

**NEW YORK—NEW JERSEY
METROPOLITAN AREA
SEWAGE SLUDGE DISPOSAL
MANAGEMENT PROGRAM**

OCTOBER 1976

Prepared by

INTERSTATE SANITATION COMMISSION

NEW YORK • NEW JERSEY • CONNECTICUT

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10 COLUMBUS CIRCLE • NEW YORK, N. Y. 10019

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Honorable David J. Bardin, Commissioner -
New Jersey Department of Environmental Protection
Honorable Peter A.A. Berle, Commissioner -
New York State Department of Environmental Conservation

Gentlemen:

The Interstate Sanitation Commission transmits herewith its report on Sludge Management for the New York - New Jersey Metropolitan Area. It is the result of a two year study financed with grant funds from the United States Environmental Protection Agency. Many individuals and agencies contributed of their time and knowledge. We also had the assistance of able consultants. However, the report is that of the Commission.

It is essential to emphasize that this is not an academic examination of all of the possibilities for sludge treatment and disposal theoretically available. It has been made for a particular time and place in order to assist the communities and states of the Region to make decisions which it has been announced that they will be required to make and implement during the next several years.

The Commission undertook this study because sludge management is an integral part of the water quality control process. The presence of sewage solids in the tidal waters of the Interstate Sanitation District and the adjacent ocean is one of the significant determinants affecting the uses to which they can be safely put and their value as amenities for the people of the Region.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "N. Colosi".

Natale Colosi, Ph.D.
Chairman

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INTRODUCTION

In 1972, two pieces of federal legislation of great importance for sludge disposal were enacted. They were the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500, 33 U.S.C. sec. 1251 et seq. (1973 Supp.)) and the Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532, 33 U.S.C. sec. 1401 et seq. (1973 Supp.)). In particular, Sections 403, 404 and 405 of the former enactment and all of the latter statute set forth a national policy to reduce drastically or to eliminate the disposal of wastes into marine waters. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 13 November 1972, to which the United States is a signatory, also provides for restriction of ocean dumping.

Pursuant to these statutory and international obligations, the United States Environmental Protection Agency and the National Atmospheric and Oceanic Agency of the Department of Commerce have undertaken studies and other work designed to determine how the objectives of cleaner marine waters may be achieved. As part of these programs, U.S. EPA, with the approval of the States of New York and New Jersey, sought and obtained the cooperation of the Interstate Sanitation Commission in investigating sludge disposal in the New York-New Jersey Metropolitan Area. Due to funding requirements by Region II of EPA, Connecticut was not a part of this study. The subject is of mutual interest to the Commission, the States, and the U.S. EPA because the waters of the Interstate Sanitation District are tidal and because the region has relied heavily on disposal of sludge and other wastes at sea. Accordingly, the water pollution control program of the Commission eligible for grant support by the U.S. EPA pursuant to Section 106 of the Federal Water Pollution Control Act Amendments of 1972 has included for fiscal years 1975 and 1976 work items and U.S. EPA grant funds to perform the technical, legal and institutional investigations for which this is the final report.

SUMMARY

Pursuant to federal law, the U.S. Environmental Protection Agency has issued permits containing conditions which call for discontinuance of ocean disposal of sludge by the end of 1981. This comes at a time when the required upgrading of the sewage treatment processes in the New York-New Jersey Metropolitan Area is producing greatly enlarged tonnages of sludge. At present, 700 tons a day require disposal. Of this amount 500 tons is dumped at sea. By the year 2000 it is estimated that daily sludge production from the Region's public treatment plants will triple.

There is no doubt that great quantities of sewage solids are in the tidal waters and in the ocean relatively close to shore. These solids come from the disposal of sludges, the solids remaining in sewage effluents even after treatment, and from the frequent overflow of combined sewers.

The problem is regional because the several portions of the metropolitan area share common waters. Since some treatment and disposal methods result in the discharge of contaminants into the outdoor atmosphere, regional effects on air quality also must be taken into account.

Ocean disposal is the least expensive method of removing sludge from our population centers. Therefore, it is vital that any plan developed in response to requirements for abandonment of the method be undertaken for sound environmental reasons and that the costs be equitably distributed over the Region.

The Phase 1 and Phase 2 technical reports secured by the Commission pursuant to contracts with consultants were technical in nature. They analyze and compare alternatives to ocean disposal actually practiced or examined in the literature and thought to be capable of application to sludge treatment and disposal in the immediate future. The methods which appear to be most feasible for use in the Region are composting followed by land spreading of the resultant materials and pyrolysis followed by carefully controlled disposal of residues in landfills.

Composting produces a substance which, under appropriate circumstances is usable as a soil conditioner. At present a difficulty is that the heavy metals and synthetic organics content of almost all the Region's sludges makes them too toxic for safe spreading on agricultural lands or even on recreational lands. However, pretreatment of industrial wastes could make many of these sludges, after treatment by composting suitable for land spreading, at least on acreages not used for crop production.

Pretreatment would also assist in those instances where pyrolysis or other combustion methods may be used. These processes leave substantial quantities of residues which must be disposed. If it will not be lawful to dump them in the ocean, the most likely means of disposal available will be in landfills. However, leaching is a problem which, although theoretically preventable, should be expected to occur at least to some extent. Thus, landfill sites must be carefully chosen, properly operated, maintained and monitored. By reducing the toxic content of sludges, pretreatment also would reduce the toxicity of the residues left by the combustion processes. Municipal sewage treatment processes do not remove appreciable quantities of heavy metals or synthetic organics. Combustion may destroy synthetic organics but does not remove heavy metals. Consequently, the most practicable way to obtain a relatively innocuous residue is to pretreat the wastes before discharge to public sewers.

Further, pretreatment is important for the reduction of toxicity in the sludges reaching the Region's waters by virtue of combined sewer overflows. These occur every time there is appreciable rainfall and result in the raw discharge of large quantities of sewage and accumulated sewage solids. These materials never reach the treatment plants. Consequently, whatever substances are in them when they leave factories, commercial establishments and homes are found in the sludges when they are discharged directly from the combined sewers. Industrial pretreatment is feasible, but pretreatment from residential facilities and from many commercial establishments is not. Product control is a means of coping with the latter problem.

The Commission's recommended management plan which follows is designed to meet effectively the immediate needs of the Region while allowing the necessary flexibility for future technological and other innovations and modifications to be implemented in a cost effective manner.

Recommended Management Plan

- 1) Those treatment plants now having sludge of a quality that can be composted and put on the land should make such a commitment. Information available to the Commission is that Oakwood Beach and Port Richmond (New York City), Long Beach and West Long Beach (Nassau County), and Monmouth County now have such sludges.
- 2) By December 31, 1977 each contributory sludge source should commit itself as to its treatment and disposal method or methods. If by that time the sludge from that source is of a quality which permits composting, it should select this method. In any other case a source should be required to commit at least one-half of its 1977 sludge tonnage and any additional tonnage due to growth through the mid 1980's to treatment by pyrolysis. The remaining half of 1977 tonnages should be committed at the sources, options either to pretreatment and composting or to pyrolysis. The objective is to abandon ocean disposal by the end of 1981 or as soon thereafter as possible. Consequently the commitment should be to institute composting and pyrolysis no later than that time.

Five sites are recommended for pyrolysis installations. The location (name) of the site, the contributory waste treatment plants and costs are given in Table I on page xiv.

- 3) The remaining sewage treatment plants located for the most part in the outlying portions of the metropolitan area should follow the options and recommendations indicated for each of them contained in Chapter III of the Camp, Dresser & McKee Phase 2 report. However, as soon as the sludges become suitable, composting should be substituted for landfilling.
- 4) In the early 1980's each sludge source should review its situation and make a commitment as to treatment and disposal methods for a further period of time. This review is meant to accord opportunity to shift additional tonnages to composting and land spreading as the circumstances warrant and to take account of any new and developing technologies.

Because capital costs are assisted by federal construction grant aid, pyrolysis which is a capital intensive method may be significantly reduced in its burden on local governments.

Contracting for sludge management services also is available as a means of securing all or any part of the function from another county, municipality or interlocal agency. It is most likely to be a practical approach for a small community having a larger neighbor which has invested in a pyrolysis plant, landfill or other major facility. It is a possible alternative only where one of the contracting governmental entities is willing and able to incur the initial capital costs by itself, although service contract payments might be so calculated that in the long run, recipients of the services pay some share of both capital and operating costs.

While the Commission's plan has been so divided as to make it possible for most of the individual local communities and interlocal waste management agencies to accomplish the sludge management function for themselves, some matters should be viewed as being of continuing regional character. There will be some extraterritorial effects of sludge management activities. There will be a continuous need for pooling of information and experience with sludge management technology and administration, including evaluation of new and developing methods.

Land spreading of composted sludges or of other products which may be developed from sludge may also benefit from cooperative activities on a regional basis. This could be especially true if improvement in the quality of most of the Region's sludges makes possible their use in significant quantities on agricultural land. Under such circumstances, consideration of common or joint marketing arrangements could be advantageous.

The Interstate Sanitation Commission should act as a regional forum for the consideration of these matters and could function as a joint instrumentality where that proves to be appropriate in the future.

CHAPTER I

CONDUCT OF PROGRAM

Phases of Work

The work was done in three phases. Phase 1 was a technical inquiry into land disposal methods which might be used as alternatives to disposal of sludge at sea from the New York-New Jersey Region. All known alternatives actually employed or described as reasonably possible in the accepted professional literature were evaluated. The purpose was partly comparative and partly to select one method, or a limited number of methods, which appeared most promising.

Phase 2 also was a technical investigation which examined the methods found in Phase 1 to be most promising (pyrolysis and land disposal) and compared them with ocean disposal.

Phase 3 was a legal-institutional investigation to examine management arrangements and determine what would be necessary to implement the selected technical method or methods of sludge treatment and disposal on a regional basis.

Phases 1 and 2 were performed by Camp, Dresser & McKee under contracts with the Interstate Sanitation Commission. Phase 3 was performed by the Commission in-house. Phases 1 and 2 each extended over one-year periods, with the former being completed on June 15, 1975, and the latter on June 15, 1976. Phase 3 was performed concurrently with Phases 1 and 2.

Constraints

When this project began, it appeared that there might be some role for ocean disposal, although it was known that the federal laws had been formulated on the basis of an underlying philosophy strongly favoring abandonment of disposal at sea for a variety of substances including sludge. It was also known that considerable scientific and political controversy existed concerning the relative merits and demerits of the various means of treatment and disposal. The reports obtained by the Commission from its consultants and its own investigations have clarified the nature of the problem. However, it continues to be true that there are important gaps in knowledge concerning the environmental and other effects that will, in the long run, result from pursuit of the several sludge management alternatives.

Decisions taken on matters of basic direction for sludge management in the immediate future will continue to be policy decisions. Under present laws, U.S. EPA and the Congress have

the authority to make the fundamental choices and to determine the limits within which the New York-New Jersey Metropolitan Area's governmental units can pursue their responsibilities.

In July, 1976, U.S. EPA in the exercise of its permit authority under the Marine Protection, Sanctuaries and Research Act and the Federal Water Pollution Control Act Amendments of 1972 banned ocean disposal of sludge from the Region's public sewage treatment systems after 1981. This action has reduced the alternatives available for inclusion in the Commission's plan by eliminating ocean disposal which until then was under consideration by the Commission for some possible role in overall regional sludge management.

Thus, the Commission has prepared this report to offer the communities of the Region a plan which would make it possible to meet the requirements of federal law as presently interpreted and administered. Planning of this kind is necessary now because the time until the announced deadline is short.

Program Guidance

An Executive Committee composed of representatives of the New Jersey Department of Environmental Protection, the New York State Department of Environmental Conservation, local governments and their waste management agencies, and the United States Environmental Protection Agency-Region II met frequently to hear and discuss the nature and progress of the work. In addition, larger groups of local and state officials met to review and comment on various stages of the legal-institutional work. Each of these meetings was preceded or accompanied by dissemination of an appropriate written progress report or working paper so that the committee or group had the benefit of both written and oral presentations.

Public Information

To keep the general community as informed as possible of progress during the program, the Commission staff met with many environmental groups to answer specific questions. Quarterly Summary Reports of the progress of the investigation throughout the two-year Sludge Management Development Program period were made available and widely distributed. Additionally, approximately 1,000 copies of the Phase 1 and Phase 2 technical recommendations by Camp, Dresser & McKee were distributed.

Since this Sludge Management Development Program was ongoing at the same time as many other activities in the Region, such as those of 208 Planning Agencies, a special effort was made to

continually keep these agencies abreast of the Commission's program in order that the work done by the Commission could be of benefit to the planning studies. The Commission also furnished preliminary information to designated A-95 Review Agencies.

Comments were actively solicited on the technical reports for the guidance of the Commission in the conduct of the study and for use in the Commission's report. The inputs and suggestions from these and other sources were invaluable. However, the Interstate Sanitation Commission has prepared this final report and takes responsibility for it.

Reports

This final report presents the conclusions and recommendations of the Interstate Sanitation Commission with respect to regional management of the sludge generated by the public waste treatment plants (see Fig. I on page 4) of the region consisting of New York City and the Counties of Nassau, Suffolk, Westchester, and Rockland in the State of New York and the counties of Bergen, Essex, Hudson, Middlesex, Monmouth, Morris, Passaic, Somerset, and Union in the State of New Jersey. The Connecticut portion of the Tri-State Metropolitan Area has been considered only to the extent that care has been taken to frame recommendations for regional sludge management practices and arrangements in which the southwestern Connecticut area could participate or with which there could be a compatible Connecticut program. The reason for this concentration on southeastern New York and northeastern New Jersey is that the funding arrangements were only with U.S. EPA-Region II.

Camp, Dresser & McKee prepared separate reports to cover their work in Phases 1 and 2. These contain technical recommendations together with the data and analyses supporting them. The Interstate Sanitation Commission has relied heavily on the work done by the contractor in Phases 1 and 2 in addition to studies by the National Oceanic and Atmospheric Administration (NOAA) and EPA on the impact of ocean disposal sites. For the conclusions and recommendations of the Commission, however, only this report should be consulted. The Phase 1 and 2 reports provide a reference for detailed discussions of technical alternatives.

Because the Phase 3 investigation of legal and institutional arrangements were done in-house, no separate report has been prepared for it. The Phase 3 data, analyses, conclusions and recommendations have been incorporated directly into this final report of the entire project.

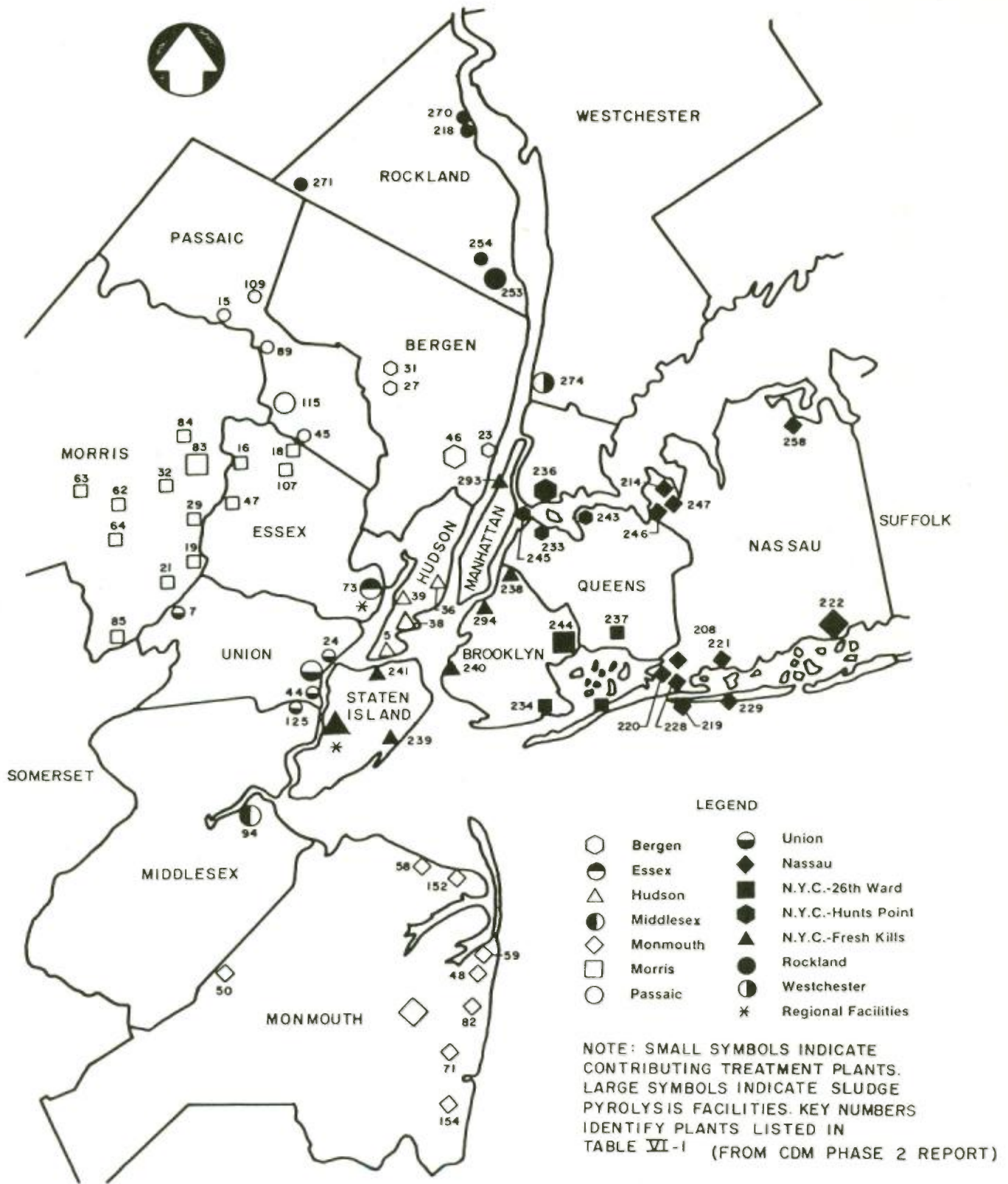


FIG. I STUDY AREA - WASTEWATER TREATMENT PLANTS

CHAPTER II

THE SLUDGE PROBLEM

Sludge is what remains of sewage or other liquid wastes after treatment has separated out the portion discharged as effluent. It contains substances which, under appropriate conditions, could be beneficially used. But, except where such use is or can be made practicable from the standpoint of economics and health, sludge must be considered a waste substance. In the New York-New Jersey Metropolitan Area, most of the sludge produced by public sewage treatment plants is presently dumped at a U.S. Environmental Protection Agency approved site situated 12 miles offshore in the New York Bight.

Federal statutes enacted in 1972, an International Convention on Marine Dumping to which the United States is a party, and the present policy of U.S. EPA all tend to limit disposal of sludge at sea and in the future even to foreclose the use of this disposal method. The time before this happens may not be long. U.S. EPA now considers 1981 to be a target date by which the major change in the Region's sludge disposal practices will be required to occur. Thus it is essential that plans and arrangements be made for alternative treatment and disposal of sludge.

At the present time, the approximately 100 sewage treatment plants in the New York-New Jersey Metropolitan Area produce about 700 dry tons per day of sludge of which 500 tons are barged to sea.

By the year 2000, the treatment plants from which sludge is presently barged to the ocean will produce about 1600 dry tons per day. The total municipal production of sludge will be about 2000 dry tons per day with a volume divided nearly equally between New Jersey and New York plants. This tripling of the sewage sludge volume will be due not only to the construction of new secondary waste treatment plants but also to the upgrading of present facilities so that all of them will provide no less than secondary treatment.

In order to understand the sludge disposal problem, it needs to be placed in proper perspective. Present and forthcoming sludge problems are not limited to the question of ocean disposal from sewage treatment plants. There are large quantities of sludge reaching the Region's waters without ever passing through treatment facilities. In the New York Harbor area, 400 million gallons per day of untreated sewage are discharged. A large portion of this

waste is not scheduled to be treated until the middle 1980s. There are also more than 750 million gallons a day of sewage which will continue to receive only primary treatment at least until 1980.

The effluent from sewage receiving only primary treatment contains fully 50% of the solids present in the untreated wastes. Needless to say, the untreated sewage discharged into the Region's waters contains all of the solids. Further, it should be remembered that even secondary treatment effluents contain 20-30% of the solids present in the raw sewage. Therefore, any plan for overall environmental management of tidal waters in the New York-New Jersey Metropolitan Area should take account of the fact that even the complete cessation of disposal into water bodies will still see considerable quantities of sludge reaching New York Harbor and the adjacent marine environment.

We cannot fully address the overall sludge problem without considering the impacts of combined sewers*. In the Metropolitan Area, over 90% of the sewerage systems are of the combined type. A substantial portion of the solid material which constitutes part of the sewage flow drops to the bottom of the pipe and accumulates there. When runoff from rain enters the combined sewer, the increased flow flushes large quantities of solids off the bottom. However, for the most part, they are discharged through the sewer regulators as overflow directly to the waterways of the Region and never reach the treatment plants. Accordingly, in time of rain, it is not only the sludge component of the sewage then passing through the combined sewer which discharges as overflow directly to the waterways but also a major part of the solids accumulated since the last rain.

Because of the assigned subject matter of this report, concentration will be on sludge emanating from public treatment plants. Similarly, in discussing the ocean dumping problem, consideration will be primarily of the materials which are disposed at the approved site 12 miles offshore or at any other sites, presumably some distance from the coast, which may hereafter be approved. Nevertheless, such sludge is only part of what reaches the marine environment. The solids from untreated and partially treated sewage (including the solids from secondary effluents) are discharged, not 12 miles or more at sea, but adjacent to the

*A combined sewer is one which conveys sanitary wastes as well as rainfall-caused runoff.

Region's shorelines and beaches. These solids and the contaminants they contain (such as heavy metals and other toxicants) cause much of the pollution. Much of this material sinks to the bottom of the Harbor and tributary waterways. It then is dredged up to maintain navigation and in connection with other construction. Since dredge spoil is also deposited at an approved dump site even closer to shore, it makes a substantial contribution to the condition of the New York Bight and the surrounding area.

Almost all municipal sludges in the area contain toxic substances, including polychlorinated biphenyls (PCBs) and a number of heavy metals such as cadmium, mercury, lead, and zinc. There is no treatment process which can assure that major quantities of these solids will not reach the tidal waters and the coastal ocean. At present, it is not practicable to remove these substances from the sewage at the treatment plants. But even if technological breakthroughs eventually make it possible to separate heavy metals and PCBs from sludge, the other sources of solids discharges probably will continue to produce the harmful effects on the marine environment which it should be the objective of a comprehensive program to minimize or prevent. This is not to argue that efforts to keep toxic sludges from the ocean should be slackened. At the very least, reduction of the burden placed on marine waters is meritorious and would have beneficial results even if it only diminished the quantities of toxicants reaching the waters of the Region and of the sea beyond.

Because of the foregoing considerations, it is essential that any solution of the regional sludge problem include the prevention of entry of the toxic metals and other similarly harmful substances into the matter discharged into public sewer systems.

Further, barging of sludge to sea is subject to inevitable accidents and interruptions which, even though some of them are infrequent, nevertheless are from time to time extremely damaging. For example, the Metropolitan Area experiences periodic labor-management impasses resulting in tugboat strikes. When these occur, storage capacity is used up causing raw discharges of sludge which can no longer be retained. Even more frequently, adverse weather conditions for prolonged periods interrupt barging schedules seriously enough to cause the jettisoning of sludge.

There is a wide divergence of views concerning the proper course to follow in management of the sludge emanating from public treatment plants in the Region. Some would prefer to leave things much as they are, permitting at least those communities which now barge to sea, and perhaps others who may hereafter find this method

convenient, to continue the practice. The reason is not merely inertia. They know that any of the other methods now considered technically available and feasible are almost certain to prove more costly than ocean dumping. Further, they can argue that the effects of sludge on all aspects of the marine environment have not been fully documented and are not entirely understood.

Another point of view is that all, or at least the major part, of the Region's sludge should be spread on the land, where it can find use as a soil conditioner or fertilizer. It is said that resources should not be wasted. Admittedly, it is necessary to recognize that in their present condition most of the sludges from the area's public treatment plants contain heavy metals, PCBs, and other toxicants, but the amounts of these substances should be reduced to the point where the material can be put to constructive use rather than merely thrown away.

Still others would reduce the sludge by some form of combustion and dispose of the residues. They contend that resource recovery is not yet proven to be economically feasible and that it is unrealistic to look upon sludge as anything other than a waste material which must be removed from the human environment.

Yet another way of looking at the situation is to recognize that Federal law and its implementation by U.S. EPA promised to require a shift in the Region's treatment and disposal practices within the next 5 years. EPA has announced 1981 as the year in which it proposes to require that ocean dumping be ended. Consequently, it is not really a matter of choice whether to continue present methods or switch to new ones. In this view, the only questions worth serious consideration relate to which land disposal techniques will be feasible and how they can be put into operation by local governments no later than 5 years from the present writing -- in other words, by 1981. Proponents of this view place the highest priority on discontinuing ocean disposal, whether because such is the direction in which the Federal statutes and International Convention appear headed or because they are convinced that land disposal is a better choice.

Perhaps there are other viewpoints as well. Certainly, the brief indication of opinions just presented does not capture the many nuances and qualifications that individual policy positions represent. Nonetheless, it is clear that there are many divergent opinions on the question of sludge management. Controversy existed two years ago when the Commission's work began. One of the conclusions that has become increasingly apparent is that no approach presently possible will satisfy all the points

of view. The reason is that no solution yet devised by the engineering and scientific community is free of environmental and economic disadvantages. Further, an important consideration continues to be that there are still many gaps in scientific knowledge concerning the actual effects of the various treatment and disposal methods on the environment, marine eco-systems, the food chain, and human health.

In these circumstances, practicality requires that a regional sludge management plan strike as good a balance as possible among available alternatives. This argues for a realistic appraisal of what must be done, the time schedule on which it can be accomplished, and the people and governmental entities who must develop and implement the programs.

For a program to be implementable, the disposal methods recommended must be phased so that combinations of alternatives may be modified to meet changes in technology or characteristics of the sludge. A plan proposed for the management of sewage sludge in the New York-New Jersey area must also be workable and equitable and have minimum impact on the total environment with consistent policies that apply regionwide. The recommended Management Plan discussed in this Report (Chapter IV) meets these criteria.

CHAPTER III

SLUDGE TREATMENT AND DISPOSAL METHODS

Sludge comes from the sewage treatment processes as the residue retained when the liquid wastewater effluent is discharged into streams and tidal waters. It is still mostly water but contains almost all the solid matter present in the untreated sewage. Its precise content is subject to some variation because not all sewage is identical in composition. Contributions from households, and especially from manufacturing and commercial establishments can vary from hour to hour and day to day. Industrial plants and storage facilities frequently collect their wastes and deliver them into the public sewers at intervals rather than in continuous streams. Further, some communities are more heavily industrialized or more varied in their manufacturing activities, while others are predominantly residential with the consequence that their sewage (including its sludge component) is composed almost entirely of human and other household wastes.

With few exceptions the sludges produced at the Region's public treatment plants contain three or four percent of solid matter. The sludges also exhibit varying degrees of toxicity because of the presence of metals such as cadmium, mercury, zinc and lead and certain compounds such as polychlorinated biphenyls. Pathogens are also in the sludge making it a potential source of disease.

As already noted, and as will be explained further in Chapter IV, disposal of sludge at sea is an option which is subject to increasing restriction and which U.S. EPA has announced its intention to prohibit by December 31, 1981. Further, the content of sludge is such that its disposal raw is not desirable. Consequently, this Chapter will describe methods already in use or likely soon to be available for the treatment of sludge. Alternative methods for its disposition will then be presented. Of the many methods, only composting, incineration and pyrolysis are described. Similarly, indication is given only of what disposal activities may follow these treatment processes. The objective is to give readers who are not familiar with the technology an idea of what sludge management operations would be like if the Commission's plan is followed. For the many treatment and disposal modes evaluated during the two years of work on which this report is based, the use of which is not included in the Commission plan, reference should be made to the Phase 1 and Phase 2 reports of Camp, Dresser & McKee. In particular, the Phase 1 report examines a variety of treatment and disposal methods on a descriptive and analytical basis. It presents the reasons why our consultants considered many of the technologies

unsuitable for use in the New York-New Jersey Metropolitan Area.

The present sludge processing and disposal methods used by treatment plants in the Region are given in Table II which begins on page 12. This table is an excerpt from Table VI-I entitled "Sludge Process and Disposal Methods" of the CDM Phase 2 report.

Composting

Sludge can be prepared for use as a soil conditioner or fertilizer. The techniques by which this is done are several in number and will not be separately described. Composting is one of them and is briefly explained here to give some idea of what is involved and also because it appears to offer hope of reasonably significant use in the New York-New Jersey Metropolitan Area.

As a first step, the sludge is dewatered until its solid content is anywhere from twenty to forty percent. In fact, for a number of treatment processes, and also to reduce volume and make transportation easier, dewatering is a prelude.

The sludge is then mixed with wood chips or other bulking solids and left to weather. Odors are controlled, and under best practices eliminated, by aerating the composting sludge and deodorizing the gases by passing them through a finished compost pile or other absorber. This is known as the static-pile method with forced aeration system.

Composting results in a product free of pathogens and with a rich earthy quality. Some land is required to be devoted to the composting of the sludge, although a site can be used indefinitely because the cured product is removed for disposal elsewhere. Depending on its content, the composted sludge may be spread as a soil conditioner or used as a fertilizer on agricultural land. However, it is of interest that in the New York-New Jersey Metropolitan Area there is no present use of treated sludge of any kind for application to crop producing land. This should not be taken as an indication that such use of treated sludge of appropriate content is not possible, but it does illustrate a present fact: i.e. with very few exceptions, the sludges now being produced in the Region contain percentages of heavy metals and other substances which make them inappropriate for application to fields on which agricultural crops are grown. However, some are of a quality that would allow them, when composted, to be spread on public lands such as golf courses, parkland, and along highways. The costs of composting are estimated to be in the range of \$73 to \$90 per dry ton with the lower end of the range applying when done by public

TABLE II.
SLUDGE PROCESSING AND DISPOSAL METHODS

Key Number*	Plant	Present	
		Processing/Disposal Methods**	Production, tons/day
<u>Bergen County</u>			
23	Edgewater	D,DW,LF	2
27	Fairlawn	D,DW,LF	2
31	Village of Ridgewood	D,VF,P	2
46	Bergen County S.A.	D,O	42
108	N.W. Bergen County S.A.	DW,I,LF	6
Total			54
<u>Essex County</u>			
16	Caldwell	D,DB,LF	3
18	Cedar Grove	D,O	2
47	Livingston	D,VF,LF	3
73	Passaic Valley Sewerage Commissioners	O	120
107	Verona	D,DB,LF	2
Total			130
<u>Hudson County</u>			
5	Bayonne	D,VF,LF	2
36	Hoboken	D,VF,LF	15
38	Jersey City East	--	--
39	Jersey City West	VF,I,LF	20
98	Secaucus	D,VF,LF	1
Total			38
<u>Middlesex County</u>			
94	Middlesex County S.A.	O	67
125	Rahway Valley S.A.	D, to Linden Roselle	24
Total			91
<u>Monmouth County</u>			
48	Long Branch S.A.	D,LF	5.0
50	Western Monmouth Utilities Authority	D,S	0.2
58	Middletown R.S.A.	D,O	2.2
59	Northeast Monmouth S.A.	O	4.6
71	Neptune R.S.A.	VF, Rutgers	0.2
82	Ocean Township S.A.	VF,LF	1.7
106	Bayshore R.S.A.	C,I,LF	3.0
152	Atlantic Highlands-Highlands S.A.	Proposed (designed)	--
154	South Monmouth R.S.A.	Under construction	--
Total			16.9
<u>Morris County</u>			
19	Madison-Chatham J.M.	D,DB,LF	2
21	Highland	D,DB,LF	0.5
29	Florham Park	D,DB,LF	0.5
32	Hanover S.A.	D,DB,LF	1
62	Morristown	D,DB,LF	1.5
63	Morris Township	D,O	0.6
64	Woodland	D,S	0.7
83	Parsippany-Troy Hills	D,VF,LF	3
84	Rockaway Valley S.A.	D,VF,LF	4
85	Passaic Regional	D,DB,LF	1
153	Two Bridges S.A.	--	--
Total			14.8
<u>Passaic County</u>			
15	Pequannock Regional	VF,LF	1.5
45	Little Falls	D,DB,LF	1
89	Pompton Lakes Regional	O	1
109	Wanaque Valley Regional	Proposed	--
115	Mountain View	VF,LF	4
Total			7.5

TABLE II. (Continued)

Key Number*	Plant	Present	
		Processing/Disposal Methods**	Production, tons/day
<u>Somerset County</u>			
8	Bernards	D,DB,P	0.5
14	Somerset-Raritan Valley S.A.	C,I,LF	6
52	Manville	D,VF,LF	1
	Total		7.5
<u>Union County</u>			
7	Berkeley Heights	D,DB,LF	1
24	Elizabeth Joint Meeting	0	28
44	Linden Roselle S.A.	0	11
	Total		40
<u>Nassau County</u>			
208	Cedarhurst	D,DB,LF	0.2
213	Glen Cove	T,0	5.3
214	Great Neck	D,VF,LF	0.5
219	West Long Beach	D,0	0.4
220	Inwood	D, to Bay Park	1.4
221	Bay Park	D,0	23
222	Cedar Creek	D, to Bay Park	6
228	Lawrence	D,DB,P	0.3
229	Long Beach	D,HT,0	3.1
246	Belgrave	D, to Bay Park	0.6
247	Great Neck S.D.	D,VF,LF	1.9
248	Port Washington	T,C,I,LF	2.0
258	Oyster Bay	D,HT,DW,DB,LF	0.4
	Total		45.1
<u>New York City</u>			
233	Bowery Bay	D,0	20.2
234	Coney Island	D,0	12.0
236	Hunts Point	D,0	8.5
237	Jamaica	D,0	14.9
238	Newtown Creek	D,0	62.2
239	Oakwood Beach	D,LF	3.0
240	Owl's Head	D,0	23.0
241	Port Richmond	D,0	3.8
242	Rockaway	D,0	2.3
243	Tallmans Island	D,0	3.0
244	Twenty-Sixth Ward	D,0	7.0
245	Wards Island	0	29.1
293	North River	Under construction	
294	Red Hook	Proposed	
	Total		189.0
<u>Rockland County</u>			
218	Haverstraw	T,VF,LF	2.8
253	Rockland County S.D. No. 1	T,D,W,0,VF,LF	5
254	Orangetown	VF,I,LF	7
270	Stony Point	AD,DB,LF	0.5
271	Suffern	D,DW,LF	0.6
	Total		15.9
<u>Suffolk County</u>			
205	Port Jefferson	D,S	0.6
206	Holbrook	D,S	0.1
215	Greenport	DB,P	0.1
216	Smithtown	--	--
225	Huntington	DW,LF	2.0
249	Northport	D,DB,LF,I	0.1
252	Ocean Beach	T,LF	0.2
260	Patchoughe	D,DW,LF	0.1
265	Riverhead	T,D,DB,LF	0.8

TABLE II. (Continued)

Key Number*	Plant	Present	
		Processing/Disposal Methods**	Production, tons/day
<u>Suffolk County (Cont.)</u>			
290	Yaphank	Proposed	
291	S.W. Suffolk	Under construction	
	Total		4.0
<u>Westchester County</u>			
207	Buchanan	To Yonkers for processing	
230	Mamaroneck	To New Rochelle for processing	
232	New Rochelle	D,VF,I	6.7
261	Peekskill	D,DB,LF	0.7
262	Port Chester	To Yonkers for processing	
267	Blind Brook	WO,VF,LF	2.9
274	Yonkers	T,D,C,O	32
277	Yorktown Heights	D,VF,LF	0.6
292	Ossining S.D.	Proposed (designed)	
	Total		42.9

* Key numbers same as those used in phase I report.
 Notes following table refer to these numbers.
 Map on Page 5 of Chapter I of this Report.

** AD = Aerobic digestion LF = Landfilling
 C = Centrifuging O = Ocean disposal
 D = Anaerobic digestion P = Public
 DB = Drying on beds S = Scavenger
 DW = Dewatering (unspecified) T = Thickening
 FP = Filter pressing VF = Vacuum filtration
 HT = Heat treatment WO = wet-air oxidation
 I = Incineration

agencies. Composting provides a much lower total cost solution than pyrolysis.

For a more complete discussion and evaluation of land application including composting and landfilling alternatives and the restraints imposed by heavy metals and toxic materials, refer to Chapter VIII of the Phase 2 CDM Report.

Incineration

Sludge is incinerated by some of the communities in the Region and by others throughout the country. In this method, dewatering is also employed in order to obtain a sludge having a high enough percentage of solid matter so that it can be effectively burned.

There are number of kinds of incinerators. They differ primarily in the internal arrangement of the incinerator for the reception and exposure of the material to be burned.

One type of incinerator (the multiple hearth) is of particular interest because it can be fairly readily converted into a pyrolysis unit. As will be explained in Chapter IV, this element of flexibility is especially desirable because it would make possible some shifts in technology in accordance with decisions that may be better made some years hence.

The incinerator is a furnace which reduces the bulk of wastes by combustion in the presence of substantial quantities of air. Such equipment is widely used for garbage and trash. It has also been used to some extent for sludge processing.

Incineration produces gases and solid residues, the former, and some of the solid material which turns into dust and ash particles, are emitted to the atmosphere. A number of devices are available to reduce air contamination.

Scrubbers are designed to retain the particulate matter before it can escape to the outdoor air. Afterburners subject the waste gases to further combustion before discharge. Nevertheless, quantities of vapors and particulate matter do enter the outdoor atmosphere. Unless the incinerator is operated effectively at very high temperatures, there are also likely to be objectionable odors.

Incineration reduces the bulk of the sludge to about one half the dry tons of the material fed into the unit for burning. This residue must nevertheless be disposed of in some acceptable manner before the sludge may truly be said to have been removed from the human environment. Depending on the circumstances pertaining to an individual installation, incineration can be either somewhat more costly or somewhat less expensive than pyrolysis.

Pyrolysis

Pyrolysis is a process long used to convert coal into coke. It is only now being developed for use in ridding communities of solid wastes and sludge. However, research, experiments and demonstrations now underway indicate that pyrolysis should be available for municipal use on a reasonable scale within the next few years.

Like incineration, pyrolysis is a combustion process. It differs from incineration in that the combustion occurs in a limited air atmosphere. When properly operated, the process should result in far less emission of pollutants to the outdoor atmosphere than occurs with incineration. Further, pyrolysis can be operated so as to recover usable energy at the pyrolysis site. It should also be noted that in all likelihood, energy recovery would not be sufficient to make the pyrolysis process show a profit, but under favorable conditions it could materially reduce the cost of sludge disposal. As with incineration, the sludge must be dewatered to allow for economical combustion, and the process results in solid residues which must be disposed of in some acceptable manner.

Figure II on page 17 shows a schematic process flow diagram for a filter press - pyrolysis system and Figure III on page 18 shows a schematic diagram for energy recovery. It should be noted that the pyrolysis schematic diagram shows the use of a filter press for sludge dewatering. CDM recommended their use since they can economically produce a sludge cake with 40 percent or more solids which should allow the process to be self sufficient for combustion following startup. This will conserve the use of fossil fuels.

The cost of pyrolysis is estimated to vary from \$90 per dry ton to \$160 per dry ton.

For more detail, refer to Chapter VII of the CDM Phase 2 Report which contains a more complete discussion of pyrolysis as it relates to types of processes, air pollution control, energy recovery, dewatering, sidestream treatment, transportation, residue disposal and environmental assessments.

Resource Recovery and Residue Disposal

Obviously, it is better to make beneficial use of sludge residues than to throw them away. One question to be faced is whether the expenditure of resources necessary to make the residues into usable products can be kept below the value of the resultant materials. Another is whether the residues or products made from them can be used safely.

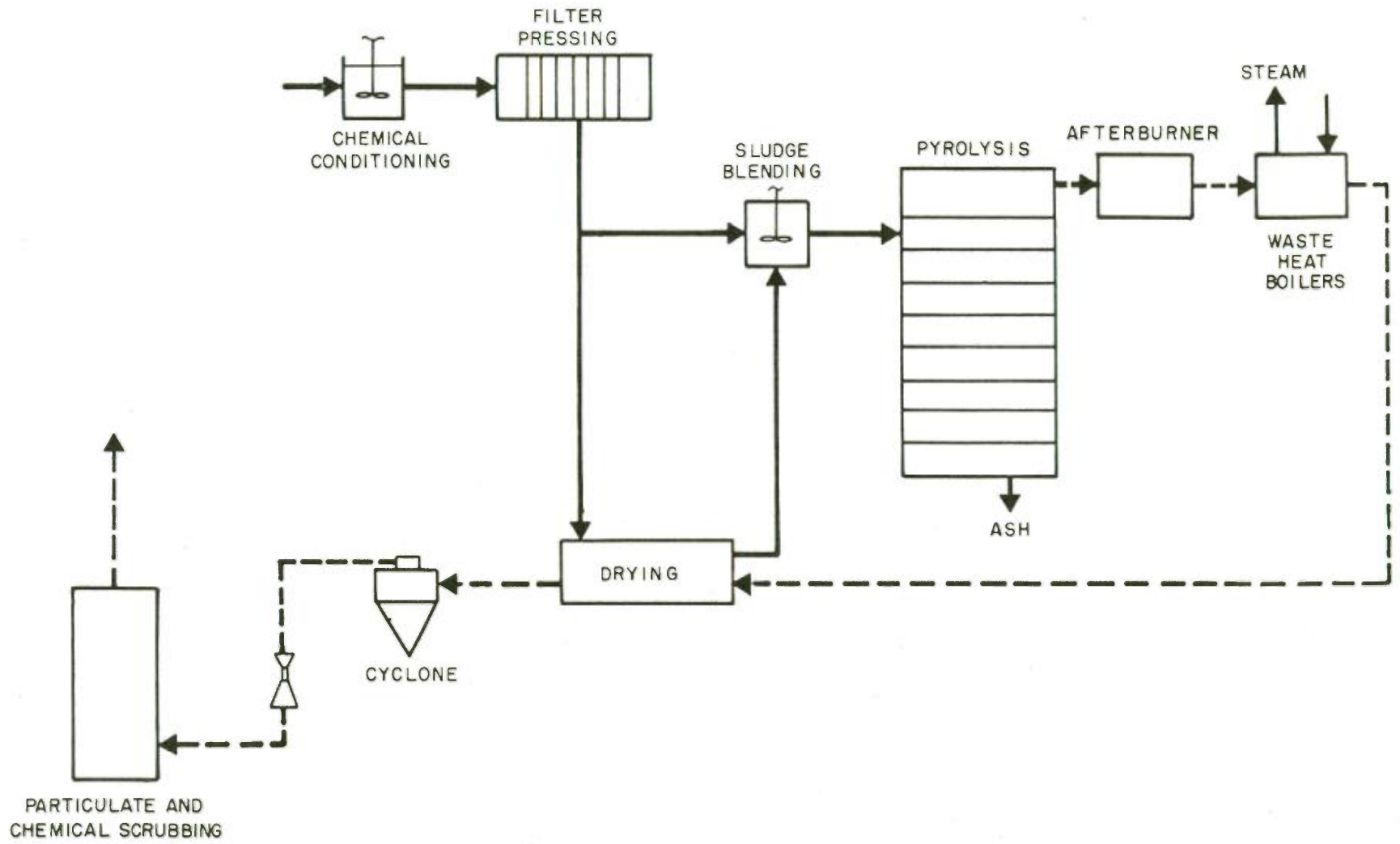


FIG. II PROCESS FLOW DIAGRAM FOR SLUDGE DRYING AND PYROLYSIS

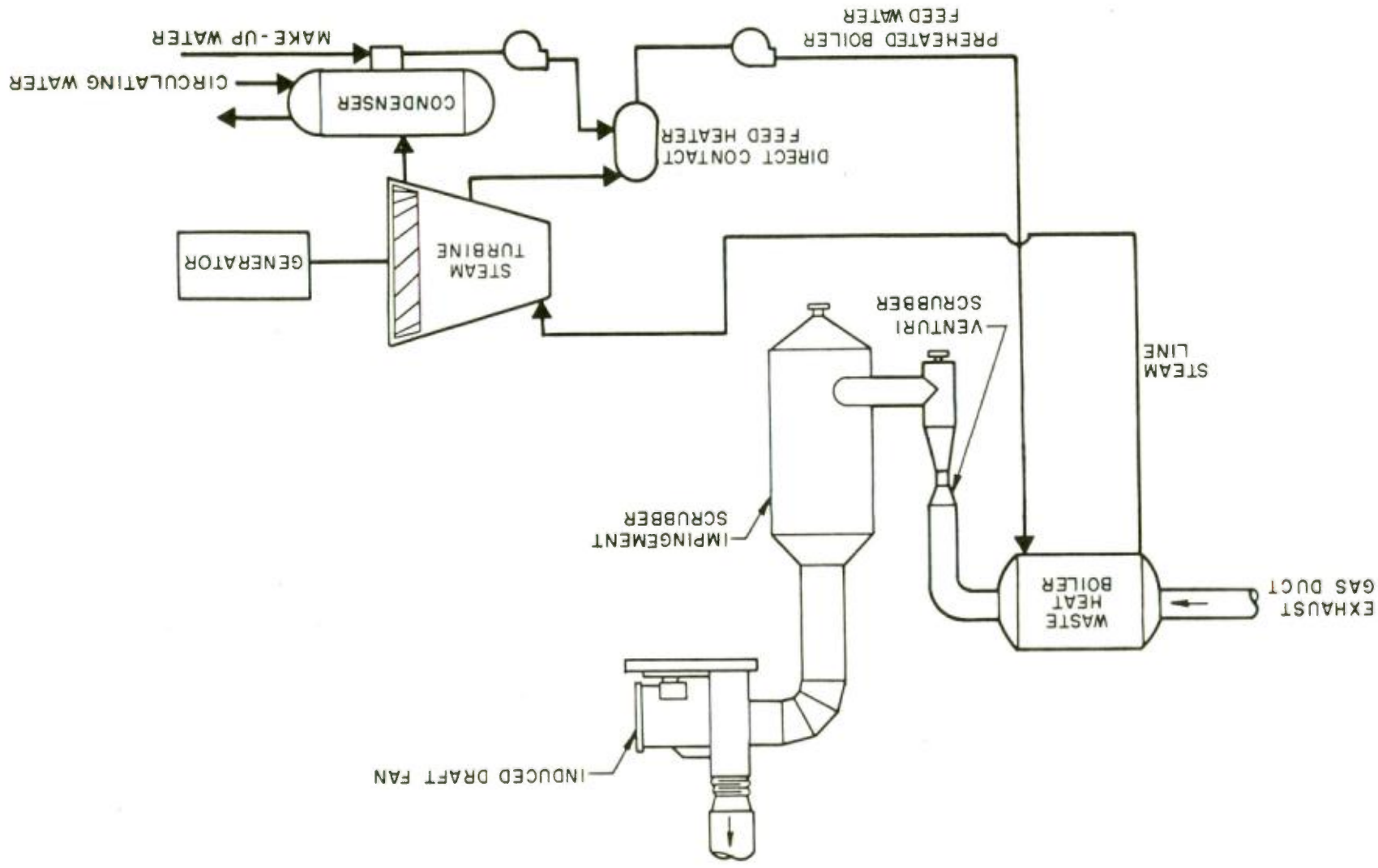


FIG. III ENERGY RECOVERY SCHEMATIC

of the major methods of sludge treatment and disposal is used somewhere in the region. This does not mean that every engineering process commercially available is represented. However, ocean dumping, incineration, and some forms of land disposal are all employed. Pyrolysis is not yet used in the New York-New Jersey Metropolitan Area, nor is resource recovery from sewage currently practiced on any significant scale.

While the choices among each of the technologies which can implement any one of the major types of treatment and disposal can have a significant bearing on acceptability of the method, it is advantageous to think initially only in terms of the major

distinctions -- ocean dumping, reduction by some form of combustion and land disposal. Once the major policy outlines in dealing with these three have been established in preliminary fashion, the available subchoices and their implications can be more easily appreciated.

No treatment and disposal method is devoid of drawbacks. Consignment to nearby or more distant waters has effects on marine organisms important to man and to the overall environmental balance. Moreover, some of these effects are only suspected or imperfectly known. They may be either less serious or far worse than generally believed. Combustion contributes pollutants to the atmosphere which it would certainly be better to keep out of the air. Land disposal poses dangers for the quality of soil and groundwater.

Nevertheless, it is unthinkable to let increasing quantities of sludge accumulate and befoul places of human habitation and to interfere with the comfort, convenience, and healthfulness of the region. Accordingly, the choice is not between unadulterated good and unmitigated evil. A successful sludge management program will strike a reasonable balance among the various factors important to human life and happiness under highly urbanized conditions.

Under prevailing provisions of law and administrative regulation, it is highly improbable that any treatment of the predicted additional quantities of sludge, or even continuing disposal of current amounts, can be accomplished in conformity with law, unless accommodations of some kind can be made. The stated intention of U.S. EPA is to tighten permit conditions for ocean disposal and to phase this method out by December 31, 1981.² Discharges close on shore or into streams clearly would be questionable in the light of present effluent limitations and the objectives of federal and state laws to attain and maintain fishable, swimmable waters.

Any further emissions to the atmosphere, from whatever sources and in whatever quantities, are bound to be in contravention of ambient air standards. According to U.S. EPA, many air quality control regions in the United States, of which this region is one, now have more heavily polluted atmospheres than are consonant with applicable standards.³ Thus, emissions from sludge incineration or any other combustion process resulting from treatment of increased quantities of sludge must surely be improper, unless some existing emission sources are withdrawn or materially cut back. The Commission has been informed by U.S. EPA that a policy statement may soon appear in the Federal Register

to the effect that such accommodations to new or increased emissions resulting from the treatment of sludge will be possible if certain approval conditions are met. However, it is said that they will likely include compensating reduction of other emissions in the area and compliance (immediate or under approved timetable) by all other emission sources under the same ownership.⁴

Application of most sludge produced in this area to land involves deposit of toxic substances and so should be carefully restricted in amount and composition, unless such disposal is only on land permanently dedicated to a relatively few reasonably safe public purposes and strict precautions are taken to protect groundwaters, and in some instances even to forbid public access. It may be doubted that sufficient acreages can be so set aside in the highly congested metropolitan area.

Under present statutory patterns, the evolution of a coordinated set of policies and actions which makes a sound balance among the major competing environmental, economic, and social concerns will require a high degree of cooperation and understanding from federal, state, and local officials and the general public. The federal air and water pollution control laws are each single-minded in their respective mandates to attain clean air or water, as the case may be.⁵ There are some provisions which can allow individual waste dischargers, on pleas of technical infeasibility or lack of economic and social justification for higher standards, to achieve less than the norm.⁶ In recent years, each of these statutes has been enacted or revised to pay some heed to comprehensive environmental and other factors, but generally for the purpose of making them serve the objective of either clean water or clean air, or merely to note a relationship in general terms.⁷ The laws of New York and New Jersey, like those in other states, take much the same tack as the federal enactments.⁸

U.S. EPA is responsible for administering both kinds of law and in New York and New Jersey, umbrella environmental departments are responsible for both the air and water quality programs. Nevertheless, their statutory mandates do not specifically encourage tradeoffs of better air quality at some sacrifice to water quality or vice versa.

In common with the federal and state environmental agencies, many of whose responsibilities the Interstate Sanitation Commission shares, we believe that proper effort and conscientious application of existing technology can improve both air and water quality.

Moreover, such improvements are essential and in the public interest. Nevertheless, the dilemmas which can be created if only one part of the environmental spectrum at a time is considered must be recognized.

The regulation of land quality is much less a subject of law than is either air or water. Federal regulation is limited to some pesticide measures and a few efforts to assert some indirect influence by attaching administrative requirements to statutory programs basically designed for other purposes. State controls cover somewhat the same ground and also regulate landfills and dumps. There are the beginnings of efforts to control the deposit of sludge on agricultural lands. But whatever the extent of regulation by law, a responsible sludge management plan must come to grips with the health and safety factors involved in the use of the several land disposal methods.

Regional Considerations

Until now, sludge management has not been viewed as a regional matter. So long as each unit of local government or intermunicipal sewage treatment agency can utilize or dispose of its own sludge without going outside its borders, it could be argued that the subject is not of regional concern. However, even though treatment and disposal is handled by many communities within their own confines, important effects are felt elsewhere. Because the metropolitan area is interstate in character, some of the consequences of local sludge management activities spread across the New York-New Jersey line.

For example, incineration of sludge anywhere in the region adds emissions to the atmosphere of the metropolitan area as a whole and affects the general pollutant level more or less seriously in portions of both states and in Connecticut as well. Even if each incinerator is constructed and operated so as to meet applicable emission control requirements, there may be a regional interest in whether that method of sludge treatment or some other is chosen. Similarly, the reliance of local governments on disposal off the coast may have effects on common waters or may relieve the need to find other means of treatment and disposal which would present regional problems. Spreading on land raises the question of which land and whether highly urbanized communities can long continue to find sites within their own borders.

Thus, the problem does have regional aspects. They may be regarded from either or both of two points of view. The management

of sludge by the local communities and agencies may have extra-territorial effects, or the problem may merely be one faced by every community of the entire area. The former could suggest consideration of regional planning and regulatory approaches to coordinate or even integrate the making and implementation of sludge treatment and disposal policies. The latter might be served by a common program of applied research or an interstate meeting ground where those with the common problem could consider their own mostly separate actions and appreciate better the extent to which individual community or state policies and actions ameliorated or exasperated the problems of others. The extent and character of the regional mechanisms necessary to deal with the New York-New Jersey Metropolitan Area sludge problem is also importantly affected by the treatment and disposal methods selected. If barging to sea were to continue indefinitely as the principal means of relieving all concerned of the projected two thousand tons per day, and if disposal were at sufficient distances from the coast, there might be little reason to alter present practices and arrangements. On the other hand, conversion of the entire region from a basically sea disposal oriented set of operations to reliance on a method which requires consolidation of processing at a strictly limited number of large installations or sites would tend to compel regionalization of decision making and administration.

The foremost objective of sludge management in the New York-New Jersey Metropolitan Area should be to dispose of the waste in ways which are environmentally acceptable, if not advantageous. To the extent that choices exist, the effort should be to do the job as efficiently as possible and at reasonable cost. Where resources can be recovered or conserved, this should be done, both for its own sake and as a means of lowering the net costs of the waste disposal program.

The objectives just mentioned relate to effective use of technology. It is also important to have sludge programs which accord as well as may be with political and administrative conditions. In theory, there is as much reason for the people on both sides of the Hudson to establish common institutions whenever economies of scale or environmental advantages are to be realized in that way, as there is for the communities within a single state to do so. Indeed, New York and New Jersey have probably undertaken and maintained more joint programs and actions in their shared metropolitan area than any other states having similar interstate urban complexes. Nevertheless, the development of large operating or regulatory programs on an interstate basis is more difficult than equivalent undertakings

confined to a single state or municipality. Consequently, in formulating a plan for sludge management in the region, every effort should be made to favor arrangements which can be put into effect by existing units of government with little or no change in present laws. Of course, where this cannot be done, or where the advantages in new or intensified interstate action are substantial, such a course should be pursued.

The Choices

The two-year technical investigation of alternative methods of sludge treatment and disposal undertaken for the Commission by Camp, Dresser and McKee shows clearly that there is no method devoid of major drawbacks or possessing such great advantages as to be the obvious choice for use by all communities in the region. If there were, it probably would be adopted by a large majority of the local governments without much prompting from the states or U.S. EPA. It is clear, however, that each of the leading methods is not equally feasible or attractive to all counties, municipalities or interlocal waste management agencies. Landfills are used where land is available, but especially in the more heavily developed parts of the metropolitan area sites have been or are being exhausted. There is little practical experience with the more potentially useful approaches to spreading on the land such as composting and spray irrigation, but these could solve substantial parts of the problem only if ways were found to make reasonably certain that crops, other vegetation and groundwater would not be endangered. Ocean dumping has recommended itself to most of the area's larger communities and to many others as well because it is the least expensive alternative and because it removes the sludge from the immediate vicinity of human habitation more completely than does any other method. Employment of any of the burning techniques places at least some additional stress on the outdoor atmosphere and leaves residue for which satisfactory means of handling must be found.

There is no value in changing the methods employed by public sewage treatment systems merely for the sake of being able to say that things are being done differently from before. Indeed, unless there is good reason for them to change, there is something to be said in favor of leaving things as they are. Capital investments have already been made in the land, facilities and equipment now in use for sludge treatment and disposal and prudent fiscal practice would argue that what the communities have purchased should be used until it is exhausted or beyond reasonable repair. From the economic point of view, the best time to make changes is when facilities or equipment can no

longer function efficiently or when a new site must be selected.

On the other hand, there could be at least two factors which would be compelling enough to make considerations of cost and convenience yield. One would be application of laws and policies by federal or state regulatory authorities which would substantially alter the availability of one or another of the presently employed treatment and disposal methods; the other would be conviction that the environmental risks attendant upon existing practices are significant.

A difficulty which plagues the region, and which must concern anyone attempting to make or reaffirm a sludge management program, is that scientific data on the effects of sludge and its ingredients are by no means as complete as they could be, nor are their interpretation free from controversy. Accordingly, it is difficult in objective terms to assert categorically that human welfare requires the universal adoption or prohibition of any given sludge method. Nevertheless, it is often necessary to make decisions in the absence of complete knowledge and on the basis of the best that can be known and chosen at the time. The reason is that sludge disposal is a continuous necessity. Adherence to present practices is itself a decision, even if it is usually less conscious and attention-catching than a change. But decision cannot be postponed because the sludge cannot be left to accumulate.

In view of all the relevant considerations, it seems inevitable that sludge policy for the region must be developed as a balance among courses of action which all have advantages and disadvantages.

A good sludge management plan for the region must distribute disadvantages in such a way that burdens on the environment are minimized. To the extent that resource recovery is practicable, the methods and arrangements chosen should be such as to make possible the realization of whatever benefits can reasonably be expected. Since no method of treatment and disposal is free of known or suspected environmental and economic problems, a good plan should provide for rational choices among or combinations of available alternatives to produce the most satisfactory overall effects. Until technology finds ways to convert sludge into wholly or predominantly useful and valuable products, the essential and most beneficial result of sludge management will be removal of the sewage wastes from the immediate living environment of the region's people.

The problem is a mixed one of technology and public policy. In order to give proper perspective for both kinds of consideration, we will first present a plan that the Commission believes most appropriate from the environmental and economic points of view. The subject will then be examined in terms of the legal, administrative and public policy framework.

Importance of Pretreatment

Potentially the best methods of sludge disposal are those which spread it on the land in some useful form. If sludge can be used as a soil conditioner or as fertilizer, its disposal could justly be viewed as an activity having an affirmative economic and social purpose rather than merely as the throwing away of an unwanted substance.

Unfortunately, only some of the harmful ingredients are removed from sludges by technological processes now in use or on the engineering horizon. Bacterial contaminants can be destroyed, but heavy metals and some carcinogens remain. Since they are not removed by treatment of the sewage at the plants or by processing of the separated sludge, the only present means of making truly substantial tonnages suitable for constructive land application is to require that these non-treatable constituents be kept out of the wastes discharged into public sewer systems. For industrial establishments, this means pretreatment of wastes by them or readjustment of manufacturing processes so as to keep the unmanageable substances from reaching the discharged wastes.

Within the existing legal and institutional framework, there are several ways of accomplishing this objective. The federal, state, and local governments each have at least some authority of the kind that could support obtaining sewage, and thus sludge, which is greatly reduced in metals, polychlorinated biphenyls, and other such materials.

U.S. EPA and those states which have assumed the permit function under the National Pollutant Discharge Elimination System (NPDES) probably have the best tool available for the purpose. Section 307 of the Federal Water Pollution Control Act Amendments of 1972 specifically authorizes EPA to require pretreatment of industrial wastes. With appropriate implementation of this requirement, NPDES permits could then allow discharge of only those wastes which had been made sufficiently free of the unwanted substances. To date, however, EPA has established little more than the format for pretreatment controls in its regulations of those wastes which appear to raise the most serious obstacles to

production of safe sludges. The problem has been largely passed on to state and local governments by language in the regulations providing:

In particular cases, a State or municipality, in order to meet the effluent limitations in a NPDES permit for a publicly owned treatment works may find it necessary to impose pretreatment requirements stricter than those contained herein.⁹

EPA appears to be concentrating first on the public treatment facilities and the governmental units which operate them. Its treatment plant permits are requiring that the local governments develop pretreatment plans and that their sludge dumping at the ocean disposal site be monitored. While these measures are useful, they should not be expected to correct the major deficiencies caused by absence of direct controls on the entry of the harmful substances into the sewage flow at the originating end.

In the New York-New Jersey Metropolitan Area, the presence of combined sewers introduces an additional consideration of great significance which is relevant to both the administration of the NPDES Permit Program and the institution of thoroughgoing pretreatment requirements. As explained in Chapter II, it is not enough to require proper effluent control and sludge management at and after the sewage treatment plant stage. Since the combined sewers act as giant settling tanks and flush enormous quantities of solids through their regulators during and immediately after every significant rainfall, protection of water quality in the harbor, its tributary waterways and the adjacent seacoast requires that the sewer regulators be recognized as the "point sources" that in fact they are and that NPDES permits be issued for each of them just as for any other outfalls or regular discharge points. The effluent limitations contained in such permits should be the same as for other point source discharges. The reason is that it is fully as damaging to have sewage solids (sludge) jetisoned from combined sewers as it is to have it put into the water at a treatment plant or from a barge.

A permit for a regulator could not realistically require the discharge of only treated effluent. However, it could and should limit allowable discharges to effluent containing no more heavy metals and other toxicants than are permissible for discharge in public treatment plant effluents. This would be a logical concomitant of pretreatment requirements and would at

least assure that the overflow of raw sewage unfortunately attendant upon the use of combined sewers would result in only relatively nontoxic domestic sewage reaching receiving waters. Of course, the most desirable system would be one under which the overflows were prevented, but this would require either the separation of sanitary and storm sewers (an approach presently impractical in all but a very few instances) or the application of additional technological remedies as yet unavailable or unproven.

Thus pretreatment has an essential connection with the purposes to be attained by the cessation of marine dumping of sludge. Combined sewer overflows contribute a major portion of the heavy metal content of bottom mud and so of the dredge spoil which is now dumped in much larger quantities than sludges from public treatment plants. Since avoidance of environmental detriment is both the goal and justification for prohibiting ocean disposal of sludge, it would be self-defeating to permit continued marine deposits of dredge spoils which contain much greater concentrations of heavy metals than are found in the sludges. This is especially true because pretreatment would improve the quality of both sludge and spoil.

A corollary and equally key feature of such a pretreatment and permit program would be careful and close monitoring. While it may be that ordinary motivations to comply with the law would lead most dischargers to put forth reasonable efforts to meet the conditions of their NPDES permits fully, the presence of toxic substances in sludge or sludge derivatives spread on the land would be just as damaging coming from violators, either willful or unintentional, as from free and open discharges in the absence of legal restraints. Since treatment processes at the municipal plants do not remove any appreciable quantities of heavy metals and some other kinds of toxicants, it is as important for pretreatment requirements to be in specific, enforceable terms as it is for effluent limitations imposed on the municipal discharges to be of such character. Only limitations containing concentration values and requirements which industrial establishments can understand clearly and precisely and which regulatory agencies can specifically judge as to compliance will be satisfactory in promoting good sludge quality.

In view of the extensive role of U.S. EPA, both pretreatment and permit controls by the states would be easier if they implemented policies similar to those of the Federal Government. However, if New York or New Jersey should decide that spreading

sludge or sludge derivatives on their lands in substantial quantities was a necessary means of waste management, either or both states could require pretreatment of industrial wastes because of its necessity as a measure to assure safe sludge.

A permit is required from the New York Department of Environmental Conservation for the discharge of industrial or municipal wastes into the waters of the state.¹⁰ Even aside from the NPDES permit program now administered by New York, the Department can set conditions and requirements consistent with law for such discharges. Limitations on the composition of effluents is clearly included. In addition, should the Department find that pretreatment is necessary to make possible the proper functioning of a treatment system so that toxic substances will be kept out of either effluents or sludges, appropriate permit conditions to such effect can be employed. Section 307 (b) (4) of the federal statute specifically provides that state pretreatment requirements not in conflict with the federal law may be imposed.

A New Jersey statute specifically provides for pretreatment of discharges into public sewer systems. It authorizes the Department of Environmental Protection to issue regulations and also contemplates control by the municipalities or other public bodies operating collection systems and treatment plants.¹¹

Local governments also have means of reaching the problem. They can enact local laws and ordinances or insist on contract provisions governing reception of industrial wastes into their sewage collection and treatment systems which would either expressly or indirectly compel pretreatment for all facilities not having their separate outfalls. Of course, as with regulation at the state and federal levels, an indispensable element of any such program would have to be effective monitoring and enforcement.

It has also been observed that household wastes contain toxic substances some of which are not dissipated or destroyed by municipal sewage treatment processes. So far as the substances which make sludge toxic are concerned, the only effective means of coping with the problem, if it should be found significant once industrial sources are controlled, would appear to be product regulation. Ordinary residential facilities, and many commercial or other non-manufacturing establishments, cannot realistically be expected to pretreat wastes. Consequently, the influents which they deliver to the public sewers can be free of harmful matter ultimately embodied in sludge only if the household

or other supplies they customarily use are of a character which will not generate unmanageable wastes.

But even after all this has been said, at least one important consideration remains. Pretreatment will only separate out or concentrate the toxic substances. Unless this is done in ways which make the metallic and other materials truly recovered resources which can then be put to commercial and industrial use as raw materials or otherwise, the need will be to dispose of the pretreatment wastes in ways less harmful than disposing of them in the sludge. The ramifications of this aspect of the subject have been outside the scope of the Commission's work. Nevertheless, the least that can be said is that pretreatment would drastically reduce the bulk of the most objectionable wastes so that their disposal in landfills would require relatively small acreages to be set aside for the purpose. It should be expected that pretreatment would significantly reduce but not entirely eliminate heavy metals and other toxicants from sewage flows. Of course, the degree of improvement would depend on the extent to which pretreatment is actually required and the diligence with which it is enforced.

Consequently, pretreatment also would be advantageous for combustion methods. Both in incineration and pyrolysis, the heavy metal content of the sludges essentially remains in the residues. Moreover, some of the toxic substances are released to the atmosphere in the form of vapors from these processes, and smaller amounts of them in the sludge would result in cleaner emissions.

For some years, the technology has been known whereby materials such as the sludge residues from incineration or pyrolysis could be safely placed in landfills. If the site is properly chosen and prepared, and if the landfill is adequately lined and covered over, the method may be feasible. However, a necessary condition would be regular and careful monitoring of the site into the indefinite future after it was no longer in use for waste disposal in order to make sure that no escape of the toxicants was occurring. If found, any problems would then have to be promptly remedied by measures constituting good and proper maintenance. As a practical matter, it is unlikely that any significant number of local governments would actually undertake and faithfully perform such maintenance programs, especially if great increases in pyrolysis residues should make necessary the dedication of large acreages and more numerous sites as landfills.

It is therefore fortunate that work now underway by several equipment and engineering firms seems to be showing the way to more effective containment of residues including toxicants. The processes vary in detail but they can be described in general terms. Their essence is the use of certain kinds of ash with other materials to bind the heavy metals so that they resist escape into surrounding soils or water. Even so, the mischief that can be done by soil or water pollution from the escape of toxic substances, whether by accident or miscalculation, is sufficiently great so that keeping them out of the sludge to the maximum extent possible is both worthwhile and prudent.

In ocean disposal, it is also true that absence of toxics from the sludge would make them less objectionable, if not fully acceptable for reception by the sea.

Consequently, the Commission is of the opinion that pretreatment of industrial wastes to remove heavy metals, polychlorinated biphenyls, and other toxic substances is essential as a preliminary to advantageous use of land application methods and would be desirable for other methods as well.

Necessity for Combustion Methods

Since U.S. EPA has announced a deadline of December 31, 1981, for ending ocean disposal, and until one knows that there can and will be sufficient pretreatment to make it safe to dispose of large quantities of sludge on land, reduction by one or another of the combustion methods seems of necessity to be the main reliance for the near and intermediate future. As previously explained, the combustion method holding most promise is pyrolysis.

In Chapter VII of the Camp, Dresser & McKee Phase 2 Report, the findings of the Commission's technical consultants considering this method were set forth. From that information, it is apparent that efficient use of pyrolysis requires facilities of considerable size. This is essential in order to permit continuous operation and to make feasible the recovery of waste heat as an energy source. The Commission's management plan is built in part on the construction and operation of five pyrolysis plant sites to handle most but not all of the area's sludge.

The Technical Plan

Within the range of permissible options, local governments and their waste management agencies should continue to be allowed

their own choices of treatment and disposal methods. In such circumstances, a plan cannot identify to the last detail how each community will manage its sludge. Consequently, even if stated in specific terms, a description of the Region's sludge management practices five, ten, or twenty years hence must be regarded as part way between an illustration of how the system could work and a depiction of what it will actually be. The objectives and the overall governing limitations for the Region as a whole can and should be stated with reasonable particularity, but it should be recognized that, within the Region, any number of combinations of the available treatment and disposal techniques could produce the desired results. If each of the community or interlocal agency approaches to the problem is an environmentally tenable one and does not frustrate or unreasonably burden the attainment of overall regional objectives, failure to conform literally to the preconceived blueprint should not be thought of as an adverse criticism.

The environmentally defensible reason for curtailing or completely abandoning any particular method of sludge disposal is that the materials involved are deemed toxic or otherwise damaging to the ocean, land, or air, as the case may be. To the extent that sludge or residues remaining after treatment are rendered safe or even beneficial, restrictions on their use or disposal should be diminished. Accordingly, the first variable in a sludge plan for the future is the character of the materials which will in fact require treatment and disposal during the 1980s, 1990s, and beyond.

If and to the extent that U.S. EPA, the states, or their local entities actually require pretreatment of wastes, the region's sludge can be spread on the land in sufficient quantities to solve the major part of the problem. For some counties and municipalities there may not be enough open land of any kind to accommodate the tonnages produced. For these areas, the available land disposal alternatives depend on the feasibility of transporting the sludge and success in making arrangements for its reception where land is available. Where economically and otherwise suitable arrangements are not made, the method to be employed should be pyrolysis.

If not commercially marketable or otherwise beneficially used, the pretreatment waste products should be disposed of in carefully regulated landfills. The substances will be toxic and so will need to be consigned to land dedicated to use as dumps and probably not intended for ultimate conversion to recreational or other purposes aside from their disposal function.

At the present time, U.S. EPA is in the best position to determine whether the pretreatment approach is intensively enough pursued to make land disposal the predominant means of sludge management. Section 307 of the Federal Act is a clear authorization and expression of Congressional intent that EPA regulate toxic substances in sewage and employ pretreatment requirements as one of the means. Moreover, the NPDES permit program applies to all waste dischargers. It can be made to include specific pretreatment requirements, as appropriate in individual permits. For wastes discharged into public sewers, the responsible permittee would be the local treatment system. However, NPDES permit conditions could be so written as to make imperative and inevitable the control of toxic wastes at or prior to entry into the public system. While the federal law expressly safeguards the right of state and local governments to make some pretreatment requirements of their own, duplication of permit programs is to be considered only if one system does not suffice.

The key to determining which communities should put their sludges on the land and which should treat them by pyrolysis is their quality in terms of toxicity. For the reasons already discussed, land spreading of composted sludge probably should be regarded as more advantageous than a method which still leaves substantial residues for disposal. In order to discontinue ocean dumping within a few years, however, commitments must be made now. Otherwise, time will not suffice to acquire necessary facilities and make the financial and administrative arrangements essential to place either composting or pyrolysis in actual operation. It is not merely that a year or two is important to avoid being in violation of law. Unless firm plans are made and implementation of them begun, the period before action to secure environmental improvement and protect against ecological damage can be taken will tend to become long and indeterminate.

In anticipation of the Commission's findings, U.S. EPA proposes to award Step 1 construction grants to public sewage treatment systems now disposing sludge to the ocean in the New York-New Jersey Metropolitan Area. The funds should be used to determine whether each such system will use composting or pyrolysis. The decisions are to be made and commitments given to U.S. EPA by December 31, 1977. At that time, each Step 1 grantee should indicate whether the quality of its sludge is then such that it can be composted and put on the land. If so, a commitment to implement that method of treatment and disposal should be made.

At the present time, information available to the Commission is that Oakwood Beach and Port Richmond (New York City), Long Beach

and West Long Beach (Nassau County), and Monmouth County now have such sludges. It is possible that others may, or that between now and the end of 1977 measures will have been taken which render their sludges of sufficient quality.

All other communities should be required to commit themselves to implement pyrolysis for no less than half of the sludge which at the close of 1977 they are producing and for the projected increase which they may have through the mid-1980s. They should be allowed to commit themselves to composting for up to one-half of the tonnage which they are barging to sea at the end of 1977 upon a showing that they are undertaking measures to dispose of appropriate quality sludge by land spreading no later than December 31, 1981. The objective is to meet the announced EPA requirement that all sludges be disposed of by means other than ocean dumping no later than the 1981 date.

It can be argued that at the close of 1977, communities which do not yet have composting quality sludges should be allowed to make commitments that all of their sludge will be of such quality within the four years remaining until ocean disposal must cease. As previously explained, land spreading utilizes the waste in beneficial fashion. Moreover, it is invariably cheaper than combustion processes. Unfortunately, there are serious drawbacks to allowing such latitude. Communities which do not have good quality sludges by 1977 cannot really be certain what they will have for sludge quality in 1981. Consequently, their complete reliance on composting would certainly result, in many instances, in 1981 sludge which could not be put on the land and for which alternative arrangements had not even begun to be made. Accordingly, the Commission believes it reasonable to require that commitments be made at the close of the Step 1 planning which will result in significant reduction of ocean dumping by the end of 1981, even if the full attainment of the goal is slightly delayed.

It should also be recognized that the achievement of operational pyrolysis plants by January 1, 1982, will require perfect coordination of planning, construction, financing, administrative and political processes, with no delays. This may be possible, but it is not normal. Accordingly, it is recommended that where the December 31, 1981 date is not scrupulously attained, it be met as soon thereafter as practicable and the concern of the regulatory agencies be that progress is being made with due diligence toward the objective.

The best projections which can now be made envisage continued increases in sludge tonnages to the year 2000 and perhaps beyond. By the early 1980s it is likely that more sludges than can be so identified in 1977 will be free enough of toxicants to warrant their use on land. Experience with pyrolysis also will be much greater, and there may be new technologies to consider. In view of these factors, the Commission proposes that a re-evaluation of the situation by each agency be made at that time and new commitments made as to the sludge programs from then until the turn of the century. If we refrain from fixing absolute patterns too far into the future, a desirable element of flexibility can be preserved. Further, what must inevitably be large capital expenditures may be kept at a minimum consistent with environmental objectives.

The Phase 2 consultant report prepared for the Commission proposed six large pyrolysis plants to handle the bulk of the year 2000 sludge. Two would be in New Jersey: one at Port Newark to serve an intercounty area, and the other at Sayreville to serve either Middlesex County alone or Middlesex plus Monmouth Counties. Four would be in New York State: one at Cedar Creek in Nassau County and the remaining three in New York City.

The Commission proposes that the two New Jersey pyrolysis installations and three of the four identified for New York State be undertaken promptly, but with only enough capacity to meet projected needs through the mid 1980's.

The Fresh Kills site proposed in the consultants Phase 2 report is the one which this plan eliminates. Two of the sewage treatment plants (Oakwood Beach and Port Richmond) which would be served by Fresh Kills are among those probably already having sludges suitable for composting. Two others, North River and Red Hook will not be completed until after the time suggested for re-evaluation of treatment and disposal alternatives. Thus, the Commission believes that commitments for construction at the Fresh Kills site would involve premature expenditures which may prove unnecessary.

See Tables III, IV, V, VI and VII starting on page 37 for the estimated capital and operating costs of these five pyrolysis plants.

TABLE III

NEW JERSEY REGIONAL
SLUDGE PYROLYSIS FACILITY
AT PORT NEWARK

	Capital Cost,* <u>\$ Millions</u>	Amortized Cost, <u>\$/year</u>	O & M Cost, <u>\$/year</u>	Total Cost, <u>\$/year</u>
Transportation v a pumping and barging	3.4	300,000	1,200,000	1,500,000
1.5-mil-gal storage	1.7	100,000	400,000	500,000
Dewatering via twelve 500-cu-ft filter presses	28.2	2,800,000	1,500,000	4,300,000
Pyrolysis via three 26-ft-diameter, 12-hearth furnaces	15.0	1,500,000	500,000	2,000,000
Sidestream treatment	10.7	900,000	600,000	1,500,000
Nonprocess building	2.6	200,000		200,000
Site development (10 acres)	1.5	100,000		100,000
Ash disposal (194 tons/day)			1,100,000	1,100,000
Subtotal (rounded)	63.1	5,900,000	5 300,000	11,200,000
Energy recovery benefits				-900,000
Total				10,300 000

*The cost is based upon an estimated 365 dry tons/day of sludge to be processed.

TABLE IV

MIDDLESEX COUNTY SEWERAGE AUTHORITY
 SLUDGE PYROLYSIS FACILITY
 AT SAYREVILLE PLANT

	Capital Cost* \$ Millions	Amortized Cost, \$/year	O & M Cost, \$/year	Total Cost, \$/year
Dewatering via ten 500-cu-ft filter presses	25.4	2,500,000	1,900,000	4,400,000
Pyrolysis via four 26-ft-diameter, 11-hearth furnaces	19.2	1,900,000	700,000	2,600,000
Sidestream treatment	4.6	400,000	300,000	700,000
Nonprocess building	2.0	200,000		200,000
Ash disposal (107 tons/day)			500,000	500,000
Subtotal (rounded)	51.2	5,000,000	3,400,000	8,400,000
Energy recovery benefits				500,000
Total				7,900,000

*The cost is based upon an estimated 247 dry tons/day of sludge to be processed.

TABLE VII

NEW YORK CITY
SLUDGE PYROLYSIS FACILITY
AT THE HUNTS POINT PLANT

	<u>Capital Cost,* \$ Millions</u>	<u>Amortized Cost, \$/year</u>	<u>O & M Cost, \$/year</u>	<u>Total Cost, \$/year</u>
Transportation via barging			400,000	400,000
0.6-mil-gal storage	0.7	100,000	200,000	300,000
Dewatering via five 500-cu-ft filter presses	12.4	1,300,000	1,200,000	2,500,000
14 Drying via two rotary dryers	2.7	300,000	100,000	400,000
Pyrolysis via two 26-ft-diameter, 11-hearth furnaces	9.7	1,000,000	300,000	1,300,000
Sidestream treatment	4.4	400,000	300,000	700,000
Nonprocess building	1.4	100,000		100,000
Site development (reclaim 5 acres)	4.3	300,000		300,000
Ash disposal (80 tons/day)			400,000	400,000
Subtotal (rounded)	35.6	3,500,000	2,900,000	6,400,000
Energy recovery benefits				-100,000
Total				6,300,000

*The cost is based upon an estimated 107 dry tons/day of sludge to be processed.

The capital costs for the five pyrolysis plants included in the Commission plan are estimated to total \$206.1 million; the yearly operating and maintenance costs would be \$15.8 million; the yearly installments of amortized costs would be \$18.3 million. These figures are important because they indicate the overall costs of employing the method. However, they do not show what portions of the financial burdens would be borne by the local governments involved. To the extent that these pyrolysis projects actually obtain the grants for which they would be eligible, the costs to localities would be reduced. It should be noted that under present laws, up to 87½ percent of capital costs might qualify for federal and state grants, thus materially reducing local contributions to both capital and interest charges. In New York, the operating and maintenance costs could be diminished, so far as local treasuries are concerned, by the amounts received from the state program.

In all probability, the disparity between present costs of ocean disposal and projected costs for pyrolysis are such that the latter method would still be more expensive for the local governments, but not to the extent that one might suppose from consulting the gross figures.

A similar observation applies to composting, but only within a much more limited sphere. Since composting is not as capital intensive as pyrolysis, and since there is considerable doubt that present EPA construction grant regulations would allow land costs for the composting process to be eligible for federal assistance, the federally defrayed percentage of composting undoubtedly would be lower, although the total costs connected with the use of the method would be less than for pyrolysis.

The number of variables is so great that this report cannot undertake to analyze the actual situation that will be faced by each community in making its choices. However, we have felt it important to point out the elements involved so that those concerned with site specific problems will be on notice as to the factors which they should consider.

These cost estimates are based on the assumption that by December 31, 1977 (in conformity with the Commission's plan), the communities of the Region commit themselves to

the maximum amount of composting contemplated by the plan for the period beginning at the end of 1981. A further assumption is that only the several communities now known to the Commission as having sludges probably suitable for composting are able to produce such sludges by December 31, 1977. If greater commitments to composting are possible by that date, or if commitments are made to pyrolyze more sludge than contemplated, the costs would have to be adjusted upward or downward in view of the actual conditions.

There are a substantial number of sewage treatment plants in the outlying portions of the metropolitan area. While the general principles and approaches just discussed are applicable to them, the details in particular instances will vary. For specific discussions of these plants and the sludge management options open to them, the reader should consult Chapter III of the CDM Phase 2 report. However, composting should be substituted for landfilling as soon as the sludges become suitable.

In those areas where there is not enough sludge produced to make pyrolysis of this kind of waste alone efficient, codisposal with solid waste is an option that may be worth considering. Where large quantities are involved, codisposal may also be thought appropriate in some instances, but the reasons are most likely to involve other than technical considerations.

Cost Equalization

It is generally considered that land spreading is a preferred method because it can make beneficial use of the sludges. Nevertheless, the making of commitments necessary to meet the 1981 deadline could encourage reliance on pyrolysis in preference to composting. This is true partly because measures required to assure widespread pretreatment probably will take until after December 31, 1977 to implement and partly because the present federal construction grant program favors capital intensive solutions. It does so by reducing the burdens for communities of employing those methods which qualify for the largest grants. Thus, pyrolysis, which is almost certainly more expensive than land-spreading of composted sludge, is costly primarily due to the heavy capital requirements of the pyrolysis plants.

But the communities and agencies making the choice of method will expect to receive federal assistance in the amount of 75 percent of capital costs, and perhaps state grants in addition.

On the other hand, composting followed by land-spreading requires relatively little capital investment. Its costs are made up principally of labor. Operating and maintenance costs are aided not at all by the present federal program; only to a maximum of one-third by New York State; and not at all in New Jersey. Accordingly, anywhere from the major portion to almost the entire cost of composting and spreading sludge will be borne by local governments.

The Commission's plan would allow communities and inter-local agencies to choose between the two methods for disposing of significant percentages of their present tonnages. In the early or mid-1980's, they would again be faced with a choice affecting treatment and disposal methods for a further time into the future. It would be unfortunate if they were encouraged to select alternatives which, although less costly to them, were overall most expensive and least desirable in terms of resource utilization.

The most likely way of equalizing local options and so encouraging them to select composting whenever possible would be for Congress to provide grants applicable to the composting and land-spreading alternative commensurate with those available for the capital intensive methods. Accordingly, it is recommended that serious consideration be given to such a change in the federal construction grant program.

Administering The Plan

If land disposal or pyrolysis were less costly than barging to sea for the communities which now engage in the last named practice, the plan just presented would need little conscious administration, except for the normally to be expected actions of the local governments involved in selecting and implementing their own liquid waste treatment methods. However, the reasons behind a policy decision which seeks to reduce or eliminate ocean dumping of sludge have to do with the belief that this practice is harmful to the marine environment. Further, in a nation that is every day less able to afford to discard potentially useful resources merely on the plea of convenience or inertia, it can be desirable to choose more expensive means of sludge management for the sake of other values.

The problem is that the costs accrue to the local governments, at least in substantial part. As a component of sewage treatment facilities, pyrolysis plants could qualify for federal construction grant assistance under Title II of the Federal Water Pollution Control Act. Thus, within available federal funds, 75 percent of initial construction costs could be borne by other than state and local sources. Presumably state aid would account for some of the remaining 25 percent because both New York and New Jersey have programs which supplement the federal construction grants.¹² Nevertheless, an eventual bill of some tens of millions of dollars for new facilities, disposal sites, or both will remain for local governments and the several intermunicipal agencies to shoulder.

Moreover, assuming the present laws of the two states, any increases in operating costs resulting from the curtailment or abandonment of ocean disposal would come to rest entirely on the local governmental sector in New Jersey and in a two-thirds to one-third ratio on the local and state governments of New York.¹³

Consequently, it would appear that unless there is to be as yet uncomtemplated and unauthorized special federal aid to compensate for additional costs occasioned by foregoing ocean disposal of sludge, some degree of regulation will be necessary to impel the local governments concerned

to shift from their present least cost method to land disposal or pyrolysis. The reason is that the financial burdens will be concentrated in the New York-New Jersey Metropolitan Area and will be visible, while the benefits will be more widely diffused and perhaps less sharply defined in terms which can appeal to local populations.

The organizational adequacy of the administrative and legal structure for sludge management should be judged by the sufficiency of their jurisdictional reach and substantive powers to accomplish the results intended by the plan. In essence this means that the institutional arrangements in and for the region must be capable of selecting and combining available technological methods of sludge management and of operating them to rid the metropolitan area of the wastes while doing equity among the two states and their many communities.

The legal framework and administrative structure must assure the local governments and their waste management agencies as much flexibility as reasonably possible, given the foreclosure of the ocean dumping option, while providing for the degree of regulatory control necessary to secure compliance with environmental requirements by individual treatment and disposal programs and for the region as a whole.

It should also be recognized that a shift away from reliance on barging of sludge to sea will almost certainly intensify the need for interlocal and, in some respects, even regionwide cooperation. To date, each community or interlocal sewage treatment agency has been able to handle its own ocean disposal problem by operating its own barges or contracting with available private firms to transport and dump their wastes. The Atlantic Ocean has been a kind of no-man's-land in which all comers had equal rights without asking their neighbors. Moreover, the very smallest quantities aside, the viability of the method has not depended on having sufficient quantities of sludge or on finding adequate disposal sites. In contrast, both combustion processes and spreading on the land are not manageable for all within the territorial confines of each separate local governmental entity or joint waste treatment agency service area.

Land Methods

Although there are some privately operated landfills, it must be expected that most such installations for sludge disposal from public treatment facilities will be owned and operated by local public entities. The most densely populated counties and municipalities are either already exhausting their available sites or are virtually certain to do so before the year 2000. Consequently, their ability to utilize that means to rid themselves of sludge will be dependent on acquiring sites in other communities, either for their exclusive use or for joint operation on a multicomunity basis. The possibilities for such interlocal cooperation would have to surmount the widespread resistance to receiving someone else's wastes -- a very difficult but not always impossible task. The legal methods suitable for such undertakings will be discussed later in this chapter.

Spreading on land for beneficial purposes could be accomplished by making arrangements with private owners or with public agencies which administer lands. If the sludges will be of reasonably good fertilizer or soil conditioning quality so that farmers and operators of privately owned recreational lands such as golf courses would find it useful to accept large tonnages on a fairly regular basis, sewage treatment agencies may be able to meet substantial parts of their needs in that way. The Commission recommends that only composted sludges be considered for this use. An advantage of such an approach over landfill is that the communities would incur no costs for land acquisition or maintenance. Whether the sludge could be sold to such users or whether they might simply be induced to take it at no cost would depend on the quality of the treated product and on the effectiveness of sales programs which the local governments and their treatment agencies might undertake. As a public service the composted sludge could be made available to local residents on a pickup basis.

Since the quality and composition of the region's sludges as they may be in the 1980s and beyond is so heavily dependent on what the pre treatment and treatment processes of this future period may be, it seems safest to assume that land spreading could be on public property maintained as parks, recreational facilities and highway rights-of-way. Although these kinds of properties are seldom if ever under

the administration of sewage treatment agencies, the local governments of which they are a part or which they serve all have properties that fit the description. The state is also a large holder of open space and highway properties.

Thus, it may be assumed that with the making of inter-agency and state-local agreements for the reception and spreading of sludge, considerable quantities can be absorbed on a continuing basis.

Nevertheless, there are wide differences in the amounts of publicly owned open space from place to place within the Region as well as in the purposes to which the lands are put. Accordingly, it is certain that, unless interjurisdictional arrangements are made, some local governments will be able to rely on beneficial land spreading of sludge to a much greater extent than will others.

Pyrolysis

Any liquid waste treatment agency which has enough sludge to keep a pyrolysis unit in efficient operation might build and maintain one for itself. Its financing and operation would raise no different problems from those required to be solved in the construction and running of a sewage treatment plant. If treatment and disposal costs must be borne, and if pyrolysis is selected as the most suitable method, no special legal or administrative arrangements should be necessary. There will be need to design, build and operate the facility to meet applicable environmental and other requirements, but the same can be said for the acquisition and maintenance of any facility. There is nothing about a pyrolysis installation per se that requires it to be a multicomunity or regional in ownership, operation or service area. However, if it is to be used by several communities each of which has a small volume, or if there are any other circumstances which make it advantageous for one community to be served by a pyrolysis plant in another community, interlocal arrangements will be necessary.

Both of the New Jersey plants identified by the CDM report could be of the intercommunity sort. The one in Middlesex County could serve to treat Monmouth County sludge as well as that generated from the Middlesex Authority, although the Commission recommends strongly that Monmouth

County consider composting. The plant at Port Newark would be appropriate for the Passaic Valley Sewerage Commissioners. It would not by that fact alone raise the special problems of an interjurisdictional facility because PVSC is already an interlocal waste management agency having responsibility for the treatment and disposal of liquid wastes and the sludge generated by its own treatment operations. However, the CDM recommendation is that the Port Newark facility could be used by some sewage treatment agencies outside the present PVSC service area. Special arrangements on a contract or other basis would have to be made to accommodate such broadened usage.

The Cedar Creek pyrolysis plant could be a Nassau County facility and would be intended to serve treatment plants there. The two pyrolysis installations for New York City would be used only for the City's sludge. Interlocal arrangements would be necessary in Nassau County because some of the sewage treatment plants are owned by individual communities rather than by the county government.

It has also been suggested that some sludge might be transported from the New York portion of the region to New Jersey. If all parties were to find this convenient or economically advantageous, special arrangements could be negotiated and implemented for the purpose. However, we do not envisage any need to undertake the interstate transportation of sludge if land disposal and pyrolysis are employed to handle the Region's treatment and disposal problems.

Sludge and Solid Waste

There is yet another possibility for sludge treatment which the funding arrangements for the present work did not allow us to consider, except in passing. Incineration is now a significant means of reducing garbage and trash to residues of much lesser volume which are then consigned to landfills. As pyrolysis becomes operational, it may well replace incineration for the same reasons that have led us to recommend it in the regional sludge management plan to be progressively implemented during the coming quarter century.

It is possible to burn solid waste and sludge together by mixing them in proper proportions. In any given situation, it may or may not be true that such combined treatment of the two kinds of wastes is better than separate handling. Volumes of solid waste, as well as of sludge, have been increasing. Moreover, the former involves much larger tonnages. Consequently, it may well be that present and even expanded solid waste treatment facilities will often be completely spoken for before adding sludge to their loads. However, it is not wise to answer specific questions with general conclusions. In particular instances, there is likely to be good reason for pyrolyzing sludge along with the community's solid waste. If this is done in some municipal or county systems, the major outlines of the Commission's plan will not be adversely affected.

In considering the construction of new facilities, there is a further problem. Under present law, sewage treatment systems are eligible for federal grant assistance. Thus a sludge pyrolysis plant should qualify thereby drastically reducing its initial cost to the local governments involved. Solid waste facilities are not covered by any federal construction grant program. It follows that use of the same facilities to treat the two kinds of wastes would lead to violation of grant restrictions and so force the project to be accomplished without federal aid.

It may also be appropriate to observe that sewage treatment and solid waste management programs are frequently, if not customarily, administered by different agencies. While it would probably be feasible to negotiate agreements or realign administrative responsibilities if combined sludge and solid waste treatment should become important enough, the need to take such measures in order to achieve combined treatment programs should be recognized.

Interlocal Cooperation Mechanisms

For the most part, this plan has been structured on the premise that each of the sewage treatment agencies would take care of its own sludge. Shifts from ocean disposal to land disposal will undoubtedly necessitate more inter-agency relationships within municipal and county governments because landfills, recreational properties and highways are administered in other departments. However, this does

not present unique problems and can be worked out by each agency in accordance with its particular circumstances.

The several interlocal treatment agencies in New Jersey present a variant of this situation but should not be in a materially different position. They function for several municipalities in accomplishing liquid waste treatment and disposal rather than for only one. Consequently, the cooperative arrangements which they conclude may be with a larger number of municipal or county entities, but the needs and relationships involved will be essentially similar.

However, it is necessary to consider the question of authority to see that sludge which until now has been barged to sea is accepted by public agencies for spreading on the lands they administer. Similarly, there will need to be assurance that pyrolysis residues will be received into landfills operated by agencies other than those responsible for generating them.

Until and unless experience demonstrates otherwise, the making of necessary arrangements should be considered a voluntary process. Local governing boards and relevant department heads should be provided with plans and information that will show the value of sludges as soil conditioners and fertilizer and that will make clear the necessity of accommodating pyrolysis residues in existing or new landfills. Even though the practices involved are not yet in widespread operation, there are enough precedents and enough results from research and demonstration projects so that the activities involved need not be regarded as ventures into the unknown. The publicly owned land administering agencies generally have authority to treat their properties with soil conditioner, fertilizer or fill and so would certainly not be precluded from receiving properly treated sludge for such use or disposal.

The New York Department of Environmental Conservation and New Jersey Department of Environmental Protection, along with the Interstate Sanitation Commission, should assume leadership roles in providing necessary information and encouraging local governments and agencies to think along the lines just discussed.

The possibility of state legislation to assist in securing sufficient access to the land for sludge and sludge residues should be seriously entertained only if the voluntary measures instituted during the next few years give signs of not producing enough results to absorb the tonnages which will have to be disposed in order to avoid continued reliance on barging to sea.

The only other interlocal cooperation required for the implementation of the Commission's recommendations, over and above that already in effect in some areas of New Jersey where regional sewage treatment systems are employed, would be to enable groupings of counties or municipalities to build and operate regional pyrolysis plants or landfills for the reception of sludge residues.

The laws of New York provide ample authority for local governments to undertake joint financing, construction and operation of such ventures. There are two vehicles through which the undertakings could be accomplished - the Interlocal Cooperation Act and the Environmental Facilities Corporation.

The former is a statute enacted specifically for the purpose of permitting local units of government to undertake and administer joint projects, including those for the acquisition and operation of common facilities. Action of all the local legislative bodies concerned is necessary. A joint agency can be created to administer the project or program, with representation on the governing board from all the participating local governments. The claiming of state aid of any kind for which there would be eligibility if the activity were one of a single local government is expressly provided.¹⁴

The Environmental Facilities Corporation is a public corporation established by act of the state legislature¹⁵ to assist local governments with their waste management functions. It is authorized to construct and operate facilities of its own or to plan, build and operate them on a contract basis for governmental entities. In either case, the local governments must invite the services of the Corporation and in one way or another must supply the financial wherewithal.

An advantage of the EFC mechanism is that its existing statutory authorizations already specifically encompass

all aspects of waste management, including sewage treatment, sludge and solid waste. Consequently, it is probable that intercounty or intermunicipal sludge management activities would require no more than the conclusion of satisfactory implementing contracts. Ways of meeting the costs must be found no matter which mechanisms are employed.

However, recent developments have limited the previously established modis operandi of EFC. At least in part because of the credit difficulties encountered by New York State, the financing of new undertakings by the Corporation are now subject to approval by the Public Authorities Control Board.

In New Jersey, the Consolidated Municipal Service Act¹⁶ can be used for similar purposes. The interlocal agreements which it authorizes are called "contracts" and should not be confused with the more familiar contracts for services to be discussed below. New Jersey already has a number of interlocal (joint meeting) sewage treatment agencies. The device could be used to establish joint sludge treatment and disposal mechanisms as well.

If two or more counties, municipalities or liquid waste treatment districts should find it advantageous to enter into new joint arrangements for the treatment and disposal of their sludges, it appears certain that the specific terms will need to be fashioned in the light of the particular circumstances. It is assumed for the purposes of this plan that the most likely subject of such cooperative arrangements would be the establishment and joint operation of a pyrolysis plant and/or the acquisition and operation of one or more landfill sites for the disposal of sludge or sludge residues. If the undertaking were also intended to include joint sewage treatment activities, the interlocal agreement or joint meeting approach could be used for both. Of course, where it may be desired to include the pyrolysis and disposal functions along with the activities of the present intermunicipal liquid waste agencies, little if any additional legal framework would be required. These agencies are already responsible for the disposal of their own sludges.

It should also be noted that special statutes are always available as an approach to the creation of agencies and districts for waste management, either sludge management alone or in combination with other waste functions. While

the New York Interlocal Cooperation Act and the New Jersey Consolidated Municipal Service Act were designed to make resort to specially drawn legislation unnecessary, their generalized provisions and requirements could prove unsuitable in some particular that was especially important for a given arrangement, thus making a special act the preferred approach for that instance.

To give some idea of what might be involved for a new arrangement relating only to intercounty or intermunicipal sludge treatment and disposal, some possible provisions for a model statute have been drafted. They are presented as an appendix to this report.

Regional Concerns

Until the midpoint of the two years of study on which this report is based, it appeared that heavy reliance on incineration to treat the Region's sludges would afford the only hope of meeting an early deadline for abandonment of ocean disposal. Much work was done on the development of an institutional framework which would support incineration of the bulk of the sludges.

The first major problem was that siting difficulties resulting from anticipated contributions to air pollution would have made necessary the concentration of operations at a small number of locations. This inevitably meant resort to many interlocal arrangements or to direct operation of the treatment processes by the states. A concomittant problem was the need in such a system for much transportation of sludges because site concentration would have meant that many sewage treatment plants would not have their own incinerators.

When the Phase 1 report of the Commission's consultants argued that development work on pyrolysis technology had reached the point where that process could be available for new installations almost as rapidly as incineration and that it offered substantial advantages, the legal and institutional aspects of our planning underwent marked change.

Although the primary reasons for recommendation of pyrolysis are technical, a comparison of these two combustion methods revealed that pyrolysis is much simpler from the institutional point of view. This is especially true

because of the locations at which the major pyrolysis installations can be placed and because the likely lessened emissions from successful pyrolysis operations makes it less necessary to avoid all decentralization of the facilities.

While it has already been pointed out that land spreading of composted sludges will require interagency, and in some instances interlocal or state-local arrangements, this form of treatment and disposal also reduces the need for intricate intergovernmental relationships when compared with regional reliance on incineration. Each county, municipality or interlocal sewage treatment agency can dispose of the composted sludge which it produces on publicly owned lands within its own jurisdiction or service area. Extra-territorial disposition probably will be necessary in some cases, but the number of instances need not be large.

Nevertheless, there are some regional concerns which will continue to be of importance even in a system which gives individual communities and existing interlocal sewage treatment agencies a fairly high degree of self sufficiency in handling their own sludge problems. They relate to the regional character of the waters, the quality of which is to be improved by proper waste management, including the sludge aspect.

The communities on both sides of the Hudson, and for a considerable distance inland from the harbor and coastal ocean comprise a single interstate metropolitan area. Wastes discharged into the waters at one point in the region ebb and flow to many other points. Similarly, the air is a common regional resource. Consequently, the choices among treatment and disposal methods for sludge which determines whether burdens are to fall on water or air, and in what proportions, are of concern to the area as a whole, not only to the individual local jurisdictions composing the metropolitan complex.

In some ways, composting and land spreading might be viewed as the least regional of the alternatives. But even so, the highly urbanized character of the New York-New Jersey Metropolitan Area probably will force some interjurisdictional arrangements for utilization of composted sludges not good enough to go on crop lands but

suitable for parks and other recreational open spaces.

Moreover, because the precipitating cause for changes in the Region's sludge disposal practices is the common reaction to the announced cessation of ocean dumping, each community will have a stake in how its neighbors actually handle sludge in the coming years. There is likely to be equity perceived in some communities giving up their relatively low cost barging method only if all are required for similar reasons to select the costlier alternatives, and only if regionwide espousal of pretreatment actually assures substantial improvement of common waters.

It should also be observed that while a virtue of the Commission's plan is the preservation of at least some freedom for each community and interlocal agency to choose land disposal of composted sludge, pyrolysis, or some combination of both, the individual choices made can affect the other communities of the Region. This may be in regard to air quality or in terms of increased pressures to receive composted sludge across municipal, county or special district service area boundaries.

If pretreatment of wastes before discharge into public sewers takes substantial quantities of the Region's sludge suitable for beneficial application to agricultural lands, a further avenue of regional cooperation may develop. Marketing of composted sludge or conversion into fertilizer or soil conditioning products along the lines practiced by Milwaukee in its sales of "Milorganite" could be more feasible and effective on a volume basis such as could be attained only by combined disposal of the sludge or sludge products of a number of sewage treatment systems.

Although some preliminary thought was given to the matter, this report has not attempted to sketch a regional production or marketing system or to provide the legal authorizations and institutional structure useful for such an undertaking. The reason is that our consultant's Phase 2 report shows very few of the present sludges to be suitable for land disposal of any kind. As a consequence, the Commission is recommending that for the present composted sludge be used on publicly owned acreages. It probably will be a number of years before significant quantities of

agriculturally usable sludge are available. If the commitments contained in the Commission's report are made, the question of major sludge use on croplands will not arise again until the early 1980s at the earliest. Accordingly, it seems appropriate to consider institutional arrangements for that disposal method when the question of feasibility has been affirmatively settled and in the light of the conditions and needs then prevailing.

A Regional Forum

Although most of the decisions contemplated by the Commission's plan will be made by the individual communities and special district sewage treatment agencies, there will be need for consultation and discussion, and perhaps for some applied research on a regional basis. The Interstate Sanitation Commission has already begun to serve these needs by its conduct of the studies and the issuance of this report.

The Commission, with funding from U.S. EPA is now engaged in an essential next step. It is managing a research project which, among other things is to determine on a pilot plant basis how pyrolysis of sludge can be most effectively conducted. An existing test unit of the Nichols Company at Belle Mead, New Jersey is being used under contract for the purpose. Selected municipal sludges taken from the Region's sewage treatment plants will be pyrolyzed and the results analyzed. The work is expected to be completed by mid 1977. Thus, the information and experience gathered will be available prior to the time when the communities working under the EPA Step 1 grants make their commitments of disposal method to be used through the early 1980s.

As part of its regular function in coordinating the interjurisdictional concerns and actions of the state and local water quality agencies in the Region, the Interstate Sanitation Commission also looks forward to serving as a forum for the consideration of sludge management problems as they develop.

FOOTNOTES

1. Tri-State Compact, Article #1
2. Ocean dumping permits issued to agencies in the region, e.g. Passaic Valley Sewage Commissioners, Ocean Dumping Permit #NJ003, July 23, 1976, para 7.
3. U.S. E.P.A. - Region #2, Inter-Division Communications, May 20, 1976.
4. Gerald Hansler, E.P.A. Administrator - Region #2, to Thomas R. Glenn, Jr., Director and chief Engineer, Interstate Sanitation Commission, dated September 10, 1976.
5. See Federal Water Pollution Control Act, 33 USCA 1251 et seq., and Clean Air Act, 42, USC 1857 et seq.
6. Relevant provisions of the Federal Water Pollution Control Act are 33 USCA 1311 (c) (1) and (2) (Waste discharger may provide less treatment on showing that he is providing maximum within his economic capability and is making progress); and 33 USCA 1312 (b) (2) (Administrator may modify effluent limitations upon demonstration that cost of compliance is too excessive in proportion to benefits obtained). Relevant provisions of the Clean Air Act are 42 USC 1857 c-5 (f) (1) (A), (B), (C) and (D), and 42 USC 1857 f-1 (b) (5) (C) (Administrator may postpone the application of air pollution requirement, including those which deal with motor vehicles, those which are necessary for national security, when alternative measures of control are found which are economically and technologically more feasible, or when efforts to comply with the regulations are made in good faith).
7. Relevant provisions of the Federal Water Pollution Control Act are 33 USCA 1288 (b) (2) (E), and (G) (Waste treatment management plan must take into consideration elements of economic, social and environmental impacts, and the impacts of agricultural, silvicultural and mine-related sources of pollution. But purpose of plan is to accomplish water quality control and not to improve these other resources); 33 USCA 1252 (a) (Administrator is authorized to prepare programs to abate water pollution, with due regard given to fish and wildlife, and for recreational, agricultural and other purposes); and 33 USCA 1254 (t) (2) (Administrator is authorized to investigate the environmental impacts on water and air quality and land use of alternative methods of control of thermal discharges. This is one of the few instances in the Act which is directed to really

compare different effects on the environment). Relevant provisions of the Clean Air Act are 42 USC 1857 (a) (2) This provision states that public health and welfare, crops, livestock, property and other environmental concerns have been injuriously affected by air pollution); 42 USC 1857 b-1 (a) (5) (Secretary is authorized to conduct an investigation of new and improved ways to recover and market byproducts which result from the elimination of air pollution); and 42 USC 1857 c-10 (k) (1) (B) (Administrator is authorized to study and report on effects on environment and on supplies of fuel and electricity resulting from emission reduction technology).

8. McKinney's Laws of New York, ECL 19.0107 (3) and NJSA 26:2C-2 (In their respective definitions of "air pollution", both statutes allude to other environmental concerns, such as public health and welfare, property, plant and animal life, and enjoyment of life and property, as being adversely affected and damaged by such pollution).
9. 40 C.F.R. sec. 128.110.
10. McKinney's Laws of New York, ECL 17.0701 (1).
11. NJSA 58:11-49 to 58:11-55.
12. NJSA 26:2E-1 et. seq.; McKinney's Laws of New York, ECL 17.1901 et. seq.
13. New York has an operations and maintenance grant aid program for sewage treatment facilities, McKinney's Laws of New York, ECL 17.1905. The definition of "Sewage treatment works" means and includes the structures, equipment, vehicles, vessels, and appurtenances of local government used exclusively for the treatment of sewage and for the disposal of sludge resulting from sewage treatment. Sewage treatment works shall also include outlet sewers, overflow structures on sewer systems, and diversion chambers on intercepting sewers. Such treatment works shall not include any other sewers, nor any properties used in whole or in part for the administration of sewage treatment works unless such properties are on the site of, and an integral part of, the sewage treatment plant, McKinney's Laws of New York, ECL 17.1905(1)(b). If "disposal" as used in this definition can be construed broadly enough to include process appropriate to ready sludge for disposal or reduce it, pyrolysis plants or incinerators could qualify for operation and maintenance aid.
14. McKinney's Laws of New York, General Municipal Law, Sec. 460 et. seq.

15. McKinney's Laws of New York, ECL 51.0101 to 51.0109;
51.0303, 51.0305; 51.0901 to 51.0907.
16. NJSA 40:8A-1 et seq.

APPENDIX

SAMPLE STATUTORY PROVISIONS

As explained in the body of this report, it is contemplated that the bulk of the sludge management functions can and should be performed by the existing waste treatment agencies. The Commission's plan set forth in Chapter V does not, generally speaking, call for any actions not already within the powers of the appropriate agencies. However, in a limited number of instances, it may be found desirable for two or more communities or for two or more counties jointly to undertake certain functions. Where the scope or character of the undertaking is such as to be inappropriate for performance under a service contract, an inter-jurisdictional agency is the most likely recourse. The local governments might choose to proceed under statutes already authorizing interlocal cooperation -- the Interlocal Cooperation Act in New York (McKinney's Laws of N.Y., General Municipal Law, sec. 460 et seq.) and the Consolidated Municipal Services Act in New Jersey (NJSA 40:48B-1 et seq.). The language of the sample statutory provisions presented here could be used as the provisions of the interlocal agreement.* If a special statute is deemed desirable for a particular joint undertaking, the provisions could be incorporated into such an act.

Local governments or waste treatment agencies which decide to use pyrolysis and which do not have large enough volumes of sludge or sludge and solid wastes to employ a pyrolysis facility of their own efficiently could establish and operate a joint facility. Another possible multi-jurisdictional function might be the acquisition and ownership of a landfill.

Standard provisions relating to the organization and internal management of public authorities or special districts are not included in these sample provisions, unless their presence is desirable to make a point of particular importance to the kind of waste management venture envisaged. Examples of statutorily created authorities and special districts are to be found in the laws of both New York and New Jersey and should be consulted for the style and practice familiar to the state.

*In New Jersey, the interlocal agreement is a contract to establish and operate a joint meeting.

Statutory Provisions.

Section . Authority created

The _____ Authority, hereinafter called "the Authority", is created and shall exercise the powers and jurisdiction and have the obligations conferred upon it by law. The Authority shall provide service for a District to be composed of (enumerate the local governments to be served or describe the territory to be served).

Commentary

This Section is merely designed to create the agency which will be employed to perform the sludge related services desired for a multi-jurisdictional area. The organizational and substantive provisions follow in the subsequent sections.

Section . Board of Directors

a. The affairs of the Authority shall be conducted in accordance with the actions of a Board of Directors, hereinafter called "the Board". The Board shall be composed of one member from each local government or special waste management district agency within the District. Each such member of the Board shall be selected by the government or agency which he represents in such manner as it may provide or, if applicable local law otherwise provides, in accordance therewith. A member of the Board shall serve thereon for such time as the selecting agency or body shall determine. A vacancy on the Board shall be filled in the same manner as the original appointment.

b. The members of the Board shall be entitled to one vote each. No action of the Board shall be binding unless taken at a meeting at which a quorum is present and a majority of those present vote in favor thereof. The Board shall meet at least twice a year. In its bylaws, and subject to such directions and limitations as may be contained therein, the Board may delegate the exercise of any of its powers relating to internal administration and management to the Executive Director. In no event shall any such delegation include final approval of:

1. A budget or schedule of charges.
2. The annual report.

Commentary

The Authority is intended to be a service agency for the liquid waste treatment agencies and their constituent local governmental areas. It will be providing the sludge management function which is only one element of overall liquid waste management. Consequently, this Section provides that the Authority would be directed by the liquid waste management agencies and the concerned units of local government.

The creation of a separate special district authority is sometimes considered a disadvantage because it is regarded as an overlay on existing local governments. If made completely independent of them, the mechanism is sometimes criticized for being insufficiently subject to control. The joint agency here suggested would be interlocked with the local governments and agencies it serves through the composition of its Board.

If the waste management function or its sludge management component is to be performed pursuant to an interlocal or joint meeting agreement under the New York or New Jersey law respectfully, the provisions of this Section would need to be conformed to the exact requirements contained in one or the other of these statutes.

Section . Powers

In addition to any other power conferred upon the Authority elsewhere in this Act or otherwise pursuant to law, the Authority shall have power to:

1. Acquire, construct, operate and maintain facilities and equipment for the treatment of sludges by combustion or otherwise and for the collection, transportation and disposal of sludges, sludge residues and pretreatment wastes.
2. Treat and dispose of sludges by pyrolysis, deposit in landfills, or by any other means in accordance with law.
3. Transport raw sludge, treated sludge, by-products and recovered resources.
4. Dispose of sludges and residues.
5. Sell at economically justified prices, or for such prices as may offset such portion of costs as may be, sludges,

residues, by-products, and recovered resources.

6. Refuse to accept for treatment any sludge which does not conform to such pretreatment requirements as it may have established and to such pretreatment requirements as may be otherwise applicable pursuant to law.

7. Acquire, operate and maintain landfills for the disposal of sludge and sludge residues, and wastes resulting from the pretreatment of substances to prevent them from being introduced into sewage flows.

8. Acquire, construct, operate and maintain facilities, equipment and sites for the treatment, disposal and resource recovery from combined processing of sludge and solid wastes, if so authorized pursuant to law other than this Act.

9. Make and perform service contracts with nonmember jurisdictions and agencies for the transportation, treatment and disposal of sludge and sludge residues.

10. Exercise the power of eminent domain pursuant to (cite appropriate provision of state law).

11. Issue, pay principal and interest, and otherwise service bonds and other evidences of indebtedness secured by the revenues from its operations.

12. Receive, administer, and expend appropriate funds, gifts, grants and donations and payments for services.

13. Apply for, receive, administer and expend any state and federal air for which it may be eligible.

Commentary

The powers presented in this Section are those most directly connected with the conduct of the sludge management activities which may become the subject of interlocal or regional operations. While it is probable that local governments and agencies seriously interested in such ventures will find it either necessary or advantageous to enter upon them as full participants, the provision also allows participation by service contract. Under such an arrangement, a community which does not have enough of a sludge volume to warrant its actual participation in the Authority and the sharing in capital costs

or Authority management could purchase sludge processing or transport service. Of course, this could be done only if the Authority found the arrangement agreeable.

As explained in the body of this report, the scope of the present work has not allowed for investigation of co-disposal of sludge and solid waste. Nevertheless, this must be regarded as a significant possibility. Accordingly, this Section specifically recognizes that the Authority might engage in such activity on the condition that it is authorized by other laws to do so. The reason for this proviso is that the problems involved are beyond the preview of the present report.

A number of other powers (principally those relating to the internal management of a public authority) have not been included. These are among the standard provisions that can easily be included in accordance with prevailing practice in the state.

Section Collection, treatment and disposal of sludge

The Authority shall receive sewage sludge in such amounts as any and all public liquid waste treatment systems in its District may make available for collection by or deliver to it and shall treat and dispose of all such sludge. Collection of the sludge and transportation of it to the processing facilities of the Authority shall be by the Authority, except in those instances where specific arrangements are made providing for delivery of the sludge by a liquid waste treatment agency. The Authority may make reasonable requirements relating to the pre-treatment of sludge. Such requirements may include but need not be limited to the removal or separation of toxicants or other substances which cannot be appropriately neutralized or removed by the treatment and disposal methods employed by the Authority.

Commentary

It is necessary that the Authority be obligated to take all sludge made available by the public liquid waste treatment agencies. Sludge processing is properly regarded as a public utility activity performed by governmentally owned entities. Any local governments or waste management agencies which undertake to participate in a regional system must be able to rely on its satisfying the needs as they develop.

It is provided that the general rule will be for the Authority to be responsible for collection and transportation of the sludge. Inevitably, regionalization will mean that some treatment plants are closer to the sludge processing facilities than others. This presents the certainty of cost differentials among the public liquid waste treatment agencies, unless there is an equalizing mechanism. Requiring the Authority to be responsible for collection and transportation is part of the mechanism provided. The rate structure for charges is the other part of the mechanism.

Section . Construction and operation of facilities

a. The Authority shall construct and operate pyrolysis plants and all necessary or appropriate appurtenances thereto sufficient to perform its responsibilities for the reception, treatment and disposal of sludge pursuant to this Act. If at any time the Authority finds that another method or methods, along with or in substitution for pyrolysis are feasible and advantageous, it may employ such method or methods in addition to or in substitution for pyrolysis.

b. The Authority shall construct and operate its facilities in accordance with all applicable provisions of law and requirements of the (Department of Environmental Protection) (Department of Environmental Conservation) relating to water quality, air quality and the health and safety of the environment. Accordingly, the Department may, pursuant to any authority it may have other than this Act, require the Authority to modify or change its sludge treatment and disposal processes or methods.

c. The Authority shall acquire any lands and other interests in real property necessary for the facilities required pursuant to this Act.

Commentary

Programs to implement the Commission's sludge management plan will rely primarily on pyrolysis and the several presently known forms of land disposal. However, technological and scientific progress, as well as accompanying shifts in public policy reflected in changes in laws and administrative regulations must be expected to occur from time to time. To take account of these contingencies, this Section specifically refers to pyrolysis. However, there is also authorization for the Authority to employ such other methods as may be found appropriate and in accordance with law.

Section . Support of sludge program

a. Except as may be otherwise provided by or pursuant to law, sludge treatment and disposal operations of the Authority shall be self-sustaining, both as to capital and current costs. With respect to its sewage sludge treatment and disposal facilities and equipment, the Authority shall be eligible and make application for such construction, operating and management grants as the state may make to public liquid waste treatment facilities and operations. The Authority also shall apply for any federal aid to which its sludge management activities under this Act may make it eligible.

b. Except to the extent that appropriated funds, grants, gifts or donations may be received by the Authority and lawfully applied to meet such costs, they shall be defrayed by charges made by the Authority for its sludge collection, treatment and disposal services. Such charges shall be made by the Authority, and shall be so calculated as to equalize all costs of sludge collection, transportation, processing and disposal to the respective liquid waste treatment agencies or local governments which are members of the Authority or otherwise use its services, except that charges shall be based on the volumes of sludge handled and may be adjusted to take account of any abnormal costs which the Authority may incur in treating particular sludges by reason of their content. The rates or rate schedules shall not be revised more often than once in any year; provided that rate schedules applicable to member governments and agencies and service contracts with nonmember local governments and agencies may contain formulae for the recalculation of charges to take account of changing costs on a continuing basis. Any income derived from the sale or other disposal of residues or by-products recovered or processed from the sludge shall be credited against the costs of the sludge operations. If the treatment and disposal operations combine the processing of sludge and other wastes, reasonable apportionment of costs and charges, and of any income credited, may be made by the Authority. Charges may include reasonable allowances for operating reserves required for the efficient conduct of the sludge program.

Commentary

The capital funds required to construct or acquire pyrolysis plants and other facilities probably will come from revenue bonds. A complete statute will have to contain appropriate borrowing provisions to make this possible. Other financial resources should

be expected from a variety of sources, including appropriations and federal and state grants. However, in order to establish credit for the Authority, it is important to require that the sludge operations be self-sustaining. The municipal, county and regional public waste treatment entities now pay for whatever treatment and disposal their sludge receives. This Section anticipates that this will continue to be the case. The only difference will be that the public waste treatment systems will make payments to the Authority for services rendered.

In performing the sludge processing and disposal function, the Authority will be performing in the manner of a public utility. Accordingly, the Authority is empowered to fix rates for its services. However, it is not a profit making institution. Consequently, its charges are directed to be no more than necessary to defray the costs of operation, including the maintenance of reasonable reserves. It may be desirable to add a provision making the rates and services of the Authority subject to regulation by the state public utilities agency.