Additional sources of these nutrients include industrial wastes and dredge spoils which are ocean dumped, as mentioned above.

The elimination of any single source of these plant nutrients could not be expected to end the over-fertilization of the coastal waters. It was important to carefully consider, therefore, the relative benefits of phasing out each of these sources. Nevertheless, public policy choices had to be made also on the basis of which sources could be reduced most rapidly and efficiently.¹

OFFICIAL ACTION

The Marine Protection, Research and Sanctuaries Act of 1972 had established regulations and criteria on waste discharge to the ocean (except by pipeline), to be implemented by a permit system. This permit system went into effect April 23, 1973 under the auspices of the United States Environmental

¹ An NMFS report released in June, 1978 does not support many of the conclusions reached formerly about the extensive Ceratium tripos bloom. According to the report, C. Tripos: is found at temperatures ranging from -1.0 to 29.5° C; can utilize low light intensities; and is not highly nutrient - dependent for growth; although high nutrient levels may have increased the growth rate and elongated the bloom period.

Protection Agency (EPA). Part of the Act provided for a research program designed to minimize or end all dumping of materials within five years. Regulations and criteria published on October 15, 1973 made all permits interim and conditional. Expanded regulations and criteria were proposed on June 28, 1976 and finalized after the 1976 fishkill. These final regulations and criteria established for all interim permit holders the requirement that a schedule for phasing out of ocean dumping by December 31, 1981 be included in the permit. On November 4, 1977, President Carter signed into law the Marine Protection, Research and Sanctuaries Act Amendments of 1977,² legislating the December 31, 1981 deadline for the cessation of ocean dumping.

The New Jersey DEP's Division of Water Resources regulates several aspects of wastewater treatment within the State, including the design and construction of wastewater treatment facilities. As advanced wastewater treatment of municipal wastewater is implemented for some New Jersey plants, the input of nitrogen and, for some systems, phosphorus to waterways leading into the ocean will be reduced. However, the disposal of the resultant sludges becomes a larger problem as treatment plants are upgraded and expanded, since volumes and nutrient concentrations increase proportionally. In addition, industrial wastes entering municipal plants can reduce, sometimes destroy, their nutrient removal efficiency. These problems could not be adequately addressed within DEP considering its structure and staffing at that time. The problems relating to the ocean disposal of industrial wastes and municipal sludges clearly required full-time, professional attention.

In February of 1977, Commissioner David J. Bardin created the Office of Sludge Management and Industrial Pretreatment (OSMIP) within the Office of the Director of the Division of Water Resources. This Office is entirely dedicated to the problems associated with sludge disposal, and particularly with ending ocean dumping of municipal sludge and industrial wastes,³ the substitution of environmentally sound land-based alternatives, and the pretreatment of industrial inputs to all municipal wastewater treatment systems.

In May of 1977, "Interim Guidelines for the Preparation of Sludge Management Plans" were distributed by DEP. These Guidelines provide the technical and regulatory framework for developing sludge management programs by New Jersey authorities and municipalities. The Guidelines were available for use by municipal and industrial ocean dumping permittees in developing land-based alternatives. Methods resulting in resource or energy recovery are encouraged and emphasized in these Guidelines.

In order to ensure the end of ocean dumping by the 1981 deadline, and to legally authorize State supervision and intervention as necessary in the planning, design, and construction periods, Commissioner Rocco D. Ricci promulgated "Regulations Concerning Ocean Dumping Alternatives Development"⁴, commonly known as N.J. Ocean Dumping Regs., on December 2, 1977. These regulations required the submission of Sludge Management Plans (SMP's) to DEP by December 31, 1977. The following discussion chronicles the program which was undertaken in response to the Congressional mandate to end ocean dumping by December 31, 1981.

² P.L. 95-153

³ Dredging operations and the disposal of dredge spoils continue to be regulated by the Corps of Engineers. Studies on this disposal method and land-based alternatives are in progress.

⁴ N.J.A.C. 7:14-7.1 et seq.

II. ALTERNATIVES DEVELOPMENT

In 1976, before the fishkill incident, 137 N.J. municipalities were included in permits for the ocean dumping of sewage sludge. Of these, nine are considered major ocean dumpers, as defined below, with the rest falling under the designation of minor ocean dumpers. As of the date of this report, the nine majors and thirteen minors continue to ocean dump sludge.

The Federal Water Pollution Control Act Amendments of 1972, P.L. 92-500, state that for Title II, Construction Grants, Section 201,⁵ "It is the purpose of this title to require and to assist the development and implementation of waste treatment management plans and practices which will achieve the goals of this Act." The planning of full-scale sludge management for sewerage authorities clearly falls within the scope of the Grants Program, and eligibility of SMP's for 201 grants was established by Spring of 1976. The Federal Water Pollution Control Act was amended again in 1977,⁶ and re-named "The Clean Water Act".

Early in 1977, at the direction of DEP and EPA, eleven⁷ ocean dumping authorities applied for Federal and State funding for the preparation of SMP's. Funding for nine of these was approved around January-February 1977. Total funding for these studies was \$2.5 million. The Borough of Wood-Ridge and the Town of Kearny were denied the funds for which they applied. In the case of Wood-Ridge, their application was not for a grant to do an SMP, but rather for a complete 201 facilities planning grant. In addition to being an inappropriate request at that time, considering the crisis nature of the sludge management issue alone,⁸ this request conflicted with the preliminary Section 208 areawide planning, which called for the phasing out of the Wood-Ridge plant to the Bergen County sewer system. The application was denied and Wood-Ridge thereafter refused to apply for funding to study their sludge problem. Kearny's application was denied due to the predominantly industrial nature (over 95%) of their flow. Federal regulations precluded a grant to Kearny on this basis. The nine authorities receiving funds at that time were designated as major ocean dumping authorities. Most of them held their own permits and all of them treated wastewater flows of at least 4 million gallons per day (MGD). Documents outlining the studies to be undertaken were received early in 1977, and approved between April and August of 1977. The major ocean dumping authorities and their 201 grants are delineated in Table 2 in Appendix C. The service areas for these authorities are delineated in Appendix D. On or about December 31, 1977, draft SMP's were received from all these major authorities by OSMIP.

These plans examine the alternatives for sludge disposal for the particular sewage treatment system involved, and compare the options on the basis of cost-effectiveness, environmental acceptability and implementability. The solution chosen must be demonstrated to have the best combination of these

⁵ See glossary for explanation of Section 201.

⁶ P.L. 95-217

⁷ Bergen County S.A., Elizabeth Joint Meeting, Town of Kearny, Linden Roselle S.A., Middlesex County S.A., Middletown Township S.A., Northeast Monmouth County S.A., Passaic Valley Sewerage Commissioners, Rahway Valley S.A.,

⁸ West New York Town, Borough of Wood-Ridge.

⁸ See glossary for explanation of Section 208.

factors. It is the function of DEP and EPA to review these plans and to insure that the plans meet the above criteria. In some cases, the plans are given conceptual approval for certain portions such as the dewatering⁹ of the sludge or the final disposal method. In such cases it is generally required that some details receive further attention and discussion between the consulting engineer and the regulatory agencies. However, conceptual or conditional approvals permit the engineer to proceed on certain aspects of the plan.

Due to various factors, such as sewage treatment plant locations and type and volume of sludge, each treatment system has a unique sludge disposal scheme. In some instances, it would have been cost-effective for plants that are close to each other to institute regional sludge disposal solutions. However, regionalization may not be implementable due to either institutional or time restraints. It is expected that all of these authorities will be able to proceed to the design phase by the end of 1978.

Industries and smaller municipal authorities engaged in ocean dumping were informed on December 19 and 20, 1977, respectively, of the requirements of the N.J. Ocean Dumping Regs. As mentioned above, these regulations made meeting the 1981 deadline and relevant intermediate deadlines firm State requirement. Although compliance schedules had been included by EPA in Ocean Dumping Permits since 1973, permits were issued directly to the waste transporter for these smaller municipalities and industries until this became an issue late in 1976. On May 25, 1977, a public hearing (See Appendix F) held by EPA considered, case-by-case, the renewal of permits for each ocean dumping municipality and industry.

By December 20, 1977, some of the ocean dumpers had already stopped using the ocean as a repository for their wastes. Some other dumpers have since instituted land-based methods of disposal/utilization, or have been denied ocean dumping permits. Most of the remaining dumpers have submitted at least preliminary plans for ending ocean dumping by December 31, 1981 or sooner. In the case of Allied Chemical of Elizabeth, DuPont of Gibbstown, and National Lead of Sayreville, special permits may be issued after 1981, where especially stringent environmental criteria are met for their wastes, and where it is demonstrated that no other economically feasible alternative exists. Investigation of land-based disposal must continue, nonetheless.

The sewerage authorities in New Jersey which use ocean disposal for their sludges, as mentioned previously, were required to submit SMP's to the DEP and EPA. These plans discuss and compare various sludge disposal and dewatering options on the basis of cost effectiveness, environmental acceptability and institutional implementability. A discussion of the individual SMP's for these authorities is included in Appendix A. These plans are summarized in the following section.

⁹ See glossary for explanation of sludge dewatering.

III. SUMMARY STATUS OF LAND-BASED ALTERNATIVES

Sludge management plans have been received from all nine of the major ocean dumpers. Proposed land-based methods of sludge disposal/utilization include static-pile composting, various methods of incineration, wet-air oxidation, and lime stabilization. Some of these plans have been approved, others approved conceptually or conditionally, the remainder being still under review. It is expected that all of the major dumpers will be under design by the end of 1978.

The thirteen remaining minor municipal dumpers, are discussed in Section 3 of Appendix A, Specific Alternative Plans. Four of these authorities will cease ocean dumping during 1979. The other dumpers are included in larger 201 studies, some involving regionalization, and some of these are making interim arrangements in the event that the 201 work does not assure that they will meet their permit deadlines. Some of the small municipal dumpers will cease operating as treatment plants due to regionalization plans, while others will continue operating, but will use regional facilities for sludge disposal/utilization. A few will initiate independent sludge disposal/utilization operations.

The remaining commercial septage hauler will cease ocean dumping on December 23, 1978.

Six industries presently ocean dump their wastes. Two of these will cease this practice by early in 1979; two others will change their manufacturing processes or treat their wastes to allow landfilling of residues, with municipal treatment of certain portions. The three remaining industries meet EPA's environmental impact criteria or will institute process changes in order to do so, and may receive special permits after the 1981 deadline. It should be noted that such permits are granted only where impacts are environmentally acceptable, and that continued research into land-based alternatives remains a permit requirement nonetheless.

A quick reference on the status and schedules for all of the ocean dumpers is provided by Appendix E.

IV. STATEWIDE SLUDGE MANAGEMENT

A. Projected Benefits to the Ocean

The immediate areas where sludges are being dumped have been undeniably impacted by this practice. The natural ecosystems at these sites, where they have survived at all, have been drastically simplified. Specifically, the normally complex community of plants and animals has been reduced to a few species. At some sites, there is no biota in practical terms.¹⁰ There is some evidence that the simplification of the marine community is spreading, thereby expanding the affected area.¹¹

¹⁰ Dr. Jack Pearce of the NMFS Laboratories at Sandy Hook pioneered this work at the 12-mile dump site in the New York Bight.

¹¹ Ocean quahog data was described in a verbal communication during the EPA Ocean Dumping Hearing concerning Philadelphia's Permit, which was held in Georgetown, Delaware on May 11, 1978. Data is being gathered by the Federal Public Health Service and the Maryland Environmental Services group.

With the end of the ocean dumping, it is anticipated that natural mechanisms will gradually restore the indigenous marine organisms to the dumping sites. As these are located on the shallow continental shelf, (with the exception of the 106-mile site), increased productivity which will benefit fishing and shellfishing industries, is eventually anticipated. This process of recovery is likely to require a considerable period of time.

Man's contributions to the overfertilization of the ocean with plant nutrients was discussed in the Introduction. That part of those contributions for which sludge dumping was responsible, will be eliminated by December 31, 1981.

B. Resource/Energy Recovery Benefits

As stated in OSMIP's "Interim Guidelines for the Preparation of Sludge Management Plans", "It is the Department of Environmental Protection's position that sewage sludge contains recoverable resources and that the ultimate disposal of sludge should, whenever possible, result in an environmental and economic benefit to society." Various land-based sludge disposal/utilization methods can meet these criteria for particular sludges.

Composted sewage sludge makes an excellent soil conditioner, improving moisture retention capacity, and providing trace nutrients as well as small amounts of primary nutrients to plants. The incorporation of composted sewage sludge into the soil can significantly increase its agricultural/horticultural worth. Composting can convert "filth to tilth". Other forms of stabilized sludge may also be incorporated into the soil, returning valuable nutrients to the earth. Pathogen survival, however, is greater in commonly used stabilization methods other than composting. In addition, sludge which has been composted with a bulking agent tends to be considerably easier to handle than other forms of stabilized sludge.

In addition to containing plant nutrients, New Jersey's municipal sewage sludges contain varying concentrations of heavy metals and/or toxic organics, depending on the degree of industrial input to the treatment plants. Beneficial uses of these wastewater residuals must avoid, to the maximum extent particable, negative environmental impacts on ground waters, surface waters, plant and animal tissues. OSMIP's approach to land application has been conservative in this respect, stressing thorough planning, calculation of environmentally acceptable application rates and sound management practices.

In cases where sludge volumes are large, land is at a premium, or heavy metals and/or toxic organics levels preclude land application, energy recovery may be an attractive alternative. The average sludge contains 10,000 BTU per pound of dry volatile solids. Again, on the average, this potential may provide usable energy above that required for thermally reducing the sludge, at solids contents of 30% or greater. This modest energy bonus can be harnessed in the production of steam. Thermal reduction methods of sludge disposal/utilization must, however, deal with problems associated with meeting air quality standards and disposing of sludge ashes as well as any scrubbing waters that may be used. In particular, these problems may be serious in the most populated areas of the State, which have been designated as air quality attainment areas by EPA. Sludge incinerators in such areas may produce sufficient air emissions to result in necessary but expensive restrictions on future emissions by new industries planning to locate in these areas. Such potential trade-offs must be carefully considered by the communities affected.

C. Interface with Pretreatment Program

In attempting to solve the sludge disposal problem, another issue has clearly emerged. This is the problem of the contamination of the sludge by heavy metals and toxic substances. This occurs in many areas of the State, and particularly in the Northeast. The solution to the sludge problem must also, therefore, address itself to the area of industrial pretreatment. It has been argued that it is simpler to deal with large quantities of municipal sludge than to deal with a plethora of concentrated toxic industrial sludges resulting from a pretreatment program. In practical terms, however, the contamination of huge quantities of sludge by industrial pollutants makes the sludge disposal problem even more difficult, since it reduces the chances of safely recycling the valuable nutrients contained in the sludge, or recovering potential energy without causing air quality problems. At the same time, the industrial toxics themselves are more difficult to recover for recycling or dispose without polluting the environment.

New Jersey's Industrial Pretreatment Program will be guided by information contained in a computerized data base which will include the reports from a statewide sludge quality reporting program and an equally extensive industrial waste survey program. This initial work will provide a realistic evaluation of the degree of sludge contamination throughout the State. It will allow the sewerage authorities with the most serious problems in this regard to receive the attention, funding, and encouragement, as needed, to clean up these municipal sludges and permit maximum resource and energy recovery in New Jersey.

D. Statewide Sludge Management Picture

Sludge management, which includes septage, is presently being considered by several agencies and programs in the State. The Federal Clean Water Act provides funding for 201 facilities planning, including the Sludge Management Plans discussed above, and 208 areawide planning. State funds supplement these monies when available. The Solid Waste Act provides funds for county-wide solid waste planning, also including sludge and septage disposition. The coordination among all of the groups in these planning areas has been initiated. Cooperation and open-ended communication among these planning agencies will mean maximum benefit from Federal and State funds to the citizens of New Jersey.

Ocean dumping of wastewater treatment sludges and septage will end in the State of New Jersey by December 31, 1981. The coordination of sludge and septage planning groups and the interfacing of Sludge Management and Industrial Pretreatment Programs for the State will mean resource recovery for many municipalities. Industry will similarly benefit, where innovative pretreatment projects are developed by individual companies. In addition, energy recovery from sludges remains a possibility.

A study is being conducted for EPA on the present status of sludge management in the U.S. New Jersey's programs are being reviewed, and may serve as models in the EPA report. We are confident that in ten years' time the State of New Jersey will indeed provide a model of resource and energy recovery from sludges. If the past two years are a reliable indication, these years will see innovative technology providing tangible environmental benefits.

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8. Township of Middletown Sewerage Authority, "Facility Plan, Land Based Sludge Alternatives," Schoor Engineering, Inc., Matawan, N.J., December 23, 1977.
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ABBREVIATIONS

AWT	Advanced Wastewater Treatment
BCUA	Bergen County Utilities Authority
BTU	British Thermal Unit (measure of energy content)
EJM	Elizabeth Joint Meeting or the Joint Meeting of Essex and Union Counties
EPA	Environmental Protection Agency (Federal)
DEP	Department of Environmental Protection (State)
LRSA	Linden Roselle Sewerage Authority
MCSA	Middlesex County Sewerage Authority
MGD	Million gallons per day (measure of flow)
MTSA	Middletown Township Sewerage Authority
NMRSA	Northeast Monmouth Regional Sewerage Authority
NMFS	National Marine Fisheries Service (subgroup of NOAA)
NOAA	National Oceanic and Atmospheric Administration
OSMIP	Office of Sludge Management and Industrial Pretreatment
PVSC	Passaic Valley Sewerage Commissioners
RVSA	Rahway Valley Sewerage Authority
SMP	Sludge Management Plan
STP	Sewage Treatment Plant
SWA	Solid Waste Administration
TPD	Tons per day (measure of sludge production)
WNY	Town of West New York

GLOSSARY

- Activated Sludge - the bacterial population which feeds on the organic fraction of sewage in a secondary wastewater treatment system; some of the population is removed (wasted as it grows) - this wasted material requires disposal
- Aerated static pile composting - aerobic, microbiological breakdown of dewatered sludge by mixing the material with a bulking agent, arranging it in mounds, and drawing air through the mass
- Aerobic digestion - the microbiological breakdown of liquid sludge by bacteria that require air for their metabolism - air is pumped into sludge tanks
- Anaerobic Digestion - the microbiological breakdown of liquid sludge by bacteria that do not require air for their metabolism; methane gas is produced as a by-product and removed from the tank for use as a fuel
- Anoxic - deficient or lacking in oxygen
- Autogenous combustion - the burning of sludge without a net use of fuel--this results when the energy released is greater than or equal to the energy used
- Belt filter press - dewatering device which squeezes sludge between two continuous filter belts, forcing the liquid through the belts
- Biota - all of the living organisms--plant, animal, and microbial
- Dewatering - separation of the solids in the liquid sludge from most of the liquid; results in sludge cake
- Incineration (sludge) - process of desiccation and combustion of dewatered sludge, using fuel, air, high temperature and turbulence; sludge converted to ash and gases (mostly carbon dioxide and water)
- Lime stabilization - addition of lime in quantities sufficient to maintain a minimum pH of 11.0 for a period of two weeks, in order to kill pathogenic bacteria and eliminate odors

- Multiple hearth incineration - combustion in vertically stacked baffle chambers (hearths) through which the sludge is mechanically guided, from the top to the bottom, where the ash residue deposits; combustion gases travel from bottom to top and exit through a stack after treatment
- Pyrolysis - thermal reduction of sludge in an atmosphere deficient in oxygen; high temperatures result in destructive distillation of volatiles; combustible gases and char produced
- Plate and frame press - dewatering device which separates the solids from the sludge by using hydraulic pressure to force the liquid through a filter
- Section 201/208 - two sections of the Federal Water Pollution Control Act Amendments of 1972, which provide federal funds for wastewater treatment; Section 201 involves the planning (Step 1), design (Step 2), and construction (Step 3) of wastewater treatment facilities; Section 208 involves areawide planning for the development of regional wastewater management solutions; there are about 100 facilities planning areas, and 12 areawide planning areas in New Jersey
- Sludge - the solid residue and/or liquid associated with the residue resulting from a physical, chemical or biological industrial process or from physical, chemical, or biological treatment of domestic or industrial wastewaters
- Sludge cake - the semisolid form of sludge after it has been dewatered
- Starved-air combustion - thermal decomposition of sludge in an oxygen - limited atmosphere; results in partial incineration and partial destructive distillation; unlike incineration, some combustible gases are produced
- Thermal reduction - synonym for combustion; includes infrared incineration, multiple hearth incineration, and starved-air combustion
- Thermocline - the well-defined boundary of a layer of warm water overlying a layer of cold water--occurs with air masses as well--tends to be rather stable
- Wet-air oxidation - oxidation of liquid sludge in the presence of high temperature and high pressure in order to stabilize the material

APPENDIX A - Specific Alternative Plans

1. Major Municipal Dumpers

BERGEN COUNTY UTILITIES AUTHORITY

The Bergen County Utilities Authority (BCUA) is currently expanding its secondary treatment plant serving 41 communities in Bergen County. (See Appendix D.) The BCUA will service 650,000 people by the year 2000 with a 75 MGD sewage treatment plant. This facility will generate 43.5 dry tons per day (TPD) of sludge when operating at full capacity.

The SMP proposed by the consultant engineers for BCUA involves two phases. Dewatering facilities using belt filters will be constructed in time to implement Phase I before the December 31, 1981 deadline. This short term solution involves the composting of the sludge using the aerated static-pile technique. The added time afforded to the Authority by the Phase I scheme will allow the consultant to fully develop the long range, or Phase II solution.

<u>Total Capital Costs:</u>	\$18,900,000
<u>Cost/Ton:</u>	\$ 155
<u>Annual Cost/Capita:</u>	\$ 2.25

ELIZABETH JOINT MEETING

The Elizabeth Joint Meeting (EJM), also called the Joint Meeting of Essex and Union Counties, serves eleven communities in these two counties. (See Appendix D.) The population of this area has leveled off at 600,000 people and is not expected to increase further by the year 2000. Construction of secondary treatment facilities has just been completed. This 75 MGD secondary treatment facility should generate about 34 TPD of sludge.

Due to the high concentrations of metals in the EJM sludge, a land disposal option required large acreage, and therefore the most cost effective alternative for this area was thermal reduction of the sludge by the incineration process. One of the methods of incineration being considered is infrared irradiation. However, this technology is proprietary (produced by only one manufacturer). DEP and EPA, by regulation, cannot approve proprietary technology unless it is proven to be a substantial improvement over other systems. The data needed to demonstrate this advancement is currently being gathered by the consultant.

A regional solution was investigated for the Elizabeth Joint Meeting, Rahway Valley and Linden-Roselle treatment plants. However, the cost of transporting the sludge from each facility to a final disposal site pushed the cost of the regional facility above the cost of separate facilities.

The ash from the proposed thermal reduction option would be deposited in a secure landfill at the treatment plant site.

<u>Total Capital Costs:</u>	\$9,100,000
<u>Cost/Ton:</u>	\$ 119
<u>Annual Cost/Capita:</u>	\$ 1.18

LINDEN ROSELLE SEWERAGE AUTHORITY

The Linden Roselle Sewerage Authority (LRSA) serves a population of 63,000, in the two communities of Linden and Roselle in Union County. Being constructed at the present time is a 17 MGD secondary treatment facility. By the year 2000 the plant will produce 12.5 TPD of digested sludge.

Due to the proximity of the LRSA and the Rahway Valley Sewerage Authority treatment plants, a regional solution to the problem is being investigated. Complications in implementing the institutional arrangements have arisen, however, delaying the finalization of the regional plan. The final report is due in March, 1979. This report will include a contingency plan to ensure the cessation of ocean dumping before 1982.

It has been determined that separate dewatering facilities at each plant site using belt filter presses is the most cost-effective method. The design of the dewatering equipment is proceeding at the current time.

LRSA had completed a plan proposing aerated static pile composting for LRSA alone. If the regional solution ultimately proves to be non-implementable, LRSA will fall back to this plan. The costs listed below are for this separate facility.

<u>Total Capital Costs:</u>	\$3,967,000
<u>Cost/Ton:</u>	\$ 160
<u>Annual Cost/Capita:</u>	\$ 2.74

MIDDLESEX COUNTY SEWERAGE AUTHORITY

The Middlesex County Sewerage Authority (MCSA) serves a major portion of Middlesex County along with sections of Union and Somerset Counties. There are 33 communities in this service area. (See Appendix D.) The secondary treatment facilities just completed in March 1978 will service a population of 933,000 by the year 2000. The flow treated by the plant at this time will be 120 MGD. Due to the fairly high concentration of industrial and commercial establishments in the area, the amount of sludge produced by the secondary plant will be 271 TPD by the year 2000.

The Sludge Management Plan for MCSA proposes filter presses for dewatering and thermal reduction for the disposal method. The method of thermal conversion to be employed is multiple-hearth incineration performed in the starved-air combustion mode. This technique allows for the autogenous combustion of the dewatered sludge, and thus produces more energy (in the form of steam), than it consumes. The design of the combustion unit will also permit the addition of shredded solid waste in conjunction with the sludge. The use of Middlesex County's solid waste could be implemented by 1982.

The ash produced as a by-product of the combustion will be lagooned in a specially constructed landfill at a site close to the treatment plant. There is enough land available for deposition of the ash to last well beyond the 20 year design period.

The Middlesex County Solid Waste Management Program has recently received a grant to study the feasibility of constructing a co-disposal facility that could dispose of both sludge and solid waste. A project of this magnitude will require several years to fully implement. If this project does prove to be feasible, MCSA will develop a composting operation for the time period between December 31, 1981, and the initiation of the co-disposal facility.

<u>Total Capital Costs:</u>	\$74,750,000
<u>Cost/Ton:</u>	\$ 103
<u>Annual Cost/Ton:</u>	\$ 4.20

MIDDLETOWN TOWNSHIP SEWERAGE AUTHORITY

Middletown Township Sewerage Authority (MTSA) is located in Monmouth County. By the year 2000, this secondary treatment plant will serve 77,000 people. The amount of sludge produced by the 6.4 MGD plant is 4.3 TPD.

MTSA has proposed composting using the aerated static-pile technique. MTSA will begin design of the dewatering option using belt filters very shortly.

<u>Total Capital Costs:</u>	\$1,231,000
<u>Cost/Ton:</u>	\$ 153
<u>Annual Cost/Capita:</u>	\$ 2.16

NORTHEAST MONMOUTH REGIONAL SEWERAGE AUTHORITY

The Northeast Monmouth Regional Sewerage Authority (NMRSA) serves 12 communities in Monmouth County. (See Appendix D.) This secondary treatment will be able to service 102,000 by the year 2000. At this time, the design flow of the plant will be 9.5 MGD and the sludge produced will be 6.3 TPD.

The submitted plan proposes composting for NMRSA. The plan includes four options ranked in order of their cost effectiveness. The least expensive option involves the delivery of dewatered sludge to a private facility in Ocean County. The sludge would be composted at this site for a fixed fee. The second choice is the regionalization of sludge disposal plans with the Township of Middletown. The third best, if the other two prove not to be implementable, is composting at the treatment plant site. The final option is composting by NMRSA off-site, that is, at a location other than the treatment plant site. In all cases, dewatering will be performed by belt filters.

<u>Total Capital Costs:</u>	\$1,900,000
<u>Cost/Ton:</u>	\$ 239
<u>Annual Cost/Capita</u>	\$ 2.50

PASSAIC VALLEY SEWERAGE COMMISSIONERS

The treatment plant run by the Passaic Valley Sewerage Commissioners (PVSC) in Newark is nearly as large as all of the aforementioned plants combined. A total of 1,324,000 people, living in 30 municipalities (see Appendix D), will be serviced by the plant when the construction of secondary treatment

facilities is completed in 1980. At this time, the plant will be able to treat 300 MGD. In addition, nearly 4000 industries discharge into the sewer system serviced by PVSC. It is expected that over 600 TPD of sludge will be produced by this plant.

The sludge may be reduced to less than 400 TPD by heat treatment (wet-air oxidation), and will be dewatered using filter presses. PVSC has been awarded a Step 2 grant of \$2,250,000 for design of the dewatering facilities.

Various alternatives for the disposal of the PVSC sludge are being considered. It would appear, however, that the large volume of the sludge being generated and the high concentrations of the heavy metals would favor a thermal scheme. In the interim, temporary storage of the dewatered, heat-treated sludge has been proposed. This will allow PVSC to terminate ocean disposal by the end of 1981.

(Interim Storage Only)

<u>Total Capital Costs:</u>	\$27,000,000
<u>Cost/Ton:</u>	\$ 26
<u>Annual Cost/Capita:</u>	\$ 0.61

RAHWAY VALLEY SEWERAGE AUTHORITY

The Rahway Valley Sewerage Authority (RVSA) serves nine communities in Union County. (See Appendix D.) The population for this region is expected to reach 213,000 by the design year 2000. There will be no further expansion or upgrading of the plant from the current design capacity of 35 MGD. By the year 2000, the plant will produce 19 TPD of digested sludge.

As stated previously, RVSA and LRSA are considering a joint solution. RVSA also prepared a plan to treat its own sludge. This can be implemented in the event that the regional solution is unfeasible. The individual plan calls for infrared incineration, with the ash being disposed on-site in a secure landfill. Note: Infrared incineration is discussed in the section on Elizabeth Joint Meeting.

<u>Total Capital Costs:</u>	\$6,477,000
<u>Cost/Ton:</u>	\$ 144
<u>Annual Cost/Capita:</u>	\$ 1.62

WEST NEW YORK TOWN

The Town of West New York (WNY) is in a unique situation. WNY is a member of the Hudson County S.A. The final regional solution for Hudson County is not expected to be completed until 1986. However, since WNY currently disposes of its sludge in the ocean, the Town prepared an interim solution for the period 1981-1986.

West New York Town has a primary treatment plant serving 60,000 people from the Towns of West New York, Union City and Weehawken. The future plans for the treatment plant are contained in the Hudson County S.A. Facilities Plan, due late in 1978.

The interim plan submitted by the engineering consultant proposes lime stabilization as the alternative. At the present time, however, no site has been found for the final disposal of the lime stabilized sludge. If a site cannot be found, the Town has been advised to consider composting, since composted sludge could be applied to abandoned landfills in the Hackensack Meadowlands. Composting is more environmentally sound since the end product is more stable, and pathogen survival is substantially lower. In addition, it is easier to properly incorporate composted sludge than the lime stabilized material at these dump sites. Nonetheless, if an acceptable site is located for the disposal of lime stabilized sludge from WNY, the proposed plan will be reconsidered for approval.

<u>Total Capital Costs:</u>	\$680,000
<u>Cost/Ton:</u>	\$ 189
<u>Annual Cost/Capita:</u>	\$ 2.21

2. City of Camden

The case of the City of Camden is unique for several reasons. Alone among New Jersey's ocean dumpers, Camden disposed of its sewage sludge at the 35 mile site off the coast of Delaware, along with Philadelphia. Permit renewal for Camden became a serious issue during the summer of 1976, and was denied by EPA, Region III in November of that year. The permit denial subsequently went to court. EPA, Region II was ordered to issue an interim permit to the City of Camden on December 7, 1976 for a period of 90 days, renewable at the discretion of the court.

Even before the permit denial, in September of 1976, negotiations by the DEP, EPA, and the City of Camden resulted in a decision to end ocean dumping as soon as possible. Camden readily agreed to implement a low technology composting facility in the City with the help of Federal and State funds.

Within eighteen months of the permit denial, a major composting operation underwent planning, design and construction, and an extensive research program was initiated. A Federal grant for 75% of the \$3.1 million project and the \$1.1 million research study was awarded in January of 1977. A State grant of 8% was given to the City of Camden, and a special grant of 25% was provided by the State to Rutgers for the research program, expected to supply data for use throughout New Jersey. By March of 1977, design work for the facility was underway, and a groundbreaking ceremony was held on October 6, 1977. The operation of the physical plant began on May 15, 1978, and official dedication ceremonies took place on June 16, 1978. The research program, under the auspices of DEP and conducted by Rutgers University, began in March of 1977, and is scheduled to continue through 1980. The three-year study will consider environmental, technical, and economic factors involved in the production and land use of the composted sewage sludge.

The planning, development and implementation of this project short-circuited some of the normal 201 grant procedures on alternatives exploration due to the emergency nature of the situation in legal terms and the pilot-demonstration aspects of the project itself.

In any case, the City of Camden Composting Project clearly demonstrates that cooperation among Federal, State and local agencies can have prodigious results in the area of sludge management, especially when low-technology solutions are chosen.

3. Minor Municipal Dumpers

The ocean dumping of sewage sludge has been used as a method of sludge disposal for some time by numerous small municipalities, processing 3 MGD or less of wastewater. These municipalities did not have their own permits until January of 1978, and have come to be referred to as minor municipal dumpers.

A total of 128 municipalities were listed in the ocean dumping permits of two commercial haulers before August of 1976. These municipalities were listed as potential customers of these haulers, since their sludge disposal was through lowest bidder contracting. If a contract was put out to bid, and either General Marine Transport or Modern Transportation Company won the contract, this would be reported to EPA, Region II, before disposal occurred. As public concern over ocean dumping increased, a tighter system was implemented to more carefully limit dumping activities. EPA contacted the 128 municipalities by mail, and requested information concerning their wastes, their need to ocean dump, and the status of their investigation of alternative disposal means. No response was received from 57 municipalities, and 36 indicated that they were landfilling their sludges. These 93 potential customers were removed from the permits of the commercial bargers, leaving 35 of the original 128 on the combined list. Included for these municipalities in the bargers' permits issued in August, 1976, were specifications on waste characteristics, volumes, alternative disposal methods if known, and phase-out dates for ocean dumping.

On May 25, 1977, a public hearing was conducted by EPA, Region II to carefully review permit renewal for each of the 35 municipalities listed in the August, 1976 bargers' permits. Individual permits were granted in January of 1978 for 22 municipalities. One of these municipalities, West New York Town, has been discussed above in the section on major dumpers. The remaining 21 municipalities, and the 13 not receiving permits, are discussed below. Appendix E provides a quick reference on the status of these dumpers, as well as that of the major municipal and the industrial dumpers.

PERMITS NOT ISSUED TO 13 MUNICIPALITIES

Four of the dumpers are no longer operating sewage treatment plants (STP's). The Point Pleasant Beach and Spring Lake Heights plants have been abandoned, and the plant in Belmar became a pumping station in August of 1977. The Western Monmouth plant in Matawan, not to be confused with the authority by that name in Manalapan, has also been abandoned.

Six of the dumpers were already using land-based alternatives at the time of the 1977 hearing and review. Three of these--the Boroughs of Avon-by-the-Sea and Fairfield, and the City of Long Branch--were then landfilling the liquid sludges from their STP's. The Avon plant will cease operating late in 1978, with its sewage going to the Neptune Township Regional Sewerage Authority. Fairfield plans to tie into the Two Bridges Regional Sewerage Authority shortly after its completion during 1979. (Two Bridges will incinerate its sludge). Long Branch is currently researching possible alternatives to the landfilling

of its sludge. The three other municipalities are the Townships of Montville, Aberdeen and Warren. Montville sends its sludge to the Parsippany-Troy Hills plant for incineration. Aberdeen Township, formerly Matawan Township, is presently storing its digested sludge. This sludge may be used in a pilot composting study by the Monmouth County Planning Commission. Alternatively, incineration of this stored sludge will be included in the final Service Agreement drafted for the inclusion of Aberdeen Township in the Bayshore Regional Sewerage Authority. Warren Township presently uses drying beds for its digested sludge. Current plans for utilization include spreading most of the dried sludge on nearby Somerset County Parks and giving the rest to local citizens for horticultural use. Some of the sludge may also be used by a large seed company.

Three of the original 34 municipalities were denied permits. The Baldwin's Run plant in Camden is now sending its sludge to the main STP for disposal. The status of that plant (City of Camden) has already been discussed in Section 2 of this appendix. The Town of West Milford was not granted a permit on the basis of having failed to consider alternatives up to the time of the May 25, 1977 hearing. Early in 1978, West Milford began to investigate land-based disposal/utilization methods, and will probably send its sludge to an incineration facility as a final solution possibly to Parsippany-Troy Hills. West Milford's sludge is presently disposed in a New York landfill. A small private sewerage company, the Wynnewood S.U. Company in Freehold, is now landfilling its sludge.

PERMITS ISSUED TO 21 MUNICIPALITIES

There were 20 permits issued for 21 minor dumpers in January 1978. While 21 municipalities were then permitted to ocean dump, only 13 continue this practice today. Of the eight no longer dumping, three had already instituted land disposal by the date of permit issuance, and have had their permits cancelled. Passaic Township (Millington) digests and landfills its wastewater treatment sludge. The Borough of Caldwell digests and dewateres its sludge partially, and stores it on-site for later contract removal. Ultimate disposal at present is to landfill. The Township of Chatham uses digesters and sludge drying beds, with ultimate disposal of its dried sludge also to landfill. The other five municipalities utilized their permits for part of 1978, but have now discontinued doing so. The Township of Wayne stopped dumping in mid-April, 1978, when operations began for one of their two incinerators. By 1979 Wayne may be able to accommodate the sludges of some of the remaining minor ocean dumping authorities, at least on an interim basis. Neptune Township and the Ocean Grove Camp Meeting, which shared a permit, have discontinued ocean dumping and will tie into the regional Township of Neptune Sewerage Authority shortly. The ocean dumping permits for the Boroughs of Pompton Lakes and Oakland expired on June 30, 1978. These boroughs may send their sludges to Wayne for incineration.

Four of the 13 authorities currently ocean dumping their sewage sludge will cease this practice during 1979. The Lincoln Park Borough plant will be abandoned, with its sewage processed at the Two Bridges facility, while Roxbury Township will contract with Two Bridges to incinerate its sludge.

The Town of Kearny recently signed a Consent Agreement with EPA which specifies the implementation of an alternative disposal method by April 30, 1979. Kearny may contract with Modern Transportation Company to lime-stabilize and dewater its sludge, or may carry out such an operation independently. Kearny is presently a member of the Hudson County Sewerage Authority (HCSA) and will be abandoned at some future date. Kearny's flow will be diverted either to PVSC, or to HCSA. The Borough of Wood-Ridge has been refused permit renewal, and will stop ocean dumping on January 9, 1979. Wood-Ridge intends to contract with Modern Transportation Company for its lime-stabilization and dewatering services at the Kearny facility. In both of the above cases, the dewatered, stabilized material will be disposed in landfills as an interim measure. Wood-Ridge will, for the long term, be diverted to BCUA, or will be upgraded and expanded.

Nine municipalities will continue to ocean dump after 1979. These municipalities are already involved in regional 201 studies. Some will utilize other 201 facilities on an interim basis while their own facilities are being completed, in order to meet their permit deadlines.

Pequannock Township (Pompton Plains) proposes to send its sludge to Two Bridges for incineration, while the Township of Cedar Grove intends to do this on an interim basis, implementing a final solution by 1985. Wanaque Borough will regionalize with the Borough of Ringwood in the Wanaque Valley Regional Sewerage Authority by 1981. Wanaque will join with the Pequannock River Basin Regional Sewerage Authority in planning its sludge management option, with the Wayne or Two Bridges incinerators as backup in the event that interim disposal/utilization is needed. The Boroughs of Totowa and West Paterson will regionalize by 1981 as well, and have recently indicated that the preferred option is contracting with Two Bridges for incineration, at least as a temporary measure. The City of Asbury Park STP should become a pumping station for the Township of Ocean Sewerage Authority by the deadline for ocean dumping. This issue has only recently been settled, eliminating possible plans for expanding and/or upgrading the Asbury Park plant. Morris Township (Convent Station) is part of two planning studies, one for the Whippany and the other for the Upper Passaic Basin. This municipality will consider composting sludge from its two plants in an independent operation as a final solution. Incineration at Parsippany-Troy Hills or Two Bridges are possible interim plans. The Borough of Atlantic Highlands will regionalize with the Borough of Highlands, probably after 1981, but will send its sludge either temporarily or on a permanent basis, to Middletown or Camden for composting, or to Two Bridges for incineration.

Washington Township is included in the 201 study for the South Branch of Raritan River. DEP informed the Township that this would not necessarily ensure that they would meet the 1981 deadline, and that an interim plan would have to be prepared. This plan suggests two possibilities--aerobic digestion and land-spreading or incineration. Preliminary negotiations have been initiated with the Two Bridges and Parsippany-Troy Hills authorities. The final 201 plan may call for composting on a regional basis.

4. Commercial Haulers

Two commercial haulers originally held ocean dumping permits which included potential customer municipalities for sludge hauling. The balance of those permits were for the dumping of septage collected by numerous septic tank cleanout operations.

In January 1978, General Marine Transport of Bayonne was issued a permit for septage dumping which expired on April 23, 1978. General Marine did not make any plans for land-based waste disposal/utilization and has since ended its septage disposal operation. Modern Transportation Company of Kearny was also issued a septage permit scheduled to expire April 23, 1978. Modern is planning a septage treatment facility in Kearny for its customers, with the filtrate being treated at the Jersey City STP. Landfilling of the lime-stabilized solids has been approved by the Solid Waste Administration (SWA). As an interim measure, and in view of its demonstrable initiative in seeking an alternative, Modern's permit has been extended to December 23, 1978. It is expected that some of General Marine's former septage customers may utilize this facility when it becomes available. The volume of septage specified on Modern's permit was increased for the permit life to allow the inclusion of about 90% of the septage previously hauled by General Marine.

5. Industrial Dumpers

Twelve industries were permitted to ocean dump in 1976. Of these, six no longer engage in this practice.

S.B. Penick & Co. has closed down its Montville operation. A permit was denied to the J.T. Baker Chemical Co. of Phillipsburg, and the M&M Mars permit expired in November of 1976 for their Hackettstown process plant.

Norda, Inc. in East Hanover, sends its waste to the Pollution Control Industries, Inc. industrial waste processing site in Kearny, with the effluent going to PVSC and the sludge to a landfill. Keuffel & Esser Co., Rockaway, contracts with Modern to hold and treat its wastes, discharging the effluent and landfilling the sludge. Pfizer, Inc. in Parsippany-Troy Hills sends its sludge to the municipal plant for vacuum drying and incineration, with the filtrate returning to the head of the Parsippany-Troy Hills system.

Six industries continue to ocean dump their wastes. NL Industries, Inc. (National Lead), Sayreville, has researched the possibility of neutralizing and landfilling their waste, and found this unacceptable for economic and environmental reasons. National Lead's waste probably will, however, meet the environmental impact criteria for ocean dumping. EPA is requiring that they continue to research alternatives for disposal and manufacturing changes, but may grant a special permit after the 1981 deadline.

E.I. du Pont de Nemours & Co., Inc. Gibbstown, has extensively studied various alternatives, which they claim are entirely unfeasible economically. EPA has decided to grant Du Pont a special permit, in view of the above and the fact that its waste meets the environmental criteria for ocean dumping. Merck & Co., Inc., Rahway plans to implement manufacturing changes or pretreat its waste to permit discharge to the municipal system, with landfilling of the by-product (calcium sulfite cake). Merck has preliminary approval from SWA for landfilling of this cake.

After examining 11 possible alternatives, Reheis Chemical Co., Berkeley Heights, decided to dewater its waste and landfill it. Reheis contracted for hauling and disposal of the waste cake to landfill as of September of 1978. SWA has approved the landfilling of this material. Reheis will be out of the ocean by December 31, 1978.

American Cyanamid Co, Linden, has proposed a combination of biodegradation of part of its waste, possibly at LRSA, and thermal treatment of the remainder. Linden Roselle has agreed to accept the biodegradable wastes from Cyanamid for treatment at its municipal sewage treatment facility. Problems arose with meeting New Jersey emission standards during the thermal oxidation part of its waste treatment. Various Consent Agreements have resulted in further work on emissions reduction, including equipment modification and more extensive testing. There have also been negotiations concerning the applicability of certain aspects of the regulations to the Cyanamid wastes. Cyanamid must meet all State requirements by April 30, 1979.

Allied Chemical Corporation, Elizabeth, has submitted alternative disposal plans to DEP. Their plans indicate that considerable volume reduction is possible for their waste, and that the remaining material might be discharged to Newark Bay or dumped in the ocean. The DEP is requiring extensive work to justify discharge to Newark Bay, making continued ocean dumping a more likely possibility. A special permit may be issued here also, according to USEPA Region II.

Continued investigations of land-based alternatives to ocean dumping will be required of all industries to which special permits are issued.

APPENDIX B - Alternative Sludge Management Techniques

The development of alternative sludge management techniques and programs is best understood in light of an appreciation of the basic elements of municipal wastewater treatment. The treatment of domestic wastewater falls under the categories of primary, secondary, and advanced wastewater treatment (AWT). Primary treatment consists of the physical settling of solids in the sewage. Secondary treatment is the biological (activated sludge) utilization of organic matter in the wastewater, and AWT usually consists of the removal of nutrients such as nitrates and phosphates from the wastewater. As a matter of definition, AWT generally implies that secondary treatment is also present, while secondary treatment generally implies that primary is also present. Thus, AWT is the most stringent treatment and produces the cleanest effluent. All New Jersey authorities must implement at least secondary treatment before 1983, while some may have to construct AWT facilities.

Most of the wastewater treatment plants in New Jersey provide secondary treatment at present. The largest authorities in New Jersey are either constructing or using secondary treatment facilities. In the normal operation of this method of treatment, biological growth of the activated sludge occurs, and a small fraction of this material must be continuously removed. This "waste activated sludge" is usually combined with the solids settled by the primary system, if present, for treatment and disposal/utilization.

Raw sludge may be treated by digestion, which is also a biological breakdown by microorganisms. This reduces the volume of the sludge, the putrescible portion (subject to decomposition by microorganisms), and its content of pathogenic organisms. Digesters are essentially large tanks to which air may be added. In this case, the process is called aerobic digestion. In anaerobic digestion, on the other hand, the bacteria which break down the sludge do not require air for their metabolism and produce methane gas, which must be removed from the digester. The gas is often used as fuel within the plant.

Liquid sludge from primary or secondary plants is typically between 2-5% solids. It usually accounts for around 3% of the original volume of influent wastewater. Since the sludge at this point is still 95-98% water, its disposal is difficult. To facilitate this disposal, the material is generally dewatered to produce a semisolid sludge "cake", which is easier to handle. This is usually accomplished by drawing it through a filter of some type. Prior to filtering, a chemical conditioner is added to the liquid sludge to facilitate the dewatering operation. Depending upon the sophistication of the filtering device used, the solids percentage of the dewatered sludge can vary from 15% to 45%. Generally, the higher the percentage of solids obtained, the more costly the equipment, but at the same time, the amount of sludge to be disposed is proportionally lower. Thus, there are several cost factors which must be weighed in order to choose the best type of dewatering for a particular plant's sludge.

Dewatering devices themselves generally fall into one of several major types or categories: drying bed, vacuum filter, centrifuge, belt filter press, or plate and frame press.

The most widely used dewatering method in the United States is the drying of sludge on sandbeds. The Sandbeds, which may be covered or uncovered, consist of four to nine inches of sand over eight to eighteen inches of graded gravel or stone. Sludge is poured over the sand layer. Underdrains collect filtrate at the base of the bed. Dewatering occurs by drainage for the first two days, followed by a period of evaporation. Drying beds are used primarily by smaller treatment plants, since larger plants (greater than 4 MGD) need large areas for the beds. Final solids concentrations vary greatly depending on the type of sludge, climatic conditions, and detention time of the sludge on the bed. Typical values range between 15% and 45%.

Vacuum filters use the suction power of a vacuum to draw the liquid from the sludge through either a belt or a spring coil, leaving behind a sludge cake on the filter. Solids content of the cake varies from 15% to 25%.

A centrifuge, as the name implies, uses the centrifugal force of a rapidly rotating drum to force the liquid from the sludge through a filter. Cake concentration varies between 20% and 30% solids.

Belt filter presses use the pressure between two moving belts to squeeze the liquid from the sludge. The sludge is subjected to gradually increasing pressures to obtain as dry a cake as possible. The pressure is applied by rollers on the outside of the belts, and the solids concentration of the cake can vary between 25% and 35%.

Plate and frame presses, (also called filter presses), hydraulically squeeze the liquid sludge in a cavity formed between two plates. The sludge is pumped into the cavity and forced by the hydraulic pressure through a filter media, which borders the cavity. The sludge cake forms on the inside of the filter, and falls into a chamber when the plates move apart. The concentration of the cake varies from 35% to 45%.

The solids concentration of the sludge cake is an especially important parameter when thermal reduction is considered for the disposal option. Sludge, when dry enough, will burn by itself, without the addition of fuel. This is called autogenous combustion. Depending on the type of sludge and the method of thermal reduction employed, the minimum solids content needed to achieve autogenous combustion varies. Generally, it is in the range of 30%-35%. Without autogenous combustion, thermal reduction alternatives are unlikely to meet cost-effectiveness requirements, as a result of fuel expenses.

The methods of thermal reduction considered for sludge disposal include various types of incineration and pyrolysis. The differences here involve the method of heating and the amount of air used for combustion. These terms are defined in the Glossary.

Dewatered sludge may also be composted or broken down by aerobic bacteria, producing a peat-like substance which can be used as a soil conditioner. The aerated static-pile method is a simple approach to this process.

In this method, the sludge cake is mixed at the composting site with a bulking material, such as wood chips. The mixture is arranged in a mound or pile over perforated pipe and a bed of wood chips or screened compost. The mound is covered by a insulating blanket of screened compost. The bulking material provides and maintains air spaces in the pile, and air is pulled through the pile by a low horsepower vacuum pump attached to the perforated pipe. Air is drawn intermittently through the pile, maintaining aerobic conditions.

The organic matter in the sludge, plus the air supply, provide the ingredients for breeding of the aerobic bacterial population. These bacteria perform the transformation of sludge to compost. The heat generated by the process builds up in four days to a level of 160°F. This temperature, and the competition between microorganisms, is sufficient to substantially eliminate the pathogenic organisms present in the sludge. After 21 days, the pile is screened to separate the wood chips from the compost. The wood chips can be reused three or four times before they finally decompose entirely to compost. The screened compost is cured for a month before use.

APPENDIX C - COSTS TO MAJOR OCEAN DUMPERS

This section presents data showing approximate ocean dumping costs incurred during 1977 (Table 1), the Step I or planning grants for SMP's (Table 2), and the total costs of sludge facilities (Table 3), along with the local costs (Table 4), for each major dumper. In some cases these figures are available only for dewatering and a temporary storage or disposal method, as a final disposal/utilization option has not been chosen. A short commentary on these tables follows.

Table 1

This Table describes the amounts of sludge and the costs of sludge dumping in 1977 for the major ocean dumpers. The amounts disposed are listed by the volume of liquid dumped (millions of gallons) and the estimated weight of the solids dumped (dry tons). These "dry" figures are approximate since the solids content of the sludge is an estimate.

Camden is the only dumper on this list that used the 106 mile site for its sludge in 1977. (Camden has ceased dumping.)

Table 2

This Table delineates the grants awarded to the major dumpers in order to perform the necessary sludge management planning. The grants finance 75% of the costs of the studies.

Although the Linden Roselle and Rahway Valley Sewerage Authorities currently dispose of their sludges jointly, separate grants were awarded to permit the development of separate reports. As stated previously, the two authorities are considering a joint solution.

Table 3

This Table outlines the costs for the design, construction and operation of the sludge facilities.

"Total Capital Costs" is the initial expenditure that must be made to build the facility.

"Amortized Capital Costs" is the annual cost to the sewage authority to finance the Total Capital Costs.

"Operation and Maintenance Costs" is the annual cost of operating the facility, including the costs of any chemicals and transportation.

"Total Annual Cost" is the sum of the Operation and Maintenance Costs and the Amortized Capital Costs.

"Costs per Dry Ton Sludge" is the amount spent to dewater and dispose of each ton of dry solids. The total costs give a basis of comparison for the costs of the different projects. From these figures, some general statements can be made:

- Larger projects tend to have lower unit costs due to economies of scale.
- PVSC's costs are low because only the interim solution is included here.
- WNY's costs are higher since the costs are distributed over a five-year period, rather than the usual twenty-year span.

Table 4

This Table summarizes the actual costs to the various authorities to build the sludge facilities, over and above the grants awarded by EPA. Grants are awarded for 75% of the eligible capital costs. There is no funding available for the operation and maintenance costs of the projects.

The estimated cost per capita does not necessarily reflect any changes that may occur in the annual sewer bills in these areas. These costs will vary due to the type of alternative chosen, the location of the project, and the time frame of the project.

TABLE 1

Costs of Ocean Dumping for Major Municipalities

<u>Authority</u>	<u>Thousand Gallons Dumped in 1977</u>	<u>Dry Tons Dumped in 1977</u>	<u>Cost (\$) for 1977</u>
Bergen County S.A.	53,000	8,500	294,000
*Camden Dept. Public Works	12,720	4,500	400,000
Elizabeth Joint Meeting	20,000	5,600	112,000
**Linden Roselle S.A. & Rahway Valley S.A.	54,300	7,600	296,000
Middlesex County S.A.	71,500	22,000	398,000
Middletown Township S.A.	3,400	400	20,000
Northeast Monmouth Reg. S.A.	10,940	2,280	61,000
Passaic Valley S.C.	170,000	52,600	952,000
West New York	8,100	1,700	45,000

* 106 mile site

** LRSA and RVSA dispose of their sludge jointly.

TABLE 2

Municipal Planning Grants

<u>AUTHORITY</u>	<u>MILLION GALLONS OF SLUDGE DUMPED 1977</u>	<u>GRANT AWARD (\$)</u>
Bergen County S.A.	53.0	525,000
Elizabeth Joint Meeting	20.0	225,000
*Linden Roselle S.A.	54.3	207,000
*Rahway Valley S.A.		120,000
Middlesex County S.A.	71.5	600,000
Middletown Township S.A.	3.4	35,625
Northeast Monmouth Reg. S.A.	11.0	71,250
Passaic Valley S.C.	170.0	660,000
West New York	8.0	63,750

* Linden Roselle and Rahway dump jointly.

TABLE 3
TOTAL COSTS OF SLUDGE FACILITIES

		<u>BCSA</u> ¹	<u>EJM</u>	<u>LRSA</u>	<u>MCSA</u>	<u>MTSA</u>	<u>NMRSA</u>	<u>PVSC</u> ²	<u>RVSA</u>	<u>WNY</u>
Total										
Capital	Dew	11,500	3,096	1,264	15,810	569	1,600	16,330	2,558	332
Costs	Dis	7,400	6,004	2,703	58,940	662	300	10,670	3,919	358
Thousand \$	Total	18,900	9,100	3,967	74,750	1,231	1,900	27,000	6,477	680
Amortized										
Capital	Dew	1,728	273	115	1,439	59	145	1,486	229	79
Costs	Dis	1,112	530	246	5,363	64	27	970	350	87
Thousand \$/yr.	Total	2,840	803	361	6,802	123	172	2,456	579	166
Operation and Maintenance										
Costs	Dew	602	357	92	1,444	34	79	975	211	64
Thousand \$/yr.	Dis	800	327	283	1,914	73	115	254	210	115
	Total	1,402	684	375	3,358*	107	194	1229	421	179
Total Annual										
Costs	Dew	2,330	630	207	2,883	93	224	2461	440	143
Thousand \$/yr.	Dis	1,912	857	529	7,277	147	142	1224	560	202
	Total	4,242	1,487	736	10,160	240	366	3685	1000	345
Costs per Dry Ton Sludge \$/dry ton										
	Dew	85	51	45	29	59	146	17	63	78
	Dis	70	68	115	74	94	93	9	81	111
	Total	155	119	160	103	153	239	26	144	189

* Includes \$4.65 million credit for sale of electricity.

TABLE 4

LOCAL COSTS OF SLUDGE FACILITIES

	<u>BCSA</u> ¹	<u>EJM</u>	<u>LRSA</u>	<u>MCSA</u>	<u>MTSA</u>	<u>NMRSA</u>	<u>PVSC</u> ²	<u>RVSA</u>	<u>WNY</u>
Local Share of Total Annual Cost Thousand \$/yr.	2,112	885	465	5,059	138	237	1,843	566	221
Local Cost Per Day Ton Sludge \$/dry ton	77	71	101	51	88	155	13	81	121
Estimated Cost per Capita of Sludge Facilities (\$/person)	2.82	1.18	2.74	4.20	2.16	2.50	0.61	1.62	2.21

NOTES FOR TABLES 3 & 4

Legend and Footnotes

- BCSA - Bergen County Sewerage Authority
- EJM - Elizabeth Joint Meeting
- LRSA - Linden Roselle Sewerage Authority
- MCSA - Middlesex County Sewerage Authority
- MTSA - Middletown Township Sewerage Authority
- NMRSA - Northeast Monmouth Regional Sewerage Authority
- PVSC - Passaic Valley Sewerage Commissioners
- RVSA - Rahway Valley Sewerage Authority
- WNY - West New York Town
- Dew - Cost for the Dewatering Facility
- Dis - Cost for the Disposal Facility

- 1 - Phase I solution only
- 2 - storage facilities only

APPENDIX D - Major Municipal Dumpers - Communities Served

Bergen County Utilities Authority

Bergenfield	Montvale
Bogota	Moonachie
Carlstadt	New Milford
Closter	Northvale
Cresskill	Norwood
Demerast	Oradell
Dumont	Palisades Park
East Rutherford	Paramus
Emerson	Park Ridge
Englewood	Ridgefield
Englewood Cliffs	Ridgefield Park
Fairview	River Edge
Fort Lee	River Vale
Hackensack	Rochelle Park
Harrington Park	Rutherford - future
Hasbrouck Heights	South Hackensack - section
Haworth	Teaneck
Hillsdale	Teterboro
Leonia	Washington
Little Ferry	Westwood
Maywood	Woodcliff Lake

Elizabeth Joint-Meeting

East Orange
Elizabeth
Hillside
Irvington
Maplewood
Millburn
Newark - section
New Providence
Roselle Park
South Orange
Summit
Union
West Orange

Appendix D (continued)

Linden-Roselle S.A.

Linden
Roselle

Middlesex County S.A.

Bound Brook	North Brunswick
Carteret (future)	North Plainfield
Cranbury	Old Bridge
Dunellen	Perth Amboy (future)
East Brunswick	Piscataway
Edison	Plainfield
Fanwood	Sayreville
Franklin	Scotch Plains
Green Brook	South Amboy (future)
Helmetta (future)	South Bound Brook
Highland Park	South Brunswick
Jamesburg (future)	South Plainfield
Metuchen	South River
Middlesex	Spotswood (future)
Milltown	Watchung (future)
Monroe	Woodbridge (future)
New Brunswick	

Middletown Township S.A.

Middletown Township

Northeast Monmouth R.S.A.

Eatontown
Fair Haven
Little Silver
Monmouth Beach
Oceanport
Red Bank
Rumson
Sea Bright
Shrewsbury Boro
Shrewsbury Twp.
Tinton Falls - section
West Long Branch

Appendix D (continued)

Passaic Valley Sewerage Commissioners

Belleville
Bloomfield
Clifton
East Newark
East Orange
East Paterson
East Rutherford - section
Fair Lawn - section
Garfield
Glen Ridge
Glen Rock
Haledon
Harrison
Hawthorne
Kearny - section

Lodi
Lyndhurst - section
Montclair
Newark - section
North Arlington - section
North Haledon - future
Nutley
Orange
Passaic
Patterson
Prospect Park
Rutherford - section
Saddle Brook
South Hackensack - section
Wallington

Rahway Valley S.A.

Clark
Cranford
Garwood
Kenilworth
Rahway
Roselle Park - section
Springfield
Westfield
Woodbridge

West New York Town

Union City - section
West New York
Weehawken - section

APPENDIX E - Summary Status of Ocean Dumpers

	<u>Sewerage Authority</u>	<u>Phase Out Date</u>	<u>Phase Out Completed</u>	<u>Submitted Sludge Management Plan (SMP)</u>
1	Aberdeen Township (Matawan Township)	7/31/79	x	
2	Asbury Park	12/31/81		x
3	Atlantic Highlands	12/31/81		
4	Avon-by-the-Sea	12/31/78	x	
5	Belmar	6/30/77	x	
6	Bergen County	12/31/81		x
7	Caldwell Boro	12/31/81	x	
8	Camden (Baldwin's Run)	8/31/76	x	
9	Camden (Main STP)	6/30/78	x	
10	Cedar Grove	12/31/81		x
11	Chatham Township	3/2/78	x	
12	Elizabeth Joint Meeting	12/31/81		x
13	Fairfield	12/31/79	x	
14	Freehold (Wynnewood)	12/31/80	x	
15	Kearny Town	4/30/79		x
16	Lincoln Park	7/31/79		x
17	Linden Roselle & Rahway Valley	12/31/81		x
18	Long Branch	12/31/79	x	
19	Matawan (Western Monmouth)	12/31/76	x	
20	Middlesex County	12/31/81		x
21	Middletown Township	12/31/81		x
22	Montville	12/31/81	x	
23	Morris Township (Convent Station)	12/31/78		x
24	Neptune Twp.-Ocean Grove	6/15/78	x	
25	Northeast Monmouth Regional	12/31/81		x
26	Oakland Boro	6/30/78	x	
27	Passaic Township	2/28/78	x	
28	Passaic Valley S.C.	12/31/81		x
29	Pequannock Township	12/30/80		x
30	Point Pleasant Beach	7/31/76	x	
31	Pompton Lakes	6/30/78	x	
32	Roxbury Township	7/9/79		x
33	Spring Lake Heights	7/31/77	x	
34	Totowa Borough	12/31/81		x
35	Wanaque S.A.	5/30/80		x

Appendix E (continued)

	<u>Sewerage Authority</u>	<u>Phase Out Date</u>	<u>Phase Out Completed</u>	<u>Submitted Sludge Management Plan (SMP)</u>
36	Warren	2/28/77	x	
37	Washington Twp. (Morris Co.)	12/31/81		x
38	Wayne Township	6/30/78	x	
39	West Milford	12/31/81	x	
40	West New York	12/31/81		x
41	West Paterson	12/31/81		x
42	Wood-Ridge	1/9/79		x
COMMERCIAL				
	General Marine Co. (Septic Tank Wastes)	4/23/78	x	
	Modern Transportation Co. (Septic Tank Wastes)	12/31/78		x
INDUSTRIAL				
I	Allied Chemical Corp.	12/31/81	&	x
11	American Cyanamid Co.	2/28/80		x
III	J.T. Baker	-	x	
IV	DuPont Grasselli	-	*	x
V	Keuffel & Esser Co.	-	x	
VI	M. & M Mars	11/76	x	
VII	Merck & Co.	4/1/81		x
VIII	NL Industries, Inc.	12/31/81	*	x
IX	Norda	-	x	
X	S.B. Penick, & Co.	12/31/77	x	
XI	Pfizer, Inc.	11/1/77	x	
XII	Rehers Chemical Co.	12/31/78		x

& Liquid dumping only

* Special permit to continue dumping probable

APPENDIX F - Ocean Dumping Hearing Testimony

This appendix contains the hearing testimony presented on behalf of the Department of Environmental Protection on four separate occasions. Testimony was given in New York City concerning the renewal of ocean dumping permits for various N.J. municipalities and authorities on May 25, 1977, and October 16, 1978. Proposed renewals of the ocean dumping permit of Philadelphia resulted in DEP's testimony being presented in Georgetown, Delaware, on July 6, 1977, and May 11, 1978.

The DEP is fully committed to ending ocean dumping by December 31, 1981, and to ensuring the development and implementation of environmentally sound land-based alternative methods of sludge disposal/utilization. The Department has, therefore, supported permit renewals where the affected municipalities and authorities have demonstrated responsible progress in this regard, or where environmental costs of outright denial would be dire. In instances of the latter type, DEP has recommended changes in the permitted dumping site to the designated area 106 miles offshore as an environmental precaution and an economic incentive to cooperation from recalcitrant permittees.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
OFFICE OF SLUDGE MANAGEMENT AND INDUSTRIAL PRETREATMENT
COMMENTS TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ON THE RENEWAL OF OCEAN DUMPING PERMITS

PRESENTED IN NEW YORK CITY, NEW YORK
ON MAY-25, 1977

Mr. Bermingham, Members of the Panel, I am Dr. Marwan M. Sadat and the Program Director of the Office of Sludge Management and Industrial Pre-treatment in the Division of Water Resources of the New Jersey Department of Environmental Protection. Today, I am presenting the views of this Department on the U.S. Environmental Protection Agency's (EPA) proposal to reissue certain permits for the ocean dumping of sewage sludge and certain other wastes for an interim one-year period.

Summary of DEP's Position

Our view of the renewal of these sludge dumping permits can be briefly stated as follows. Given the practical consideration of the lead times needed to implement sound alternatives to the ocean dumping of sewage sludge, and DEP's position that the placing of sludge in existing anti-quoted landfills is not an acceptable method, we believe, in general, that these permits should be renewed on a one-year basis. (There are exceptions which are described below.)

This should not be interpreted to mean that DEP favors ocean dumping. Rather, DEP remains firmly committed to the goal of getting sludge out of the ocean as soon as feasible, even before EPA's goal of 1981 if possible. We are actively working toward the cleanup of all New Jersey sources of ocean pollution. DEP is seeking additional Federal monies as well as interstate cooperation to deal with the bulk of this coastal problem which originates in the New York-New Jersey Metropolitan Area. DEP is also committed to encouraging rapid development of technology and institutional arrangements to implement the land-based disposal of sewage sludge to relieve the ocean of this burden.

Environmentally Sound Sludge Disposal

The environmentally sound land-based disposal of New Jersey's sludges will probably include a combination of composting, pyrolysis, and direct land application by subsurface injection. Composting has the added advantage of producing a useful soil conditioner. The primary factor that will determine the optimal combination of these techniques is the heavy metal and toxic chemical content (lead, cadmium, mercury, zinc, pesticides, organic chemicals) of the sludges which may make their application on land not feasible due to the accumulation of metals in plants grown on compost-enriched soils. Without pretreatment, the sludges from the metropolitan area, including the Passaic Valley Sewerage Commissioners and Middlesex County Sewerage Authority (by far the largest New Jersey sludge sources) may not be able to be used for agricultural purposes, although they will probably be suitable for sod farming and horticulture.

Land application and composting processes are desirable from an economic and environmental standpoint since they require relatively low capital investment per ton of disposal and return nutrients and organic matter to the land where it can be beneficially used: in growing vegetation that does not enter the human food chain directly; for land restoration

or enhancement; or for other purposes. Pyrolysis, although not yet tested operationally on a full scale, is certainly preferable to ocean dumping but involves higher capital and operating costs per ton than land application. (For cost estimates, see the attached January DEP staff report.)

DEP does not consider ocean dumping to be an environmentally acceptable method for the disposal of sewage sludge. We are vigorously encouraging the composting of sludge as soon as feasible in all possible situations, especially at the smaller sewage treatment plants which typically have sludges containing relatively lower heavy metal concentrations. Nonetheless, most of these New Jersey municipalities will be unable to initiate composting or any other sound disposal technique by July 31 of this year, the expiration date of their current permits. At the present time, and generally for the next year, these communities and the two commercial agents disposing of sludge from the septic systems of a number of communities have no realistic options available to them. Therefore, DEP must, reluctantly, support the renewal of these ocean dumping permits.

DEP Initiatives

The implementation of land-based alternatives is progressing well in New Jersey. The Office of Sludge Management and Industrial Pretreatment has been established within the Office of the Director in DEP's Division of Water Resources. Several positive steps have been taken toward stimulating and coordinating statewide utilization of land based solutions to the sludge disposal problem.

Sludge management plans are being required of all sewerage authorities receiving Federal and State monies for planning (or Step 1) grants. Some authorities receiving Step 2 or design phase grants are also being required to provide such plans. Incidentally, consideration of disposal of septic cleanouts is being required in all 201 plans. Interim guidelines for the preparation of sludge management plans have been drafted and distributed to these authorities. Comments on the guidelines are being received and the progress of each authority in the preparation of sludge management plans is being followed by this new DEP office.

Different land application techniques are appropriate for sludges having certain chemical characteristics. Therefore, detailed chemical analyses and other assessments will be necessary before a specific technique is chosen for the sludge from a specific sewage treatment authority. Of particular significance in choosing a technique are the heavy metal and organic chemical contents, as previously mentioned. The presence of these substances in sludge will not only determine which ultimate disposal techniques are suitable, but will also necessitate special monitoring of sludges and disposal areas to insure consistent environmental protection.

Regulations are being developed for the testing and monitoring of sludges on a regular basis. As necessary background for the drafting of the regulations, information is needed on the availability of laboratories equipped to perform the required tests, and the approximate costs involved. To this end, the Office of Sludge Management and Industrial Pretreatment has initiated a preliminary survey of New Jersey's laboratories. Further, we expect our economic impact analysis of our proposed regulations to be completed by July, 1977.

The first extensive project for a land based alternative to ocean dumping is well underway. The sludge being produced by the City of Camden will be composted in an extensive new operation funded by State and Federal monies, which is being designed and implemented jointly with Rutgers University and USDA under an inter-agency agreement with DEP's Division of Water Resources. Dewatering equipment has already been contracted for. A thorough soil investigation for preparation of the composting site has been completed. The actual detailed design of the composting site is underway. DEP fully expects Camden to be out of the ocean, with its composting project operational, prior to October 30, 1977.

Our support for the renewal of the ocean dumping permits in question is by no means indicative of any satisfaction with utilizing the ocean as a disposal location. DEP is fully committed to the elimination of ocean dumping by each permittee as soon as an environmentally sound, land based alternative is implementable. In keeping with this commitment, DEP recommends that the permits for Montville, Pompton Lakes, Oakland and West Milford be phased out sometime in 1977. This Department has determined that land based alternatives are available for these communities. The sludge from Montville can be trucked over to the Parsippany-Troy Hill Sewage Treatment Plant for incineration. This interim solution will be necessary until the collection system for Montville is completed. In the case of Pompton Lakes and Oakland Boro, a 201 Facility Plan is underway and these two communities will probably combine their sludge for disposal at Pompton Lakes. On an interim basis we propose the transportation of the sludge from these two localities to the Wayne Township incinerator slated to be operational by late this fall. The Township of West Milford, however, poses an especially vexing problem. This community has consistently refused to investigate land based alternatives for the disposal of sludge and has refused to enter into a service agreement with the Wanaque Sewerage Authority. Upon investigation, the Department has determined that the Township of West Milford can dispose of its sludge by incineration by entering into a special agreement with either the Township of Parsippany-Troy Hill or the North West Bergen County Sewerage Authority. We urge EPA to phase out these permits in such a manner as to allow sufficient time for an orderly transition from ocean dumping to land based alternatives.

Landfills and Sludge

A large number of New Jersey communities currently dispose of their sewage sludge in landfills. There are eleven landfills in the State which are registered with EPA for the acceptance of wastes which include liquid sewage sludge. DEP has documentation of extensive ground water contamination associated with all of these landfills. A particularly severe case of chemical contamination was the Helen Kramer Landfill in Gloucester County. This site overlies the Mt. Laurel/Wenonah aquifer, which is used extensively for potable water purposes in South Jersey. Recent analysis produced the following data:

Total Dissolved Solids	2,080 mg/l
Cadmium	0.15 mg/l
Flourides	2.7 mg/l
Phenols	.085 mg/l
Chlorides	600 mg/l
COD	1540 mg/l

Fecal coliforms were also present in the ground water. This landfill was closed by DEP on April 25, 1977.

The Ocean County Landfill Corporation, Inc. is an outstanding example of bacteriological contamination with 10,000 MPN/100 ml of fecal coliforms and 9,200 MPN/100 ml of fecal streptococci found in the ground water. This was in addition to chemical contamination.

The latest report dated May 19, 1977 indicates that these landfills are causing a continuous and expanding problem. Two Burlington County concerns, Sanitary Landfill, Inc. and Florence Land Recontouring are producing ground water contamination by an increasing number of parameters. These include nitrates for Sanitary Landfills, Inc. and phenols, silver, manganese, and iron for both concerns.

As documentation of the problems associated with New Jersey landfills, we would like to place on record a special report entitled "City of Camden Sewage Sludge - Land Alternatives to Ocean Dumping" prepared by the Solid Waste Administration, and a recent update of that report.

The blanket denial of the interim ocean dumping permits now before you, would result in increased volumes of raw sewage sludge entering New Jersey landfills. This situation is already intolerable. DEP, while strongly in favor of ending all ocean dumping, cannot endorse any action which would aggravate these ground water and surface water contamination problems. Rather, DEP is intent on stimulating and coordinating the development and implementation of environmentally sound, land based disposal and energy recovery techniques. In this way, we can begin to provide solutions to the environmental problems caused by ocean dumping and current landfill practices. DEP favors a positive approach on all fronts, as opposed to a small forward move accompanied by a backward step.

Conclusion

In conclusion, with the four exceptions of Montville, Pompton Lakes, Oakland and West Milford, the New Jersey Department of Environmental Protection supports the renewal of the ocean dumping permits in question, on a one-year basis. Our view is firmly based on long term environmental considerations.

Thank you for giving us this opportunity to present to you this testimony.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMENTS TO THE
U. S. ENVIRONMENTAL PROTECTION AGENCY
ON THE RENEWAL OF OCEAN DUMPING PERMITS

Presented in New York City, New York

on

October 16, 1978

Mr. Birmingham, members of the panel:

I am Dr. Glenn Paulson, Assistant Commissioner for Science of the New Jersey Department of Environmental Protection (NJDEP). With me are Dr. Marwan Sadat, Director, Office of Sludge Management and Industrial Pretreatment, and Ms. Theresa Van Rixoord, Supervisor of the Industrial Pretreatment Section of the Office of Sludge Management and Industrial Pretreatment.

Today I am presenting comments of the NJDEP on the United States Environmental Protection Agency (USEPA) proposal to reissue ocean dumping permits for a number of New Jersey sewerage authorities and municipalities.

Summary of DEP's Position

The DEP's position with respect to the renewal of the sludge dumping permits can be briefly stated as follows.

Based on the very practical considerations of the lead time necessary to design and to construct land based sludge disposal facilities, and knowing the progress that the major ocean dumping authorities have achieved over the last 18 months, it is DEP's position these permits, with one exception, should all be renewed for one year. In no way, however, should this be interpreted that DEP favors ocean dumping as a sound method of sludge disposal. We remain firmly committed to the goal of ending sludge dumping in the ocean as soon as feasible, and certainly no later than December 31, 1981. In fact, we believe that some authorities and municipalities may be able to achieve this goal prior to 1981. The Department remains firmly committed to the development of land based alternatives for all ocean dumping authorities and municipalities in New Jersey. We can proudly point to the example of Camden and the efforts which the City of Camden, NJDEP and EPA have expended to achieve the cessation of ocean dumping by the City in May, 1978.

Status of the Sludge Management Plans for Ocean Dumping Authorities

The DEP, in 1977, issued regulations mandating that all New Jersey ocean dumping authorities submit Sludge Management Plans (SMP's) for the implementation of land based alternatives by December 31, 1977. Drafts of these Plans were received from the following major Authorities: (1) Bergen County Utilities Authority, (2) Joint Meeting of Essex and Union Counties, (3) Linden-Roselle Sewerage Authority, (4) Middlesex County Sewerage Authority, (5) Middletown Township Sewerage Authority, (6) Northeast Monmouth Sewerage Authority, (7) Passaic Valley Sewerage Commissioners, (8) Rahway Valley Sewerage Authority, and (9) the Town of West New York. In addition, the minor ocean

dumping authorities and municipalities submitted to us documentation indicating that they were actively involved in developing SMP's as part of their basic 201 facilities plans. The Borough of Wood-Ridge and the Township of Kearny, however, failed to submit the required documentation, and the Department subsequently issued Administrative Orders against these two municipal entities.

As of October 31, 1978, so-called Step II applications for the design and construction of dewatering facilities have been submitted to DEP by the following: Joint Meeting of Essex and Union Counties, Morris Township, Bergen County Utilities Authority, the Northeast Monmouth Sewerage Authority and the Rahway Valley Sewerage Authority. In addition, DEP has certified to EPA applications for Step II grants for the design of dewatering facilities for (a) Passaic Valley Sewerage Commissioners, (b) Middletown Sewerage Authority, and (c) the Linden-Roselle Sewerage Authority.

DEP has also required all major ocean dumping authorities to develop contingency plans for the disposal of their sludge should the construction of their long term sludge disposal facilities be delayed past the 1981 deadline. DEP is convinced that the dumping of sludge which originates from New Jersey will cease by December 31, 1981. However, as an additional deterrent to prevent authorities from violating their compliance schedule, and to insure that the construction of land based sludge disposal facilities proceed with appropriate speed, DEP strongly recommends that this hearing panel weigh the concept that any further violation of the compliance schedules by any permittee should result in an automatic change of the ocean dumping site from the 12 mile site to the 106 mile site for that permittee. We must note that DEP has already advocated this policy in a report which was issued in 1976 and which included the same recommendations to former Regional Administrator Gerald Hansler.

The use of the 106 mile site for the ocean dumping of sludge, we believe, would offer little environmental hazard to the area and could be used as a realistic and practical alternative to the denial of ocean dumping permits to recalcitrant ocean dumpers. As we have indicated before in testimony presented to EPA in May of 1977, the use of landfills in New Jersey for the disposal of any additional liquid sewage sludge is unacceptable. We have extensively documented the ground water contamination associated with all the landfills in New Jersey licensed to accept liquid sludge. The blanket denial of any ocean dumping permit for the major ocean dumping authorities would result in an unacceptable environmental hazard to New Jersey. We favor a positive approach in all fronts as opposed to a small forward move accompanied by a backward environmental step.

Our best estimate, as indicated in our 1977 report, of the costs to the sewerage authorities to dump their sludge at the 106 mile site would increase the disposal costs well above that of any land based alternative. A shift to the 106 mile site would dramatically reverse the ocean-to-land cost comparison and would act as a financial incentive

to the authorities to accelerate their program to implement land based alternatives. The dumping of sludge at the 12 mile site is now cheaper to all the authorities than land disposal. A shift to the 106 mile site would reverse this relationship. The use of the 106 mile site for a short period of time would be far less likely to damage the marine environment at that site than the continued dumping of increasingly large quantities of sludge at the 12 mile site. We must note that the quantity of the sludge being dumped at the 12 mile site is expected, based on EPA's own testimony, to quadruple by 1981. These increased quantities of sludge may even threaten the water quality of the Jersey shoreline. Hence, our recommendation to move violators to the 106 mile site would not only accelerate the development of land based sludge disposal facilities, but would also begin to relieve the 12 mile site from the additional burden of drastically increasing quantities of sludge and the toxics and heavy metals contained in it between now and 1981. We believe this suggested approach would be a positive step with substantially less environmental hazard than a blanket denial of the ocean dumping permit to any of the major ocean dumping authorities, and, as I said before, strongly commend it to the attention of this hearing panel.

It must be noted that the shift of a violator to the 106 mile site can be accomplished according to Section 228.4 at the discretion of the EPA Administrator who may, "from time to time designate specific locations for temporary use for disposal of small amounts of materials under a specific 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 designation can be done by promulgation under Section 228 of the Ocean Dumping Regulations.

Among the permit applications presented to USEPA, the Township of Kearny, the Borough of Wood-Ridge, and the Township of Roxbury need to be considered separately.

Kearny, Wood-Ridge and Roxbury

As I indicated before, the DEP issued Administrative Orders to the Township of Kearny and the Borough of Wood-Ridge for failing to comply with our requirements for the submission of SMP's by December 31, 1977.

In the case of Wood-Ridge, the Borough has consented to end ocean dumping very soon and already has advertised for disposal of its sludge by commercial haulers in landfills. The quantity of the sludge being generated by the Borough can be economically hauled to landfill sites outside the state, or could possibly be processed at the Modern Transportation facility under construction in Kearny. (This facility is designed to lime stabilize septage and sewage sludge, dewater it and dispose of it in landfills.) We believe the term of the present

permit will allow them to find their alternative, and that they simply don't need any more permits. Therefore we agree with EPA's tentative determination to deny.

In the case of Kearny, however, the DEP Hearing Officer has ordered the Town to comply with our Administrative Order; we expect that tangible evidence of progress in developing land based alternatives will be available to us shortly. The treatment plant influent to the Kearny system consists overwhelmingly of industrial wastes. Although neither the Department nor anyone else, at this time, has a complete chemical analysis of the sludge generated by Kearny, we can infer from monitoring reports that heavy metal concentrations in the sludge are high. In fact, the sludge quality is such that the anaerobic digestors at the Kearny plant have consistently failed; the sludge simply cannot be anaerobically digested, almost certainly due to the inhibitory concentrations of heavy metals. DEP has requested that the Town of Kearny investigate land based alternatives within a period of thirty days.

Among the alternatives which may be available to Kearny is trucking of their sludge to the Jersey City Sewerage Authority incinerator for dewatering and thermal reduction. Although we would support the imposition of fines by EPA on the Town of Kearny, we must take the position that the blanket denial of the permit would pose an unacceptable environmental hazard to New Jersey if the sludge were disposed of in New Jersey. This treatment plant has a yearly production of 21,000 tons of wet raw sludge. This large quantity of liquid sludge could not be safely accommodated in any of New Jersey's landfills and would certainly cause us professional concern if it were to be landfilled at most other locations in neighboring states. Our recommendation to EPA would be to immediately shift the dumping of Kearny's sludge to the 106 mile site accompanied by appropriate fines. Further, we strongly believe that the proposed denial of Kearny's ocean dumping permit should not be acted upon until the completion of an environmental assessment to determine the environmental hazards to land and ground water which such an action would cause.

In the case of the Township of Roxbury, the Department has already received an application for the development of a SMP. Last spring DEP had directed the Township to construct a composting facility with its own funds. This we believed could be accomplished in a relatively short period of time since the Roxbury Township treatment plant already has the necessary dewatering equipment. An evaluation by the municipal engineer for the Township has indicated that such a facility could be incorporated in the overall long term sludge treatment system. Although the Township has been remiss in complying with EPA and DEP's previous directives, we believe that a rigid compliance schedule could insure the development of a land based alternative by December 31, 1981, and that the citizens of Roxbury should not bear the additional burden of an expenditure of upward of \$900,000 without the benefit of a 201

federal grant. The Township is clearly entitled to this federal assistance. Therefore, we would recommend to EPA that a new compliance schedule be incorporated in Roxbury's ocean dumping permit with a proviso similar to that which we recommended for Kearny, namely that any violation of the compliance schedule mean an automatic shifting to the 106 mile site.

Conclusions and Recommendations

In conclusion, with the exception of the Borough of Wood-Ridge, the NJDEP supports the renewal of the ocean dumping permits on a one year basis as described above. Our recommendations are firmly grounded both in long term environmental considerations and in our commitment to end the ocean dumping of sludge in 1981.

Thank you for allowing us this opportunity to present to you this testimony; we would be glad to answer any questions you might have.

ADDENDUM TO BE INSERTED BETWEEN THE SECOND AND THIRD PARAGRAPHS ON PAGE 2

I am also happy to advise the panel that the Linden-Roselle Sewerage Authority and the Rahway Valley Sewerage Authority have agreed to join to construct a joint sludge disposal facility. This has come about due to the combined efforts of the USEPA, the NJDEP and the two Authorities. I would like to take this opportunity to commend the governing bodies of both Authorities on this splendid example of cooperation and foresight.

New Jersey Department of Environmental Protection
Division of Water Resources
Office of Sludge Management and Industrial Pretreatment
Comments to the United States Environmental Protection Agency
on the Renewal of the Ocean Dumping Permit
of the City of Philadelphia

Presented in Georgetown, Delaware
on July 6, 1977

TESTIMONY IN GEORGETOWN, DELAWARE ON JULY 6, 1977

Mr. Chairman, Ladies and Gentlemen: I am Dr. Marwan M. Sadat, Program Director of the Office of Sludge Management and Industrial Pretreatment in the Division of Water Resources of the New Jersey Department of Environmental Protection.

Today I am presenting the views of this Department on the U.S. Environmental Protection Agency's proposal to reissue the ocean sludge dumping permit for the City of Philadelphia.

SUMMARY OF DEP'S POSITION

Our view of the renewal of this permit can be briefly summarized as follows. Given the practical considerations of the lead times necessary to implement sound alternatives to the ocean dumping of sewage sludge, DEP's position is that the placing of sludge in the ocean by the City of Philadelphia on an interim basis is the only solution which will not result in an environmental problem far worse than the one we are facing today. We believe that this permit should be renewed on a one-year basis with continuous monitoring by the USEPA of the progress that the City of Philadelphia is making into seeking land based alternatives.

DEP would recommend, however, the phase out of the present dump site which the City of Philadelphia uses and the movement of all dumping of sewage sludge whether from New York, New Jersey, or Pennsylvania to the 106 mile site. We have often expressed these views at numerous public hearings and we have issued a number of reports dealing with this complex problem. I would like to place into the record copies of the DEP report entitled, "Ocean Dumping of Sludge - Program through Phase Out in 1981". Also, a copy of the testimony of Dr. Glenn Paulson, Assistant Commissioner of the New Jersey Department of Environmental Protection which was presented in Ocean County on May 31, 1977 and my testimony to the USEPA at hearings which were held in New York City on May 25, 1977. These documents represent our position with respect to ocean dumping.

This in no way should be interpreted to mean that DEP favors ocean dumping. We in New Jersey are firmly committed to the goal of getting sludge out of the ocean as soon as possible, even before EPA's goal of 1981. We can point out with some pride our accomplishments in getting Camden the necessary monies to implement a composting project which will mean the end of ocean dumping by the City by November of 1977. We are also seeking additional federal monies as well as interstate cooperation to deal with this coastal problem which originates in the New York-New Jersey-Pennsylvania area.

DUMPING BY PHILADELPHIA AT THE PRESENT SITE

The City of Philadelphia has been dumping its sewage sludge at the present site since May 1973 when it was ordered to move from the previously dedicated area. EPA has carefully monitored the affect

of this dumping on this new site which has a relatively vigorous shellfish population. Numerous exploratory expeditions were conducted by the USEPA in 1975 and 1976 to evaluate the damage to the shellfish population caused by the ocean dumping of sludge by the City of Philadelphia and the City of Camden. These findings were summarized in a USEPA report which was authored by Dr. Donald Lear of the USEPA Field Office in Annapolis, and Dr. Gerald G. Pesch also of EPA. I am sure that the panel is aware that this report indicated that damage to the shellfish population had occurred. This damage was caused mainly by heavy metals and toxics deposited on the ocean bottom during a relatively short period of time. One would expect therefore that if the dumping were to continue until 1981, extensive reduction in the shellfish population and contamination of the ocean bottom would be inevitable.

We at DEP have computed the total amount of heavy metals which is dumped yearly by the City of Philadelphia on the ocean bottom. This data is summarized and appended to this testimony. For example, the ocean bottom in the existing dump site will receive annually 192 lbs. of mercury, 7,787 lbs. of cadmium, 233,856 lbs. of lead, and 845 lbs. of arsenic. The damage to the marine environment from these highly toxic metals can hardly be minimized. As Dr. Lear's report clearly indicates, some of that damage may be irreversible, because of the deposition of the metals in the benthos. Poor management of sludge disposal, of which ocean dumping is an example, not only threatens the ocean but also raises the possibility of eventual violation of our water quality standards.

A report which was prepared by the City of Philadelphia and which appeared in the Water Pollution Control Federation Journal in May, 1977 has taken issue with the findings mentioned above. We have carefully analyzed those reports and have reached the conclusion that Dr. Lear's data clearly indicates damage to the shellfish population. Allow me to elaborate. Studies which were quoted by the City of Philadelphia evaluated the condition of the 84 kilometer (52 mile) site shortly after ocean dumping in that location commenced. Operation "IDES" was conducted by EPA in March, 1974 which was 11 months after ocean dumping began at that site. This data was then compared with baseline concentrations which were gathered by EPA during the environmental assessment investigations for a proposed site in the New Jersey Bight. The most significant data was that which measured heavy metal concentrations in shellfish tissues. Supposedly the heavy metals concentrations in tissue samples taken from clams collected at the 52 mile site differed little from the baseline data. Consider, however, that dumping at that site had occurred for only a period of 11 months. The conclusions reached by the City of Philadelphia were hardly spectacular. In fact, they are self-evident. It would have been considerably more significant to compare the data from the original 21 kilometer (13 mile) dump site with the baseline. It seems inconceivable to us that with the benthos receiving annually the enormous quantities of heavy metals which we mentioned above, there would be no damage to the marine environment.

MOVING THE SLUDGE TO THE 106 MILE SITE

We firmly believe that the existing system of ocean dumping cannot continue indefinitely. Long term environmentally acceptable solutions must be developed to recycle and utilize the sludge generated during the wastewater treatment process. The key to environmentally sound and economically feasible sludge disposal lies in the proper management of our land and air resources. Poor management will invariably lead to costly and environmentally damaging solutions. The most glaring example is ocean dumping. Other case histories surround us. Landfilling of liquid raw sludge has led to pollution, not only of the land but also of our groundwaters, rivers and estuaries. Proper management of sludge disposal involves professional expertise and a willingness on the part of the sludge generator to accept modern and innovative methods of sludge recycling and utilization. I cannot emphasize enough that the basic concept which must underlie proper management of sludge disposal must be that the wastewater treatment process residue is recycled and utilized. We, in New Jersey, feel that one solution which will lead to meeting the 1981 deadline resides in the widespread composting and land application of these materials, and we are moving rapidly toward this end.

There is little disagreement with our stated position with respect to proper sludge management techniques which we have mentioned previously. This, however, is a long term solution. We must also carefully consider what short term options are available to us and which of these options will be the least environmentally damaging to the marine ecology. DEP, in a report which we have submitted for the record, carefully analyzed a gradual shift of ocean dumping to the 106 mile site on an interim basis. In that document, we considered not only the environmental aspects of such a move but also the economic costs which New Jersey authorities would incur should the present dumping site shift to the 106 mile site. In fact, when the City of Camden was ordered by the federal courts to move to the 106 mile site, we supported this decision, although this move resulted in a doubling of the cost of sludge disposal for the City. Our recommendation to EPA for a gradual move to utilize the 106 mile site was conditional on the following: (1) monitoring of that site as to oceanographic parameters and continuous analysis of the effect of dumping at the 106 mile site, (2) acceleration of the development of a Coast Guard surveillance system (LORAN-G system), and (3) realistic and careful assessment of barging capacity to allow for an orderly transition to the 106 mile site. Since the issuance of our report in February, 1977, we have determined that additional barging to the 106 mile site could be accomplished by the use of commercial oil tankers. We feel that the transportation problems associated with the 106 mile site are not insurmountable. Further, we recommended that any sludge producer, in this case Philadelphia, who is not adhering to a reasonable but expeditious schedule to implement

land based alternatives should be forced to move the 106 mile site immediately. This would pressure other sludge generators into accelerating their program of instituting land based alternatives. In fact, when a realistic cost analysis is made, composting of sewage sludge will turn out to be more economical than barging to the 106 mile site. Undoubtedly, the position that DEP has taken is controversial. However, as we have stated previously, our studies indicate that such a move will accomplish two purposes: (1) allow the existing dump site which the City of Philadelphia uses to recover from the onslaught of sludge dumping and be restored to commercial fishing, and (2) force the City of Philadelphia to reevaluate its position that the cheapest method of disposal is the ocean.

Perhaps even more disturbing than the City of Philadelphia's position on the economics of sludge disposal, is the stance that ocean dumping should not be phased out on a defined schedule. The article published by the City in the Journal of the Water Pollution Control Federation in May has been referred to previously. Let me illustrate this stance with a quote from the article: "Philadelphia is not seeking a determination that ocean dumping is the best or only long-term method for sludge disposal. Yet the city contends that it is premature to make a determination now that ocean dumping must be ended by a particular date".¹

We would like to remind the panel that Philadelphia was recently assessed a fine of \$250,000 for failing to adhere to certain conditions pertaining to the development of land based alternatives to ocean dumping. Moving Philadelphia to the 106 mile site would be a clear indication that EPA intends to end ocean dumping by 1981.

We have recently analyzed the costs for the City of Philadelphia to move the 106 mile site. These figures are based on costs currently affecting the City of Camden. Philadelphia's sludge, barged at present rates to the 106 mile site, will incur an approximate annual cost of 3.5 million dollars. Even the figure for barging to the 40 mile site is approximately 1.8 million dollars. We believe that these costs are far in excess of those associated with implementation of a low capital intensive alternative, such as composting.

Finally, to summarize our views, we feel that (1) moving Philadelphia to the 106 mile site will be less damaging to the marine environment than continued dumping at the present site, and (2) such a move will apply the kind of pressure which is necessary to end ocean dumping by 1981.

¹Guarino, C.F., M.D. Nelson, S. Townsend, "Philadelphia Sludge Disposal in Coastal Waters". Journal Water Pollution Control Federation, May, 1977, pp. 737-744.

Thank you for allowing me to present to you today our views and comments on the renewal of the ocean dumping permit for the City of Philadelphia.

MS:X

Total Amount in Pounds Per Year

	Philadelphia	Camden	Ratio Philadelphia/Camden
Mercury	191.4	7.1	26.96
Lead	233,856	13,578	17.22
Copper	104,835	7,402	14.16
Zinc	355,656	20,699	17.18
Chromium	56,115	5,256	10.68
Nickel	1,057	326	3.24
Selenium	1,805	120	15.04
Arsenic	845	55.63	15.19
Beryllium	50	8	6.25
Cadmium	7,787	219	35.56
Vanadium	<u>4,415</u>	<u>565</u>	<u>7.81</u>
	766,612.4	48,235.73	15.89:1

Total Amount Of Heavy Metal Deposited By The Cities Of Philadelphia
And Camden On The Ocean Bottom Per Year

TABLE 1

Concentration In Milligrams Per Kilogram Of Sludge Solids

	<u>PHILADELPHIA</u> <u>N.E. PLANT</u>	<u>CAMDEN</u>	<u>RATION</u> <u>PHILADELPHIA/CAMDEN</u>
Mercury	2.20	0.81	2.72
Lead	2688	1550	1.73
Copper	1205	845	1.43
Zinc	4088	2363	1.73
Chromium	645	600	1.08
Nickel	12.15	37.25	0.33
Selenium	20.75	13.75	1.51
Arsenic	9.72	6.35	1.53
Beryllium	0.58	0.93	0.62
Cadmium	89.5	25.0	3.59
Vanadium	50.75	64.5	0.79
Hexane extractable	223.5	72.45	3.08

TABLE 2

CONCENTRATION OF HEAVY METALS IN PHILADELPHIA AND CAMDEN SLUDGE

New Jersey Department of Environmental Protection
Division of Water Resources
Office of Sludge Management and Industrial Pretreatment
Comments to the United States Environmental Protection Agency
on the Renewal of the Ocean Dumping Permit
of the City of Philadelphia

Presented in Georgetown, Delaware
on May 11, 1978

Mr. Chairman, Ladies and Gentlemen: I am Dr. Marwan M. Sadat, Program Director of the Office of Sludge Management and Industrial Pretreatment in the Division of Water Resources of the New Jersey Department of Environmental Protection.

Our commitment to the end of ocean dumping by 1981 prevents us from accepting the tentative recommendation by EPA to renew Philadelphia's ocean dumping permit. While sewerage authorities in New Jersey have faced and met challenges very much like those which the City of Philadelphia must now face, the New Jersey authorities have been planning interim and final solutions to the question of land-based disposal or utilization of their sludge. Philadelphia has failed to produce a single proposal for a land-based alternative.

We cannot support the permissive renewal of Philadelphia's permit to dump its sewage sludge at the present site. We strongly urge that EPA reverse the preliminary finding of its hearing panel and deny this renewal, or at the most, to grant a six-month renewal of the permit but for dumping at the 106-mile site both as a protective environmental measure and as an economic incentive to the City to get down to the business of serious planning of land-based alternatives.

We strongly urge EPA, however, to deny the permit.

We in New Jersey are firmly committed to the goal of getting the sludge out of the ocean and I am pleased to announce that as of Monday, May 15, 1978, the City of Camden has effectively ceased ocean dumping and has begun its composting operation. I am also happy to report that all eleven major ocean dumping authorities in New Jersey submitted on or about December 31, 1977, sludge management plans for the development of land-based alternatives to ocean dumping and we expect that by June 15, 1978, these facilities will be under design. All New Jersey authorities and municipalities will be out of the ocean by December 31, 1981.

We have seen a commitment on the part of the authorities in New Jersey to move forward with their sludge management alternatives. The authorities have made a sincere and concerted effort to complete their studies by the December 31, 1977 deadline which was imposed by the Department of Environmental Protection. In many instances, engineering contracts were given final approval by EPA, Region II, as late as September of 1977, and yet in each and every case, a sludge management plan essential in conformance to the DEP's guidelines was submitted to my office within the time constraints.

We see no such commitment on the part of the City of Philadelphia. Last year at similar hearings, we carefully documented the environmental damage which is caused by the onslaught of sludge dumping by the City of Philadelphia and we will not elaborate on what is obviously common knowledge.

(more)

Since May of 1977, hardly any progress by Philadelphia has been accomplished. The City has yet to begin its extended pile forced aeration pilot plant study and we are told that this is due to the inability of the City to obtain the proper type of aeration piping. We find that somewhat surprising since the construction of the Camden Project, including the acquisition of dewatering equipment, the construction of a pre-stressed concrete composting pad, as well as the design, evaluation and construction of a sophisticated automated forced air system was accomplished in less than 18 months. It is apparent to us that very little time is available to the City to meet its 1981 commitment.

We hope that EPA, Region III, if it feels it must grant a permit extension to Philadelphia, will most carefully monitor the progress that the City is making in developing land-based alternatives to ocean dumping. It is inconceivable that any further delay be tolerated, furthermore, it would be entirely inconsistent with EPA's avowed environmental goals. The time for pilot plant studies is over and the City should proceed with the design and construction of facilities which will end ocean dumping. It is DEP's position that Philadelphia has not demonstrated that it deserves a permit extension and that even if this is granted, the City must meet the 1981 deadline and that EPA, Region III will take whatever steps are necessary to insure that the legislative mandate of the U.S. Congress is complied with.

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