

OCEAN COUNTY
SOLID WASTE DISPOSAL
AND
RESOURCE RECOVERY MANAGEMENT STUDY
AND
PROPOSED SOLID WASTE DISPOSAL PLAN

PREPARED FOR
THE OCEAN COUNTY BOARD OF CHOSEN FREEHOLDERS
in cooperation with
THE OCEAN COUNTY SOLID WASTE ADVISORY COUNCIL

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This plan has been prepared in accordance with the requirements of the New Jersey Solid Waste Management Act (C. 326, Laws of 1975).

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- . THE BOARD OF PUBLIC UTILITIES
- . RECLAMATION, CONSERVATION AND RECYCLING GROUPS
- . SOLID WASTE CONTRACTORS
- . OFFICIALS FROM INDUSTRIAL, COMMERCIAL, INSTITUTIONAL,
AND AGRICULTURAL FIRMS AND SECONDARY MATERIALS INDUSTRIES
- . OCEAN COUNTY PLANNING BOARD
- . OCEAN COUNTY SOLID WASTE ADVISORY COUNCIL
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SUMMARY

INTRODUCTION

Currently, Ocean County generates approximately 1800 tons per day of various categories of solid waste. Residential solid waste produced in Ocean County accounts for a little over half of the total. About another 30 percent is generated by commercial and industrial firms. The remaining 20 percent is a mix of non-residential municipal, agricultural, institutional and sewage sludges and septic wastes.

On July 29, 1977, the Solid Waste Management Act (Chapter 326, Laws of 1975), became effective. Under the provisions of the Act, each county in New Jersey and the area under the authority of the Hackensack Meadowlands Development Commission is considered a Solid Waste Management District. Each district is required to develop a solid waste management plan. The Ocean County Planning Board is the office designated to supervise the implementation of the Ocean County District Solid Waste Management Plan. Pursuant to Chapter 326, an advisory council composed of mayor or designees, persons in the solid waste business, and environmentalists was formed to provide guidance in the development of the plan.

As defined in Chapter 326 the following items must be contained in the Ocean County solid waste management plan.

1. Inventory of sources, composition, quantities of solid waste district in year new report is prepared
2. Projections of amounts and composition of solid wastes for next 10 years
3. An inventory and appraisal including life expectancy, location, etc., of each solid waste facility in district
4. Analysis of existing solid waste collection systems and transportation routes within the district
5. Statement of solid waste strategy to be utilized in the district
6. A site plan locating all existing solid waste facilities and additional sites available to handle solid wastes from the district
7. A survey of collection districts with transportation costs to existing or available sites
8. Develop procedures for coordinating activities related to collection and disposal of solid waste within the district
9. Methods of financing solid waste management in the district
10. Development and formulation of map and plan; hearings; submission of plan to Commissioner of DEP

OBJECTIVES

The Department of Environmental Protection has identified the following objectives which should be met by each of the solid waste management districts in the development and implementation of their management plans:

- . The plan should protect and enhance environmental quality.
- . The overall long term plan should terminate existing practices which cannot be upgraded to meet environmental standards.
- . The plan should consider upgrading existing practices, where feasible, to meet environmental standards and/or provide alternative services and facilities capable of meeting environmental standards.
- . Planning should conserve natural resources, and encourage waste reduction.

- . Employ the maximum practicable use of resource recovery in the Plan, including low and high technology systems.

Additional objectives which have been defined for Ocean County by the Planning Board staff, the Consultant, and the Ocean County Solid Waste Advisory Council are the following:

- . The solid waste management plan must be capable of being responsive to change.
- . The countywide solid waste disposal plan should consider the economic aspects of municipal spending caps and public concern over rising costs.
- . Ocean County should plan for the accomodation of future higher waste loads and for seasonal factors.
- . The County plan should provide the framework necessary to utilize alternate processing and disposal technologies in light of changing economics and environmental factors.

The Ocean County District Solid Waste Management Plan meets all of the above objectives.

EXISTING COLLECTION AND DISPOSAL SYSTEMS IN OCEAN COUNTY

A summary of the existing residential solid waste collection systems in the Ocean County District is presented in Table S-1. A majority of the municipalities in the district, 21 out of the 33, have municipal collection systems, Another 27 percent or nine of the 33 municipalities utilize a contract collection system. The remaining 3 municipalities utilize private collection services in which the resident must arrange normal refuse collection with a private carter. Figure S-1 shows the pattern of systems in the district.

TABLE S-1

**1978 COSTS FOR RESIDENTIAL
SOLID WASTE COLLECTION AND DISPOSAL**

<u>MUNICIPALITY</u>	<u>COLLECTION FREQUENCY/WEEK</u>	<u>REPORTED COST BASIS</u>	<u>ESTIMATED YEARLY COST PER CAPITA*</u>
BARNEGAT	Curb	Contract \$ 95,000	\$ 12.52
BARNEGAT LIGHT	Curb	Contract 34,866	12.27
BAY HEAD	Backyard	Contract 69,666	32.21
BEACH HAVEN	Backyard	Municipal 100,787	15.40
BEACHWOOD	Curb	Municipal 77,850	11.19
BERKELEY	Curb	Municipal 278,324	11.17
BRICK	Curb	Municipal 861,693	15.04
DOVER	Curb	Municipal 806,500	11.29
EAGLESWOOD	Curb	Municipal 17,400	7.10
HARVEY CEDARS	Curb	Contract 29,390	13.96
ISLAND HEIGHTS	Curb	Contract 27,669	13.76
JACKSON	3 July-Aug.		
LACEY	2 Balance	Private \$3.50/mo. + disp.	9.05
LAKEHURST	2	Municipal 245,770	12.71
LAKEWOOD	2	Municipal 37,000	11.18
	2	Municipal 223,508	5.39
LAVALLETTE	Curb	Municipal 76,025	9.13
LITTLE EGG HARBOR	3 Summer		
LONG BEACH	2 Balance	Municipal 200,000	21.90
MANCHESTER	2	Contract 194,000	14.08
MANTOLOKING	Curb	Private \$3.50/mo. + disp.	43.08
	Backyard	Contract 44,000	55.42
	3 Summer		
	2 Balance		

TABLE S-1, Cont'd.

**1978 COSTS FOR RESIDENTIAL
SOLID WASTE COLLECTION AND DISPOSAL**

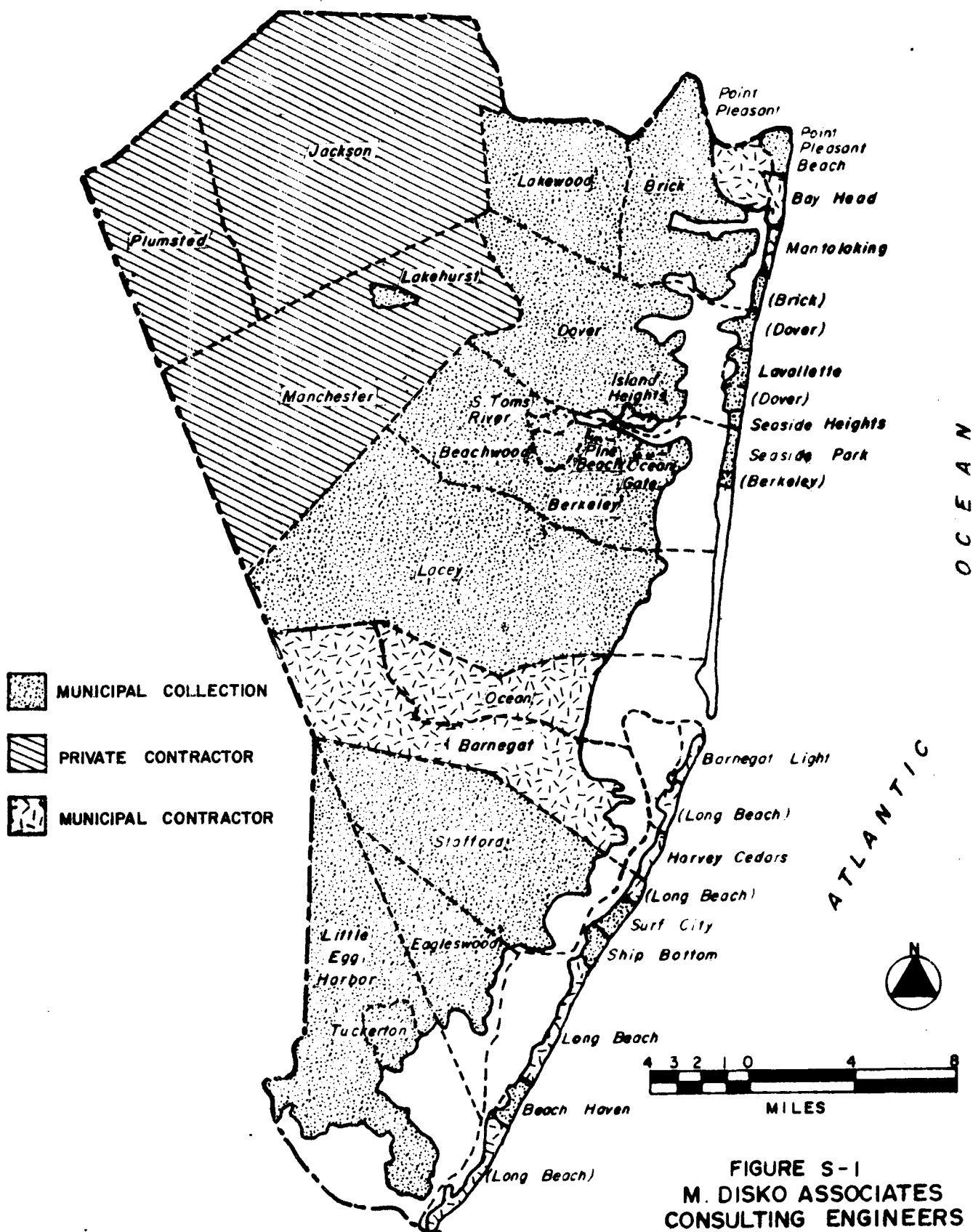
<u>MUNICIPALITY</u>	<u>COLLECTION FREQUENCY/WEEK</u>	<u>REPORTED COST BASIS</u>	<u>ESTIMATED YEARLY COST PER CAPITA*</u>
OCEAN	Curb	Contract \$ 72,416	\$ 11.71
OCEAN GATE	Curb	Municipal 38,586	16.86
PINE BEACH	Curb	Municipal 24,000	12.15
PLUMSTED	Curb	Private \$3.50/mo.	6.92
POINT PLEASANT	Curb	Contract 272,200	12.93
POINT PLEASANT BEACH	Curb	Municipal 68,885	4.71
SEASIDE HEIGHTS	Curb	Municipal 79,854	6.70
SEASIDE PARK	Backyard	Municipal 80,800	10.56
SHIP BOTTOM	Curb	Municipal 63,750	14.26
SOUTH TOMS RIVER	Curb	Municipal 26,741	5.09
STAFFORD	Curb	Municipal 152,453	15.20
SURF CITY	Curb	Municipal 69,635	16.95
TUCKERTON	Curb	Municipal 45,900	10.00

COUNTY

*Estimate cost per capita is based on average equivalent all year and summer populations.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

RESIDENTIAL SOLID WASTE COLLECTION SYSTEMS



There are many variations that the district's municipalities utilize in collection practices such as frequency of collection, curb or backyard pick-up, clean-up weeks, etc. Therefore, when comparing the costs for solid waste collection and disposal, the level of service must first be determined to insure that the systems are providing comparable items. Other important aspects to consider when collection costs are compared include: the distance between pick-ups; supplementary clean-up type services, and the amount of traffic encountered. Traffic is a significant factor during the summer in some municipalities. Hence, there is a large range in costs for the municipalities, as outlined in Table S-2. The estimated per capita costs are calculated with weighted population figures which compensate for the very large population and waste quantities during the summer season.

TABLE S-2
SUMMARY OF COLLECTION AND DISPOSAL COSTS

<u>TYPE OF COLLECTION</u>	<u>NUMBER OF MUNICIPALITIES</u>	<u>1978 RANGE OF ESTIMATED COST PER YEAR PER CAPITA</u>
Municipal, Curbside	19	\$ 4.71 - \$21.90
Municipal, Backyard	2	\$10.56 - \$15.40
Contract, Curbside	7	\$12.27 - \$17.52
Contract, Backyard	2	\$11.71 - \$55.42
Private, Curbside	3	\$18.83 - \$20.27

Normally, refuse generation follows a seasonal cycle with the peak occurring during the summer months and a lower than average generation during the winter months. The seasonal variation in the Ocean County District is significantly more pronounced than in many other districts of the state. A number of municipalities increase the base population many times during the summer season because of the resort nature of their communities. In addition, a significant influx of people from all over the state visit the resort areas on summer weekends which increase the generation of even more waste on the streets and in litter baskets. There is also an appreciable amount of waste generated typical to the shore area, beaches are cleaned, seaweed, sand and shells must be disposed of.

Table S-3 and Figure S-2 presents a summary of the existing residential solid waste disposal systems in the Ocean County District. Many municipalities utilize municipal landfills for the disposal of wastes generated in the District. A considerable number, over a third, utilize two major private landfills in the county, the Ocean County Landfill Corp. facility located in Manchester Township and the Southern Ocean Landfill, Inc. site in Ocean Township. Four municipalities use the Ocean County Landfill Corp. landfill located in Manchester and eight municipalities use the Southern Ocean Landfill, Inc. landfill located in Ocean Township.

The generators of the other components of the total waste stream, commercial and industrial establishments, institutions, agricul-

TABLE S-3

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLANSOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES

<u>MUNICIPALITY</u>	<u>DISPOSAL SITE</u>	<u>LOCATION</u>
BARNEGAT	Southern Ocean Landfill, Inc.	Ocean Township
BARNEGAT LIGHT	Southern Ocean Landfill, Inc.	Ocean Township
BAY HEAD	Lakewood Township Municipal Landfill	Lakewood
BEACH HAVEN	Southern Ocean Landfill, Inc.	Ocean Township
BEACHWOOD	Beachwood Municipal Landfill	Beachwood
BERKELEY	Berkeley Municipal Landfill	Berkeley
BRICK	Ocean County Landfill Corp.	Manchester
DOVER	Dover Township Municipal Landfill	Dover
EAGLESWOOD	Tuckerton-Eagleswood Landfill	Eagleswood
HARVEY CEDARS	Southern Ocean Landfill, Inc.	Ocean Township
ISLAND HEIGHTS	Southern Ocean Landfill, Inc.	Ocean Township
JACKSON	Jackson Township Municipal Landfill	Jackson
LACEY	Lacey Township Municipal Landfill	Lacey
LAKEHURST	Ocean County Landfill Corp.	Manchester
LAKEWOOD	Lakewood Township Municipal Landfill	Lakewood
LAVALLETTE	Waste Disposal, Inc. Landfill	Howell Twp., Monmouth Co.
LITTLE EGG HARBOR	Little Egg Harbor Township Landfill	Little Egg Harbor
LONG BEACH	Stafford Township Municipal Landfill	Stafford
MANCHESTER	Manchester Township Municipal LF (residents)	Manchester
	Ocean County Landfill (contractors)	Manchester
MANTOLOKING	Marpal Landfill	Monmouth County

TABLE S-3, Cont'd.

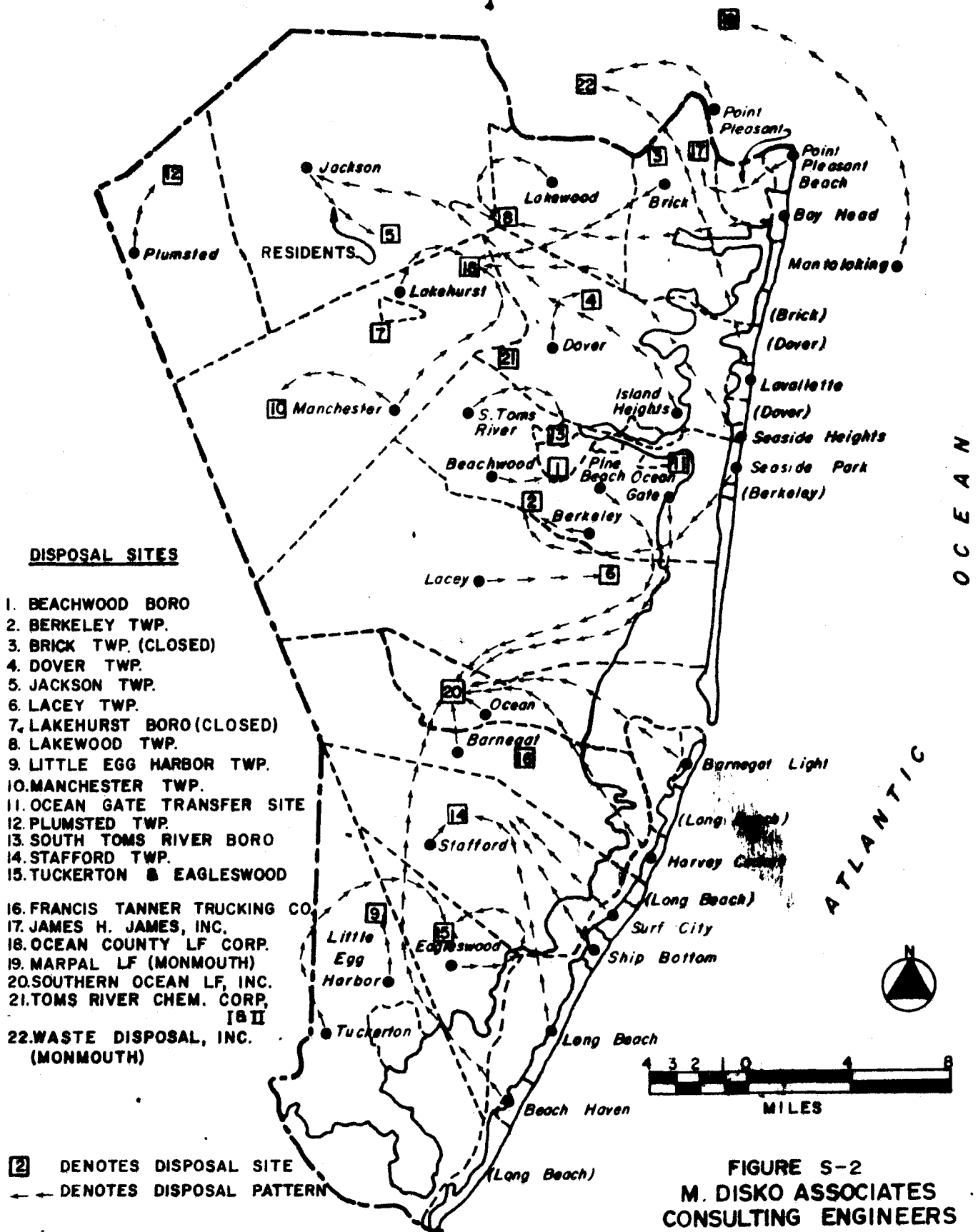
OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES

<u>MUNICIPALITY</u>	<u>DISPOSAL SITE</u>	<u>LOCATION</u>
OCEAN	Southern Ocean Landfill, Inc.	Ocean Township
OCEAN GATE	Southern Ocean Landfill, Inc.	Ocean Township
PINE BEACH	Southern Ocean Landfill, Inc.	Ocean Township
PLUMSTED	Plumsted Municipal Landfill	Plumsted
POINT PLEASANT	Waste Disposal, Inc. Landfill	Howell Twp., Monmouth Co.
PT. PLEASANT BEACH	James H. James, Inc. Landfill	Brick
SEASIDE HEIGHTS	Ocean County Landfill Corp.	Manchester
SEASIDE PARK	Berkeley Township Landfill	Berkeley
SHIP BOTTOM	Stafford Township Municipal Landfill	Stafford
SO. TOMS RIVER	So. Toms River Municipal Landfill	So. Toms River
STAFFORD	Stafford Township Municipal Landfill	Stafford
SURF CITY	Stafford Township Municipal Landfill	Stafford
TUCKERTON	Tuckerton-Eagleswood Landfill	Eagleswood

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES



tural concerns, and sludge and septic waste producers, utilize most of the disposal sites used by the collectors of residential solid wastes. There are, however, restrictions on some of the types of waste streams that can be accepted at any one particular disposal site.

SUMMARY OF SOLID WASTE QUANTITIES

An important aspect of the solid waste management plan is the calculation of quantities for the various components which make up the solid waste. This is often a difficult task because many municipalities have partial or incomplete records. Information from municipal officials is checked with information obtained from the Solid Waste Administration and Board of Public Utilities, the private contractors, and other sources. The estimated quantities presented below must be considered as having a 10 to 15 percent, plus or minus, accuracy.

TABLE S-4

SUMMARY OF SOLID WASTE QUANTITIES IN OCEAN COUNTY

<u>COMPONENT</u>	<u>1978-1979 ESTIMATED TONS/YEAR</u>	<u>1978-1979 ESTIMATED TONS/DAY</u>	<u>1978-1979 ESTIMATED LBS/CAPITA/DAY</u>
Residential	347,200	950	4.4
Non-Residential Municipal	44,750	150	0.7
Commercial	132,000	360	1.7
Industrial	62,500	170	0.8
Agricultural	27,450*	75	0.3
Institutional	24,600	65	0.3

*Only about ten percent appears at off-site disposal facilities.

TABLE S-4, Cont'd

SUMMARY OF SOLID WASTE QUANTITIES
IN OCEAN COUNTY

<u>COMPONENT</u>	<u>1978-1979 ESTIMATED TONS/YEAR</u>	<u>1978-1979 ESTIMATED TONS/DAY</u>	<u>1978-1979 ESTIMATED LBS/CAPITA/DAY</u>
Dry Sewage Sludge ** and Septic Wastes	12,800	35	0.17
County Totals	662,300	1805	8.4

**Figure at 100% solids content. At 4% solids, a typical solids content at which sludges and septic wastes are generated, the estimated daily tonnage of the liquid mix is 676. However, much of the water associated with sludges and septage, either, evaporates, is absorbed by other solid waste or leaches out.

CRITERIA AND CONSTRAINTS FOR SOLID WASTE MANAGEMENT PLANNING
IN OCEAN COUNTY

GENERAL CRITERIA

Development of a viable plan for an environmentally acceptable and cost efficient solid waste disposal plan for Ocean County requires consideration of a number of planning constraints.

Briefly, some of these constraints include: 1) public attitudes towards solid waste management, 2) increasing solid waste quantities, 3) existing solid waste disposal systems in the County, 4) the legal and administrative systems available, 5) the technology of solid waste disposal, and 6) environmental constraints. The importance of understanding the planning constraints which impact Ocean County cannot be overstated, for it is only by considering these constraints that an effective solid waste disposal management plan can be implemented.

The following key points summarize general policy considerations required for a successful solid waste disposal plan in Ocean County.

1. In order to implement a comprehensive solid waste management plan, the plan must be capable of overcoming public opposition to the location of a proposed solid waste disposal facility.
2. The proposed solid waste disposal system must have the capability of handling increasing amounts of solid waste in the future.
3. A comprehensive county-wide solid waste disposal plan must take into consideration the existing landfills within Ocean County. A county-wide system must allow gradual phase-out of smaller landfills as municipalities join a county system.
4. A county-wide solid waste plan must be founded upon the most practical administrative system available in order to make the system responsive, flexible and economically competitive.
5. Solid waste technology is in a state of continuing development. Disposal methods that have been sufficiently tested and developed to provide effective and efficient solid waste processing and disposal should be utilized in a county-wide plan. A cost effective system should be chosen for a county-wide disposal plan.
6. In developing a solid waste management plan for Ocean County, primary emphasis must be placed on protecting the County's valuable natural resources, including the groundwater aquifers, and ensuring that environmental quality standards are maintained.
7. Future solid waste disposal activities should continue to review the markets and economics of resource recovery as technology develops.

8. The plan should stabilize solid waste disposal costs and transportation haul patterns and should be responsive to the needs of the county and the municipalities.

CONSTRAINTS PLACED ON SITING NEW SOLID WASTE FACILITIES IN OCEAN COUNTY

At first glance, Ocean County would appear to have large tracts of non-developed land that might be suitable for the location of a solid waste disposal facility. However, there are several factors which impact the development of a new facility in the County. As shown on Figure S-3, the majority of the land in the county falls into environmentally sensitive areas. The area generally east of the Parkway is in the Coastal Area Facilities Review Act (C.A.F.R.A.) and the guidelines for development within this area essentially precludes siting of a new landfill or other major solid waste disposal facility.

In the area generally west of the Parkway, as outlined on Figure S-3, there are two Pinelands areas which are environmentally sensitive. The Pinelands Preservation Area is essentially closed to the development of a new solid waste disposal facility. The Pinelands Protection Area is also environmentally sensitive but development is not precluded from this area.

The final general constraint which must be considered is the proximity of a solid waste disposal site to airfields which can accommodate jet aircraft. The requirements of the Solid Waste Administration impact the construction of a 2-1/2 mile radius

from the geographic center of the runways.

LEGAL AND ADMINISTRATIVE CRITERIA

Under the provisions of the Solid Waste Management Act, each county in New Jersey is considered a Solid Waste Management District.

For Ocean County to develop a plan for a county-wide disposal system, an adequate administrative system with requisite financial, jurisdictional, legal, and operational capability would be required. Some of the requirements of the administrative structure include the following:

- . The administrative structure must have sufficient financial capabilities to fund and operate the project.
- . It must service a population sufficient to reduce the unit costs of solid waste disposal and to plan, develop, and operate on a county-wide basis.
- . It must be able to acquire property.
- . It should have control over the sources, types and quantities of solid wastes that are discharged into the processing and disposal system.
- . It should have the necessary personnel and equipment to perform its duties.

Currently, there are six administrative structures available for regional solid waste management in Ocean County including the following inter-municipal and county-level structures:

<u>LEGISLATIVE BASIS OF ADMINISTRATIVE STRUCTURE</u>	<u>TYPE OF REGIONAL SOLID WASTE SYSTEM PERMITTED</u>
Incinerator Authorities Law of 1948	One or more municipalities may create Incinerator Authority
Solid Waste Management Authorities Law of 1968	One or more municipalities may create Solid Waste Manage- ment Authority
Joint Service Contract (N.J.S.A. 49:48B-1)	Joint Meeting between two or more municipalities
County Municipal Utilities Authority Law	County Utilities Authority established by Freeholders
County Improvement Authorities Law	County Improvement Authority established by Freeholders

The selection of either a County department or an authority as the administrative structure would have to be made.

A County department could use general obligation bonds or current revenues to build and operate any facilities. A County department gives the strongest direct control to the Board of Chosen Freeholders. Bonding requirements would become part of the overall County obligations.

An authority could utilize revenue bonds to fund a project. Initially bonds could be obtained based on a pro forma statement of anticipated earnings. Revenue interest would be some-

what higher than general obligation bond interest. Revenue bonds would not be part of the overall County bond obligations. Chapter 326 requires the Freeholders to review and update the district solid waste management plan every two years. Problems could develop between an independent authority and the Board of Chosen Freeholders in the implementation and operation of a county-wide program and in the required two-year plan revisions.

PROPOSED SOLID WASTE DISPOSAL MANAGEMENT PLAN FOR THE OCEAN COUNTY DISTRICT

The proposed solid waste disposal plan for Ocean County was developed after many months of research, planning, discussion, and assessment of input from local, county, and State officials. The Ocean County District Plan is arranged in a set of three guidelines. A number of actions can be pursued under each guideline in order to arrive at a number of desired ends.

The Plan has been developed to meet the waste management needs of each Ocean County municipality. The guidelines and the actions which can be pursued are presented in the following discussions.

GUIDELINE ONE - GENERAL PLAN FOR SOLID WASTE MANAGEMENT

The development of two regional landfill facilities located within the County for the disposal of residential, commercial and non-chemical industrial waste, coupled with the exclusion of all out-of-county wastes, is seen as the best way to assure the availability of disposal facilities for all the County's municipalities for at least the duration of the ten-year planning period. It shall be the policy of the

County that all out-of county wastes shall be prohibited from all disposal facilities located in the district.

ALTERNATIVE ACTION ONE

The purchase of the two large regional, existing, privately owned sanitary landfills is a practical solution. The two landfills are Ocean County Landfill Corporation in Manchester Township, and the Southern Ocean Landfill, Inc. in Ocean Township. Currently, these two landfills are private, B.P.U. regulated landfills which accept much of the solid waste being generated in the District.

There are several distinct advantages to the purchase of these two facilities.

- a. There should be minimal public opposition to the acquisition because the disposal sites are existing. The traffic and transportation patterns are well established. No new landfill sites are proposed.
- b. It is easier to upgrade an existing sanitary landfill than to locate, design, and get approvals for a new one. Historically, very few new landfills have been located in New Jersey if public opposition was vocal.
- c. The majority of Ocean County's land area falls in either the C.A.F.R.A. zone or the Pinelands zone. These environmentally sensitive areas virtually preclude the siting of a new landfill.
- d. The acquisition of the two landfills assures Ocean County of residue disposal when, in the future, the District considers the implementation of resource recovery.
- e. Since the landfills are existing, they have a steady supply of waste being disposed of there on a daily basis. It is important to have customers using a facility when it is established. When the District acquires these two landfills, they will have a "built-in" cash flow.

- f. The Ocean County Landfill Corp. site is in the northern part of the District and can very easily service all of the northern, more populated municipalities. The Southern Ocean Landfill Inc. is in the southern part of the District and is well situated to service the southern municipalities, and Long Beach Island. In point of fact, four (4) municipalities currently use the O.C.L.F. site for residential waste disposal and eight (8) municipalities use the S.O.L.F. for their residential waste disposal. In addition, scores of private contractors collecting commercial and industrial waste also use the two landfills.
- g. The environmental problems associated with the two existing landfills can be systematically upgraded to meet current State regulations. If the two sites were to remain in private ownership, there would be no assurances of the private sector upgrading the sites in the foreseeable future. Upgrading to meet evolving Federal criteria could take many years. In the interim Ocean County could conceivably witness disposal of large volumes of sludges and other wastes in these landfills. The District is better able to assure the environmental upgrading of the two landfills in a timely fashion.
- h. Another advantage of District acquisition of the two sites is that through the legislation as outlined in Chapter 326, P. L. 1975, the District will then be able to control the flow of solid waste to the sites. In effect, the District will be able to exclude out-of-county waste from entering the two landfills. And since these two sites are the major private landfills in the County, most importation of waste into the District will be forced to stop when the two sites are owned by the District.

Therefore, as can be seen, there are many distinct advantages to the ownership of the two disposal facilities by the District.

There are some disadvantages also.

- a. By acquiring an existing landfill, the District inherits any environmental problems that the landfill might have.
- b. Since the locations of the two sites are fixed, the District has no flexibility in locating them.
- c. Since the landfilling operations are on-going at the two sites, the purchase price per acre will be higher than for virgin land.

ALTERNATIVE ACTION TWO

The acquisition and operation of the Ocean County Landfill Corporation can be undertaken by another public entity, namely the Township of Manchester. Manchester Township has expressed considerable interest in acting as an agent for the County in owning and operating the Ocean County Landfill Corporation which is located within its municipal boundaries. The Township envisions that it can provide all the advantages of public ownership outlined in ALTERNATIVE ACTION ONE above while also meeting some of its own needs.

ALTERNATIVE ACTION THREE

As an alternative to takeover of the Southern Ocean Landfill by the County or an agency thereof, Ocean Township has forwarded a proposal to the County which it favors over the County takeover of the existing private operation. The Township of Ocean has offered to sell the County a parcel or parcels of municipally owned virgin land, sufficient in size to meet the landfill needs of municipalities in the southern portion of Ocean County.

A possible disadvantage in developing a new facility bears mentioning at this point. It is not absolutely clear how amenable various State agencies will be to permitting a new facility in the southern part of Ocean County.

The new facility would be located in a restricted Pinelands Area. CAPRA restrictions may have to be overcome. Stricter regulations on new landfills imposed by the Solid Waste Administration also make this alternative action harder to implement.

One or a number of the above alternative actions will accomplish the objective of creating two modern regional landfills. Decisions regarding the alternative actions will be formulated during the Fall of 1979, as part of the County's continuing planning. Implementation is anticipated during 1980.

DELINEATION OF WASTE DISTRICTS

Not all of the District's 33 municipalities will utilize the Regional facilities when first implemented. Some of the municipalities, such as Stafford, Lakewood, Berkeley and Lacey may opt to continue to use their own landfills for the short term. Their landfills currently have ample room for additional landfilling. However, the District expects that when the full force of environmental regulations are brought to bear against the landfills, and they are forced to spend large sums of money to upgrade, that they will seriously consider closing their landfills since the County will have provided them with an acceptable alternate. Of course, the Regional facilities will be designed to handle the eventual waste input from the residential, commercial, and non-chemical industrial waste streams from all 33 municipalities.

The preliminary distribution of the waste load between the sites is as follows:

NORTH WASTE DISTRICT

The following municipalities could use the O.C.L.F. site in Manchester:

Bay Head	Lavallette	Plumsted
Beachwood	Lakehurst	Point Pleasant
Berkeley	Lakewood	Point Pleasant Beach
Brick	Manchester	Seaside Heights
Dover	Mantoloking	Seaside Park
Island Heights	Ocean Gate	South Toms River
Jackson	Pine Beach	

Total of 20

SOUTH WASTE DISTRICT

The following municipalities could use the S.O.L.F. site in Ocean Township or a new Regional facility operated by the County:

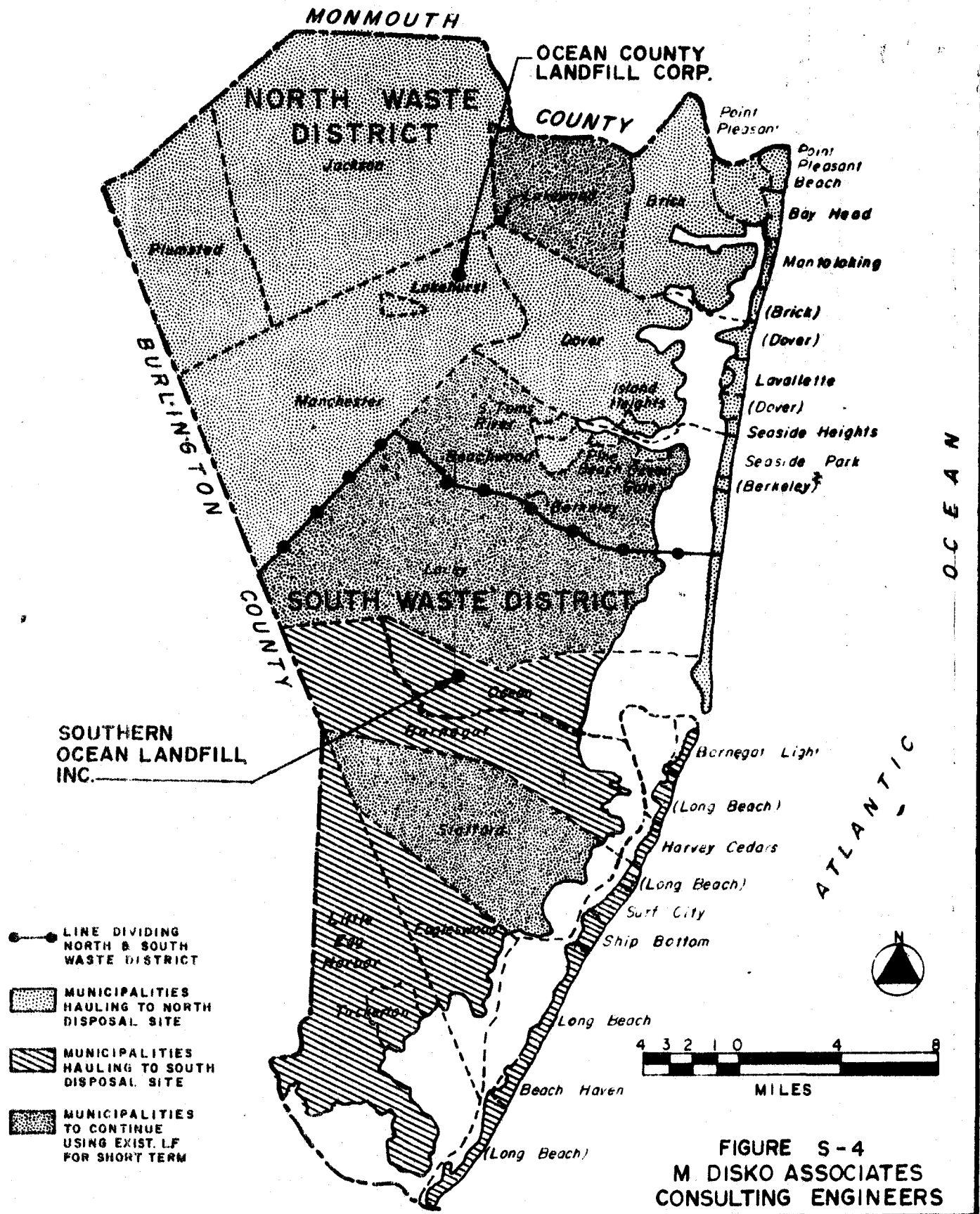
Barneгат	Lacey	Stafford
Barneгат Light	Little Egg Harbor	Surf City
Beach Haven	Long Beach	Tuckerton
Eagleswood	Ocean	
Harvey Cedars	Ship Bottom	

Total of 13

Municipalities could opt to use their existing sites for the short term. They can, of course, join the County system at any time. It is, however, the intent of the District that all landfills operating in Ocean County will be required to conform at the earliest practical date to Federal criteria governing classification as a sanitary landfill. While final regulations have not been promulgated by USEPA, criteria have been proposed pursuant to Section 4004(a) of the Resource Conservation and Recovery Act of 1976. The federal law requires that all landfills be evaluated considering federal criteria within one year after the criteria are promulgated. Any facility which does not meet the criteria will have, at most, five years to comply.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

DISPOSAL STRATEGY USING TWO SECURE SANITARY LANDFILLS



The location of the two existing sanitary landfills are geographically shown on Figure S-4. It is important to note that a new Regional facility may ultimately be the appropriate course of action decided upon and, therefore, Southern Ocean Landfill Inc. would not be considered as the focus of solid waste disposal in the South under the County plan.

The line dividing the North and South Districts is not inflexible. The Plan allows the flexibility for municipalities who may be under contract with a particular existing landfill to continue to use the site until the contract ends.

GUIDELINE TWO - RESOURCE RECOVERY ELEMENT

Chapter 326 has as a requirement, the eventual development of an implementable resource recovery system. The Ocean County Plan supports both high and low technology approaches to resource recovery. The potential for implementation of high technology resource recovery in Ocean County within the planning period will be further studied. Two actions are identified under this guideline. They are presented below.

ACTION ONE

A detailed investigation as to the proven resource recovery systems currently available and their potential for implementation in Ocean County will be made. With public control of most of the waste flow in the County, sufficient waste streams could be eventually directed to a resource recovery facility if a feasible system is implemented. Feasibility would be dependent upon consideration of technological, environmental, economic and political factors.

After due consideration, Ocean County may opt to take the direction of phased implementation of high technology resource recovery. The advantages of this action is a much shorter time frame in which a resource

recovery strategy can be implemented. Only marketable products would be recovered. Capital costs would be amortized over a longer period of time.

ACTION TWO

The County will continue to cooperate in developing the resource recovery strategy being implemented by Dover Township. Dover Township recently released a "Preliminary Feasibility Study for Solid Waste Disposal/Energy Recovery System." The system consists of modular controlled air incineration units which can either generate steam or electricity. Markets have been identified and preliminary cost estimates developed. Dover Township has expressed a willingness to include wastes generated in nearby municipalities. Dover Township is encouraged to continue their implementation program and to secure the necessary permits. This is viewed as complementary to the overall County resource recovery strategy.

Contingent on the success of the above action, Dover Township also has proposed that the system it intends to use could be implemented as part of a County program at the three regional waste water treatment plants operated by the Ocean County Utilities Authority, providing a location as well as a ready energy market. The success of the Dover program, and the feasibility of similar facilities elsewhere in the County, will be considered as part of the study discussed in ACTION ONE.

With respect to low technology resource recovery, source separation is the most practical approach. A number of programs exist at the local level currently in operation in Ocean County. Their impact on the waste stream is minimal, but their efforts should be encouraged. The District should take a strong position in favor of source separation programs which are established on either a municipal or multi-municipal basis.

A good example of a multi-municipal effort occurs in Monmouth County, where six communities have banded together to form the Regional Resource Recovery Committee. This group is in the process of writing ordinances and preparing plans for mandatory collection of newspaper at the curb from all six municipalities.

A Regional Resource Recovery Program will be developed in Ocean County.

Some possible actions which are recommended for the District include:

- A. The District should act as a clearinghouse for information on the markets and current prices for the recovered materials and, thereby, aid the local groups.
- B. The District should encourage the remaining municipalities to begin recycling programs.
- C. The District should aid, wherever possible, the individual municipality's efforts at writing and implementing source separation or curbside collection ordinances.

GUIDELINE THREE - SLUDGE AND SEPTAGE MANAGEMENT ELEMENT

Another one of the responsibilities given to the Ocean County District under Chapter 326 is the comprehensive planning for the disposal of sewage sludges and septic wastes. The management of these wastes is becoming an increasingly critical problem. State and Federal mandates will prohibit ocean dumping by 1982. In Ocean County, there are an ever-decreasing number of land-based alternatives available - only one regional landfill, Southern Ocean Landfill Corp., now accepts septage and sludges. A general policy of the district is to restrict the use of available sludge disposal capacity to Ocean County municipalities for this facility or any future facility. Two actions are presented below. They incorporate both short and long term solutions to the management problem.

ACTION ONE

In addition to Chapter 326 requirements, Federal law and various other State regulations contain provisions requiring planning for sludge and septic waste management. Under Section 201 of the Federal Water Pollution Control Act, regional agencies are charged with the responsibility of planning and implementing sludge management facilities. Section 208 agencies have also been given the task of planning for the treatment and disposal of septic waste. The apparent overlapping of responsibilities appears to promote duplication of effort. A most logical approach in Ocean County would be a cooperative effort among the three planning agencies. A cooperative effort between the OCUA, Section 208 planners, the Solid Waste Advisory Council, and the Board of Chosen Freeholders can yield an implementable, long-range sludge and septic waste management plan.

ACTION TWO

Another strategy is to encourage sludge and septage disposal processes that have been developed by the private sector. Land-based sludge and septic waste disposal facilities have been permitted in other counties of New Jersey. These facilities and the processes they use can be investigated. Methods suitable for implementation in Ocean County should be encouraged. Some of the technologies currently available which may be suitable in Ocean County include thermal reduction, soil injection, land spreading and composting.

The development of land-based disposal facilities by the private sector can be complementary to ACTION ONE. It can provide ready alternate disposal options to the 201 agency which it may find acceptable and suitable to include as a part of its comprehensive disposal plan.

PROPOSED DISPOSAL STRATEGY

The planning strategy for the Ocean County Solid Waste Management Plan is illustrated on Figure S-5. The following steps describe the proposed strategy:

1. The existing solid waste disposal system consists of the 12 municipal landfills, 2 major private landfills in-county, and 3 out-of-county landfills. The 1979 estimated average solid waste load is 2000 tons per day.
2. With input and guidance from the Solid Waste Advisory Council, the Planning Board, the Board of Freeholders, and the municipalities, the County would develop a system of two regional facilities for county-wide solid waste disposal. A decision would also be made on the appropriate study resource recovery. This would occur in 1979-1980.
3. The District would initiate activities to monitor environmental factors, including surface and groundwater monitoring program. The Ocean County District would initiate design and construction activities to develop environmentally secure sanitary landfills. This would normally occur in the period 1979-1981. During this period, some municipalities would continue to use their existing disposal sites while the majority would begin to phase into the regional system. Also, during this period an evaluation would be made of the feasibility of mandatory source separation of materials recoverable from the residential solid waste stream. The feasibility of District coordination of such a program would be evaluated.
4. During the period of 1981 through 1990, Ocean County would oversee the operation of regional environmentally secure sanitary landfills. Depending upon the previous evaluations, an appropriate level of District input would be allocated to assisting the operation of a regional source separation program.
5. During the period 1980 through 1984, Ocean County would evaluate the potential siting and use of transfer stations.
6. By the 1985 through 1990 period, the County tonnages are expected to be in the 2500 to 2750 tons/day range. Depending upon decisions made earlier in the 10 year planning period a full scale or phased resource recovery system may be operational during this time period.

The end result can be the development of facilities to treat and/or dispose of sludge and septic wastes. Disposal may be either at treatment plants, or at designated sanitary landfills. A number of alternative technologies, including composting and codisposal, will be considered.

The regional 201 planning agency, Ocean County Utilities Authority (OCUA), is on the State priority list for Federal funding to develop a comprehensive sludge management plan which would include septic waste management.

The Solid Waste Advisory Council has already indicated its support of the OCUA and its efforts to develop a plan. Full support however is contingent on a number of factors.

1. The ultimate management plan must include all areas of the County including areas in the western portion of Ocean County which are not considered to be in the service area of the OCUA.
2. Since the SWAC and the Board of Freeholders have been charged with sludge and septic waste management under Chapter 326, the SWAC should have a role in overseeing the development of the plan.
3. Septic waste management must be fully addressed and integrated into the ultimate plan.

Shorter term solutions are currently being developed by the OCUA.

The regional plant, which serves the Northern Service Area, has been accommodating a limited amount of septic waste on an experimental basis. Federal funds are being sought for construction of a septic waste pre-treatment facility at the Authority's treatment plant for the Central Service Area. Construction of such facilities will help alleviate the periodic, serious sludge and septic waste disposal problems which have plagued Ocean County in the past few years.

IMPLEMENTATION OF THE OCEAN COUNTY DISTRICT PLAN

Figure S-6 illustrates the basic steps required to implement the proposed Ocean County District Solid Waste Management Plan.

A description of the important steps follows:

1. Once the plan is adopted by the Board of Chosen Freeholders and approved by the Solid Waste Administration of the New Jersey Department of Environmental Protection, a basic decision is required to determine the administrative structure required to manage facilities proposed for District operation. A County Department could be designated as the operating agency or some form of authority can be created as allowed under a number of New Jersey laws .
2. Concurrently with the above, negotiations must be initiated to implement the regional system of two landfills. A variety of ways can be used to achieve this end. Two existing private facilities can be purchased, or a municipality can act as the County's agent in the operation of the Ocean County Landfill Corp., and/or a virgin site can be purchased in the southern portion of the County for development of a new regional facility.
3. After initial agreements are reached all applications necessary would be filed with the Department of Environmental Protection and the Board of Public Utilities. The permits as well as County policy will require that out-of-county waste be prohibited from coming into the District. Existing contracts would be honored until their expiration, but no new contracts would be allowed from out-of-district wastes.
4. Along with step number 3 above, engineering designs should be prepared for the 2 disposal facilities which will make up the base of the District management plan for solid waste. Environmental safeguards required by the State will be carefully designed. Environmental safeguards could include leachate collection and treatment, capping previously landfilled areas to reduce leachate production, constructing bottom liners, installing additional groundwater monitoring wells and gas vents, etc.
5. A study should be made of the availability of materials and markets to determine the feasibility of a regional source separation program.
6. Once all the legal and administrative hurdles have been overcome, initial operation of the disposal facilities can begin. Staff for the facilities would be selected and trained. Initial construction of the monitoring program and development of environmental safeguards would begin.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE MANAGEMENT PLANNING STRATEGY

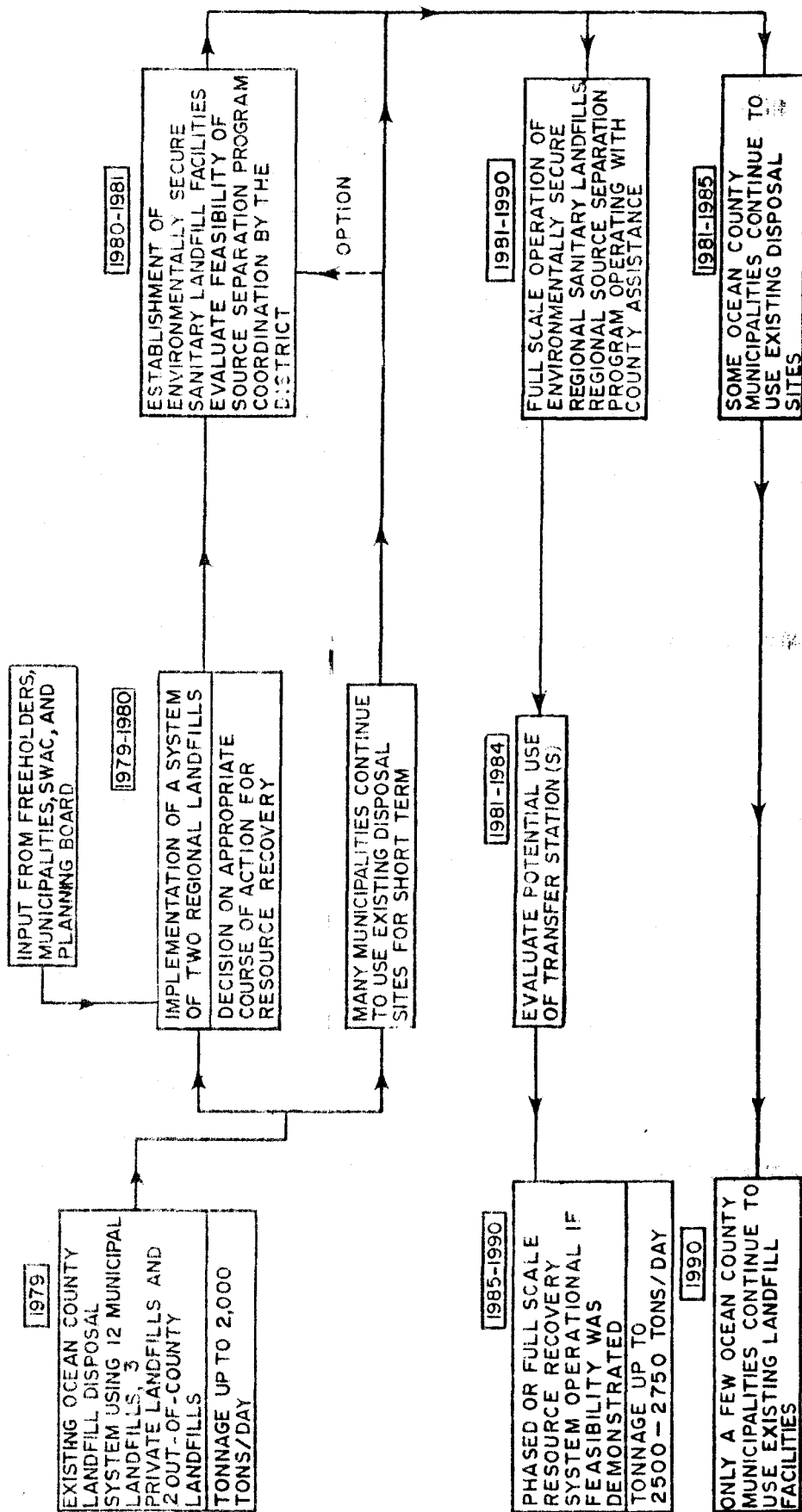


FIGURE S-5
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

7. By 1981, full scale operation of the regional sanitary landfill system could be underway. A study would be initiated to evaluate the feasibility of transfer stations on either one or both of the islands.
8. Based on the results of the study of the feasibility of a regional source separation program, a program with some level of County participation could be initiated around 1981.

In summary, the above discussions attempt to explain how the Ocean County District Solid Waste Plan attempts to coordinate all activities related to the collection and disposal of solid waste by every person engaging in such process within the District.

At the present time, the capital costs for acquiring the two private facilities, if that course of action is pursued, are as follows:

<u>SITE</u>	<u>ACREAGE</u>	<u>COST</u>	<u>COST/ACRE</u>
Ocean County Landfill Corp.	303 [±]	\$2.4 Million	\$8000.00 [±]
Southern Ocean Landfill Inc.	283 [±]	\$2.0 Million	\$7000.00 [±]

These costs are based on recent real estate appraisals. Costs might be reduced through successful negotiation with current owners. The cost of capital improvements to line landfill, provide groundwater monitoring, cap existing landfill areas, etc. in order to insure an upgraded, modern landfill operation would be in the range of \$15,000 to \$25,000 per acre. Small sections of landfill area could be developed as needed yearly to minimize capital costs.

If it is decided that Manchester Township is to act as the agent for the County in owning and operating the Ocean County Landfill Corp.,

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE MANAGEMENT - INITIAL IMPLEMENTATION STRATEGY

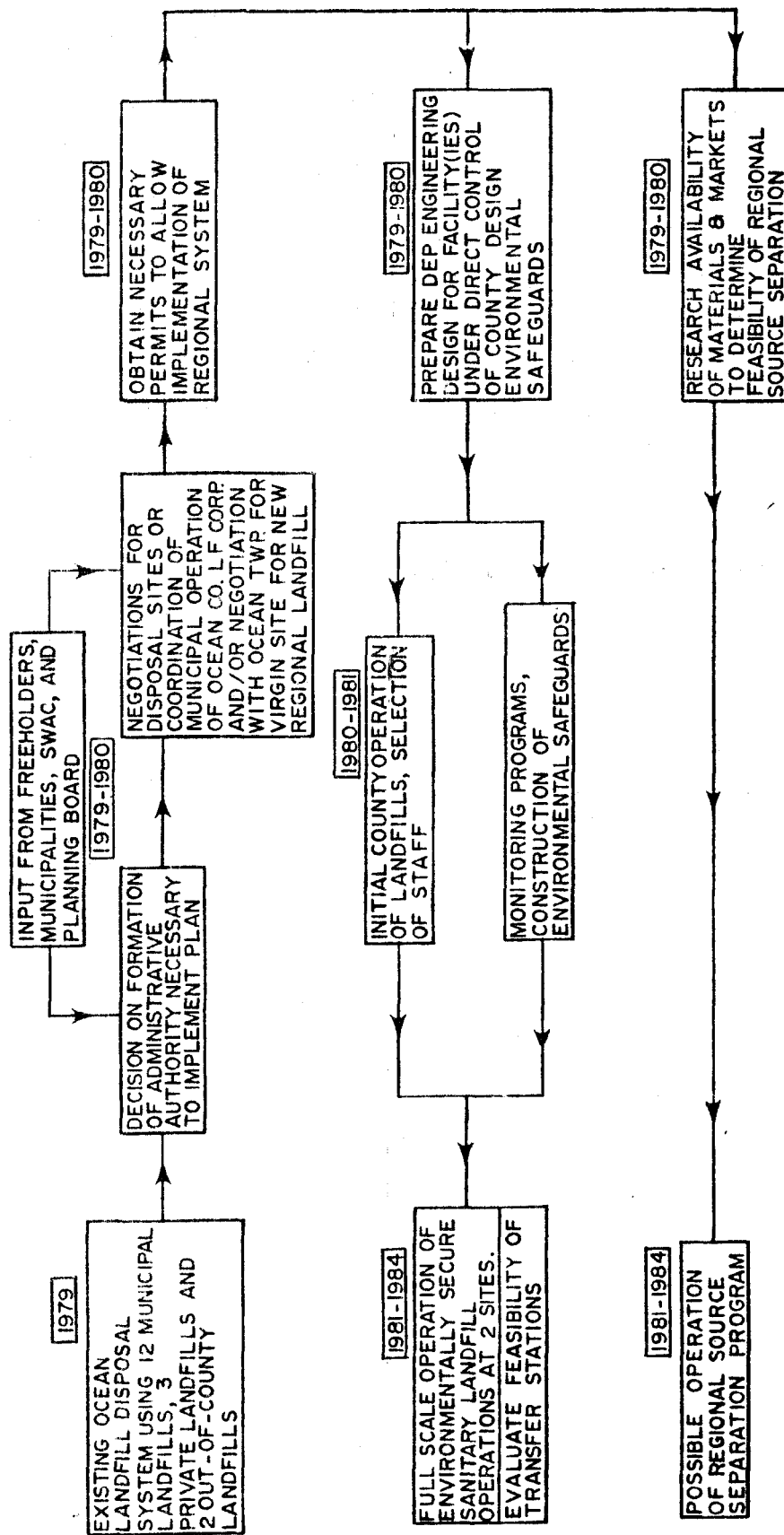


FIGURE S-6
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the capital expense of acquiring and upgrading that facility is eliminated. If it is decided that a virgin site is to be selected for a regional facility for the southern part of the County, then acquisition costs will be significantly less. The ability to obtain the necessary permits for a new disposal facility is an important factor to consider, and one which hasn't been clearly defined as of yet.

I. INTRODUCTION

THE SOLID WASTE PROBLEM

Nationally, approximately 136 million tons of post consumer solid waste was generated in 1975, a slight decline over previous years. The EPA attributes this short term decline to the general economic recession which began in mid 1974. Over the long term, however, solid waste quantities are expected to increase. In New Jersey, over 17,000 tons of municipal solid waste was generated every day. This translates into 6.21 million tons per year, or about 4.6% of the waste generated nationally in 1975.

In addition to the residential solid waste quantities, commercial, industrial, institutional, agricultural, and sewage sludge and septage waste can double or triple the total amount of wastes which must be disposed of.

Solid waste production in the United States is greater than in any other country. The availability of goods and services, the concentration of population, and a significant amount of industrial establishments probably explain at least in part why New Jersey produces such a large quantity of solid waste.

Modern production techniques and complexity, both physical and chemical, of products manufactured today are the cause of the numerous array of by-products and other wastes of production which must be disposed of. Much of this material is not recovered.

Part of the reason lies in the fact that the economics of disposal versus the economics of recovery are tilted towards more disposal than recovery in many cases. The availability of a cheap method of disposal, the landfill, has aided in tipping the balance towards more waste production. If current disposal regulations which detail appropriate safeguards to be implemented by the landfill operator were enforced, the increased cost of disposal may be enough of an economic impact to encourage less production of waste and more recovery of materials prior to disposal.

From the manufacturer the final product goes to the consumer, but not without a considerable amount of packaging. Various types of unit packages, developed for advertising appeal, product sanitation and protection, or protection against pilferage, just to name a few, transform the product produced by the manufacturer into a retail product ready for sale. But, before the product gets to the consumer, it must be distributed. Distribution involves packaging of the unit products into bulk packs for shipment to retail outlets.

The commercial establishment unpacks the unit items, disposes of the bulk packs as waste, and sells the unit product to the consumer which are put in a container, a paper bag, or plastic bag, which holds all of the other unit products together for the convenience of the consumer.

Finally, the consumer brings the product home, throws away the paper or plastic bag, throws away all or part of the packaging of the unit product, and consumes the product. Once the product has lost its utility, it is disposed of, and a replacement is bought. Most all of the wastes produced in New Jersey are disposed of in sanitary landfills.

There are currently more than 200 landfills in New Jersey utilizing many thousands of acres of land. Landfills have been typically sited in New Jersey in areas that are ecologically sensitive, such as floodplains and wetlands. Because of the negligible amount of leachate control exercised at these sites, groundwater contamination is a very real threat. Once an aquifer is contaminated, it can take decades before the water supply can be used for home consumption again.

Our society has been conditioned to using disposable products. The demand of the American consumer for disposable products which frees him or her from having to clean it to provide further utility has developed an enormous market for disposable sanitary paper and plastic products and containers.

Other items such as small appliances, toys, and the like, are manufactured so that servicing the product when it breaks is virtually impossible, or is so costly that buying a replacement product can actually be cheaper.

The transaction of business involves the use of much paper. The introduction of the photocopy machine has greatly increased the production of paper wastes by service companies.

The treatment and disposal of sewage sludge and septage has also become an acute problem over recent years. Federal and State mandates are requiring that the disposal of these wastes in the ocean be discontinued by 1982. Land based alternatives are being sought and are being implemented with the inevitable increase in cost.

In Ocean County, indications are that the solid waste production rate is increasing at about 2 to 4 percent annually. The cost for collection and disposal has increased not only to reflect the increased quantities which must be handled, but also due to the inflation of recent years. Stricter enforcement of environmental controls will also raise the disposal cost or cause landfills to close down.

THE STATE MANDATE

In 1970, the New Jersey State Legislature passed the Solid Waste Management Act. It said in part: "The collection, disposal, and utilization of solid waste is a matter of grave concern to all citizens.... and that the current solid waste crisis should be resolved not only by the enforcement of more stringent and realistic regulations on the solid waste industry, but also through the development of statewide, regional, county and inter-county plans for solid waste management and guidelines to implement the plan."

On July 29, 1977, Chapter 326 of the Laws of 1975, became effective. Under the provisions of Chapter 326, which ammended the 1970 Solid Waste Management Act, each county in New Jersey and the area under the authority of the Hackensack Meadowlands Development Commission were to be considered Solid Waste Management Districts. The Districts are required to develop solid waste management plans. According to the "Guidelines for the Development and Formulation of District Solid Waste Management Plans", issued by the Solid Waste Administration of the Department of Environmental Protection, at least the following tasks must be completed:

- a. Meet the solid waste management needs of every municipality within the district,
- b. Be in force and effect for a period of ten years following adoption and must be reviewed and updated every two years,
- c. Designate a department, unit, or committee of the district to supervise the implementation of the solid waste management plan,
- d. Inventory the sources, composition and quantity of solid waste generated and projected to be generated within the district in each of the ten years following the year in which the plan is prepared,
- e. Inventory and appraise all existing solid waste facilities within the management district. In the event that a district is presently utilizing existing facilities located outside its boundaries and it anticipates the continued utilization of these facilities under its adopted plan, the district shall request that the host district, in which the facility is

located, undertake the inventory and appraisal. Should the host district be a member of a different group of districts, it shall use a portion of its first year grant to undertake this evaluation. The evaluation would be utilized by both districts in the development of their plans. If a district wishes to continue using a facility in another district, the exporting district must obtain the approval of the host district. The inventory and appraisal will include the identity, location, remaining capacity and life expectancy and environmental status,

- f. Identify every person engaged in the collection and disposal of solid waste within the district,
- g. Contain an analysis of existing collection and transportation systems with the goal of developing and implementing the most economic and energy efficient systems,
- h. Identify a solid waste processing and disposal strategy containing the maximum practical use of resource recovery procedures, including high and low technology, and a plan for the environmental upkeep and suitable utilization of terminated landfill sites,
- i. Contain a site plan of all existing solid waste facilities located within the district that are operated and maintained in accordance with all applicable health and environmental standards and any additional sites and facilities that together will provide sufficient and environmentally sound resource recovery and disposal capacity to handle existing and projected solid waste generation,

- j. Contain a survey of proposed collection districts and transportation routes, with projected transportation costs from collection districts to existing or available suitable sites for solid waste facilities,
- k. Contain the procedures for coordinating all activities related to the collection and disposal of solid waste by every person engaging in such process within the solid waste management district. These must include procedures for entered into agreements, as provided in Chapter 326, between the solid waste districts and persons engaged in collection and disposal, and the procedures for furnishing the solid waste facilities contained in the solid waste management plan, and
- l. Contain the method or methods of financing solid waste management in the solid waste management district pursuant to the solid waste management plan.

The Act was again ammended on January 10, 1978 to require that the solid waste management plan include an investigation of the sludge management problem and detail the disposal options to be used once ocean disposal of sludges becomes illegal after December 31, 1981.

The task of developing this plan for Ocean County was given to M. Disko Associates, environmental engineering consultant, Union, New Jersey.

THE SETTING FOR THE OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

A study of the solid waste problem in Ocean County was authorized by the Ocean County Board of Chosen Freeholders on April 24, 1974.

The study had the following scope:

1. To develop a comprehensive regional solid waste management plan for Ocean County's municipalities; a plan that will ensure an area-wide approach with advantages of intergovernmental cooperation.
2. To evaluate the economic and financial aspects of a comprehensive regional solid waste management plan.
3. To enlist citizen and local government support and cooperation with definite roles in plan development and implementation.
4. To formulate the necessary legal rules, standards, and regulations necessary for implementation and operation of the regional plan.
5. To determine the organizational responsibilities, structure, and functions to implement and operate the regional solid waste management plan.
6. To evaluate the technical and environmental aspects of solid waste collection, transfer, processing, and disposal methods for a comprehensive plan.

M. Disko Associates was engaged to undertake this study. Volume 1 of the "Ocean County Solid Waste Disposal and Resource Management Study" was completed in December of 1975. This volume contained an inventory of existing solid waste systems and background

information on various aspects of solid waste management. Much of this information is requested by the current state mandate in the formulation of the district solid waste management plan.

The second volume of the "Ocean County Solid Waste Disposal and Resource Recovery Management Study", "Proposed Regional Solid Waste Disposal Management Plan", was released in November of 1976.

As a first step towards fulfilling the requirements of Chapter 326, M. Disko Associates undertook the task of updating the 1975 report. Many revisions were made to reflect the current status of existing solid waste systems in the District. Next, much of the background information was revised to incorporate the new advances in the rapidly changing solid waste industry.

During December of 1978, the consultant presented a concept plan representing the requirements of Chapter 326 to the Solid Waste Advisory Council. The plan proposed the acquisition of two existing sanitary landfills by the County as the nucleus of the District Plan. The Solid Waste Advisory Council passed a resolution approving the concept plan during their December, 1978 meeting. On January 29, 1979, the consultant presented the plan to the Ocean County Board of Freeholders for their review and acceptance.

This plan is by no means intended to be an inflexible guide to managing solid waste in the Ocean County District over the next

ten years. The State itself has required that the plan be updated at least every two years. Indeed, planning parameters in solid waste management can and do change quickly. The plan will be revised as new data becomes available. This will enable the District to implement an environmentally sound, district-wide solid waste management system.

II. TYPES OF SOLID WASTE

The Solid Waste Management Act (Chapter 326, P.L. 1975) defines solid waste as "garbage, refuse, and other discarded materials resulting from industrial, commercial and agricultural operations, and from domestic and community activities, and shall include all other waste materials including liquids except for liquids which are treated in public sewerage treatment plants and except for solid animal and vegetable wastes collected by swine producers licensed by the State Department of Agriculture to collect, prepare and feed such wastes to swine on their own farms."

A listing of most of the types of solid waste that are generated along with a short description of each is presented in Table II-1. In reviewing the table one can see the large variety of solid waste that can be generated. Each municipality in Ocean County produces a unique mix of these various types of solid wastes. The quantities of each depend on many factors. The location of a hospital in one municipality will increase its composition of pathological and other special types of waste resulting from the day to day operation of a hospital. A community with a major chemical company will have a different waste mix than a community solely involved with summer business, as is the case with many of the shore communities of Ocean County.

Another interesting feature of solid waste generation is that the quantities of solid waste generated by the shore communities varies

TABLE II-1
GENERAL TYPES OF SOLID WASTE
PRODUCED IN NEW JERSEY MUNICIPALITIES

<u>TYPE</u>	<u>COMPOSITION</u>
ABANDONED VEHICLES	Junked cars and trucks left on public property
AGRICULTURAL WASTE SOURCES	Animal manures, vineyard and orchard prunings, greenhouse wastes, pesticides and containers, crop residue, etc.
ASHES	Residue from fuel and combustion of solid wastes
BULKY WASTES	Furniture, bedding, refrigerators, ranges, rubber tires, hot water heaters, boilers, etc.
CONSTRUCTION AND DEMOLITION WASTES	Lumber, masonry, pipes, asphaltic materials, concrete, construction materials from razed projects, and scrap building materials
DEAD ANIMALS	Cats, dogs, horses, cows, deer, wild animals, marine animals, etc.
GARBAGE	Wastes from preparation, cooking, serving, marketing, handling and storage of food
INDUSTRIAL WASTES	Variety of organic and inorganic chemicals, inert and decomposable materials and scrap
RUBBISH	Paper, boxes, cartons, wood, metals, tin cans, glass, minerals, ceramics, plastics, etc.
SEWAGE TREATMENT RESIDUE	Sludge, grit, coarse and fine screenings, precipitated solids
SLAG, FLY ASH AND INCINERATOR RESIDUE	Cinders, metal slag, charcoal, frit, etc.
SLUDGES	Semi-liquid or dewatered residue from industrial process operations or waste-water treatment operations

TABLE II-1, CONTINUED

GENERAL TYPES OF SOLID WASTE
PRODUCED IN NEW JERSEY MUNICIPALITIES

<u>TYPE</u>	<u>COMPOSITION</u>
SPECIAL WASTES	Pathologic wastes, hazardous or flammable solids, radioactive wastes
STREET REFUSE	Sweepings, catch basin dirt, contents of waste receptacles, street leaves
TRASH	Leaves, trees, branches, grass yard trimmings

a great deal, as does the composition. Officials in several municipalities along the shore reported a ten fold increase in population in the summer months. This population produces a different type of solid waste than the permanent population. More convenience foods are consumed and less bulky type wastes are produced. In addition, the litter basket waste quantities increase because of the influx of people who visit the shore.

Certain industrial establishments may show a measure of seasonality in their waste production also. Seasonal fluctuations can also be recognized at the residential level. Even when the number of residents remains constant, there still are seasonal fluctuations. In the spring months a large increase in lawn, leaf, and gardening wastes develops. Many municipalities conduct clean-up programs in the spring and the early summer. Naturally, figures show that average weekly tonnages can seasonally vary by as much as 30% either way.

Another parameter that can affect the calculation of a solid waste generation rate is the amount of rainfall that falls on any particular day. Much of the solid waste found in the municipal solid waste stream is paper or organics. A substantial amount of water can be absorbed the night before a collection. The same is true of a snow fall. Normally, the moisture content of solid waste is 10 to 30% water by weight.

The densities (weight per cubic yard) of solid wastes collected in the Ocean County District vary based upon several factors:

1) the type and nature of the wastes, and 2) the method of collection (packer-truck, roll-off container with compaction, etc.)

The types of residential solid waste generated are usually consistent, therefore the densities normally fall into a relatively narrow range. The exception is during clean-up periods when the residents of the municipality discard large or bulky items. This tends to increase the overall densities during that period of time.

Typically, domestic refuse weighs about 100 to 150 pounds per cubic yard at the collection point. When collected in compactor trucks, the densities increase as shown below.

<u>Packer Truck Volume</u>	<u>Typical Range of Compacted Densities</u>
12 to 18 CY	400 to 550 lbs./CY
20 CY	500 to 650 lbs./CY
25 CY	550 to 800 lbs./CY

When the packer truck reaches the landfill it deposits its load on the working surface where landfill tractors spread and compact the waste. Initial in place densities can run anywhere between 800 to 1200 pounds per cubic yard.

RESIDENTIAL SOLID WASTE

Residential solid waste includes waste that is produced by the people

who live in the community. Wastes appearing at the curb or in the alley or the backyard of homeowners and apartment dwellers are classified under this category. The components of the residential solid waste stream include garbage, rubbish, yard wastes, and bulky wastes.

In addition to the waste generated by the individual household, there are other municipal wastes generated that are related to the maintenance and sanitation of the community as a whole. These waste types include: wooden branches and tree trimmings, road work debris, street sweepings, street litter, dead animals, etcetera. The composition and quantities of these wastes depend upon the size of the municipality and its location. The exact composition of the components will vary seasonally as discussed earlier. The quantity of waste in a week cycle also fluctuates. Mondays or Tuesdays are the heaviest collection days because there is usually an extra day's worth of waste put out. In addition much clean-up and yard waste are generated over the weekend.

Over the past couple of decades the composition of residential solid waste in the United States has significantly changed. The decline of returnable beverage bottles has produced a noticable change in the amount of glass available in the residential solid waste stream. The increased use of disposable paper products, towels, and diapers has increased the paper fraction of the waste stream. Plastics technology has advanced considerably, in addition to an increase in

convenience items, plastic cups, utensils, wraps. Many products such as appliances, tools, and toys have a higher plastic content. The advertising, marketing and packaging industries have produced many new packaging designs with the utilization of many types of raw materials, foils, plastics and papers. Many products are considerably overpackaged.

With the decline of the use of wood and coal as a fuel product, wood and coal ash has practically disappeared. These are just examples of the ways in which the composition of residential solid waste has changed over the years. Table II-2 illustrates typical residential components of solid waste in Ocean County. Table II-3 illustrates ranges of components of solid waste found in several U.S. cities.

The densities of residential solid wastes in Ocean County vary with the type of solid waste, the level of compaction, and the moisture content, etc. A detailed analysis of component densities for residential, commercial and industrial solid waste is presented at the end of the section on commercial and industrial waste.

TABLE II-2

ESTIMATED ANALYSIS OF RESIDENTIAL SOLID WASTE
COLLECTION COMPONENTS FOR THE OCEAN COUNTY DISTRICT

COMPONENT		TYPICAL PERCENTAGES	
		Rural Sections of the County	Urban Areas of the County
<u>DIRT</u>		2%	2%
<u>GARBAGE:</u>	Food Wastes, Fats, Meat Scraps, Rinds and Seeds, Vegetable Wastes	20%	12%
<u>GLASS:</u>	Bottles, Ceramics	14%	10%
<u>METALS</u>		10%	11%
<u>PAPER:</u>	Corrugated, Mail, News- papers, Kraft, Magazines, Cartons, Tissues	40%	42%
<u>PLASTICS</u>		4%	4%
<u>TEXTILES</u>		1%	2%
<u>WOOD</u>		2%	1%
<u>YARD WASTES:</u>	Leaves, Grass, Branches Garden Plants	2%	13%
<u>MISCELLANEOUS</u>		5%	3%
TOTAL		100%	100%

SOURCE: Studies by M. Disko Associates in Hunterdon, Monmouth, Passaic, Union, and Ocean Counties, including sampling programs to categorize and weigh household wastes. Percentages should be considered as typical, but may vary in a particular municipality.

TABLE II-3

RANGE IN COMPOSITION OF DOMESTIC
SOLID WASTES COLLECTIONS IN U. S. CITIES

<u>COMPONENT</u>	<u>PERCENT COMPOSITION BY WEIGHT</u>	
	<u>LOW</u>	<u>HIGH</u>
GARBAGE	0.8	36
GLASS AND CERAMICS	3.7	23
METALS	6.6	14.5
PAPER	13	62
PLASTIC PRODUCTS	1	20
TEXTILES	1.4	7.8
WOOD	0.4	7.5
YARD WASTES	0.3	33

SOURCE: Published data from Bureau of
Solid Waste Management,
Public Health Service.

COMMERCIAL AND INDUSTRIAL SOLID WASTES

Commercial waste encompasses a large and varied component of the total solid waste stream. All types of retail stores, food stores, warehouses, and distributors are included under this category. Also included are banks, insurance companies and many types of service oriented businesses. Retail stores produce a large amount of packaging waste in the form of cardboard, paper products, wood, and various plastics. Food packing plants and restaurants have major food scrap percentages. Table II-4 presents components of the commercial waste stream. The percentages shown are a composite profile of all of the types of commercial waste that are produced and should not be inferred to mean that it is representative of any one of the types mentioned above.

Wastes are usually collected by a private contractor, except in the case of the very small commercial establishment where the waste generated may fall within the limits allowed by the municipality, and therefore the municipality will collect it when it collects the residential waste. The amount of waste generated and the frequency of collection which is required depends upon the size and the type of the commercial establishment.

Larger commercial firms such as a multi-story office building, insurance companies, and department stores usually use open-top roll-off containers which range in size from 3/4 cy to 10 cy.

TABLE II-4

TYPES OF COMMERCIAL AND INDUSTRIAL
SOLID WASTES GENERATED IN OCEAN COUNTY

<u>COMPONENTS</u>	<u>TYPICAL PERCENT FROM COMMERCIAL SOURCES</u>	<u>TYPICAL PERCENT FROM INDUSTRIAL SOURCES</u>
PAPER PRODUCTS	68.4	32.7
PLASTICS	5.3	3.2
METALS	2.7	3.3
GENERAL OFFICE	0.4	1.3
WOOD PRODUCTS	7.2	10.6
TEXTILES - APPAREL	0.2	0.5
LEATHER PRODUCTS	0.0	0.0
RUBBER PRODUCTS	0.0	0.1
GLASS	0.0	3.3
DEMO./CONSTRUCTION	2.8	0.0
GARDENING WASTES	0.4	2.5
VEGETATIVE	5.5	0.0
ANIMAL OR FOOD PROCESSING	2.1	0.7
CERAMIC	4.0	0.2
DRY SEWAGE SLUDGE	0.0	27.5
CHEMICAL	0.0	12.5
OTHER	0.5	1.5
	<hr/>	<hr/>
TOTAL	100%*	100%*

Detailed questionnaires were sent to 555 industrial and commercial firms in Ocean County. Information in the above table is based on 112 fully-completed questionnaires.

*Numbers may not add because of rounding.

Very large commercial firms use a stationary compactor with a closed top roll-off container ranging in size from 20 to 45 cy. Use of the stationary compactor provides volume reduction and allows the hauler to pass on the savings to the commercial establishment. The service required by commercial firms varies between 2 to 7 times a week.

Industrial solid waste is another heterogeneous component of the solid waste stream. The waste of the following types of manufacturing industries are included under this classification: chemical; petroleum; glass; contract construction; metal products; mining; transportation; communications, etc. Chemicals, sludges, and dissolved or suspended solids in waste waters are generally classified as liquid industrial waste. Many of these sludges are disposed of in a number of landfills throughout the State. The components of the industrial waste stream were determined by M. Disko Associates. These are also presented in Table II-4. Again, as was true with the commercial components, the industrial component profile is only a composite and should not be interpreted as a component analysis of any one classification of industrial waste. Industrial collection practices vary according to the nature of the type of waste and the quantities generated. Densities of selected components of the residential, commercial and industrial waste streams are presented in Table II-5.

TABLE II-5AVERAGE DENSITIES OF SOLID WASTE COMPONENTS

<u>COMPONENT</u>	<u>SOURCE OF WASTE</u>	<u>DENSITY</u> <u>LBS/CU.YD.</u>
APARTMENT INCINERATOR RESIDUE	Residential	810
ASHES AND CINDERS FROM SOLID FUELS	Residential	1,220
AUTOMOBILE BODIES	Municipal	216
AUTOMOTIVE PARTS	Commercial	1,200
BROKEN PAVEMENT OR SIDEWALK	Municipal	2,560
BRUSH	Residential	54
CEMENT WASTES	Industrial	2,400
CHEMICAL WASTES (DRY)	Industrial	1,080
CHEMICAL WASTES (WET)	Industrial	1,620
COMMERCIAL KITCHEN WASTES	Commercial	167
CONSTRUCTION, MIXED	Industrial	1,620
DEMOLITION, MASONRY	Municipal	2,400
DEMOLITION, WOOD	Municipal	600
DIRT, SAND, AND GRAVEL	Municipal	2,430
FOOD PROCESSING WASTES	Commercial	540
FURNITURE	Residential	80
GARBAGE AND KITCHEN WASTES	Residential	167
GLASS	Industrial	700
GLASS AND BOTTLES	Residential	700
GRASS AND GARDEN CLIPPINGS	Residential	135
HEAVY METAL SCRAP	Industrial	4,050

TABLE II-5, CONTINUED

AVERAGE DENSITIES OF SOLID WASTE COMPONENTS

<u>COMPONENT</u>	<u>SOURCE OF WASTE</u>	<u>DENSITY</u> <u>LBS/CU.YD.</u>
INCINERATOR RESIDUE	Industrial	810
INCINERATOR RESIDUE	Municipal	810
LIGHT METAL SCRAP	Industrial	1,350
LIMBS AND LEAVES (CHIPPED)	Municipal	320
LOGS AND STUMPS	Municipal	675
MAJOR APPLIANCES	Residential	300
MIXED COMMERCIAL	Commercial	225
MIXED TRASH AND STREET LITTER	Municipal	140
OIL, TARS, AND ASPHALTS	Industrial	1,620
PAPER AND CARDBOARD	Commercial	120
PAPER AND CARDBOARD	Residential	120
RUBBER MANUFACTURING WASTES	Industrial	1,500
SEWAGE GRIT	Municipal	2,200
SEWAGE SCREENINGS AND SKIMMINGS	Municipal	1,600
SEWAGE SLUDGE SOLIDS	Municipal	1,750
STREET SWEEPINGS	Municipal	2,300
TREE LIMBS AND LEAVES	Residential	270
WIRE	Industrial	540
WOOD PALLETS AND CRATES	Industrial	300

INSTITUTIONAL WASTE

Institutional waste, consists of waste generated by federal, state and local government facilities, various social service and correctional facilities, schools, and hospitals.

Government facilities generate waste similar to some categories of commercial waste. The waste is mostly paper products with some food waste. Social service and correctional facility waste would more directly correlate with residential waste. The waste would however be generally more homogeneous and would not include the clean-up and bulky type waste common to typical residential waste.

School waste is waste generated by students while they are attending classes and when they are eating lunch. It also includes waste generated by instructors and by the general maintenance of the school building and grounds.

Hospitals and clinics generate pathological wastes. They use pathological incinerators to destroy waste materials which represent public health problems. Pathological incinerators typically operate at a temperature between 1200°F and 1800°F in order to effectively prevent emission of pathogens in escaping gases. Other hospital waste, produced in the treatment of

patients has increased substantially in recent years because of the growing use of disposable medical products which are more sanitary to use.

AGRICULTURAL WASTE

Agricultural waste is but a small part of the total waste stream generated in Ocean County. Two primary reasons for this is that the Pine Barrens cover most of the county and much area is covered with soil unsuitable for good crop growth.

Agricultural wastes consist of residue from harvested crops, prunings, residue from fruit orchards, and animal manures. Quantities and composition of agricultural waste that are representative of that to be found in Ocean County will be presented later in this report.

SLUDGE AND SEPTAGE WASTES

A small portion of the total waste stream in Ocean County (2%) is comprised of sewage sludge. For the purposes of this discussion, it is assumed that the sludge is 100 percent solids. In Ocean County, there are essentially two different types of sludge, that which is the by-product of the sewage treatment process at the local and regional sewage treatment plants, and that which consists of septic tank clean-out wastes from individual home systems.

Currently, most sludges produced in the State are barged to sea for disposal. Some are composted, while others are disposed of through one of several land application techniques, and some are landfilled. All ocean dumping of sewage sludges must stop by December 31, 1981. In Ocean County all sludges from sewage treatment operations are disposed of in sanitary landfills. Alternate forms of land disposal of sludges are under investigation by sewerage authorities throughout the State. Table II-6 presents information of typical sludge volumes for municipal wastewater treatment plants. Table II-7 shows typical effluent characteristics from subsurface disposal systems (septic tanks). Table II-8 presents data on some important wastewater parameters for septic tank clean-out wastes.

TABLE II-6

DATA ON SLUDGE VOLUMES AND MOISTURE
MUNICIPAL WASTEWATER TREATMENT PLANT*

<u>WASTEWATER TREATMENT PROCESS</u>	<u>GALLONS OF SLUDGE PRODUCED PER MILLION GALLONS OF WASTEWATER TREATED</u>	<u>PERCENT SUSPENDED SOLIDS REMOVED BY TREATMENT PROCESS</u>	<u>AVERAGE POUNDS OF SOLIDS GENERATED PER MILLION GALLONS TREATED</u>	<u>TYPICAL PERCENT MOISTURE OF SLUDGE GENERATED</u>
Primary Sedimentation	2,950 to 3,530	60 ± %	1,020	95%
Trickling Filter	530 to 750	30 ± %	510	93 to 97%
Primary and Activated Sludge	14,600 to 19,400	92 ± %	1,563	99%

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*Note: These are basic values for conventional sewage treatment plants. Facilities that use chemical treatment unit operations or add chemicals such as lime and iron or aluminum salts to the treatment process will produce sludge quantities greater than the values listed.

TABLE II-7

SUMMARY OF EFFLUENT CHARACTERISTICS FROM
SUBSURFACE SANITARY WASTEWATER DISPOSAL SYSTEMS

<u>PARAMETER</u>	<u>SOURCES</u>	
	<u>1</u>	<u>2</u> <u>Mean Values</u>
Alkalinity, mg/l	112-351	-
Total Solids, mg/l	141-487	-
Suspended Solids, mg/l	28-120	124
Volatile Solids, %	-	-
Total Phosphorus, mg/l	2.9-19.5	20.5
Ortho-Phosphate, mg/l	up to 10.8	-
Total Nitrogen, mg/l	-	-
Ammonia Nitrogen, mg/l	20.5-60.0	-
Nitrate Nitrogen, mg/l	-	-
pH	6.7-7.4	8.0
Dissolved Oxygen, mg/l	-	0
Total Organic Carbon, mg/l	-	129
Chlorides, mg/l	-	-
Total Coliform, MPN/100 ml	-	+110x10 ⁵
Fecal Coliform, MPN/100 ml	-	1.7x10 ⁴
Fecal Streptococci, MPN/100 ml	-	-
Chemical Oxygen Demand, mg/l	175-575	585
Biochemical Oxygen Demand, mg/l	182-410	189

1. Barshield, Robert D. and Hassan, M. El-Baroudi, "Physical-Chemical Treatment of Septic Tank Effluent", Journal of Water Pollution Control Federation, Vol. 46, No. 10, pp. 2347-2353, October 1974.
2. Laak, R., "Influence of Domestic Wastewater Pretreatment on Soil Clogging", Journal of Water Pollution Control Federation, Vol. 42, No. 8, Part 1, pp. 1495-1500, August 1970.

TABLE II-7, CONTINUED

SUMMARY OF EFFLUENT CHARACTERISTICS FROM
SUBSURFACE SANITARY WASTEWATER DISPOSAL SYSTEMS

<u>PARAMETER</u>	<u>SOURCES</u>	
	<u>3</u> Mean Value	<u>4</u> Time Equal to or Less Than, 85%
Alkalinity, mg/l	-	-
Total Solids, mg/l	2300	-
Suspended Solids, mg/l	1967	250
Volatile Solids, %	69	-
Total Phosphorus, mg/l	65	14
Ortho-Phosphate, mg/l	-	-
Total Nitrogen, mg/l	79	-
Ammonia Nitrogen, mg/l	-	105
Nitrate Nitrogen, mg/l	1.08	0.04
pH	5.4-7.0	7.15
Dissolved Oxygen, mg/l	-	-
Total Organic Carbon, mg/l	-	-
Chlorides, mg/l	-	67
Total Coliform, MPN/100 ml	-	1.45×10^7
Fecal Coliform, MPN/100 ml	-	2.6×10^6
Fecal Streptococci, MPN/100 ml	-	5.1×10^5
Chemical Oxygen Demand, mg/l	2890	800
Biochemical Oxygen Demand, mg/l	1042	350

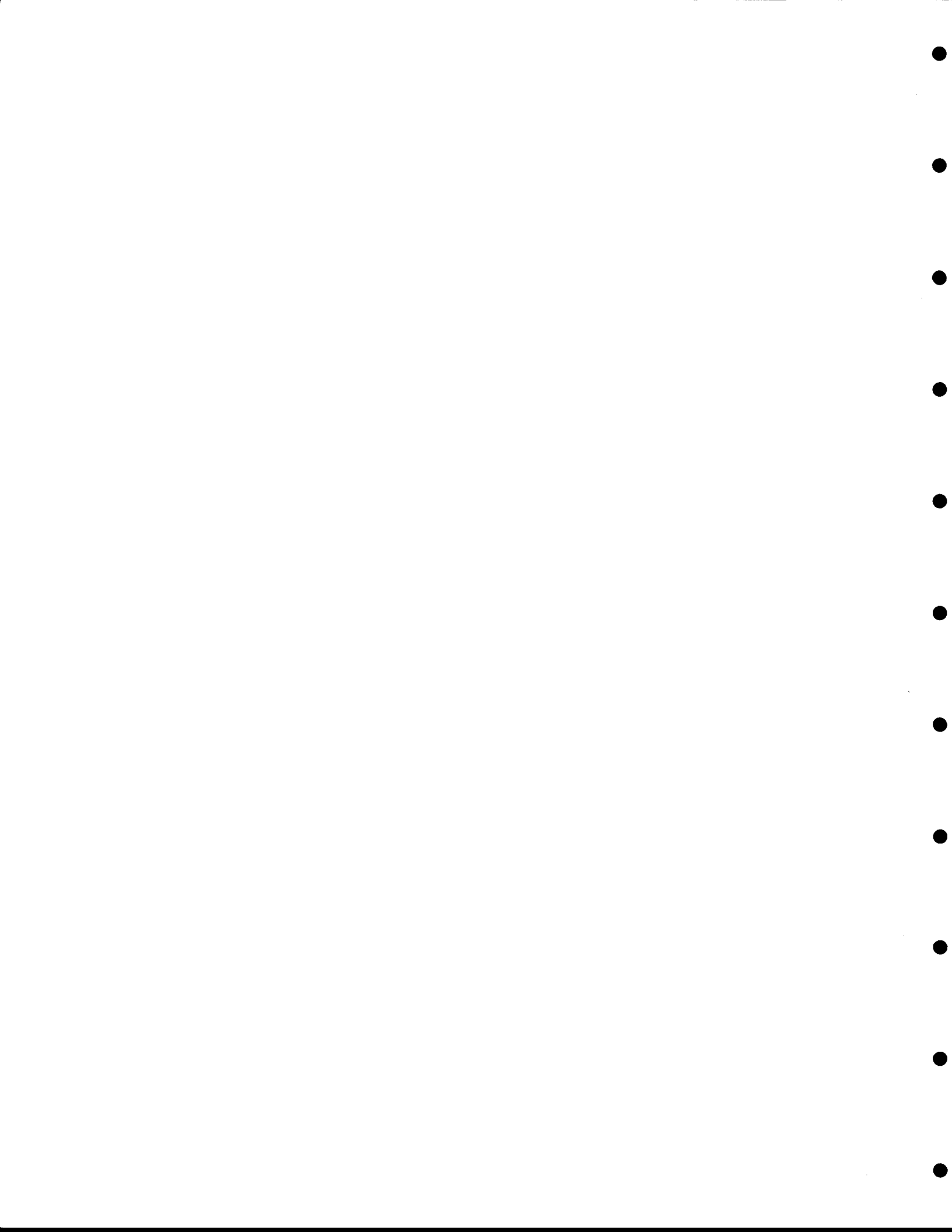
3. Kolega, J. J., B. J. Consenza, et. al., "Anaerobic-Aerobic Treatment of Septage", 28th Industrial Waste Conference, Purdue University, Part 2, pp. 894-900, 1973.
4. Viraraghavan, T., "Septic Tank Efficiency", Journal of Environmental Engineering Division, American Society of Civil Engineers, Vol. 102, EE 2, pp. 505-508, April 1976

TABLE II-8

RANGE OF VALUES FOR TYPICAL
COMMERCIAL SEPTIC TANK CLEAN-OUT WASTES

<u>PARAMETER</u>	<u>RANGE OF VALUES</u>		
	<u>LOW</u>	<u>HIGH</u>	
pH	5.4	7.8	pH units
Total Solids	2,300	28,400	mg/liter
Suspended Solids	1,967	11,420	mg/liter
COD	2,890	24,663	mg/liter
BOD	1,042	6,050	mg/liter
Nitrogen (Total)	79	466	mg/liter
Nitrate Nitrogen	0.87	1.08	mg/liter

SOURCE: J. J. Kolega, et. al., "Anaerobic-Aerobic Treatment of Septage (Septic Tank Pumpings)", 28th Industrial Waste Conference 1973 - Part 2, Purdue University



III. EXISTING SOLID WASTE MANAGEMENT SYSTEMS IN THE OCEAN COUNTY DISTRICT

DESCRIPTION OF RESIDENTIAL COLLECTION SYSTEMS AND DISPOSAL PATTERNS

The collection of residential solid waste follows any one of three basic arrangements. The municipality may have its own sanitation department which does the collection and disposal. Both the manpower and equipment are furnished by monies obtained by the municipality through property taxes. The system just described is generally known as the municipal collection and disposal system.

A second arrangement is called a municipal contract system. Under a municipal contract system, the municipality contracts with a particular contractor for collection and disposal services through a competitive bidding process. The municipality lays the framework for the frequency of collection and the types of special services required. Payment for the contractor comes out of the municipal budget. The third type of arrangement is the private contract collection system. Under this arrangement the homeowner or the apartment owner contracts directly with one of the many private firms who serve the district. The contractor usually bills the resident or apartment directly for the services rendered. Cost vary depending on the level of service desired and the waste quantities produced.

Variations of the above arrangements do exist and are employed by various municipalities. Some municipalities may have 2 municipal contractors. The municipality may handle the clean-up

operations while letting contractors collect the remainder of the refuse. Table III-1 describes the basic system available for collecting and disposing of residential solid wastes under current State legislation. Figure III-1 illustrates the residential collection systems utilized in the Ocean County District. Twenty-one of the thirty-three municipalities, or 65 percent of the municipalities of the District operate municipal collection systems. Twenty-seven percent, or nine of the thirty-three municipalities, utilize a contract collection system. Nine percent, or 3 municipalities require homeowners to contract directly with private haulers. Table III-2 gives a summary of the residential solid waste collection systems employed by the thirty-three Ocean County District municipalities. Table III-3 gives a summary of direct municipal expenditures and per capita costs for solid wastes collection and disposal.

A detailed description of each municipality's collection system and disposal pattern follows below. Where possible detailed costs and descriptions of the special service rendered are presented. This information has been obtained using a detailed questionnaire which was sent by M. Disko Associates to all municipalities during the summer and fall of 1978. The data was further verified by reviewing NJDEP records and files.

TOWNSHIP OF BARNEGAT

The Township of Barnegat employs the private collection firm of Caldeira Brothers to meet their municipal solid waste collection and disposal needs. The Township is presently under a three-year contract with this firm, ending December 31, 1980. The

TABLE III-1

TYPES OF SOLID WASTE COLLECTION AND DISPOSAL
PERMITTED UNDER EXISTING STATE STATUTES

<u>TYPE OF SYSTEM</u>	<u>CHARACTERISTICS</u>
MUNICIPAL COLLECTION	The municipality provides solid waste collection services, utilizing its own manpower and equipment. Costs are paid out of municipal tax revenues.
MUNICIPAL CONTRACT COLLECTION	The municipality contracts with a private solid waste collector for the provision of solid waste collection services. The contract is funded by the municipality.
PRIVATELY CONTRACTED COLLECTION SERVICE	Individual residents or firms hire a private solid waste contractor to provide them with collection services. Under this system, the municipality's involvement in solid waste management is generally limited to enforcing health and sanitary codes.
INDIVIDUAL COLLECTION	Individual residents or firms haul their own solid wastes to appropriate disposal areas. This method is still employed somewhat in rural areas of the State by homeowners, and by many commercial and industrial firms.
MUNICIPAL DISPOSAL	The municipality operates its own landfill (or incinerator) disposal facility. The facility may service any combination of the collection systems identified above.
PRIVATE DISPOSAL	A private individual or firm owns and operates the disposal facility which may service any combination of the collection systems identified above.
INDIVIDUAL DISPOSAL	Individual residents may employ their own landfill. In rural areas, for example, individuals may compost the organic fraction of their wastes and bury the non-organic fraction. Many large industrial firms operate their own disposal facilities.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

RESIDENTIAL SOLID WASTE COLLECTION SYSTEMS

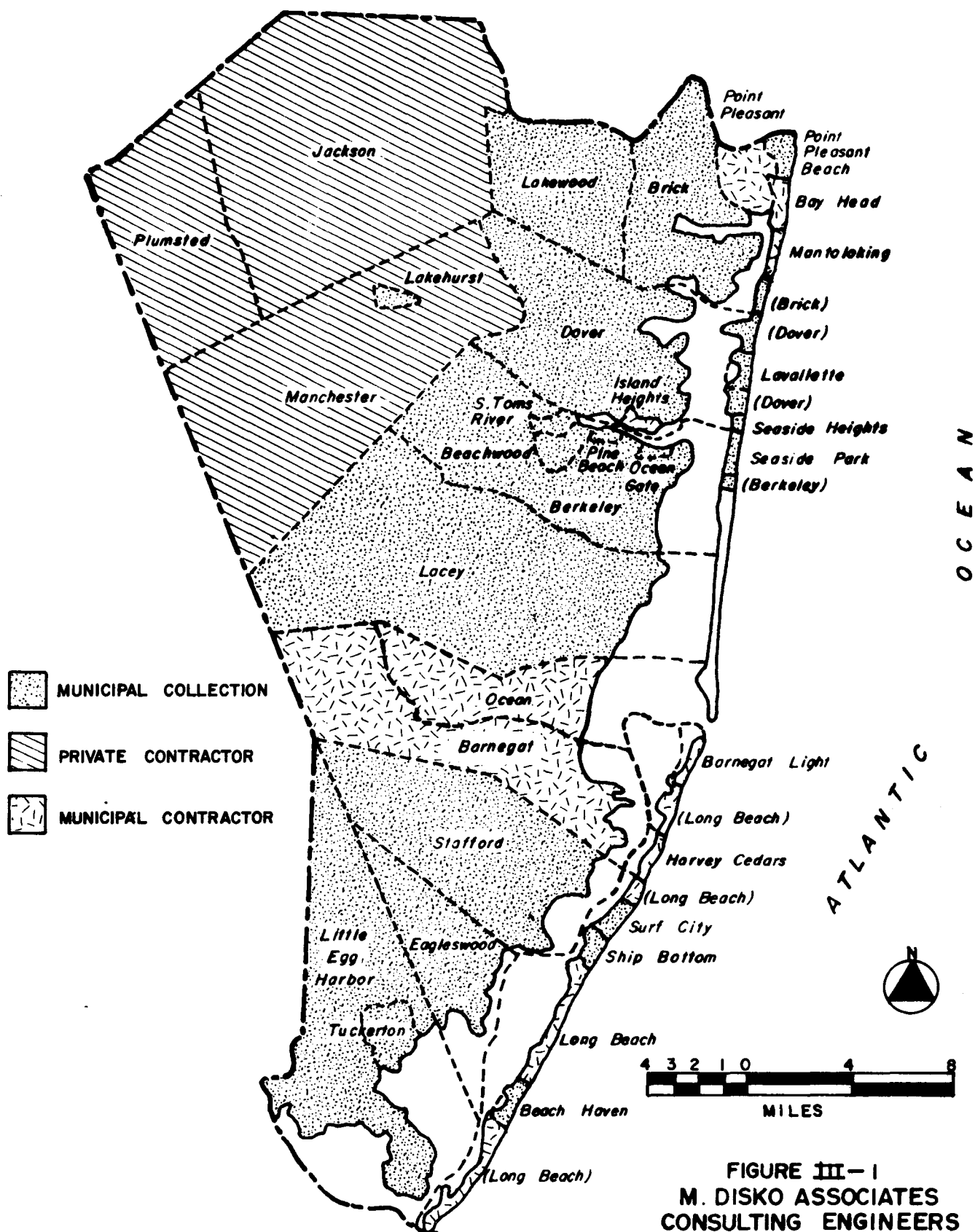


TABLE III-2

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN
RESIDENTIAL SOLID WASTE COLLECTION SYSTEMS IN OCEAN COUNTY

<u>MUNICIPALITY</u>	<u>LOCATION OF RECEPTACLES</u>	<u>NUMBER OF COLLECTIONS PER WEEK</u>	<u>TYPE OF COLLECTION SYSTEM</u>	<u>NUMBER OF SOLID WASTE CONTRACTORS</u>	<u>COLLECTION CONTRACT EXPIRES</u>
BARNEGAT	Curbside	2	Contract	1	12/31/80
BARNEGAT LIGHT	Curbside	2	Contract	1	12/31/80
BAY HEAD	Backyard	3	Contract	1	12/31/79
BEACH HAVEN	Backyard	3	Municipal	M	M
BEACHWOOD	Curbside	2	Municipal	M	M
BERKELEY	Curbside	2	Municipal	M	M
BRICK	Curbside	2	Municipal	M	M
DOVER	Curbside	2	Municipal	M	M
EAGLESWOOD	Curbside	2	Municipal	M	M
HARVEY CEDARS	Curbside	2	Contract	1	12/31/80
ISLAND HEIGHTS	Curbside	3 Summer 2 Balance	Contract	1	1/31/80
JACKSON	Curbside	2	Private	5	Varies
LACEY	Curbside	2	Municipal	M	M
LAKEHURST	Curbside	2	Municipal	M	M
LAKEWOOD	Curbside	2	Municipal	M	M
LAVALLETTE	Curbside	3 Summer 2 Balance	Municipal	M	M
LITTLE EGG HARBOR	Curbside	2	Municipal	M	M
LONG BEACH	Curbside	2	Contract	1	12/31/80
MANCHESTER	Curbside	2	Private	-	Varies
MANTOLOKING	Backyard	3 Summer 2 Balance	Contract	1	12/31/80

TABLE III-2, Cont'd.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN
RESIDENTIAL SOLID WASTE COLLECTION SYSTEMS IN OCEAN COUNTY

<u>MUNICIPALITY</u>	<u>LOCATION OF RECEPTACLES</u>	<u>NUMBER OF COLLECTIONS PER WEEK</u>	<u>TYPE OF COLLECTION SYSTEM</u>	<u>NUMBER OF SOLID WASTE CONTRACTORS</u>	<u>COLLECTION CONTRACT EXPIRES</u>
OCEAN	Curbside	2	Contract	1	12/31/80
OCEAN GATE	Curbside	3	Municipal	M	M
PINE BEACH	Curbside	2	Municipal	M	M
PLUMSTED	Curbside	2	Private	-	Varies
PT. PLEASANT	Curbside	2	Contract	1	12/31/82
PT. PLEASANT BCH.	Curbside	3 Summer 2 Balance	Municipal	M	M
SEASIDE HGTS.	Curbside	7 Summer 3 Balance	Municipal	M	M
SEASIDE PARK	Backyard	3	Municipal	M	M
SHIP BOTTOM	Curbside	3 Summer 2 Balance	Municipal	M	M
SO. TOMS RIVER	Curbside	2	Municipal	M	M
STAFFORD	Curbside	2	Municipal	M	M
SURF CITY	Curbside	2	Municipal	M	M
TUCKERTON	Curbside	2	Municipal	M	M

M = Municipal System
Municipal Collection = Collection by Municipality
Contract Collection = Municipality hires Private Contractor
Private Collection = Resident hires Private Contractor

TABLE III-3

**1978 COSTS FOR RESIDENTIAL
SOLID WASTE COLLECTION AND DISPOSAL**

MUNICIPALITY	COLLECTION FREQUENCY/WEEK	REPORTED COST BASIS	ESTIMATED YEARLY COST PER CAPITA*
BARNEGAT	Curb	Contract \$ 95,000	\$ 17.52
BARNEGAT LIGHT	Curb	Contract 34,866	12.27
BAY HEAD	Backyard	Contract 69,666	32.21
BEACH HAVEN	Backyard	Municipal 100,787	15.40
BEACHWOOD	Curb	Municipal 77,850	11.19
BERKELEY	Curb	Municipal 278,324	11.17
BRICK	Curb	Municipal 861,693	15.04
DOVER	Curb	Municipal 806,500	11.29
EAGLESWOOD	Curb	Municipal 17,400	7.10
HARVEY CEDARS	Curb	Contract 29,390	13.96
ISLAND HEIGHTS	Curb	Contract 31,500	15.66
JACKSON	3 July-Aug.		
LACEY	2 Balance	Contract	
LAKEHURST	Curb	Private \$3.50/mo. + disp.	9.05
LAKEWOOD	Curb	Municipal 245,770	12.71
	Curb	Municipal 37,000	11.18
	Curb	Municipal 223,508	5.39
LAVALLETTE	Curb	Municipal 76,025	9.13
LITTLE EGG HARBOR	3 Summer		
LONG BEACH	2 Balance	Municipal 200,000	21.90
MANCHESTER	2	Contract 194,000	14.08
MANTOLOKING	Curb	Private \$3.50/mo. + disp.	43.08
	Backyard	Contract 44,000	55.42
	3 Summer		
	2 Balance		

TABLE III-3, Cont'd.

**1978 COSTS FOR RESIDENTIAL
SOLID WASTE COLLECTION AND DISPOSAL**

<u>MUNICIPALITY</u>	<u>COLLECTION FREQUENCY/WEEK</u>	<u>REPORTED COST BASIS</u>	<u>ESTIMATED YEARLY COST PER CAPITA*</u>
OCEAN	Curb	Contract \$ 72,416	\$ 11.71
OCEAN GATE	Curb	Municipal 38,586	16.86
PINE BEACH	Curb	Municipal 24,000	12.15
PLUMSTED	Curb	Private \$3.50/mo.	6.92
POINT PLEASANT	Curb	Contract 272,200	12.93
POINT PLEASANT BEACH	Curb	Municipal 68,885	4.71
SEASIDE HEIGHTS	Curb	Municipal 79,854	6.70
SEASIDE PARK	Backyard	Municipal 80,800	10.56
SHIP BOTTOM	Curb	Municipal 63,750	14.26
SOUTH TOMS RIVER	Curb	Municipal 26,741	5.09
STAFFORD	Curb	Municipal 152,453	15.20
SURF CITY	Curb	Municipal 69,635	16.95
TUCKERTON	Curb	Municipal 45,900	10.00

*Estimate cost per capita is based on average equivalent all year and summer populations.

TOWNSHIP OF BARNEGAT, Cont'd

service provides two curbside collections per week to the residential and commercial units within the community.

In addition to those services covered under the contract, the Township of Barnegat (Public Works Department) offers spring and fall clean-up periods. During these periods, residents are permitted to leave clean-up, bulky type items at curbside for municipal collection.

There is no organized leaf collection activity in Barnegat Township, although road sweeping is a Public Works Department responsibility. Dead animal collection and disposal is handled by local police working with the Humane Society. The local police are also in control of abandoned vehicle disposal within the Township, following N.J.D.M.V. guidelines. The annual municipal budget figure for solid waste collection and disposal in Barnegat Township is \$95,000.00.

The wastes collected by Caldeira Brothers in addition to those collected by the Township are deposited at the Southern Ocean Landfill, Inc. The round-trip haul to the landfill is approximately 12 miles. The Township of Barnegat is charged at the rate of \$0.80 per cubic yard with a 5% discount.

There is no significant recycling activity presently underway in Barnegat Township.

BOROUGH OF BARNEGAT LIGHT

The Borough of Barnegat Light has a three-year contract which expires December 31, 1980, with Caldeira Brothers of Toms River. The contract provides for weekly, curbside collection serving 700 one-family residential units, 200 multiple dwelling units, and 25 commercial units. The reported cost to Barnegat Light for this contract is \$104,597.64 for the three years.

The Borough acts independently in the collection of bulky items, utilizing municipal manpower and equipment. This pick-up service is offered to residents on a weekly basis. The streets are also swept on a weekly basis by Borough employees.

The contractor disposes of wastes collected in Barnegat Light at the Southern Ocean Landfill, Inc. in Waretown, some 22 miles away. Residents may dump any extra wastes that they haul themselves to this site, at no additional charge.

Abandoned vehicles in Barnegat Light present a minimal problem, but such an occurrence would be handled by local police in accordance with N.J.D.M.V. guidelines. The Borough has a special program for the collection and disposal of dead animals.

The Borough of Barnegat Light is not currently involved in any local, citizen group recycling activities.

BOROUGH OF BAY HEAD

The Borough of Bay Head employs a municipal contractor to collect and dispose of the residential and commercial solid wastes generated within the community. The present contract is with James Whaley of Point Pleasant and expires December 31, 1979. The service provided to the 854 one-family residential units and 2 multiple dwelling units is a backyard pick-up, three times weekly. Commercial establishments are also serviced three times a week under this contract. The contract includes general clean-up for bulky item collection on two days in October, May and June. The annual municipal budget figure for this contract is \$69,666.60.

Residents place properly bagged leaves or grass clippings at curbside for pick-up by the municipal contractor. The Bay Head Street Department hires private contractors for street sweeping and the collected sand is usually put back onto beach areas.

The collection and disposal of dead animals within Bay Head is covered under a separate contract with Animals Unlimited of Farmingdale. Abandoned vehicles are handled on a case by case basis by local police following N.J.D.M.V. guidelines.

Presently, solid wastes generated within the Borough are transported to Lakewood Township Municipal Landfill in Lakewood, some 25 round-trip miles away.

The only recycling activity in Bay Head is with private scavengers, on a commercial basis.

BOROUGH OF BEACH HAVEN

The Borough of Beach Haven provides municipal collection for residential and commercial solid wastes generated within the community. The 1,712 residential units are provided with backyard pick-ups on three days a week. The 47 commercial establishments are collected on a daily basis. Leaves, grass and tree parts are collected from curbside on Wednesdays. The streets are also swept once a week in Beach Haven. Additionally, the Borough provides a spring clean-up period for two weeks in June. During this period, residents may place household clean-up items at curbside for municipal collection. The annual municipal budget in Beach Haven for solid waste collection and disposal is \$100,787.00. Of this total figure, \$10,800.00 is for disposal only.

The Borough utilizes the facilities of the Southern Ocean Landfill, Inc. in Waretown for waste disposal. This site is approximately 23 miles from Beach Haven.

The usual procedure for dead animal collection and disposal is for Borough employees to work along with the Humane Society of Farmingdale. Abandoned vehicles are covered under a Borough ordinance and by local police acting under N.J.D.M.V. guidelines for such vehicles.

There is no organized recycling effort in Beach Haven.

BOROUGH OF BEACHWOOD

The Borough of Beachwood combines municipal resources with private contractors for their solid waste collection and disposal needs. Each residential and commercial unit within the community is provided with bi-weekly, curbside collection. In addition, it is necessary for some of the larger commercial establishments to contract with private collectors and haulers to meet their needs. The annual municipal budget figure for solid waste collection and disposal in Beachwood is \$77,850.00.

Each Wednesday is designated as trash pick-up day. On such days, residents are permitted to place bulky type items, as well as as properly bagged leaves, brush, etc., at curbside for municipal collection.

Collected solid wastes are presently disposed of at Beachwood's own landfill on Pinewald Road. Reportedly, this 25-acre disposal site has an estimated remaining life of 27 years (August 1978).

Road sweepings in Beachwood are carried out with a municipally-owned mobile sweeper, with the collected debris taken to the landfill. Dead animals found within the Borough are also accepted at the landfill.

Presently, there is no significant recycling activity within Beachwood.

TOWNSHIP OF BERKELEY

The Township of Berkeley utilizes a municipal collection system for the collection and disposal of solid waste generated by the Township's 9,500 residential units and 222 commercial units. The service is twice weekly at the curb. In 1978, the Township budgeted \$278,324.00 for the solid waste collection and disposal services.

Leaves are collected in Berkeley at the curblane by vacuum trucks in the fall and the spring. The Township also utilizes one street sweeper to regularly clean the Township's streets. Dead animals are collected by sanitation crews and placed in the landfill.

If an automobile is abandoned, the police issue a summons and attempt to locate the owner. If the owner cannot be located, the auto is hauled to a junkyard. Police officials estimate that there are about 12 abandoned automobiles per year in the Township.

Currently, there are no recycling activities within the Township.

TOWNSHIP OF BRICK

Brick Township utilizes municipal manpower and equipment to provide solid waste collection and disposal services to the Township's residents. The twice weekly curbside service is

TOWNSHIP OF BRICK, Cont'd.

provided to 16,755 residential units and all commercial establishments with 10 or less cans. The Township budgeted \$861,693.00 for this service in 1978. Currently, all solid wastes generated in Brick Township are disposed of in their own sanitary landfill located on Sally Ike Road.

Brick utilizes 2-13 cy trucks for year-round clean-up of bulky materials and household debris. In addition, they have 2 street sweepers which work on Township streets. Leaves are bagged by residents and collected by the Township during regular collection. Leaves may be left in piles on the edge of the street during October and November and between April 15 and May 15 when there are large volumes making bagging impractical.

The procedure for the disposal of dead animals involves contacting Rabi Control of Bricktown, under contract with the Brick Board of Health.

Currently, the Brick Township Boys Club conducts a recycling program.

TOWNSHIP OF DOVER

The Township of Dover combines municipal forces with private contractors to meet local solid waste collection and disposal needs.

TOWNSHIP OF DOVER, Cont'd.

Some 32 collection routes provide twice-weekly, curbside collection to each of the Township's residential units and many of the commercial units. Some of the larger commercial units find it necessary to contract with private collectors to meet their added solid waste needs. Additionally, clean-up type items are picked-up at curbside on regular collection days. The 1978 annual municipal budget for solid waste collection and disposal in Dover was \$806,500.00

The Township utilizes two municipal vacuum trucks for leaf collection when necessary. Additionally, every Township road is swept at least once every 30 days. The debris collected from these operations, as well as the wastes collected from the household and commercial units, are disposed of at the Dover Township Municipal Landfill on Bay Avenue and Church Road.

Dead animal collection and disposal is a function of the Dover Township Dog Control Bureau. Abandoned vehicles are first impounded at private yards where an owner search begins in accordance with appropriate N.J.D.M.V. guidelines.

There is an ordinance in Dover Township which regulates any recycling activity within the community. Such activity by local citizen groups is encouraged by Township Officials.

TOWNSHIP OF EAGLESWOOD

Eagleswood Township and Tuckerton Borough share the responsibility of providing municipal refuse collection and disposal services to the residents of both municipalities. Eagleswood provides the landfill and the landfill equipment. Tuckerton provides all collection vehicles and all sanitation personnel. At the end of the year sanitation costs of both towns are audited. Each municipality either pays a difference to or receives a payment from the other municipality according to a preset percentage worked out by both municipalities. The 1978 cost for the Township of Eagleswood was budgeted at about \$17,400.00.

Residents receive twice a week curbside collection services. Commercial units must seek a private contractor to obtain refuse collection services. All wastes collected are then taken to the Eagleswood-Tuckerton Landfill on Eagle Road in Eagleswood.

Residents also have a period during which they can set out clean-up type wastes at the curb. The clean-up program is usually held on two Saturdays in July. Leaves are picked up with the regular collection. The Township does not provide road sweeping services.

Dead animals are taken care of by the local dog warden. There have been no procedures established for abandoned vehicle disposal. At the present time there is no recycling activity in the Township of Eagleswood.

BOROUGH OF HARVEY CEDARS

Solid waste collection and disposal in the Borough of Harvey Cedars is presently covered under a municipal contract. This contract is with Caldeira Brothers of Toms River and runs through December of 1980. The service includes two curbside, residential collections per week, and three such collections per week for commercial establishments. The fee involved under this contract is \$88,170.00 for the three-year contract.

The disposal of bulky or clean-up items, not covered by the above mentioned contract, is handled by Borough crews. The first two weeks of June as well as the first week of July and August are designated as clean-up weeks when residents are allowed to place bulky type items at curbside for municipal collection.

Dead animal collection and disposal is handled in conjunction with the Associated Humane Societies of Newark, N. J. Road sweeping is not a major problem in Harvey Cedars, as the main road is under County jurisdiction, and several side streets are gravel, and as such, are not swept. Additionally, the problem of abandoned vehicle disposal is a minimal one, although local police follow N.J.D.M.V. guidelines in such an event.

The disposal site utilized by both Caldeira Brothers and the Borough of Harvey Cedars is the Southern Ocean Landfill, Inc. in Waretown, some 18 miles away.

Presently, no concentrated recycling effort exists in Harvey Cedars.

BOROUGH OF ISLAND HEIGHTS

The Borough of Island Heights employs a municipal contractor to service its 700 one-family residential units and 55 commercial units. The one-year contract with Al Strubel of Toms River started on February 1, 1979. The service provided includes two curbside collections per week and three curbside collections from Memorial Day to Labor Day. The one-year contract cost for the collection and disposal service provided by Al Strubel amounts to \$31,500.00.

The Borough of Island Heights utilizes a leaf machine for the collection of leaves and the leaves are later used as fill within the Borough. The main roads are County roads and are swept using County equipment and manpower. The solid wastes generated in Island Heights and collected by Al Strubel are hauled to either the Lakewood Township Municipal Landfill or the Jackson Township Municipal Landfill.

There are between 1 to 3 abandoned vehicles per year in Island Heights. Abandoned vehicle disposal is handled through a Borough ordinance. First the necessary letters are sent and fines applied, after which time local police follow N.J.D.M.V. procedures for such vehicles. The County Dog Control Department is notified for dead animal collection and disposal.

BOROUGH OF ISLAND HEIGHTS, Cont'd.

At the present time, there are no waste recycling activities or efforts underway in Island Heights.

TOWNSHIP OF JACKSON

To meet solid waste disposal needs in Jackson, the residential and commercial units must either contract privately with outside collectors or haul their own wastes. A typical residential contract includes twice-weekly, curbside collection. Commercial establishments arrange for whatever service is necessary for disposal needs. Residents hauling their own wastes may deposit such material at the Jackson Township Municipal Landfill on Homestead Road, at no charge. Private contractors electing to use this site are charged \$0.50 per cubic yard. The expense to Jackson Township for running this landfill includes \$39,980.00 for salaries and wages, with \$39,310.00 for maintenance, totalling \$79,290.00 annually.

The Jackson Department of Public Works is actively involved in clean-up operations and leaf collection services for residents. The month of May is designated as "Spring Cleanup" month. D.P.W. forces are actively involved in bulky item collection during this period. The D.P.W. also utilizes a 13 cubic yard compactor Vac-All and leaf vacuum for loose leaf collection during autumn months. This material is then incorporated into compost piles at the landfill. Bagged leaves entering the landfill are buried. Additionally, branches left at curbside are broken down utilizing a department chipper. The resulting chips are then made available for local

TOWNSHIP OF JACKSON, Cont'd.

gardening and landscaping uses.

The Township does have a contract with Animals Unlimited of Farmingdale for dead animal collection and disposal. Local police are guided by Township ordinance as well as State procedures in abandoned vehicle cases.

Beyond recycling of tree branches into wooden landscaping chips, there are no waste recycling activities currently underway in Jackson.

TOWNSHIP OF LACEY

The Township of Lacey utilizes municipal resources for the collection and disposal of solid wastes produced by its 7,000 residential units. The commercial and industrial establishments must either contract privately with outside collectors and haulers, or haul their own wastes. Caldeira Brothers of Toms River handles much of this private contract waste within Lacey.

Municipal collection in the Township involves twelve separate routes, providing bi-weekly, curbside pick-up of household wastes and garbage. Once such wastes have been collected, they are transported to the Township's landfill on Lacey Road. The annual municipal budget figure for solid waste collection and disposal is \$245,770.00.

TOWNSHIP OF LACEY, Cont'd

Leaves are collected by municipal forces on the usual collection days. The debris accumulated during road sweeping operations is directly incorporated into landfill operations as daily cover.

The Township makes special arrangements for the collection and disposal of dead animals. The procedures for abandoned vehicles are covered by Township ordinance as well as by N.J.D.V.M. statutes.

Reportedly, there is no municipal recycling activity within Lacey at present.

BOROUGH OF LAKEHURST

The Borough of Lakehurst provides a municipal collection system to meet local solid waste needs. The service provided to the 879 one-family residential units, 186 multiple dwelling units and 30 commercial units, is twice-weekly, curbside collection. Utilized in these operations are two collection routes and two collection vehicles. The Borough also provides 2 week clean-up periods for bulky item collection, once in the spring with another in the fall. An on-call service is also available to residents for collection of bulky items on a year-round basis. The 1978 budget for solid waste collection and disposal was \$37,000.00.

Properly bagged leaves or grass clippings are picked up at curbside on regular collection days. The County roads in Lakehurst are swept by County manpower and equipment. Currently, all solid

BOROUGH OF LAKEHURST, Cont'd

wastes generated within Lakehurst are transported to Ocean County Landfill Corp. in Manchester, about 3 miles away.

Dead animals are collected and disposed of in conjunction with the Lacey Humane Society. The 2 to 4 abandoned vehicles per year are handled by local police operating under State guidelines for such matters.

Presently, there are no non-commercial recycling activities or efforts underway in Lakehurst.

TOWNSHIP OF LAKEWOOD

The Township of Lakewood utilizes a municipal collection system for the collection and disposal of solid waste generated in Lakewood. The municipality collects from 5,629 residential units and 408 commercial establishments. Multiple family dwellings and industrial establishments must contract with a private carter for their individual needs. The service provided by the Township is twice weekly at the curb. In 1978, the Township budgeted \$173,468.00 for collection and disposal.

Lakewood provides a clean-up service to its residents during the month of May. The entire Township is covered twice during that month and bulky items are collected at the curb and in the backyard. Additionally, during the remainder of the year, the Township will pick-up bulky waste on Wednesday by appointment. The budget

TOWNSHIP OF LAKEWOOD, Cont'd.

for clean-up for 1978 was \$10,590.00

Leaves are collected in Lakewood during November and December with a vacuum truck. Each area of the Township is covered twice. In 1978, Lakewood budgeted \$22,030.00 for leaf collection. In addition, the Township utilizes two street sweepers on a regular basis to clean the streets. This service costs the Township \$17,420.00 annually.

Dead animals in Lakewood are picked-up by the clean-up crew and buried. Abandoned automobiles are the responsibility of the Police Department.

Currently, all wastes, clean-up materials, street sweepings, etc. are disposed of at the Lakewood Municipal Landfill on Cross Street.

Recycling activity in the Township centers around a Recycling Center on 9th Street. This center accepts newspaper, tin, bottles, and aluminum. The Center is run by the Environmental Commission.

BOROUGH OF LAVALLETTE

The Borough of Lavallette utilizes municipal manpower and equipment for local solid waste collection activities. The annual municipal budget figure for this service, including collection and disposal, is set at \$76,025.00.

BOROUGH OF LAVALLETTE, Cont'd.

The service is provided to all household and commercial units within the Borough. There are two collection schedules observed in Lavallette, based on seasonal population flows. Curbside collection occurs three times a week during summer months, while service is cut back to twice a week collection during the winter months. Additionally, a clean-up day is provided on the first Tuesday of each month except during July, August and September. Although the main purpose of these days is for curbside collection of bulky, clean-up type items, small quantities of leaves may also be collected at this time.

The disposal of dead animals is covered under a contract with Animals Unlimited of Farmingdale. In an average year there may be 5 abandoned vehicles in Lavallette, which are usually disposed of by River Motors of Toms River. Local police also play a role in the disposal of dead animals and abandoned autos.

Presently, solid wastes generated in Lavallette are transported some 16 miles to Waste Disposal, Inc. landfill in Monmouth County. The Borough is charged a rate of \$0.85 per cubic yard for solid waste disposal privileges at this site.

Lavallette supports recycling efforts by making available a "Help trailer" for those residents wishing to deposit newspaper, cardboard and other paper items.

TOWNSHIP OF LITTLE EGG HARBOR

The Township of Little Egg Harbor operates a municipally-owned system for the collection and disposal of solid wastes generated within the community. However, several of the 79 commercial units have found it necessary to contract with private collectors to meet their added disposal needs. Two curbside collections per week are provided by the Township. The annual municipal budget for solid waste collection and disposal in Little Egg Harbor is \$200,000.00. This figure includes \$140,000.00 for salaries and wages, and \$60,000.00 for equipment and maintenance. The Township operates a sanitary landfill off of Forge Road for disposal of municipal solid wastes.

Properly bagged leaves are picked up on regular collection days. Additionally, the Township sweeps the roads as necessary. The Township Animal Control Warden is responsible for dead animal collection and disposal within Little Egg Harbor. The 5 to 6 abandoned vehicles per year are first brought to the attention of local police, after which they are towed to one of four local garages where every effort is made to contact the owner. If the owner cannot be located, a junk title is obtained through the State.

Presently, there are no recycling activities or efforts underway in Little Egg Harbor.

TOWNSHIP OF LONG BEACH

Municipal solid waste collection and disposal in Long Beach is presently covered under a three-year contract expiring December 31,

TOWNSHIP OF LONG BEACH, Cont'd.

1980, with Caldeira Brothers, Inc. Three collection routes service the 5,791 one-family residential units, 36 multiple dwelling units and 153 commercial units. The service provided is bi-weekly, curbside collection.

The annual municipal budget figure for solid waste collection and disposal is \$194,000.00 (1978). Of this total figure, \$30,000.00 is for disposal, \$10,000.00 for clean-up and bulky goods collection, and \$10,000.00 for road sweepings and municipal debris.

The collection and disposal of dead animals is included in the Animal Warden's contract. For the approximately 6 abandoned vehicles per year in Long Beach, the usual N.J.D.M.V. guidelines are followed. Such vehicles eventually are released for public auction.

The Stafford Township municipal landfill is the present disposal site for all solid wastes generated in Long Beach. This site is approximately 17 miles from the center of Long Beach.

Presently, there is no municipal or citizen involvement in recycling activities within Long Beach.

TOWNSHIP OF MANCHESTER

All residents of Manchester Township, whether residential, commercial or industrial, must contract privately with outside

TOWNSHIP OF MANCHESTER, Cont'd.

collectors for disposal of their solid wastes. Private contractors usually provide two pick-ups per week at curbside for the one-family residential units. The homeowners generally pay about \$3.50 per month for their collection. The commercial and industrial establishments arrange whatever is necessary for their needs with individual contractors.

The Township does provide an on-call pick-up service for the collection of bulky, clean-up type items left at curbside. There is no municipally sponsored leaf collection activity in Manchester. Municipal forces are utilized as needed for road sweepings and debris collections.

Many of the private contractors haul the wastes from the Township to Ocean County Landfill on Route 70 in Manchester. Residents have free dumping privileges at the Manchester Township Landfill also off of Route 70.

The Township Dog Warden handles most of the collection and disposal activities pertaining to dead animals. Abandoned vehicles are taken care of by local police who make every effort to locate the owner, after such a vehicle has been towed to a private yard.

There are no significant municipal or citizen group recycling activities currently underway in Manchester.

BOROUGH OF MANTOLOKING

The Borough of Mantoloking is under contract with the Marpal Company of West Long Branch, to service their residential solid waste removal needs. The present three-year contract was signed on January 1, 1978 and ends December 31, 1980. Included within the contract are three backyard pick-ups per week during summer months, and two such pick-ups per week in the winter. In addition, two spring clean-up days are provided for the collection of bulky items. The annual municipal budget for solid waste collection and disposal in Mantoloking is \$44,000.00.

The Borough's Street Department is utilized for leaf collection and road sweepings, after which such material is disposed of at the Brick Town Municipal Landfill. The solid wastes collected by the municipal contractor are hauled to the Marpal Landfill in Tinton Falls for disposal.

The collection and disposal of dead animals in Mantoloking is also a provision of the municipal contract. In the event of an abandoned vehicle, local police would respond under N.J.D.M.V. guidelines.

Presently, there are no Mantoloking citizen groups active in recycling.

TOWNSHIP OF OCEAN

The Township of Ocean employs a municipal contractor to meet local solid waste collection and disposal needs. The present three-year

TOWNSHIP OF OCEAN, Cont'd.

contract is with Caldeira Brothers and expires on December 31, 1980. The level of service provided by the contractor involves twice-weekly curb pick-up of municipal wastes. The expenditure by the Township for this three-year service is \$217,248.00 or \$72,416.00 per year.

The Township does, however, provide the month of June to residents as a clean-up period for bulky item collection. Additionally, dead animal collection and disposal usually involves Ocean Township Road Department personnel. The procedure for abandoned vehicle disposal involves local police acting under State guidelines. The County is responsible for cleaning the Township's roads.

The Caldeira Brothers transport wastes generated in Ocean Township to the Southern Ocean Landfill Inc. in Waretown. This site provides a convenient, nearby disposal area.

Ocean Township is not involved in any citizen group waste recycling activities at the present time.

BOROUGH OF OCEAN GATE

The Borough of Ocean Gate utilizes a municipal collection system to service their 1,020 one-family residential units. One municipal compactor truck is used for the three times a week, curbside collection system. Commercial establishments contract individually

BOROUGH OF OCEAN GATE, Cont'd.

for their solid waste collection and disposal needs.

Household wastes as well as bulky clean-up are first hauled to a central site in the Borough, awaiting transfer to a sanitary landfill. Within a week these wastes are hauled by municipal vehicles to the Southern Ocean Landfill, Inc. in Waretown. The annual municipal budget for solid waste collection and disposal in Ocean Gate is \$38,586.00.

Leaf collection and disposal is incorporated into regular collection schedules, or undertaken by Borough crews whenever necessary. Dead animal collection and disposal is handled on a case by case basis, utilizing the appropriate municipal personnel. A local ordinance as well as N.J.D.M.V. guidelines govern the disposal activities of abandoned vehicles within Ocean Gate. Borough roads are swept by hand as necessary, with the collected material deposited at the local transfer station.

There is currently no waste recycling activities or efforts underway in Ocean Gate.

BOROUGH OF PINE BEACH

A municipal solid waste collection system is provided to the residential and commercial units of Pine Beach. The level of service involves twice-weekly collection at curbside. The Borough also offers spring and fall clean-up operations for the collection

BOROUGH OF PINE BEACH, Cont'd.

of bulky items. An on-call service for collection of such items is also provided to residents on a year-round basis. The annual municipal budget figure for solid waste collection and disposal in Pine Beach is approximately \$29,250.00.

Leaf collection and disposal is incorporated into regular collection schedules. Ocean County sweeps County roads within Pine Beach.

Dead animal collection and disposal is carried out with Humane Society assistance. In the event of an abandoned vehicle, police make every effort to locate the owner and otherwise follow appropriate N.J.D.M.V. guidelines for such vehicles.

Solid wastes originating in Pine Beach are transported to the Southern Ocean Landfill, Inc. in Waretown, approximately 35 miles roundtrip.

There are no waste recycling activities or efforts presently underway in Pine Beach.

TOWNSHIP OF PLUMSTED

Residents of Plumsted must either contract privately for the collection and disposal of their solid wastes, or haul their own wastes. The majority of the 1,233 one-family residential units and 72 commercial units are under private contracts

TOWNSHIP OF PLUMSTED, Cont'd.

involving twice-weekly, curbside collection. The Township does, however, provide 2 to 3 days per year as a "clean-up week" for bulky items. This service reportedly costs Plumsted \$1,500.00. These wastes, as well as those collected by private contractors, may be taken to the municipal sanitary landfill on Lakewood Road in Plumsted. The estimated remaining life of this facility has been estimated at 6 years.

Road sweeping occurs in Plumsted approximately two times a week and involves Ocean County manpower and equipment. There is no organized leaf collection activity within the Township. Private wreckers handle the 2 to 3 abandoned vehicles per year in Plumsted. Their usual practice is to hold such vehicles for a year and apply the appropriate N.J.D.M.V. statutes.

The Township of Plumsted is not presently involved in any recycling efforts.

BOROUGH OF POINT PLEASANT

The Borough of Point Pleasant is currently under contract with Waste Disposal, Inc. for the collection and disposal of their municipal solid wastes. The current contract is for five years which expires on December 31, 1982, and includes 2 curbside collections per week for the 6,141 one-family residential units, 309 multiple dwelling units and 257 commercial units. The cost of

BOROUGH OF POINT PLEASANT, Cont'd.

the five year contract is as follows:

1978	\$272,200.00
1979	\$291,060.00
1980	\$305,613.00
1981	\$320,894.00
1982	\$336,938.00

Clean-up days for bulky items are provided on the second collection day of each week. The actual day for this service varies, depending on which of the three collection zones is involved. During these clean-up days, bagged leaves may also be collected. Otherwise, loose leaves are collected at curbside utilizing a municipal leaf loader.

Point Pleasant also has a contract with Animals Unlimited of Farmingdale for the collection and disposal of dead animals. Beyond the usual N.J.D.M.V. statutes for abandoned vehicles, the Borough has an ordinance regarding the storage of unusable or inoperative vehicles. The Borough zoning officer estimates that there are 50 cases per year involving such vehicles.

Point Pleasant encourages local recycling activity by providing a recycling center next to the Borough garage.

BOROUGH OF POINT PLEASANT BEACH

Municipal resources are utilized in serving the residential and commercial solid waste collection and disposal needs of Point Pleasant Beach. Although the entire community is included in

BOROUGH OF POINT PLEASANT BEACH, Cont'd.

municipal collection schedules, certain commercial establishments and larger apartment complexes have found it necessary to make additional arrangements with one of the several private solid waste contractors serving the community.

The Borough is divided into several different districts involving different days of collection, but the basic service consists of a curbside collection three times a week during summer months, with two collection days a week during winter months. All public schools (if open), as well as public litter receptacles are collected on a daily basis.

In addition to the above services, residents may arrange by appointment through the Borough Hall, for the collection of bulky items on the last Wednesday of each month. The annual municipal budget figure for solid waste collection and disposal in Point Pleasant Beach is \$68,885.00.

Although there is no definite schedule for leaf collection within the Borough, such collection is undertaken by municipal personnel and equipment whenever necessary. Road sweeping is carried out on a continuous basis within the Borough, utilizing an Elgin sweeper. Both the material accumulated from leaf collection and road sweepings are utilized as fill for low-lying, local lots.

Borough sanitation workers are responsible for collection and disposal of dead animals. Point Pleasant Beach Police respond

BOROUGH OF POINT PLEASANT BEACH, Cont'd.

to abandoned vehicles under N.J.D.M.V. guidelines. Once cleared by police, the usual practice then is the holding of a public auction to dispose of such vehicles.

The James H. James, Inc. Landfill is the present disposal site of Point Pleasant Beach solid wastes. A round trip to this Brick Township site involves some 12 miles. The Borough is charged the rate of \$0.85 per cubic yard for solid waste disposal.

Present recycling activity in Point Pleasant Beach is limited to allowing residents to deposit aluminum cans and bottles within controlled areas at the Borough yard on Saturday mornings.

BOROUGH OF SEASIDE HEIGHTS

The Borough of Seaside Heights provides its residential and commercial units with a municipal solid waste collection system. The number of collections per week varies throughout the year, depending on the seasonal population. During winter months 3 curbside collections are provided with 7 such collections per week during summer months. Bulky item collection is included in the above schedules.

Presently, the solid wastes generated in Seaside Heights are transported some 14 miles to the Ocean County Landfill in Manchester. The annual municipal budget for solid waste collection and disposal in Seaside Heights is \$79,854.00.

BOROUGH OF SEASIDE HEIGHTS, Con'td.

Properly prepared leaves left at curbside are picked up on regular collection days. Additionally, the roads are swept as necessary utilizing municipal forces. Dead animal disposal is usually handled by individual owners, or incorporated in regular collection activities. There are approximately 6 abandoned vehicles per year in Seaside Heights, and they are handled by local police. If an owner can not be located, application for a junk title is made through the N.J.D.M.V.

Citizen group recycling activity is encouraged within the Borough, and covered by a local ordinance.

BOROUGH OF SEASIDE PARK

The Borough of Seaside Park utilizes a municipal collection system to service their 1,500 one-family residential units, 300-400 multiple dwelling units, and 40 commercial units. Residences are provided with three backyard pick-ups per week. Seven collections per week are provided to commercial establishments from June through September, with two collections per week the remainder of the year. The solid waste collection and disposal budget was \$80,800.00 in 1978.

Household (bulky) trash is collected on the first Monday of each month all year, with four extra collections in the fall, and five extra days in the spring. Road sweeping is also the responsibility of Borough employees.

BOROUGH OF SEASIDE PARK, Cont'd.

The Borough of Seaside Park has no special collection and disposal arrangements for dead animals or leaves. Abandoned vehicles are handled through local police under State D.M.V. guidelines. Reportedly, this particular problem rarely occurs in Seaside Park.

Solid wastes generated in Seaside Park are disposed of at the Berkeley Township Sanitary Landfill in Berkeley Township, a one-way distance of 14 miles.

There presently are no recycling efforts active in Seaside Park.

BOROUGH OF SHIP BOTTOM

Ship Bottom has a municipally-operated system for the collection and disposal of solid wastes generated within the Borough. This service provides the 1,427 residential units and 118 commercial units with three curbside collections per week during summer months, and two such collections per week in the winter. Additionally, the Borough sets aside a week in May for spring clean-up operations. During this period residents are allowed to place bulky items at curbside for collection by the Ship Bottom Department of Public Works.

Solid wastes generated in Ship Bottom are presently transported to the Stafford Township Municipal Landfill, a one-way distance of 8 miles. The Borough is charged the rate of \$0.85 per cubic yard for disposal privileges at this site.

BOROUGH OF SHIP BOTTOM, Cont'd.

The Borough of Ship Bottom has no municipal provisions for leaf collection, road sweeping or waste recycling activities. Abandoned vehicles in the Borough are reportedly impounded by local police for eventual auction.

For 1978, the municipal budget figure for solid waste collection and disposal was \$63,750.00. Of this total figure, \$12,000.00 was allocated for disposal purposes alone.

BOROUGH OF SOUTH TOMS RIVER

The Borough of South Toms River provides municipal collection services for its residents and many of its commercial and industrial establishments. The service provided is twice a week at the curb. The Borough provides a regular clean-up service for bulky household wastes. The municipality is divided into 3 sections for clean-up. Each section is collected once on one of the first three Wednesdays of each month. Leaves are collected with the clean-up operation. Roads are swept when necessary. The annual municipal budget for solid waste collection and disposal is \$26,741.00.

Abandoned vehicles are disposed of by making an attempt to find the owner. If the owner is not found after a period of time, the police follow normal State D.M.V. procedures to dispose of the vehicle. Currently all solid waste collected in the Borough is disposed of in their own municipal landfill.

TOWNSHIP OF STAFFORD

The residential and commercial units within the Township of Stafford are serviced by a municipal collection system for their solid waste removal needs. The service provided is a bi-weekly, curbside collection system. However, several of the commercial and industrial units find it necessary to contract privately with outside contractors to meet their greater waste disposal needs. Additionally, the Township offers residents an on-call service for the collection of bulky, clean-up type items. The annual municipal budget for solid waste collection and disposal in Stafford is \$152,453.00.

The Township has no provision for leaf collection and disposal. A street sweeper is utilized on Township roads whenever it becomes necessary. Currently, the solid wastes collected by municipal vehicles are conveniently hauled a short distance to the Stafford Township Municipal Landfill off of Recovery Road.

An estimated 4 or 5 cases of vehicle abandonment occur yearly in Stafford. Such an occurrence is covered under local ordinance, as well as by local police acting under prescribed State procedures. Dead animal collection and disposal is handled by the Associated Humane Society in Lacey.

At present there is no citizen group activity in recycling within Stafford.

BOROUGH OF SURF CITY

Municipal forces are combined with private contractors in Surf City to meet local solid waste collection and disposal needs. Each of the one-family residential units, multiple dwelling units and many of the commercial units are provided two curbside collections per week. Several of the larger commercial units find it necessary to contract with outside, private contractors to meet their added collection and disposal needs. Bulky, clean-up items are collected by the Borough each Wednesday during the summer, and less often during the remainder of the year.

There is no organized leaf collection system in Surf City. The Borough Road Department does, however, sweep the streets whenever the need arises. Presently, this type of material as well as that collected from the household and commercial units is deposited at the Stafford Township Municipal Landfill, a one-way distance of 9 miles. The annual municipal budget for solid waste collection and disposal in Surf City is \$69,635.00. Included in this total figure is \$49,250.00 for collection salaries and wages, with \$20,385.00 for disposal and maintenance.

The Lacey Humane Society is combined with municipal personnel for dead animal collection and disposal. In the event of an abandoned vehicle, a summons is issued. After 60 days, local police are responsible acting under State procedures for disposal of such vehicles.

BOROUGH OF SURF CITY, Cont'd.

There is no citizen group recycling activity presently underway in Surf City.

BOROUGH OF TUCKERTON

Tuckerton Borough and Eagleswood Township share the responsibility of providing municipal refuse collection and disposal services to the residents of both municipalities. Tuckerton provides all collection vehicles and all sanitation personnel. Eagleswood provides the landfill and the landfill equipment. At the end of the year, sanitation costs of both towns are audited. Each municipality either pays a difference to or receives a payment from the other municipality according to a preset percentage worked out by both municipalities. The 1978 cost for the Borough of Tuckerton was budgeted at about \$43,000.00.

Residents receive twice a week curbside collection services. Commercial units in Tuckerton are also serviced by the municipal collection system. All wastes collected are taken to the Eagleswood-Tuckerton Landfill on Eagle Road in Eagleswood.

Residents also have a period during which they can set out clean-up types at the curb. The clean-up program is usually held on two Mondays in the Spring and two Mondays in the Fall. Leaves are picked up with the regular collection. The Borough does not provide a road sweeping service.

BOROUGH OF TUCKERTON, Cont'd.

Dead animals are taken care of by the local dog warden. There have been no procedures established for abandoned vehicle disposal. At the present time there is no recycling activity in the Borough of Tuckerton.

EXISTING COLLECTION AND TRANSPORTATION SYSTEMS

One of the requirements of the Solid Waste Management Act is to describe the existing collection and transportation systems in the Ocean County District. This investigation was completed. The information that follows is a result of that investigation. This information, together with other information, developed through the implementation of the study has significantly aided in achieving the goal of developing and implementing the most economic and energy efficient solid waste collection and transportation systems possible.

TOWNSHIP OF BARNEGAT

The Caldeira Brothers provide refuse collection services to the Township on a twice a week at the curb basis. The contractor uses three crews to collect from both Barnegat and Ocean Township. A driver and two collectors man the 20 or 25 cubic yard collection vehicles used to undertake the waste removal task. There are 3 collection routes in Barnegat Township.

The waste is disposed of at the collection contractors own landfill, the Southern Ocean Landfill Inc. landfill in Ocean Township, a round trip distance of about 12 miles.

BOROUGH OF BARNEGAT LIGHT

The Borough of Barnegat Light has a contract with the Caldeira Brothers waste collection contractors. The Caldeira Brothers use either a 20 or a 25 cubic yard truck to service the municipality. Only one route is necessary to collect the Borough's waste at the curb during the winter. During the summer three trucks are required.

The waste collected is transported to the collection contractor's own landfill, Southern Ocean Landfill, Inc. landfill in Ocean Township. The 22 mile trip takes about half an hour, one way.

BOROUGH OF BAY HEAD

The Borough of Bay Head is presently under contract for the collection and disposal of solid waste with the collection contractor of James Whaley. The contractor utilizes 2-20 cy trucks, each manned by two men. Bay Head has two collection routes, one on Monday, Wednesday, and Friday and the other Tuesday, Thursday and Saturday.

The disposal site, Lakewood Township Municipal Landfill, is 15 miles away and it takes approximately one and one half hours for a round-trip. The vehicles travel via Route 70 to the landfill.

BOROUGH OF BEACH HAVEN

The Borough of Beach Haven operates a municipal collection system. The Borough has 4-20 cy trucks each manned by three men, a

BOROUGH OF BEACH HAVEN, Cont'd.

driver and two collectors. Beach Haven is divided into 2 districts in the winter (North and South) and 4 districts in the summer with backyard pick-ups three times a week.

The vehicles transport the solid waste to the Southern Ocean Landfill, Inc. landfill, a 46 mile round-trip. A round-trip takes approximately one hour and a quarter with vehicles traveling via Route 72 to the landfill.

BOROUGH OF BEACHWOOD

The Borough of Beachwood provides a municipal collection system for the collection and disposal of solid waste. The Borough uses 1-17 cy truck manned by three men, a driver and two collectors, and it has 2-20 cy trucks which the Borough uses as backup vehicles.

The vehicles travel by way of Beachwood's local roads to the Township landfill on Pinewald Road, an approximate 15 minute round-trip.

TOWNSHIP OF BERKELEY

The Township of Berkeley utilizes a municipal collection system for the collection and disposal of solid waste twice weekly at the curb. There are 12 collection districts in the winter and 19 in the summer. The Township utilizes 6-25 cy trucks manned by three men, a driver and two collectors. Pick-ups are made on Monday and Thursday in South Seaside Park to Holly Park, Tuesday

TOWNSHIP OF BERKELEY, Cont'd.

and Friday in Silver Ridge and Holiday City, Wednesday and Friday in Silver Ridge, Belair to Pinewald.

The Berkeley Township landfill is 4-6 miles away and it takes approximately one half hour for a round-trip. The vehicles travel by way of Pinewald and Keswick Roads (better known as Route 530) to the landfill.

TOWNSHIP OF BRICK

The Township of Brick operates its own solid waste collection system. In order to provide twice a week curbside service to its residents, the Department of Public Works utilizes twelve 20 cubic yard collection vehicles and four 25 cubic yard collection vehicles to collect and dispose of the waste. Each truck is normally manned by three men, one driver and two collectors. During the winter there are 11 collection districts and during the rest of the year there are 14.

Once the collection vehicle is loaded it transports it's load from Brick Township to the Ocean County Landfill Corp. landfill in Manchester for disposal. The vehicle usually travels via Route 35 to Mantoloking Rd. and then to the landfill. The landfill is approximately 6 miles away and the round-trip usually takes about 45 minutes. The Public Works Department feels that its equipment is adequate at the present time.

TOWNSHIP OF DOVER

The Township of Dover utilizes a municipal collection system. The Township has 15-25 cy trucks, 2-30 cy trucks and 7-20 cy trucks manned by two men. The solid waste is picked up at curbside twice weekly. During the summer the whole fleet is utilized. Dover Township has 32 collection districts - 13 districts are picked up on Monday, 11 districts are picked up on Tuesday, and 8 districts are picked up on Wednesday.

The solid waste is transported to the Dover Township Municipal Landfill on Bay Avenue and Church Road, an approximate one hour round-trip. The vehicles travel via local roads and Routes 37 and 166 to Church Road and then to the landfill.

TOWNSHIP OF EAGLESWOOD

The Township of Eagleswood services its residents by having the Borough of Tuckerton collect the solid waste in the municipality. (See Borough of Tuckerton for a more extensive description)

BOROUGH OF HARVEY CEDARS

The Borough of Harvey Cedars has a contract with the Caldeira Brothers waste collection contractors. The Caldeira Brothers use either a 20 or a 25 cubic yard truck to service the municipality. Only one is necessary to collect the Borough at the curb during the winter. During the summer three trucks are required.

The waste collected is transported to the collection contractor's own landfill, Southern Ocean Landfill, Inc. landfill in Ocean

BOROUGH OF HARVEY CEDARS, Cont'd

Township. The one way distance is about 18 miles. The trip to the landfill takes about forty minutes.

BOROUGH OF ISLAND HEIGHTS

The Borough of Island Heights employs the waste collection and disposal services of Al Strubel Inc. Waste is collected twice a week at the curb with a 20 cubic yard vehicle. Only one route is necessary to collect waste from the entire municipality. Waste collected is disposed of at either the Jackson Township Municipal Landfill or at the Lakewood Township Municipal Landfill. The one-way distance is between 11 and 15 miles.

TOWNSHIP OF JACKSON

The Township of Jackson is contracted privately by the homeowners for the collection and disposal of solid waste. The private contractors usually provide twice a week at the curb pick up. The Township has a municipal landfill on Homestead Road where residents may haul their own garbage and dispose of it free of charge. Private contractors servicing residents of Jackson are also allowed to use the Jackson Township Landfill. The landfill is about a 6 to 10 mile haul.

TOWNSHIP OF LACEY

The Township of Lacey has a municipal collection system for the collection and disposal of solid waste. There are four collection

TOWNSHIP OF LACEY, Cont'd.

routes with curbside pick ups twice weekly. The Township has 5-20 cy trucks but uses only four manned by three men. Collections are made East of Route 9 on Monday and Thursday, West of Route 9 and Cranberry Hill on Tuesday and Friday, at Barnegat Pines and Bamber Lake on Wednesday and Saturday.

The solid waste is transported to the Township Landfill on Lacey Road, an approximate 45 minute round-trip for the 2 mile haul.

BOROUGH OF LAKEHURST

The Borough of Lakehurst utilizes a municipal collection system for the collection and disposal of solid waste. Lakehurst has 2-25 cy trucks manned by three men, a driver and two collectors. The Borough provides bi-weekly at the curb pick ups for the two collection routes.

The solid waste is transported 3 miles away to the disposal site, the Ocean County Landfill Corp. landfill, a round-trip of about 20 minutes via Route 70.

TOWNSHIP OF LAKEWOOD

The Township of Lakewood utilizes a municipal collection system. The Township has 3-25 cy trucks and 2-20 cy trucks which it employs to collect wastes from the municipality. It also has 5-25 cy trucks which are not in service at the present time. Lakewood provides bi-weekly pick ups at the curb. Pick ups are

TOWNSHIP OF LAKEWOOD, Cont'd.

made on the North side of the town on Monday and Thursday and on the South side of the town on Tuesday and Friday.

The Lakewood Township Municipal Landfill is 3.5 miles away and it takes 45 minutes to make a round-trip. The vehicles travel by way of Route 9 and Central Avenue to the landfill.

The equipment in Lakewood is adequate according to the Public Works Department.

BOROUGH OF LAVALLETTE

The Borough of Lavallette has a municipal solid waste collection system. The 3-25 cy trucks and 1-20 cy truck are each manned by three men, one driver and two collectors. The Borough has two collection routes, the Northside and the Southside. The routes are collected three times a week in the summer and twice a week in the winter.

The disposal site is the Waste Disposal Inc. landfill in Howell Township, located in Monmouth County some 16 miles away.

The Public Works Department feels its equipment is adequate.

TOWNSHIP OF LITTLE EGG HARBOR

The Township of Little Egg Harbor maintains its own solid waste collection system and municipal landfill. The Township has 6

TOWNSHIP OF LITTLE EGG HARBOR, Cont'd.

collection routes utilizing 3-20 cy trucks. On Monday and Wednesday collections are made in W. Tuckerton and Mystic Islands. On Tuesday and Friday collections are made in Mystic Islands, Parkertown and W. Tuckerton.

The vehicles transport the solid waste via Route 539 and Forge Road to the Township's sanitary landfill which is an approximate 40 minute round-trip.

The Public Works Department feels the equipment is adequate.

TOWNSHIP OF LONG BEACH

The Township of Long Beach is provided with refuse collection and disposal services through a contract with the Caldeira Brothers. Three routes and 3 trucks are necessary to collect the refuse in the winter and 7 crews and 7 trucks are needed to collect the refuse in the summer. 20 or 25 cubic yard trucks are used, usually manned by 3 men, a driver and two collectors.

The waste collected is disposed at the collection contractors own landfill, the Southern Ocean Landfill Inc. landfill, located in Ocean Township, about 17 miles away.

TOWNSHIP OF MANCHESTER

The residents of the Township of Manchester privately contract for solid waste collection and disposal. Usually the contractors

TOWNSHIP OF MANCHESTER, Cont'd.

provide twice a week collections at the curb.

Residents may haul their garbage to the Manchester Township Municipal Landfill on Route 70 and dispose of it at no charge.

BOROUGH OF MANTOLOKING

The Borough of Mantoloking is presently under a three year contract for the collection and disposal of solid waste with the Marpal Company. Backyard collections are made three times a week in the summer and twice a week in the winter. Mantoloking has two collection routes and the size of the truck collecting the solid waste varies from 1-20 cy truck to 1-31 cy truck.

The solid waste is transported to the Marpal Landfill in Monmouth County, some 17 miles one way.

TOWNSHIP OF OCEAN

The Caldeira Brothers provide refuse collection services to the Township on a twice a week at the curb basis. The contractor uses three crews to collect from both Ocean and Barnegat Townships. A driver and two collectors man the 20 or 25 cubic yard collection vehicles used to undertake the waste collection task. There are two collection routes in Ocean Township.

The waste is disposed of at the collection contractors own landfill, the Southern Ocean Landfill Inc. landfill, located within Ocean Township.

BOROUGH OF OCEAN GATE

The Borough of Ocean Gate provides a municipal collection system for the collection and disposal of solid waste. The Borough utilizes 1-20 cy truck manned by three or four men. During the summer months collections are made three times a week, Monday, Wednesday and Friday and in the winter twice a week, Monday and Wednesday.

The disposal site, Southern Ocean Landfill, Inc. landfill, is 17 miles away and a round-trip takes approximately one and one quarter hours to one and three quarter hours. The vehicles travel by way of Routes 9 and 532 to the landfill.

BOROUGH OF PINE BEACH

The Borough of Pine Beach utilizes a municipal solid waste system for the collection and disposal of solid waste. Pine Beach has a new 31 cy truck and a 25 cy truck which it uses as a backup vehicle. The Borough is divided into two districts with bi-weekly pick ups at the curb. The East side of town is picked up on Monday and Thursday and the West side of town on Tuesday and Friday.

The Southern Ocean Landfill, Inc. landfill is 17 miles away and a round-trip takes approximately one and one half hours with vehicles traveling via Route 9, Route 549 and Route 532 to the landfill.

TOWNSHIP OF PLUMSTED

The residents of the Township of Plumsted privately contract for the collection of solid waste. Collections are made bi-weekly at the curb.

The solid waste is transported to the Plumsted Municipal Landfill on Lakewood Road.

BOROUGH OF POINT PLEASANT

The Borough is under contract with Waste Disposal Inc. for waste collection and disposal services. Three collection routes are necessary to gather the waste from the entire municipality. The service is twice a week at the curb.

Once collected, the waste is transported to the collection contractors own disposal facility in Howell Township, Monmouth County, a distance of about 7 miles.

BOROUGH OF POINT PLEASANT BEACH

The Borough of Point Pleasant Beach provides a municipal collection system for the collection and disposal of solid waste. Three 25 cy trucks, each manned by two men are utilized to make collections in the two districts. Collections are made at the curbside three times a week in the summer and twice a week in the winter.

The disposal site, James H. James landfill in Brick Township, is

BOROUGH OF POINT PLEASANT BEACH, Cont'd.

4-6 miles away and a round-trip takes approximately 45 minutes with vehicles traveling via Herbertsville Road and Route 35 to the landfill.

BOROUGH OF SEASIDE HEIGHTS

The Borough of Seaside Heights utilizes a municipal collection system for the collection and disposal of solid waste. The Borough has 6 collection routes serviced by 2-20 cy trucks and 1-25 cy truck. The trucks are each manned by two men. Waste is collected 7 times a week during the summer months and 3 times a week for the balance of the year.

The disposal site, the Ocean County Landfill Corp landfill in Manchester, is 14 miles away and it takes approximately one and one half hours for a round-trip. The vehicles travel to the site by way of Route 37 and Route 541.

BOROUGH OF SEASIDE PARK

The Borough of Seaside Park maintains a municipal collection system. In the winter backyard pick ups are made twice weekly, utilizing 1-25 cy truck manned by three men. In the summer pick ups are made three times a week, utilizing 3-25 cy trucks, each manned by three or four men.

The landfill the Borough uses, the Berkeley Township Landfill, is located 14 miles away and a round-trip takes approximately one hour with vehicles traveling via Route 37, the Parkway, and Double Trouble Road.

BOROUGH OF SHIP BOTTOM

The Borough of Ship Bottom utilizes a municipal collection system for the collection and disposal of solid waste. Curb-side collections are made twice weekly in the winter and three times a week in the summer. The Borough has 2-20 cy trucks and 1-18 cy truck which make pick ups Monday and Thursday on the ocean side and Tuesday and Friday on the bay side. During the summer two trucks are put on split routes.

Ship Bottom is 8 miles away from the Stafford Township Municipal Landfill and a round-trip takes approximately 45 minutes. The trucks travel to the landfill by way of Route 72 and Recovery Road.

The Department of Public Works is feeling a strain with the 5% cap on municipal expenditures.

BOROUGH OF SOUTH TOMS RIVER

The Borough of South Toms River maintains both its own refuse collection system and its own municipal landfill located within its borders. One collection vehicle is normally utilized to collect the waste from the Boro's residents. The Boro does own one other collection vehicle which it uses as a backup unit. The Boro is broken down into 3 collection districts. Sections 1 and 3 are collected on Tuesdays and Fridays and Section 2 is collected on Mondays and Thursdays. The Wednesdays are dedicated to bulky waste pickups. Section 1 is picked up on the first

BOROUGH OF SOUTH TOMS RIVER, Cont'd.

Wednesday. The second section is picked up on the second Wednesday and the third section is picked up on the third Wednesday. The last one or two Wednesdays of the month are utilized for maintenance and special pickups.

It takes the collection vehicle at most 15 or 20 minutes to make a roundtrip to the municipal landfill. A part-time mechanic operates a front end loader evenings to keep the landfill in an environmentally acceptable condition.

TOWNSHIP OF STAFFORD

The Township of Stafford provides a municipal collection system with 4-20 cy trucks and 1-16 cy truck each manned by three men, a driver and two collectors. The Township is divided into East and West routes with twice weekly curbside collection.

The solid waste is transported to, deposited, and the collection vehicle returns from the Township Municipal Landfill within approximately 15 minutes to one half hour with vehicles traveling Route 72 and Recovery Road.

The Department of Public Works feels it needs an additional truck this year to adequately handle the job of collecting and disposing of the solid waste generated.

BOROUGH OF SURF CITY

The Borough of Surf City utilizes a municipal solid waste collection system. Twice a week at the curb pick ups are made during the winter by 1-20 cy truck and in the summer by 3-20 cy trucks each manned by three men, a driver and two collectors.

The disposal site, the Stafford Township Municipal Landfill, is 9 miles away and it takes approximately one half hour to make a round trip with vehicles traveling Route 72 and Recovery Road to the landfill.

BOROUGH OF TUCKERTON

The Borough of Tuckerton provides a municipal collection system for the collection and disposal of solid waste. The Borough utilizes 2-20 cy trucks each manned by three men, a driver and two collectors. There are two collection routes with pick ups at the curb twice a week. The Beach Area and all of Eagleswood is picked up on Monday and Thursday. The remainder of Tuckerton is picked up on Tuesday and Friday.

The solid waste is transported to the Tuckerton-Eagleswood Landfill on Forge Road in Eagleswood Township.

DESCRIPTION OF LANDFILLS SERVICING THE OCEAN COUNTY DISTRICT

Disposal of solid wastes in sanitary landfills is the primary method of disposal in the Ocean County District. Almost all of the residential solid wastes and the majority of the commercial, industrial and institutional solid wastes generated in the Ocean County District are hauled to landfills for disposal. Over 90 per cent of the agricultural waste is used on site as soil conditioner. The other 10 or less percent is landfilled.

Table III-4 lists the disposal areas utilized by the Ocean County municipalities. Figure III-2 illustrates the general patterns of solid waste disposal in Ocean County.

The following sections gives a detailed analysis of each of the landfills both within and outside the Ocean County District. The information was obtained from the files of the Solid Waste Administration of the New Jersey Department of Environmental Protection, the Board of Public Utilities, and information derived from a questionnaire on municipal solid waste collection and disposal practices sent to every municipality in the district.

TABLE III-4

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLANSOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES

<u>MUNICIPALITY</u>	<u>DISPOSAL SITE</u>	<u>LOCATION</u>
BARNEGAT	Southern Ocean Landfill, Inc.	Ocean Township
BARNEGAT LIGHT	Southern Ocean Landfill, Inc.	Ocean Township
BAY HEAD	Lakewood Township Municipal Landfill	Lakewood
BEACH HAVEN	Southern Ocean Landfill, Inc.	Ocean Township
BEACHWOOD	Beachwood Municipal Landfill	Beachwood
BERKELEY	Berkeley Municipal Landfill	Berkeley
BRICK	Ocean County Landfill Corp.	Manchester
DOVER	Dover Township Municipal Landfill	Dover
EAGLESWOOD	Tuckerton-Eagleswood Landfill	Eagleswood
HARVEY CEDARS	Southern Ocean Landfill, Inc.	Ocean Township
ISLAND HEIGHTS	Jackson Twp. & Lakewood Twp. Mun. Landfills	Jackson, Lakewood
JACKSON	Jackson Township Municipal Landfill	Jackson
LACEY	Lacey Township Municipal Landfill	Lacey
LAKEHURST	Ocean County Landfill Corp.	Manchester
LAKEWOOD	Lakewood Township Municipal Landfill	Lakewood
LAVALLETTE	Waste Disposal Inc.	Howell Twp., Monmouth Co.
LITTLE EGG HARBOR	Little Egg Harbor Township Landfill	Little Egg Harbor
LONG BEACH	Stafford Township Municipal Landfill	Stafford
MANCHESTER	Manchester Township Municipal LF (residents)	Manchester
	Ocean County Landfill (contractors)	Manchester
MANTOLOKING	Marpal Landfill	Monmouth County

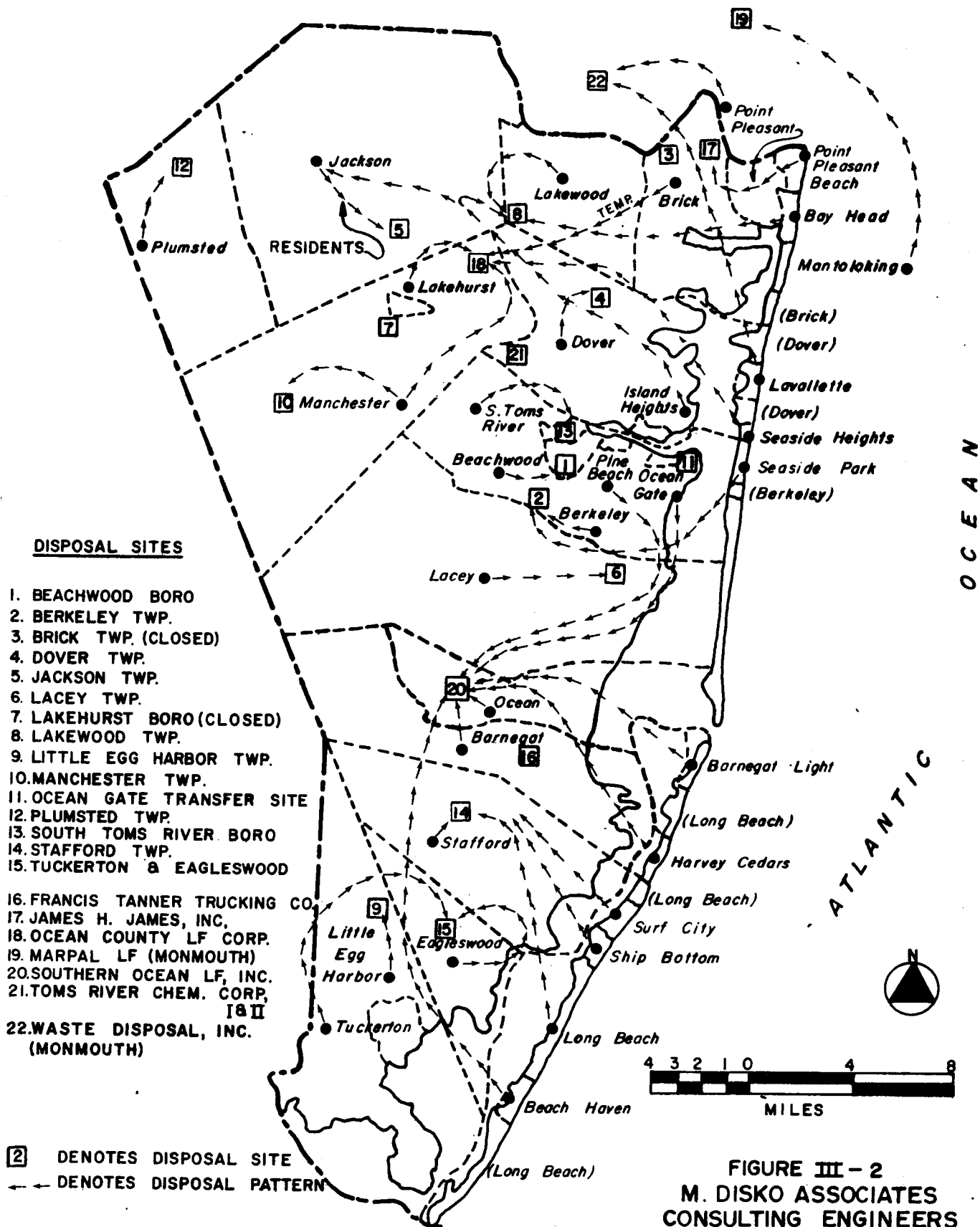
TABLE III-4, Cont'd.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLANSOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES

<u>MUNICIPALITY</u>	<u>DISPOSAL SITE</u>	<u>LOCATION</u>
OCEAN	Southern Ocean Landfill, Inc.	Ocean Township
OCEAN GATE	Southern Ocean Landfill, Inc.	Ocean Township
PINE BEACH	Southern Ocean Landfill, Inc.	Ocean Township
PLUMSTED	Plumsted Municipal Landfill	Plumsted
POINT PLEASANT	Waste Disposal, Inc. Landfill	Howell Twp., Monmouth Co.
PT. PLEASANT BEACH	James H. James, Inc. Landfill	Brick
SEASIDE HEIGHTS	Ocean County Landfill Corp.	Manchester
SEASIDE PARK	Berkeley Township Landfill	Berkeley
SHIP BOTTOM	Stafford Township Municipal Landfill	Stafford
SO. TOMS RIVER	So. Toms River Municipal Landfill	So. Toms River
STAFFORD	Stafford Township Municipal Landfill	Stafford
SURF CITY	Stafford Township Municipal Landfill	Stafford
TUCKERTON	Tuckerton-Eagleswood Landfill	Eagleswood

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE DISPOSAL SITES UTILIZED BY OCEAN COUNTY MUNICIPALITIES



BEACHWOOD BOROUGH MUNICIPAL LANDFILL

The Borough of Beachwood owns and operates a sanitary landfill off Pinewald Road in Beachwood. Typical wastes accepted by the landfill include household and commercial wastes, institutional wastes, bulky items, leaves, chopped trees/stumps as well as construction and demolition materials.

The on-site ground cover consists of wooded areas of small pines and scrub oaks. On-site cover material is considered suitable and sufficient for the 25 cy of such material needed daily.

The landfill site is zoned industrial, although no future land use plans have been announced.

Currently, the landfill utilizes the trench and area methods of landfilling. The site consists of 32± acres and has a life expectancy, as of 1978, of 29 years. The equipment at the facility consists of a 1.5 cy loader.

During the period of January 1 through December 31, 1977, the landfill reportedly accepted 15,900 cubic yards of household, commercial and institutional waste and 500 cubic yards of bulky materials.



FIG. III-3 BEACHWOOD BOROUGH MUNICIPAL LANDFILL
View Looking East



FIG. III-4 BERKELEY TOWNSHIP MUNICIPAL LANDFILL
View Looking Southwest

BERKELEY TOWNSHIP MUNICIPAL LANDFILL

A sanitary landfill is maintained by the Township of Berkeley on Pinewald-Keswick Road, within Berkeley. Household and commercial wastes, bulky items, tires, tree parts/stumps, in addition to construction and demolition materials, are all accepted by the landfill.

The passage of a variance has allowed this landfill to operate two working faces. One face is utilized for municipal solid wastes, and as such must be covered daily. The second face is reserved strictly for tree stumps, and only requires weekly cover.

An example of the volume of this operation is represented by 1974 figures, when approximately 12,759 tons of solid wastes were collected.

An inspection of the violation file at the Solid Waste Administration revealed no major violations. Several minor violations such as litter and insufficient cover material on the refuse were noted.

The 145⁺ acre site is currently using the area method of landfilling. The landfill estimates that about 125 trucks per week use the facility.

Equipment at the site consists of an Allis-Chalmers HD-11 Bulldozer. The Bayville Fire Department is on call for fire protection.

BRICK TOWNSHIP MUNICIPAL LANDFILL

The Township of Brick owns 41 $\frac{1}{2}$ acres of land off of Sally Ike Road for the operation of a sanitary landfill. Typical of the wastes collected are household, commercial, and institutional wastes, bulky items, and controlled quantities of septic waste clean-out material. The landfill currently serves the Township of Brick and Spring Lake Borough in Monmouth County.

The landfill utilizes the trench and area methods of landfilling. Equipment consists of a combination dozer, loader and compactor, a 2-1/2 yard rubber-tired loader, a clam-shell bucket crane and a 5 cy dump truck. Stand-by equipment includes a crawler dozer, a crawler loader and another 5 cy dump truck.

Design data assumed this landfill would service an average population of 44,000 persons, becoming 80,000 between the months of July and August. The fill per capita for this operation was set at 6 pounds per person per day, or approximately 330 cy of fill per day.



FIG. III-5 BRICK TOWNSHIP MUNICIPAL LANDFILL
View Looking West



FIG. III-6 DOVER TOWNSHIP MUNICIPAL LANDFILL
View Looking Southeast

BRICK TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

The Brick Township collection system involves approximately 100 trucks per week visiting the site, depositing approximately 700 tons per week. Additionally, 51 trucks belonging to individual collectors may deposit 255 tons of solid wastes weekly.

A review of B.P.U. records indicated the following rate schedule for various waste types:

<u>MATERIAL</u>	<u>*RATE</u>
Liquid Sewage or Septic Waste	\$2.50 per thousand gallons (\$4.00 minimum charge)
Acceptable Chemicals	\$0.08 per gallon
Solid Wastes:	
Logs, Tree Stumps	\$1.50 per cubic yard
Closed Roll-Off Containers	\$1.35 per cubic yard
Commercial and Industrial Trash in Roll-Off Containers	\$1.10 per cubic yard
Brush	\$1.00 per cubic yard
Building Debris	\$1.00 per cubic yard
Bulky Wastes:	
Tires and Rubber Materials	\$2.00 per cubic yard
Other Bulky Refuse	\$1.35 per cubic yard

*The minimum charge for the use of this facility is \$3.00.

The sanitary landfill operates from 8 A.M. to 4:30 P.M. on Monday through Friday, and from 8 A.M. to 12 P.M. on Saturdays. The site is zoned for sanitary landfill, although a park and recreational area is the planned future use.

A review of D.E.P. violations file indicates numerous violations for insufficient cover material and protruding refuse.

DOVER TOWNSHIP MUNICIPAL LANDFILL

The Township of Dover maintains a sanitary landfill on a 94-acre tract of land owned by the Township. Of this total acreage figure, actual landfill operations involve approximately 22 acres. The landfill site is bounded to the west by Bay Avenue and the Garden State Parkway, to the east by lots bordering on Silverton Road, and to the south by lots on Church Road. The disposal site, as well as surrounding areas, carry a rural zoning designation.

The area method of landfilling is utilized by this operation, primarily for municipal wastes generated in Dover Township. Materials considered acceptable by the facility include household and commercial wastes, bulky items, as well as leaves, branches and tree stumps.

In July 1978, the County completed a 208 Water Quality Management Planning Report which indicated leachate contamination of waterways surrounding the landfill. Sampling points were located upstream and downstream of the landfill.

In 1978, Dover Township budgeted \$103,000.00 for operation of the landfill. According to municipal officials, the facility had a 2.5 year life expectancy as of the fall of 1978.

JACKSON TOWNSHIP MUNICIPAL LANDFILL

The Township of Jackson is currently operating its own sanitary landfill on about 120 acres of land on Homestead Road off Lakehurst



FIG. III-7 JACKSON TOWNSHIP MUNICIPAL LANDFILL
View Looking East



FIG. III-8 LACEY TOWNSHIP MUNICIPAL LANDFILL
View Looking Southwest

JACKSON TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

Avenue. The property being landfilled is a portion of the Glidden Company mining tract.

This sanitary landfill accepts household, commercial and institutional wastes, bulky items, tires, construction and demolition materials, in addition to tree parts and stumps. In 1978 the life expectancy of this facility was set at 25 years.

The Jackson Township landfill currently has problems with groundwater contamination reportedly caused by septage disposal at the site. Efforts are underway now to minimize further contamination.

An estimated 100 trucks per week use this site where the trench and ramp methods of landfilling are incorporated. A Caterpillar D-8 crawler dozer and a rubber-tired loader are involved in daily operations with a Caterpillar D-6 dozer and another rubber-tired loader on stand-by. In the event of fire, the local, volunteer fire companies would be called upon.

B.P.U. records indicate the following rate schedule for various materials:

<u>MATERIAL</u>	<u>*RATE</u>
Solid Wastes:	
20 cy Vehicle or 4 Tons, whichever is less	\$5.00 per load
16 cy Vehicle or 3 Tons, whichever is less	\$3.50 per load
9 cy Vehicle or 1/2 Tons, whichever is less	\$2.00 per load

JACKSON TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

<u>MATERIAL</u>	<u>*RATE</u>
Compacted Materials	\$1.20 per cubic yard
Domestic Garbage (Non-Compacted, Originating in Jackson)	\$0.50 per cubic yard
Building Materials, Trees, Weeds, Commercial or Industrial Garbage or Tires	\$1.00 per cubic yard
Jackson Residents (Under 1/2 Ton)	No Fee

*Minimum charge to use this facility is \$8.00.

LACEY TOWNSHIP MUNICIPAL LANDFILL

The Township of Lacey operates its own sanitary landfill for the disposal of solid waste generated within the Township. The facility is located behind the Public Works Building on Lacey Road. Currently, (September 1978) the landfill is using an 11 acre tract of land. But, according to municipal officials, the Township will soon be closing on an additional tract of land adjacent to the existing facility.

The landfill currently accepts household trash and garbage, commercial, and institutional waste, bulky clean-up items, tires, leaves, and other lawn debris. The soils at the site consist of coarse sand and gravel. Some additional cover material for the landfill has to be trucked onto the site. The landfill equipment used include a Caterpillar D-5 dozer and a Michigan 75B rubber-tired front-end loader. A new scraper is on order. The landfill currently accepts approximately 40 Township trucks per week. According to municipal officials, the annual municipal budget for operation of the facility is \$21,400.00.

LAKEHURST BOROUGH MUNICIPAL LANDFILL

The Borough of Lakehurst maintained a sanitary landfill on Myrtle Street in Lakehurst to meet their municipal solid waste disposal needs. Typical of the wastes accepted include household, commercial, and institutional wastes, bulky items, tires, dry sewage sludge as well as vegetative wastes. According to municipal officials, the landfill has been temporarily closed because of the high cost of hauling cover material onto the site.

The landfill kept the daily working hours of 8 A.M. to 3 P.M. A Caterpillar 951 crawler loader was used in conjunction with the area and ramp methods of landfilling. Ten Borough trucks per week used the facility.

There is no zoning designation for the landfill site, but the municipal governing body has taken action that would dedicate the land to a light industrial use.

LAKEWOOD TOWNSHIP MUNICIPAL LANDFILL

The Lakewood Township Municipal Landfill is located on Farraday Avenue in Lakewood. Also accepted at the Lakewood Township Municipal Landfill are household and commercial wastes, bulky items, vegetative wastes as well as construction and demolition materials. In addition to the household and commercial wastes collected within Lakewood Township, private contractors are permitted to dump



FIG. III-9 LAKEHURST BOROUGH MUNICIPAL LANDFILL
View Looking East - (LF Presently Closed)



FIG. III-10 LAKEWOOD TOWNSHIP MUNICIPAL LANDFILL
View Looking East

LAKEWOOD TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

at this site. In order to do so, however, all private contractors must first obtain a Township Mercantile Business License, in addition to landfill tickets.

The trench method of landfilling is utilized at the 62 acre facility on soil consisting of various grades of sand.

In an average week's activity, approximately 50 trucks may use the site, 20 of which would be Lakewood collection trucks, the remainder coming from private contractors. With this volume of traffic, an estimated 140 tons of waste per week are deposited.

When present sanitary landfill operations cease, a public recreation and light industry land use is planned. The life expectancy of the facility is 10 years.

B.P.U. records indicate the following tariff schedule for the Lakewood Township Municipal Landfill:

<u>MATERIAL</u>	<u>RATE</u>
16-20 cy Packer	\$5.00 per load
12-16 cy Packer	\$3.50 per load
9-12 cy Packer	\$2.00 per load
Under 9 cy Packer	\$1.00 per load
 Demolition Material	 \$5.00 per room
 Lakewood Township Residents (household and commercial) who haul their own debris to landfill	 No Charge

LAKEWOOD TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

The landfill equipment used at the site include a Caterpillar 966 front end loader and a Caterpillar D-6 dozer.

According to information filed with the D.E.P., the facility accepted in 1976, 51,000 cubic yards of household and commercial waste and 25,128 cubic yards of bulky waste. The D.E.P. violations file has indicated numerous violations at the landfill for litter, insufficient cover, and erosion.

LITTLE EGG HARBOR MUNICIPAL LANDFILL

The Eggwood Corporation owns a sizeable parcel of land off Stafford Forge Road, of which 10⁺ acres are leased by Little Egg Harbor Township for municipal landfill operations. Typical of the acceptable waste types are household and commercial, septic waste clean-out, leaves and tree parts, in addition to construction and demolition materials.

On site soils consist of a 3-foot clay layer overlain by approximately 13 feet of sand. The area method of landfilling is utilized here incorporating a 20-ton bulldozer with a 1-1/2 cy front-end loader on stand-by. The 50 cy of cover material needed daily is reportedly available on the site.

In 1975 the landfill received approximately 4,550 tons of solid wastes, along with 100,000 gallons of septic waste clean-out



FIG. III-11 LITTLE EGG HARBOR TOWNSHIP MUNICIPAL LANDFILL
View Looking Northeast



FIG. III-12 MANCHESTER TOWNSHIP MUNICIPAL LANDFILL
View Looking Northeast

LITTLE EGG HARBOR MUNICIPAL LANDFILL, Cont'd.

liquids. The daily hours of operation observed by this landfill are from 8 A.M. to 4 P.M., Monday through Friday.

MANCHESTER TOWNSHIP MUNICIPAL LANDFILL

The Manchester Township Municipal Landfill is located on Sampson Street off of Route 70 serving Manchester Township residents in their waste disposal needs. Materials accepted by the landfill include household, commercial and institutional wastes, bulky items and septic clean-out wastes. The landfill is located on approximately 200 acres of land zoned rural-agriculture.

During 1977, approximately 1,000 cy of the above mentioned waste types were collected. Landfill records indicate that the single greatest user of the facility has been the Manchester Township Road Department. During an average week approximately 20 trucks may use this facility, 10 from the Road Department, and the remainder from residents or private contractors collecting from within the Township.

The trench method of landfilling is used on the site with the aid of a Caterpillar D-6 bulldozer. In the event of fire, the local fire department would be called in.

OCEAN GATE TRANSFER SITE

The Borough of Ocean Gate owns a corner lot bordering on Averno and Wildwood Avenues for the operation of a transfer site. This



FIG. III-13 OCEAN GATE BOROUGH TRANSFER SITE
View looking Northeast



FIG. III-14 PLUMSTED TOWNSHIP MUNICIPAL LANDFILL
View Looking Southeast

OCEAN GATE TRANSFER SITE, Cont'd.

facility accepts household and commercial wastes, bulky items and vegetative wastes generated within the community, any liquid or septic wastes are excluded from this operation. Such acceptable wastes are first collected where they undergo a mild compaction process, preparing them for eventual transfer to suitable landfill sites in the area.

Utilized in this operation are a pair of crawler loaders in conjunction with open top trailers receiving the compacted material for transfer.

An example of the volume of this operation is represented by 1976 figures from D.E.P. During that year, 6,512 cy of household and commercial wastes along with 3,190 cy of bulky items passed through the facility.

The N.J. D.E.P. inspection records indicate that this facility has been well run with no major deficiencies in operational practices.

PLUMSTED TOWNSHIP MUNICIPAL LANDFILL

The Plumsted Township Municipal Landfill is situated in a heavily wooded area on approximately 10 acres of land off Lakewood Road. Typical of the wastes accepted by the site are household, commercial and institutional wastes, tires, construction and demolition materials, vegetative wastes as well as ferrous metals.



FIG. III-15 SOUTH TOMS RIVER BOROUGH MUNICIPAL LANDFILL
View Looking South



FIG. III-16 STAFFORD TOWNSHIP MUNICIPAL LANDFILL
View Looking Northeast

PLUMSTED TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

Additionally, only wastes collected within Township boundaries are accepted for disposal at this site.

The landfill utilizes the trench method of landfilling, and on-site cover is reportedly suitable and sufficient for daily operations.

An average week's activity involves approximately 10 Township collection trucks using the facility. In 1976, the estimated remaining useful life of the facility was set at 10 years.

An investigation of D.E.P. violations files indicated some minor violations for windblown litter, but generally it is a well run site.

SOUTH TOMS RIVER LANDFILL

The Borough of South Toms River owns and operates a landfill for the disposal of solid wastes generated within the Borough. The landfill is located off of Drake Lane in the Borough. According to D.E.P. files, the facility may accept household, commercial, and bulky wastes and leaves, branches and tree stumps. In 1975, the facility accepted 2,435 tons of household and commercial wastes with another 25 tons spread out over the other categories, plus 10 tons of construction and demolition wastes.

As of September of 1976, the facility had an estimated remaining life of 10 years.

SOUTH TOMS RIVER LANDFILL, Cont'd.

An inspection of the D.E.P. violations files revealed no violations against this landfill.

STAFFORD TOWNSHIP MUNICIPAL LANDFILL

The Township of Stafford owns and operates a landfill at 200 Recovery Road in the municipality. The facility covers a total of 280 acres with 145 being actually used as landfill. Approximately 25.5 of those acres are currently actively being utilized. According to the D.E.P., the facility may accept household, commercial and bulky wastes, septic tank wastes and liquid sewage sludge. In 1975, the facility accepted 95,000 tons of household and commercial wastes and 6,000 tons of bulky wastes. In 1976, the facility accepted 215,000 gallons of septic wastes and 1,000,000 gallons of liquid sewage sludge.

The landfill uses the area method of landfilling. Equipment at the site include a 645 Allis Chalmers front-end loader, an Allis Chalmers HD-11 bulldozer, and a 260E 23 yard elevating scraper. Fire protection at the site includes fire extinguishers on all operational equipment. There is also extensive cover material on site that can be used to smother fires, and if needed, the services of local fire departments can be called upon.

Currently, the following Ocean County municipalities use the facility: Long Beach Township, Ship Bottom, Surf City, and Stafford Township.

STAFFORD TOWNSHIP MUNICIPAL LANDFILL, Cont'd.

In August of 1977, the facility had an expected life of about 50 years, or the capacity to accept 1,125,000 tons.

The Board of Public Utilities has authorized the following tariffs for use at the Stafford Township Landfill.

Septic wastes	\$6.00 per 1000 gallons of capacity of vehicle
Compacted materials	\$1.20 per cubic yard of capacity of vehicle
Domestic garbage and rubbish (non-compacted and delivered in open-body vehicle	\$1.00 per cubic yard
All other materials including refuse, building materials, trees, weeds, commercial or industrial garbage and rubbish, fill and tires	\$1.10 per cubic yard
Minimum charge for use of site facilities	\$8.00 per load

TUCKERTON-EAGLESWOOD MUNICIPAL LANDFILL

This facility is collectively operated by the Borough of Tuckerton and the Township of Eagleswood. It is a 27 acre landfill located on Forge Road in Eagleswood Township. According to the D.E.P. files the facility is allowed to accept the following wastes: household, commercial, bulky, and septic clean-out wastes, tires, leaves, branches and tree stumps, and construction and demolition wastes. In 1975, the facility accepted 3,120 tons of household and commercial wastes, 832 tons of bulky wastes, 156,000 gallons of septic clean-out wastes and another 128 tons of waste spread out over the other acceptable categories.

The facility utilizes the area method of landfilling. A John



FIG. III-17 TUCKERTON-EAGLESWOOD MUNICIPAL LANDFILL
View Looking West

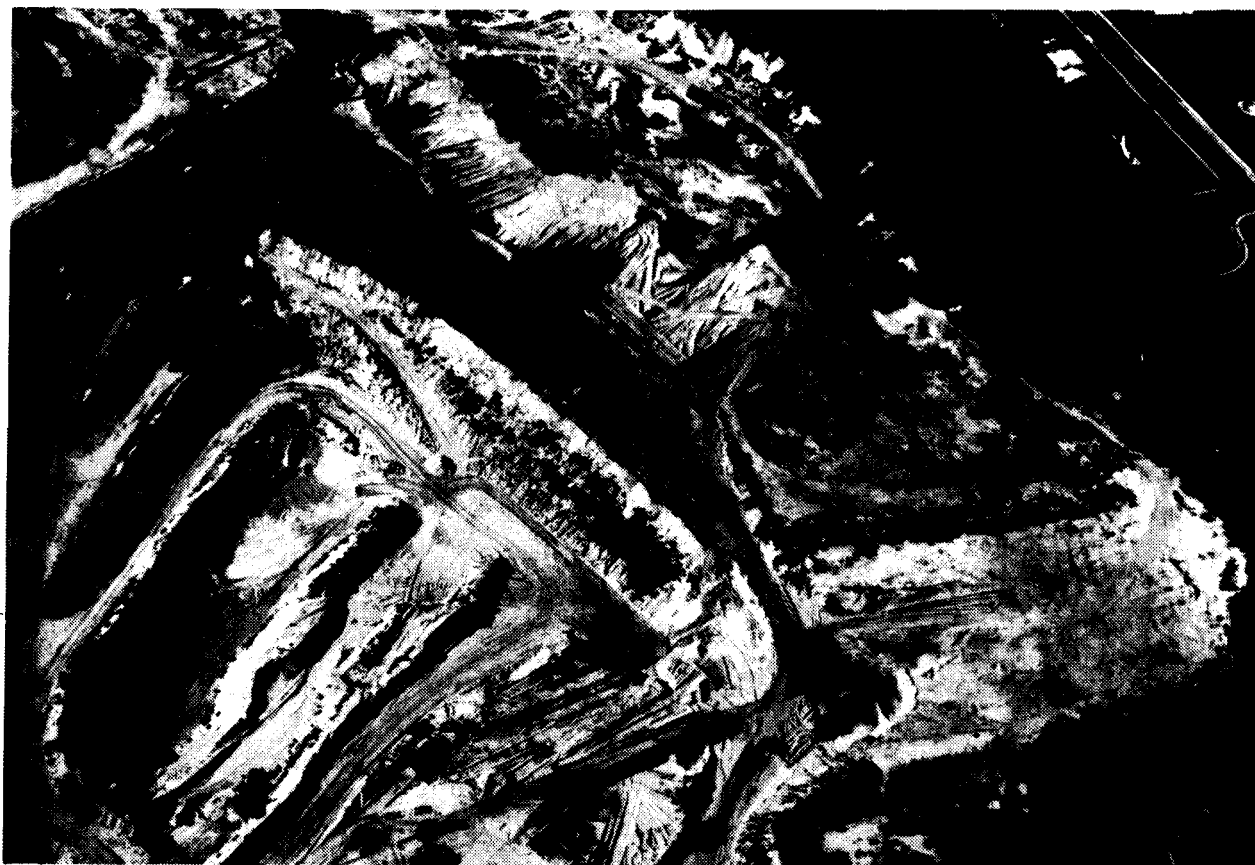


FIG. III-18 JAMES H. JAMES LANDFILL (PRIVATE)
View Looking Northwest

TUCKERTON-EAGLESWOOD MUNICIPAL LANDFILL, Cont'd.

Deere 450B is used to apply cover material. Local fire departments are called in case of fire at the landfill.

The facility had an expected life of 50 years as of 1975 with the capacity to accept 13,300 tons of solid wastes. The landfill has no zoning designation.

PRIVATE SANITARY LANDFILLS SERVING OCEAN COUNTY

FRANCIS TANNER TRUCKING COMPANY LANDFILL

The Tanner Trucking Company owns and operates a landfill on Gunning River Road in Barnegat for the disposal of bulky, construction and demolition wastes, leaves, branches and tree stumps. In 1976, the facility accepted 10,000 cubic yards of bulky wastes. The 30 acre site had an expected life of 4 years as of May 1977.

The soil on the site consists of coarse to medium sand with gravel and clay surface sand. The site utilizes the area method of land-filling. According to company officials, there is sufficient cover material on the site to meet the needs of the landfilling operation. Approximately 150 Tanner Trucking Company trucks dispose at the site each week.

JAMES H. JAMES, INC., LANDFILL

The private contracting firm of James H. James, Inc., of Brick Township maintains a private landfill for disposal of solid wastes including commercial, industrial, clean-up, branches, leaves,

JAMES H. JAMES, INC., LANDFILL, Cont'd.

tires, etc. Currently, the Boroughs of Point Pleasant Beach and Lavallette are hauling to this site.

The landfill, located on 21 acres of land at the end of School House Road in Brick Township, utilizes the area method of land-filling. The soil contains a mixture of coarse and fine sands with isolated lenses of clay. The groundcover varies from trees and scrub brush to sand. The water table is reportedly at least 53 feet below the surface. The site also contains sufficient and suitable cover material to meet the needs of the landfilling operation.

The equipment used on the landfill includes a Michigan 4-wheel drive 2 cy loader and a John Deere 1 cy backhoe. Fire protection is supplied by pumping from wells located on landfill property.

According to D.E.P. records, 30 James H. James, Inc. trucks per week and 50 other private contractor's trucks use the facility. The site is zoned residential. According to B.P.U. records, the following fee schedule is in effect at the landfill.

<u>MATERIAL</u>	<u>RATE</u>
Bulky Trash	
Pick-Up Truck	\$ 4.00 per load
4-16 cy Truck	\$10.00 per load
10-14 cy Truck	\$20.00 per load
Tractor and Trailer	\$30.00 per load
Tires	\$ 2.00 each tire
Over 20 Tires	\$ 5.00 each tire
Garbage	\$ 1.50 per cy

MARPAL SANITARY LANDFILL (FORMERLY SHREWSBURY DISPOSAL COMPANY),
MONMOUTH COUNTY

Marpal Sanitary landfill is located off Asbury Avenue in Colts Neck. The disposal site is privately owned and accepts wastes including household, commercial, industrial, institutional, agricultural, yard debris and bulky clean-up items, for disposal from 15 municipalities. The Borough of Mantoloking has its waste disposed of at the Marpal Landfill.

According to New Jersey Department of Environmental Protection files, the landfill's area is 131⁺ acres. The soils consist of silty fine sands and the groundcover is partially wooded. It is anticipated that the landfill will be closing in early 1980 since they have essentially exhausted their available land area.

The facility uses the area method of landfilling. According to landfill sources, there is sufficient and suitable cover on site to meet the needs of the operation. The facility reportedly uses between 200 and 300 cy of cover daily. Equipment at the site includes a Caterpillar D-8 bulldozer, a Michigan 210 earth mover, a crawler pan and a backhoe. The dozer and portable pumps are used for fire protection purposes.

According to the Board of Public Utilities, the following fee schedule is used at the fill:

<u>MATERIAL</u>	<u>RATE</u>
Residential Refuse	\$0.70 per cy
Bulky Refuse	\$1.50 per cy
All Other Disposal	\$1.00 per cy
Minimum Charge	\$5.00



FIG. III-19 MARPAL LANDFILL, MONMOUTH COUNTY (PRIVATE)
View Looking East



FIG. III-20 OCEAN COUNTY LANDFILL CORP. (PRIVATE)
View Looking Northwest

MARPAL SANITARY LANDFILL, Cont'd.

Reportedly, approximately 450 trucks per week enter the facility. Its operating hours are 6 A.M. to 6 P.M., Monday through Saturday.

The disposal site area is zoned for industrial purposes.

OCEAN COUNTY LANDFILL CORP.

The Ocean County Landfill Corporation leases land owned by Atlantic Pier Company, Inc., for sanitary landfilling operations. This landfill is located on approximately 450 acres of land situated in Manchester Township off Route 70. The extensive list of materials acceptable to the landfill includes, household, commercial and institutional wastes, bulky items, dry sewage sludge, septic waste, leaves and tree parts, stumps, as well as liquid sewage sludge.

Both the trench and area methods of landfilling are practiced here. B.P.U. records indicate the following rate schedule for this operation:

<u>MATERIAL</u>	<u>RATE</u>
Oversize Bulky Items, Brush, Logs, Stumps	\$6.00 per ton (\$6.00 minimum)
Wood	\$6.00 per ton
Residential Refuse	\$4.50 per ton
Commercial Refuse	\$4.50 per ton
Bulky Items (furniture, tires, lumber, appliances, bath fixtures, pallets)	\$4.50 per ton (\$4.50 minimum)
Concrete	\$3.00 per ton

OCEAN COUNTY LANDFILL CORP., Cont'd.

<u>MATERIAL</u>	<u>RATE</u>
Individual Refuse (deposited by a single individual customer)	\$1.00 per 30 gal. container
Septic Tank Clean-Out and Other Raw Sewage	\$0.06 per gallon
Municipal Contracts	Negotiated

The soil at the disposal site is gravel, sand, and clay to a depth of 75 feet. The groundcover is topsoil and road gravel. There is sufficient cover material on the site.

Equipment utilized on the landfill include a Bucyrus Erie 61-B 3-1/2 cy drag line, a Caterpillar D-8 bulldozer, a Caterpillar 980 front-end loader, a Caterpillar RF motor grader and three Caterpillar 35 ton rear dump trucks.

The facility currently accepts waste from the following municipalities:

Lakehurst
Manchester
Seaside Heights
Many private contractors servicing additional Ocean County municipalities.

SOUTHERN OCEAN LANDFILL INC.

The Caldeira Brothers own and operate the Southern Ocean Landfill, Inc. The facility is located on Route 532 at Brookville Road in Ocean Township. The facility is 283 acres in size. According to files at the D.E.P., the facility can accept household, commercial, industrial, institutional, and bulky wastes, junk autos, leaves,

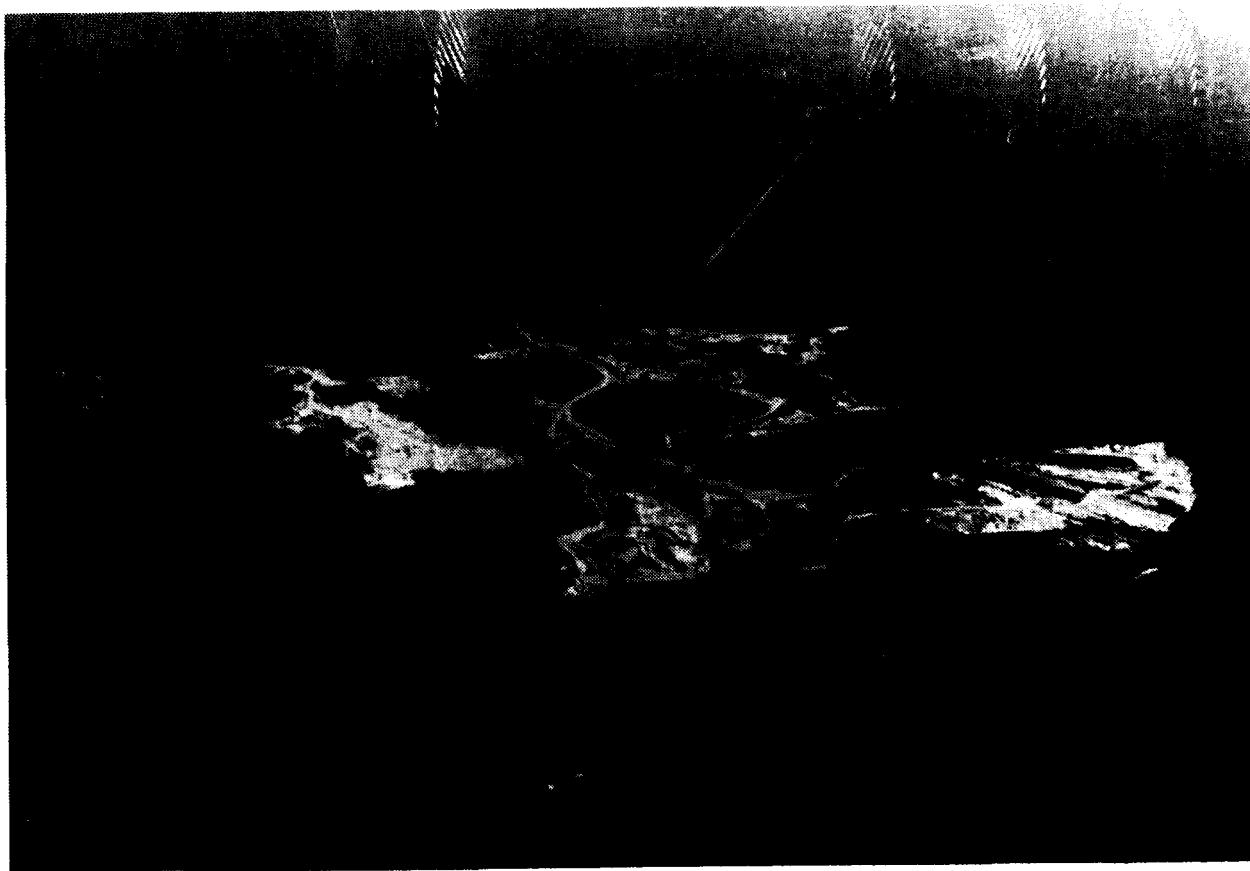


FIG. III-21 SOUTHERN OCEAN LANDFILL, INC. (PRIVATE)
View Looking Southeast

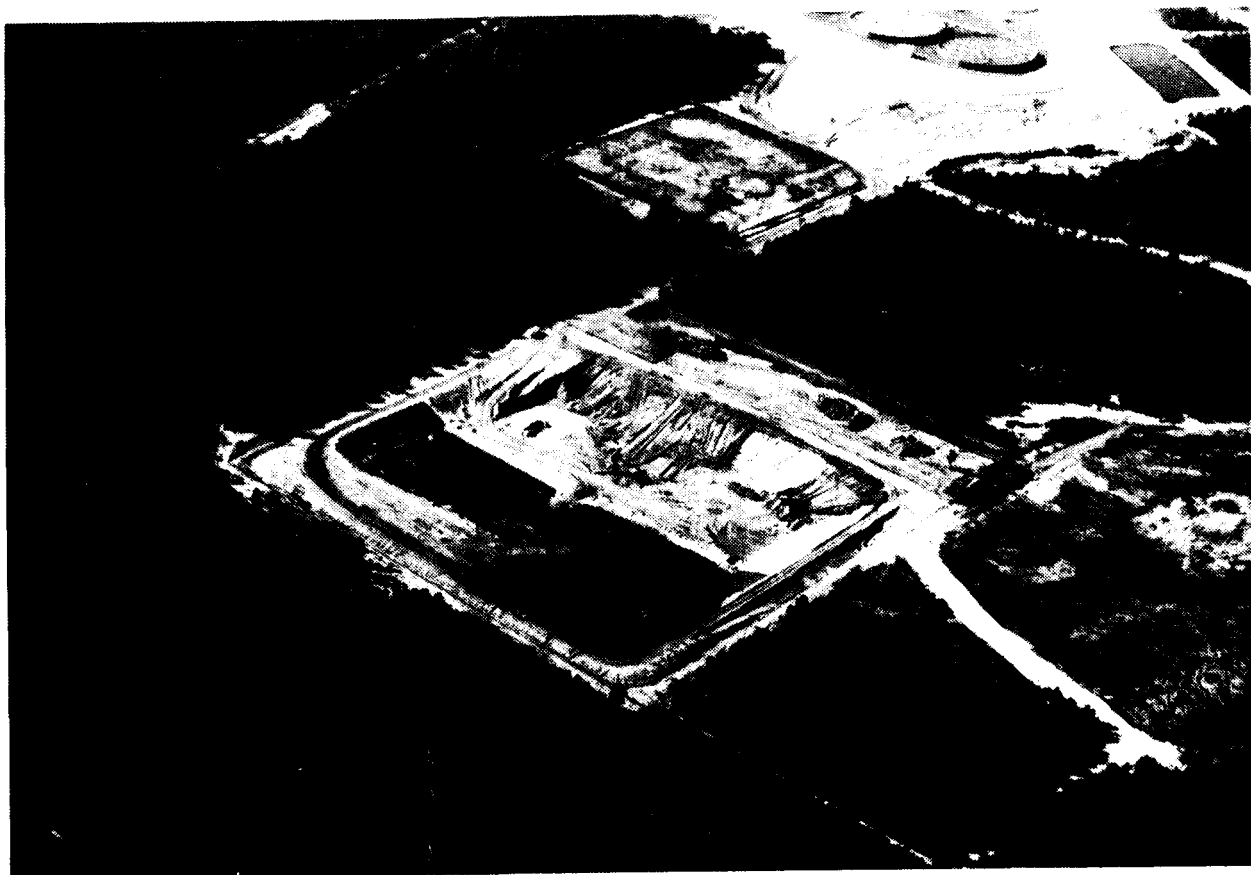


FIG. III-22 TOMS RIVER CHEMICAL CORP. (PRIVATE)
View Looking Northwest

SOUTHERN OCEAN LANDFILL, INC., Cont'd.

branches and stumps, food processing wastes, dry and liquid sewage sludge, and septic tank wastes.

In 1976, the facility accepted 19,190 tons of household and commercial waste, 4,500,000 gallons of septic tank waste, and 23,802,000 gallons of liquid sewage sludge among lesser amounts of other types of waste.

The soil is mostly sand with clay lenses. The landfill utilizes the area and trench methods of landfilling. As of August 1977 it was reported that the facility has a life of approximately 29 years, with the ability to accept 650,000 tons of solid wastes.

The facility currently accepts municipal solid wastes from the following Ocean County municipalities: Barnegat Light, Beach Haven, Harvey Cedars, Ocean Gate, Ocean Township, Pine Beach, and Union Township as well as other private contractors servicing other municipalities.

According to Board of Public Utilities tariffs, Southern Ocean Landfill, Inc., uses the following fee schedule:

<u>MATERIAL</u>	<u>RATE</u>
Bulky Refuse	\$2.50 per cy or \$6.00 per ton, whichever is greater
Loose and/or Compacted Refuse	\$0.75 - \$3.00 per cy
Chemicals	\$0.05 per gallon
Septic Waste	
1000-2000 gallons	\$5.00 per 1000 gallons
2100 or greater	\$8.50 per 1000 gallons

SOUTHERN OCEAN LANDFILL, INC., Cont'd.

The site utilizes a Caterpillar 977H front-end loader, a C210 dump truck and a 966-B rubber-tired front-end loader.

TOMS RIVER CHEMICAL CORPORATION LANDFILL II

Toms River Chemical Corporation is currently operating a lined landfill on their property on Route 37 in Dover Township. The existing landfill, which was approved by the N.J. D.E.P. in October of 1977, currently accepts dry non-hazardous chemical wastes consisting primarily of epoxy resin residues, clarification residues, and distillation residues. In addition, dried sewage sludge from the Company's sewage treatment plant is also landfilled.

Recently, TRC received approval to expand this landfill to a size of 21 acres. The existing landfill would serve as the first of eight identical cells, each of which would incorporate the same protection features.

The bottom of the existing landfill is lined with two 30-mil thick PVC membranes. As the final elevations are reached in the landfilling process, the top of the landfill will also be lined with 30-mil thick PVC membrane.

According to engineering data, approximately 7,000 drums of chemical waste and 26,000 cy of dried sewage sludge will be landfilled per year. It is estimated that the total life expectancy of the proposed landfill would be 12 to 16 years.

WASTE DISPOSAL INC. LANDFILL - HOWELL

Waste Disposal Incorporated maintains a sanitary landfill on Allenwood and Lakewood Roads in Howell Township. The 250-acre site accepts household and commercial solid wastes, bulky items, tires, construction and demolition materials as well as vegetative wastes. Currently, solid wastes from Lavallette and Point Pleasant are disposed of at the WDI facility, located in southern Monmouth County.

This disposal facility utilizes both the area and ramp methods of landfilling. A 292 Hancock pan earth mover and a D-6 bulldozer are involved in daily operations, with a 955 front-end loader Caterpillar on stand-by. It has been indicated by the landfill that on-site cover material is suitable and sufficient for daily operations. An estimated 100 yards of such material is needed daily for cover purposes.

The landfill is open daily between the hours of 6 AM - 9 PM. Records indicate that approximately 300 trucks per week may enter the facility, depositing 3,000 tons of solid waste.

The landfill has been in operation since 1948 with approval from both the State and the Howell Township Board of Health, and as such has no specific zoning designation. It is reported, however, that after landfill operations cease, a heavy industrial site is planned.



FIG. III-23 WASTE DISPOSAL, INC. LANDFILL (PRIVATE)
View Looking Northwest

WASTE DISPOSAL INC. LANDFILL, Cont'd.

According to tariffs on file with the Board of Public Utilities, the following rate schedule is in effect:

Residential Solid Waste (Non-Compacted)	\$1.00/cy
Residential Solid Waste (Compacted)	\$1.25/cy
Septic Tank Waste (Howell only)	\$0.01/gal.
Bulky Refuse (Non-Compacted)	\$1.25/cy
Bulky Refuse (Compacted)	\$1.75/cy
Chemical Waste	\$0.08/gal.

TERMINATED LANDFILLS

INTRODUCTION

The Ocean County District has within its boundaries a few recently terminated solid waste disposal facilities and a few other operating facilities which will reach capacity and close within the planning period of this study. The district is required to give due consideration to the ultimate use of these sites and safeguard against any environmental impacts which would affect the health, safety and welfare of its residents. The District does not have the legislative authority necessary to require the implementation of measures which would minimize environmental impacts or the necessary means to finance these measures. The District can, however, suggest strategies that the appropriate agency for this task, the Solid Waste Administration, can take to implement the necessary corrective measures.

TERMINATION OF A SANITARY LANDFILL

The Solid Waste Administration requires that:

- "1. The registered operator of any landfill shall notify in writing the State Department of Environmental Protection and utilities shall petition the Public Utilities Commission (Board of Public Utilities) pursuant to its rules and regulations of his intent to discontinue operations thereon, at least 30 days prior to the intended date of discontinuance.

2. The State Department of Environmental Protection shall examine all sanitary landfills upon discontinuance of operations to determine whether there is compliance with the New Jersey Administrative Code (N.J.A.C.) 7:26-2, the Rules of the Bureau of Solid Waste Management (Solid Waste Administration) Concerning Disposal.
3. Upon termination of the landfill, a detailed description of the landfill shall be recorded, along with the deed, with the appropriate County Hall of Records. The description shall include the general types and locations of wastes on the site, the depth of fill, the depth and type of cover material, the dates the landfill was in use, and all such other information as may be of interest to potential landowners.
4. Any landfill that is terminated under the provisions of this subchapter must be maintained in accordance with the landfill design submitted and must remain in compliance with all regulations of this subchapter. Responsibility for the maintenance of discontinued operations shall rest with the property owner of record.¹

When a facility is terminated, the Solid Waste Administration requires that: "Final cover material shall be applied to....all surfaces."²
Final cover material must have a minimum thickness of 24 inches.

¹N.J.S.A. 26-2. 9.1-4

²N.J.S.A. 26-2. 5.16

Cover material is defined by the Solid Waste Administration as:

"Soil, earth, or other insoluble and non-degradable material approved by the Department which is used to cover composted solid waste in a sanitary landfill for the purpose of rodent and vector control, to minimize moisture entering the fill, to provide a fire break, and in the case of final cover, to grow vegetation for erosion control. The depth or thickness of cover material is to be measured after compaction with at least one pass of a bulldozer or other suitable equipment having a gross weight in excess of 10,000 pounds.³"

There are a number of tasks that should be performed in the termination of a sanitary landfill, especially in the Ocean County District. Much more emphasis should be placed on the control of leachate originating from a landfill site. Most of the soils in the Ocean County District are parts of very important aquifers used as major sources of potable water supply and are very important groundwater recharge areas for other parts of the State and other states. It is therefore extremely important that leachate production be minimized from existing and terminated landfills. Suitable methods of gas venting should be implemented and maintained until such time as the threat of explosion and/or fire are miniscule.

³N.J.S.A. 26-1. 4.15

STRATEGIES THAT CAN MINIMIZE THE GENERATION OF LEACHATE AT A TERMINATED SANITARY LANDFILL

There are a number of engineering techniques which can minimize the production of leachate or prevent it from entering a water supply aquifer. These techniques are as follows:

1. Capping with a manmade or natural cover product or soil.
2. Construction of strategically placed cutoff walls.
3. Other techniques.

1. Capping with a manmade or natural cover product or soil

Table III-5 presents the suitability of general soil types for cover material. The table indicates that clay is the best natural cover material in terms of minimizing the amount of moisture entering the fill. Other objectives such as proper gas venting and rodent control are poorly met by using clay as a final cover material. Proper maintenance of the cap and appropriate vents such as the typical "T" shaped pipes seen on many New Jersey landfills are good methods to control gas production. Synthetic liners placed on the top of a terminated sanitary landfill are also a good way to cap a landfill to minimize the percolation of rainwater and hence the production of leachate. Liners are usually made of butyl rubber, polyethylene, or polyvinyl chloride. Again, "T" shaped pipes can be incorporated into the liner to allow sufficient gas venting. Rips or cracks can and do develop. Therefore, regular inspection of the liner is required, and repairs should be made when necessary.

TABLE III-5

SUITABILITY OF GENERAL SOIL TYPES AS COVER MATERIAL*

<u>FUNCTION</u>	<u>CLEAN GRAVEL</u>	<u>CLAYEY-SILTY GRAVEL</u>	<u>CLEAN SAND</u>	<u>CLAYEY-SILTY SAND</u>	<u>SILT</u>	<u>CLAY</u>
Prevent Rodents From Burrowing or Tunneling	G	F-G	G	P	P	P
Keep Flies From Emerging	P	F	P	G	G	E+
Minimize Moisture Entering Fill	P	F-G	P	G-E	G-E	E+
Minimize Landfill Gas Venting Through Cover	P	F-G	P	G-E	G-E	E+
Provide Pleasing Appearance and Control Blowing Paper	E	E	E	E	E	E
Grow Vegetation	P	G	P-F	E	G-E	F-G
Be Permeable for Venting Decomposition Gas†	E	P	G	P	P	P

*E, excellent; G, good; F, fair; P, poor.

+Except when cracks extend through the entire cover.

†Only if well drained.

SOURCE: Sanitary Landfill Design and Operation, D. R. Bernner, D. J. Keller, U.S.E.P.A. 1972, p. 14.

2. Construction of strategically placed cutoff walls.

In order to minimize the production of leachate where some of the landfilled area intersects with the water table, it is sometimes possible to construct strategically placed cutoff walls. The direction of the flow of the groundwater should first be determined. The maximum height of the water table should be determined next. A trench should then be dug in front of and far enough along the perimeter of the landfill to be certain that the groundwater will not reenter the area filled once it is diverted around the cutoff wall. The trench should be filled with a natural impermeable material such as compacted clay or some sort of impermeable man-made substance. The cutoff wall must also be deep enough so as to prevent the groundwater from intersecting the filled area once it has passed to point of constriction. Groundwater will eventually reestablish its height at the piezometric surface at a point beyond the cutoff wall. Good knowledge of local subsurface hydrology is necessary to establish the proper depth of the wall.

3. Other techniques.

It is often possible to permanently or temporarily lower the groundwater in free-draining, gravely, and sandy soils such as those found in most of Ocean County. Drains, canals, and ditches can be used to intercept the groundwater and channel it to surface water or a recharge area at a lower elevation. Again, knowledge of local subsurface hydrology is necessary. Use of a well can reduce the level of the groundwater to the extent that the

cones of influence extend beyond the limits of the filled areas. This is usually considered a temporary method because if pumping ceases, the waste will be inundated. Drains, canals and ditches placed at the lower end of the filled area can aid collecting leachate which is produced when there is no practical way of controlling its formation. The leachate can then be properly treated.

ADMINISTRATIVE PROBLEMS IN INSURING A TERMINATED LANDFILL REMAINS ENVIRONMENTALLY SECURE

As mentioned in the introduction to this section, the District does not have the legislative authority necessary to require the implementation of measures which would minimize environmental impacts or the necessary means to finance these measures. Some suggestions can be made as to how these corrective measures can be implemented by the proper agency, the Solid Waste Administration of the Department of Environmental Protection.

One suggestion is to enforce current regulations as set forth in the "Rules of the Bureau of Solid Waste Management" (N.J.A.C. 7:26-1 et seq). If the rules of the Solid Waste Administration were more strictly enforced, a resultant improvement would come about in the operation of sanitary landfills. Upgrading will increase the present cost of disposal significantly, but the true costs of landfilling will finally be borne. In the cases of terminated landfills which do not benefit from the incorporation of full environmental controls before the commencement of the

operation of the landfill, the alternative strategies suggested above will go a long way to minimizing environmental damage.

A very distinct problem in requiring the necessary environmental controls be maintained on a sanitary landfill is the delegating of the responsibility of this task to the appropriate party concerned. The Rules indicate "Responsibility for the maintenance of discontinued operation shall rest with the property owner of record."⁴ Application of this regulation to its strictest sense would mean that the second or even the third owner of a former landfill may be presented with the financial burden of remedying environmental damages which he is not fully aware of in most cases.

One means of attempting to introduce a sense of fairness in the strict enforcement of the rules would be for the Solid Waste Administration to set up an escrow account for the proper maintenance of certain terminated landfills. The State upon receiving all completed District Solid Waste Management Plans would review the status of terminated landfills in the state. Those landfills still owned by the original operators or the owner who had leased the land to the operators up to a certain cutoff date, say January, 1979, would be the only parties subject to the responsibility of maintaining the terminated landfill. Second owners up to that date would not be responsible for this requirement. After the cutoff date, proper notice must be given to the subsequent owners of land part of which was used for landfilling of solid waste

⁴N.J.A.C. 7:26-2.9.4

informing them of the rules concerning the maintenance of the landfill. The Solid Waste Administration would then investigate the terminated landfill operations which it has assumed responsibility for to determine the necessary means to maintain the terminated landfill in such a way as to minimize current and future environmental impacts.

The total cost of implementing these safeguard measures will be estimated. An estimate of the total waste buried in New Jersey landfills last year would then be estimated. The total cost of upgrading terminated landfills would be divided by the tonnage to obtain a per ton cost to be applied as a disposal surcharge.

USES OF TERMINATED LANDFILLS

There are a number of uses for a completed sanitary landfill. It can be used for passive or active recreational purposes, it can have limited agricultural uses, or some sort of light construction can be planned for it, such as a light commercial and/or industrial park.

1. Passive and Active Recreational Uses

The most common use of sanitary landfill is a park area for the use of local residents. This could be in the form of open fields or in the form of a landscaped area planted with shallow rooted grasses and other flora. Some maintenance work is required to keep the fill surface from being eroded by wind and rain.

More active recreational uses of terminated landfills include short ski runs, toboggan hills, ball fields, golf courses, amphitheaters, and playgrounds. Much more maintenance is required to keep the landfill surfaces intact.

2. Agricultural Uses

In some instances, a terminated landfill can be used for cropland or pasture. Many grasses can be grown that are suitable for hay production. The growing of cultivated crops is only recommended if the final cover surface is deep enough to prevent the roots from extending into the filled area.

3. Light Construction Uses

Structures can be constructed on a sanitary landfill. It should be noted however, that anytime a structure is planned for a sanitary landfill site much attention must be paid to designing for problems typical to all sanitary landfills - gas movement, corrosion and settlement. The cost of designing, constructing, and maintaining buildings is considerably higher than it is for those erected on a well-compacted earthfill or on undisturbed soil. Foundations, piles, doors, windows and partitions must be so designed so as to be adaptable to slight differential movements. Also, roads and parking lots must be suitably constructed of easily repairable material.

Data on terminated landfills in the Ocean County District is included in Table III-6.

TABLE III-6

TERMINATED LANDFILLS IN THE OCEAN COUNTY DISTRICT

<u>MUNICIPALITY</u>	<u>STREET LOCATION</u>	<u>DATE CLOSED</u>	<u>YEARS IN OPERATION</u>	<u>PRESENT END USE</u>
Barneget Township	West Bay Street	1950 ⁺	10 ⁺	Housing Development
Beachwood Borough	Spruce Street	1950 ⁺	Unknown	Residential
Beachwood Borough	Beachwood Boulevard	1955 ⁺	Unknown	Residential
Brick Township	Ridge Road	1974	5	Township Garage Adjacent to Landfill
Brick Township	Brick Road	Unknown	Unknown	Compound for Town Equipment
Brick Township	Lanes Mill Road	1955	3-5	Recreational Park
Dover Township	Route 37	1959	Unknown	Industrial Park
Dover Township	Whitty Road	1961	1	Recreational Park
Island Heights	Unknown	1974	10-12	Commercial Building
Jackson Township	Johns Park Area	1971	11	Recreational Area
Lakehurst Borough	Myrtle Street	1976	40	Vacant
Lakewood Township	Pine Street	1972	Unknown	Leaf Composting Area
Lakewood Township	Oak Street	1968	Unknown	Industrial Park
Ocean Gate Borough	Unknown	1974	30	Vacant
Seaside Park	Money Street	1954	Unknown	Residential

DESCRIPTION OF COMMERCIAL AND INDUSTRIAL
COLLECTION SYSTEMS AND DISPOSAL PATTERNS

Commercial and industrial firms utilize a number of strategies to have the solid waste they produce transported to the ultimate disposal site. Since many of the municipalities in the district operate their own landfills, many firms find it economically advantageous to haul their own solid wastes using their own equipment and manpower because travel times and distances to the landfills are relatively short. All commercial and industrial firms employing a private contractor for solid waste collection services make arrangements directly with the carter. The costs incurred to the commercial or industrial establishment depend on the level of service, the quantities of solid waste, and the frequency of collection. Many small commercial firms and an occasional small industrial plant, are serviced by the municipality's collection system. Still other companies utilize a combination of the above strategies. Some of the combinations utilized include: employing both private and in-company services to transport and dispose of the waste, using the municipal service available and supplementing it with the companies own equipment and manpower, and using the municipal service together with a private carter.

Table III-7 presents a breakdown of the disposal pattern for commercial and industrial solid wastes. The table shows that the overwhelming majority of waste is disposed of at sanitary landfills.

About 13 percent of the total commercial and industrial waste stream is disposed of in on-site landfills. Another 86 percent is disposed of in off-site landfills. Only about 1 percent is recycled.

When M. Disko Associates contacted the commercial and industrial firms in the Ocean County District, comments were solicited concerning ideas for solid waste management in the district. Some of the comments have been compiled in Table III-8.

Based on the commercial and industrial survey, the 1978 costs for collection and disposal of commercial waste were \$14.09 per ton. For the collection and disposal of industrial waste the costs were \$30.32 per ton.

TABLE III-7

SOLID WASTE DISPOSAL METHODS UTILIZED BY
INDUSTRIAL AND COMMERCIAL FIRMS IN OCEAN COUNTY

<u>Disposal Method</u>	<u>Percent of Total Industrial Tons/Week</u>	<u>Percent of Total Commercial Tons/Week</u>
On-Site San. Landfill	39.9	0
On-Site Recycling	0	0
On-Site Chem. Conversion	0	0
Off-Site San. Landfill	56.7	100.0
Off-Site Recycling	3.4	0
Off-Site Incineration	0	0
Off-Site Other	0	0
	<hr/>	<hr/>
	100.00	100.0

TABLE III-8

COMMENTS MADE BY CORPORATE MANAGERS
IN OCEAN COUNTY CONCERNING FUTURE OF SOLID WASTE MANAGEMENT

- . Incinerate garbage and trash for heat recovery. Consider pre-drying of sewage sludge with heat from incinerator, then burning sludge.
- . Sludge farming, generation of power through waste, covering of barren areas with mulch type waste to return ground cover.
- . Recover recyclable materials and use burnable wastes for electricity production.
- . Convert wastes into fertilizers, fuel or possibly construction products.
- . Check with existing and operating plants in Germany.
- . Utilize mobile metal shredding machines.
- . Landfill to prevent land and beach or jetty erosion.
- . Compaction of wastes, if done properly, would be an excellent base for airport landing strips.

DESCRIPTION OF COLLECTION AND DISPOSAL PRACTICES FOR SEPTAGE AND SLUDGE

As explained in Chapter II, there are several kinds of sanitary liquid waste which must be disposed of on a daily basis. These wastes are the by-products of operation of the many sewage treatment plants and the cleaning-out of individual home septic systems. Cesspool and septic tank waste are the untreated solids which have settled out and have been removed from individual home septic tanks. Liquid sewage sludge is sludge that has been digested at a sewage treatment plant and contains greater than 95 percent water. Liquid sewage sludge must be transported by tank truck. Dry sewage sludge is also digested at a sewage treatment plant, but it contains between 75 and 80 percent water and is transportable in open top dump trucks.

Currently in Ocean County there are several large sanitary landfills which have been approved by the State DEP to accept septage and liquid and dry sludges. These include the Ocean County Landfill Corp. in Manchester, the Southern Ocean Landfill Inc. in Ocean Township, and the Stafford Township Municipal Landfill. Table III-9 lists the various sewerage authorities and their service areas.

TABLE III-9

SEWERAGE AUTHORITY SERVICE AREAS IN THE
OCEAN COUNTY DISTRICT AS OF NOV. 78*

<u>SEWERAGE AUTHORITY</u>	<u>SERVICE AREA</u>	<u>LEVEL OF TREATMENT</u>
Berkeley Township SA	Berkeley Township (part)	Secondary
Brick Township MUA	Brick Township (part)	Secondary
Dover Township MUA	Dover Township (part)	Secondary
Island Heights Municipal	Island Heights	Secondary
Jackson Township MUA	Jackson Township (part)	Secondary
Lakehurst Municipal	Lakehurst	Secondary
Manchester Township MUA	Manchester Township (part)	Secondary
Ocean Township MUA	Ocean Township (part)	Secondary
Seaside Heights Municipal	Seaside Heights	Primary
Seaside Park Municipal	Seaside Park	Primary
Ocean County UA	Bay Head	Secondary
Northern Service Area	Brick Township (part)	
	Jackson Township (part)	
	Lakewood	
	Point Pleasant	
	Point Pleasant Beach	
Ocean County UA	Barnegat Township (part)	Secondary
Central Service Area	Beachwood	
	Brick Township (part)	
	Jackson Township (part)	
	Lacey Township	
	Lavallette	
	Mantoloking	
	Ocean Gate	
	Pine Beach	
	Plumsted Township	
	South Toms River	
Ocean County UA	Barnegat Township (part)	Secondary
Southern Service area	Beach Haven	
	Eagleswood Township	
	Harvey Cedars	
	Little Egg Harbor	
	Long Beach Township	
	Ship Bottom	
	Stafford	
	Surf City	
	Tuckerton	

TABLE III-9, Cont'd.

SEWERAGE AUTHORITY SERVICE AREAS IN THE
OCEAN COUNTY DISTRICT AS OF NOV. 78*

<u>SEWERAGE AUTHORITY</u>	<u>SERVICE AREA</u>	<u>LEVEL OF TREATMENT</u>
Private Operations	Barnegat Township(part)	Tertiary
	Barnegat Light Township	Secondary
	Jackson Township(part)	Tertiary
	Lakehurst N.A.S.**	Secondary
	Manchester Township(part)	Tertiary
	Ocean Township(part)	Secondary

Notes: *As can be determined at the present time, this is the current status of the sewerage systems in the Ocean County District. Within the near future the following changes are expected:

1. Dover, Island Heights, Manchester, Ocean Township, Seaside Park and Seaside Heights will become part of the Central Service Area of the Ocean County U.A.
2. Barnegat Light will become part of the Southern Service Area of the Ocean County U.A.

**A Federal facility providing secondary treatment to the wastewater of 5,600 personnel

IV. QUANTITIES OF SOLID WASTE GENERATED IN THE OCEAN COUNTY DISTRICT

BACKGROUND INFORMATION

Much of the computation of solid waste quantities included in the next section of this report is based on basic baseline information concerning the demographic characteristics of the municipalities. Important factors include normal and peak population, land area and population density. These factors directly affect the calculation of solid waste quantities. Table IV-1 presents a compilation of the populations used in the calculation of the solid waste quantities. For the purposes of this work, the 1980 population projections, as reported by the Ocean County Planning Board (208 Study), were used and a weighted population was also calculated based on the peak summer populations as reported by the individual municipalities.

RESIDENTIAL SOLID WASTE QUANTITIES

The calculation of residential solid waste generation rates for the 33 municipalities in Ocean County is complicated by many factors. For example, many municipal, municipal contract, and private collection systems have limited records concerning solid waste quantities, truck loads, and solid waste density in terms of pounds per cubic yard. Another difficulty is the differences in the level of service provided. There are several categories which were considered in each municipality's domestic figure:

TABLE IV-1

ESTIMATED POPULATIONS IN
THE OCEAN COUNTY DISTRICT

<u>Municipality</u>	<u>Projected Population for 1980</u>	<u>Approximate Summer Population</u>	<u>Weighted Population</u>
Barneget	4,450	9,500	5,421
Barneget Light Boro	900	11,000	2,842
Bay Head Boro	1,250	6,000	2,163
Beach Haven Boro	2,150	25,000	6,544
Beachwood Boro	6,900	7,200	6,958
Berkeley Twp.	20,500	43,500	24,923
Brick Twp.	56,500	60,700	57,308
Dover Twp.	67,000	90,000	71,423
Eagleswood Twp.	2,450	2,450	2,450
Harvey Cedars Boro	465	9,000	2,106
Island Hgts. Boro	1,800	2,900	2,012
Jackson Twp.	35,500	35,500	35,500
Lacey Twp.	16,800	30,000	19,338
Lakehurst Boro	3,205	3,746	3,309
Lakewood Twp.	41,500	41,500	41,500
Lavallette Boro	1,980	35,000	8,330
Little Egg Harbor Twp.	6,900	18,500	9,131
Long Beach Twp.	5,150	50,000	13,775
Manchester Twp.	17,500	24,000	18,750
Mantoloking Boro	435	2,300	794
Ocean Twp.	4,800	12,000	6,185
Ocean Gate Boro	1,525	5,500	2,289
Pine Beach Boro	1,975	1,975	1,975
Plumsted Twp.	7,700	7,700	7,700
Pt. Pleasant Boro	21,050	21,050	21,050
Pt. Pleasant Beach Boro	6,200	50,000	14,623
Seaside Heights Boro	1,650	55,000	11,910
Seaside Park Boro	1,975	31,500	7,653
Ship Bottom Boro	1,725	16,000	4,470
S. Toms River Boro	5,250	5,250	5,250
Stafford Twp.	8,850	15,000	10,033
Surf City Boro	1,515	15,000	4,108
Tuckerton Boro	<u>2,825</u>	<u>12,000</u>	<u>4,589</u>
Totals	360,375	755,771	436,412

Sources:

Projected 1980 Populations are from Ocean County Planning Board.
Approximate Summer populations are from Municipal Clerks.

1. Household garbage and solid wastes.
2. Yard clippings and debris including grass.
3. Clean-up items, including bulky white goods.
4. Small commercial, small mercantile and small industrial establishments with two or three refuse cans per collection.

Some communities include and report all solid waste quantities from each of the category items in their collection figures. Others include and report only partial quantities from each item. In the case of municipalities with private contractors, one or more contractors may not even report the volumes of quantities of waste collected to the State.

The estimated residential generation quantities of solid wastes from the 33 municipalities of Ocean County have been tabulated and are presented in the accompanying table. The figures presented should be considered as estimates only, with an accuracy of 10 to 15 percent, plus or minus. They are, however, the best figures currently available on the County production of domestic solid wastes. The values were obtained from municipal officials, contractors, engineering computations, and all available records from the Solid Waste Administration of the New Jersey Department of Environmental Protection and the Board of Public Utilities. The average per capita rate of production in the Ocean County District, based on a weighted population, is 4.4 lbs per capita per day, and the annual tonnage is about 347,174 tons or about 950 tons per day. Table IV-2 presents a detailed analysis of per capita residential waste generation rates on a municipal basis.

TABLE IV-2

1977-78 ESTIMATES OF RESIDENTIAL SOLID WASTE QUANTITIES

<u>MUNICIPALITY</u>	<u>ESTIMATED AVERAGE POUNDS PER CAPITA PER DAY*</u>	<u>ESTIMATED YEARLY TONNAGE*</u>
BARNEGAT	5.0	4,962
BARNEGAT LIGHT	5.0	2,508
BAY HEAD	4.4	1,725
BEACH HAVEN	4.4	5,004
BEACHWOOD	5.5	6,858
BERKELEY	5.2	19,475
BRICK	5.6	56,792
DOVER	5.5	57,709
EAGLESWOOD	5.0	913
HARVEY CEDARS	4.8	1,780
ISLAND HEIGHTS	4.6	1,456
JACKSON	4.4	20,036
LACEY	5.7	16,139
LAKEHURST	3.4	2,324
LAKEWOOD	4.5	28,719
LAVALLETTE	5.0	7,722
LITTLE EGG HARBOR	4.8	8,005
LONG BEACH	5.2	12,293
MANCHESTER	3.9	12,217
MANTOLOKING	4.4	642
OCEAN	5.5	5,732
OCEAN GATE	5.2	2,119
PINE BEACH	5.9	1,743
PLUMSTED	5.5	4,705
POINT PLEASANT	4.5	14,610
POINT PLEASANT BEACH	4.4	11,387
SEASIDE HEIGHTS	4.7	10,193
SEASIDE PARK	4.4	6,626
SHIP BOTTOM	5.3	4,135
SOUTH TOMS RIVER	4.5	3,369
STAFFORD	5.1	8,168
SURF CITY	5.3	3,334
TUCKERTON	5.5	3,774
AVERAGE	4.4	TOTAL 347,174

*Estimated solid waste quantities include household wastes, yard debris, some leaves, bulky goods and clean-up items, and some small commercial and mercantile establishments collected in regular pick-up. Estimates are \pm 10% to 15%. Estimates are adjusted for seasonal populations.

In addition to the waste generated by the individual household, there are other wastes produced in the municipality that are a result of the maintenance and sanitation of the residential community. These waste types include: road work debris, street sweepings, street litter, leaves, branches, tree trimmings, dead animals, beach clean-up, seashells, seaweed, and catch basin clean-out waste.

An estimate of this waste was made using information provided by a number of municipalities in the district. The estimated quantity of this waste is 0.7 pounds per capita per day or about 153 tons per day.

COMMERCIAL AND INDUSTRIAL SOLID WASTE QUANTITIES

The calculation of industrial and commercial solid waste quantities is a difficult task because of the number of individual companies which have completely different methods of solid waste disposal. To establish average values of waste disposal and to determine methods of disposal, M. Disko Associates surveyed 555 industrial and commercial firms. The information which was returned from the companies was then used as input to a computer program developed by M. Disko Associates. A total of 112 completed commercial and industrial firm surveys were inputted into the computer program that computed and compiled generation rates. The 112 firms represent a full range of manufacturers, offices, light to heavy commercial establishments including banks, offices, restaurants and service establishments, among other types. The establishments

represent 3.7% of the commercial establishments in the County and 33.8% of the industrial establishments in the County. The overall representation by the survey is 9.5%.

Total industrial and commercial employment in the County is shown in Table IV-3. The data was obtained from the New Jersey Department of Labor and Industry. The totals exclude government workers, railroads, some banks, self-employed workers, farmers, and a number of other small miscellaneous categories.

Based on the 112 questionnaires, a summary of employees and solid waste quantities reported for the 33 Ocean County municipalities is presented in Table IV-4. The average production rate of solid wastes that are collected are 16.3 pounds per employee per day in commercial activities and 32.4 pounds per employee in industrial activities.

The following table summarizes the estimated commercial and industrial tonnage in Ocean County in 1978.

<u>Type of Employment</u>	<u>Estimated Number of Employees</u>	<u>Pounds Per Employee Per Day</u>	<u>Estimated Yearly Tonnage</u>	<u>Estimated Daily Tonnage</u>
Commercial	44,318	16.33	132,000	362
Industrial	10,602	32.38	62,500	171
TOTALS	54,920		194,500 Tons/Yr	533 Tons/Day

TABLE IV-3

1977 ESTIMATED COMMERCIAL AND INDUSTRIAL
EMPLOYEES IN OCEAN COUNTY

<u>MUNICIPALITY</u>	<u>INDUSTRIAL EMPLOYEES</u>	<u>COMMERCIAL EMPLOYEES</u>	<u>TOTAL EMPLOYEES</u>
BARNEGAT	175	69	244
BARNEGAT LIGHT	25	209	234
BAY HEAD	21	207	228
BEACH HAVEN	95	979	1,074
BEACHWOOD	116	276	392
BERKELEY	257	1,012	1,269
BRICK	831	5,485	6,316
DOVER	3,136	13,361	16,497
EAGLESWOOD	36	73	109
HARVEY CEDARS	33	63	96
ISLAND HEIGHTS	59	27	86
JACKSON	396	2,793	3,189
LACEY	193	1,075	1,268
LAKEHURST	176	391	567
LAKEWOOD	3,031	6,463	9,494
LAVALLETTE	30	346	376
LITTLE EGG HARBOR	16	108	124
LONG BEACH	56	474	530
MANCHESTER	551	459	1,010
MANTOLOKING	53	30	83
OCEAN	94	253	347
OCEAN GATE	0	39	39
PINE BEACH	25	97	122
PLUMSTED	59	269	328
POINT PLEASANT	335	3,052	3,387
POINT PLEASANT BEACH	166	2,007	2,173
SEASIDE HEIGHTS	33	1,302	1,335
SEASIDE PARK	16	549	565
SHIP BOTTOM	78	581	659
SOUTH TOMS RIVER	0	158	158
STAFFORD	291	1,204	1,495
SURF CITY	2	321	323
TUCKERTON	217	586	803
TOTALS	10,602	44,318	54,920

SOURCE: Bureau of Research and Statistics, Division of Planning and Research, Department of Labor and Industry, Trenton, New Jersey

TABLE IV-4

SUMMARY OF INVENTORY OF MANUFACTURING AND NON-MANUFACTURING
SOLID WASTE PRODUCTION BY MUNICIPALITY IN OCEAN COUNTY

<u>MUNICIPALITY</u>	<u>REPORTED TOTAL TONS/YEAR</u>	<u>REPORTED TOTAL EMPLOYEES</u>
BARNEGAT	1.82	5
BARNEGAT LIGHT	6.50	7
BAY HEAD	438.50	35
BEACH HAVEN	13.03	12
BEACHWOOD	216.00	9
BERKELEY	326.93	65
BRICK	3,225.45	590
DOVER	13,032.68	1,948
EAGLESWOOD	15.08	3
HARVEY CEDARS	9.85	1
ISLAND HEIGHTS	.00*	0
JACKSON	17.42	17
LACEY	36.42	49
LAKEHURST	709.20	203
LAKEWOOD	7,183.32	1,975
LAVALLETTE	26.65	12
LITTLE EGG HARBOR	.00	0
LONG BEACH	15.60	48
MANCHESTER	210.43	8
MANTOLOKING	2.60	2
OCEAN	39.00	31
OCEAN GATE	.00	0
PINE BEACH	.65	1
PLUMSTED	26.00	2
POINT PLEASANT	26.52	39
POINT PLEASANT BEACH	261.92	96
SEASIDE HEIGHTS	.00	0
SEASIDE PARK	.00	0
SHIP BOTTOM	163.40	49
SOUTH TOMS RIVER	.52	1
STAFFORD	.00	0
SURF CITY	30.16	1
TUCKERTON	.00	0
TOTALS	26,035.65	5,209

SOURCE: Industrial-Commercial Survey Conducted in 1978
by M. Disko Associates

*Municipalities with .00 entries means that no company
from that town responded to the survey.

INSTITUTIONAL SOLID WASTE QUANTITIES

The amount of waste being generated by institutions located in Ocean County is an additional area of investigation. The types of institutions that comprise this category are Federal, State and local governmental facilities, schools and hospitals.

The waste quantity generated by the Federal, State and local government facilities was determined by using employment information from the State of New Jersey Division of Planning and Research, Office of Manpower Statistics and Analysis. Annual averages of governmental workers for 1977 were used. By multiplying these averages by the production rate of 1.55 lbs. of waste per employee per day, waste quantities were determined. This figure was derived from a report by the U.S.E.P.A. in 1977 "Office Paper Recovery: An Implementation Manual" for general office facilities. The total yearly production (based on 260 working days) of waste in this segment of the Ocean County solid waste stream is 2,861 tons per year or about 8 tons per day (based on 365 days).

A questionnaire was used to calculate the next segment of the institutional solid waste stream. The questionnaire was mailed to all boards of education and colleges in the district. The percentage of those returned supplied sufficient information to calculate an average pounds per student per day. The total number of students in the county was then determined. The number of students was multiplied by the generation rate of 3.1 lbs. per student per school day and the number of school days (typically 180)

to obtain a yearly solid waste generation figure of 17,444 tons per year or about 48 tons per day (based on 365 days).

The final segment of the solid waste stream is the quantity of waste being produced by hospitals. Each hospital in the county was mailed a questionnaire. The production rate of 27.7 lbs. per hospital bed per day was calculated from the information on the questionnaires. A yearly solid waste generation figure of 4,314 tons per year or 12 tons per day is estimated for this segment of the solid waste stream.

In summary, approximately 24,619 tons per year or about 67 tons per day are generated by the types of institutions analyzed by M. Disko Associates. The average per capita generation rate when distributed over the entire population of Ocean County is 0.3 lbs. per capita per day.

AGRICULTURAL WASTE PRODUCTION IN OCEAN COUNTY

Residue from harvested crops, prunnings and residue from fruit orchards, and animal manures are typical agricultural waste. The quantity of agricultural waste generated in Ocean County was established by mailing an agricultural questionnaire to 60 farms, nurseries and stables in the county. Twenty (20) questionnaires were returned, but unfortunately, the information was mostly incomplete. As a result M. Disko Associates used supplementary sources of information in order to get an understanding of the

magnitude of agricultural waste production in Ocean County. Information for crops and livestock was derived from the 1974 Census of Agriculture.

Waste production factors were obtained from the "California Solid Waste Management Study (1968) and Plan (1970)" and from the "Inventory of Agricultural Waste in New Jersey (1971)." This information together with crop and livestock data enabled M. Disko Associates to supplement the information provided by the questionnaires. The agricultural waste production factors are presented in Table IV-5.

Table IV-6 presents the acreage of crops being harvested and numbers of livestock. The total agricultural waste production quantity in tons for the year can be obtained by applying these numbers to the waste production factors presented in Table IV-5. These are the figures that appear in the third column. Table IV-6 shows that approximately 12,300 tons of crop waste are produced annually in Ocean County. This is approximately 45% of the total agricultural waste produced. The other 55% or 14,953 tons consist of livestock manures and bedding. These two factors make up the total 27,253 tons of agricultural waste being produced annually in the county or 74.7 tons per day. When spread over the entire population of the county, approximately 0.3 pounds per capita of agricultural wastes are produced.

The majority of agricultural wastes are disposed of on the farm. The manures are used as fertilizer by spreading or disking back

TABLE IV-5

AGRICULTURAL WASTE PRODUCTION FACTORS

<u>SOURCE</u>	<u>ANNUAL WASTE PRODUCTION FACTOR</u>	
<u>LIVESTOCK</u>		
HORSES	12	tons/head
HOGS	1.75	tons/head
BEEF CATTLE	7.5	tons/head
DAIRY CATTLE	13	tons/head
POULTRY (MEAT)	4.5	tons/1000
POULTRY (LAYERS)	47	tons/1000
SHEEP	.6	tons/head
<u>FRUITS</u>		
APPLES	2.25	tons/acre
PEACHES	2.5	tons/acre
<u>FIELD AND ROW CROPS</u>		
CORN	4.5	tons/acre
BROCCOLI, LETTUCE	4.0	tons/acre
CANTALOPES, TOMATOES, WATERMELLONS, PUMPKINS, CABBAGE, SPINACH, SQUASH	3.0	tons/acre
BEANS, CUCUMBERS, CARROTS, ONIONS, PEPPERS, EGGPLANT, POTATOES	2.0	tons/acre
BARLEY, OATS, OKRA, WHEAT, HAY	1.5	tons/acre
NURSERIES	1.5	tons/acre

SOURCES: "California Solid Waste Management Study (1968) and Plan (1970)", Solid Waste Management Office, EPA, 1971.

"An Inventory of Agricultural Waste in New Jersey",
D. A. Derr & F. R. Westcott, N. J. Agricultural
Experiment Station, Cook College, Rutgers University,
1971.

TABLE IV-6

OCEAN COUNTY DISTRICT
AGRICULTURAL WASTE INVENTORY

<u>CROPS</u>	<u>ACREAGE</u>	<u>ESTIMATED YEARLY WASTE PRODUCTION</u>
CORN	1,197	5386.5
SOYBEANS	726	2178
WHEAT	120	180
OTHER GRAINS	608	912
IRISH POTATOES	2	4
HAY	539	808.5
VEGETABLES	666	1665
ORCHARDS	5	12.5
BERRIES	257	642.5
OTHER CROPS	101	404
NURSERIES	71	106.4
<u>TOTAL CROPS</u>	<u>4,292</u>	<u>12,299.4</u>
<u>LIVESTOCK</u>	<u>NUMBER</u>	<u>ESTIMATED YEARLY WASTE PRODUCTION</u>
CATTLE		
BEEF	45	337.5 tons
DAIRY	217	2821 tons
CHICKENS		
MEAT	134	.6 tons
LAYING	148,239	6967 tons
HORSES	417	33.9 tons
HOGS AND PIGS	2,727	4772 tons
SHEEP	36	21.6 tons
<u>TOTAL LIVESTOCK</u>	<u>151,815</u>	<u>14,953.6 tons</u>
TOTAL AGRICULTURAL WASTE		
YEARLY WASTE PRODUCTION		27,253.0 Tons
DAILY WASTE PRODUCTION		74.7 Tons
POUNDS PER CAPITA PER DAY		0.2 [†]

Source: "1974 Census of Agriculture"

into the soil and crop residues are usually plowed back under the soil for mulch. A private collector may also be contracted with to remove excess manure and residues. Occasionally, another farmer will pick up manures or crop residues for use as a soil conditioner on his farm.

The State Air Pollution code has banned open burning so once burned forest and orchard prunnings and other wastes must now be disposed of by either being buried or hauled away. Most pesticide, fertilizer, and other containers are collected by the hauler who collects normal household garbage. Thus, most agricultural wastes generated in Ocean County are used or disposed of on-site. Less than 10% of the agricultural wastes produced in the county are estimated to be disposed of in sanitary landfills.

SEWAGE SLUDGE AND SEPTIC WASTE QUANTITIES

Chapter 326 requires that sewage sludges and septic wastes be considered in the District Solid Waste Management Plan. Current Federal and State legislation requires that municipalities and municipal and regional sewerage authorities must provide an alternate to ocean dumping of sewage sludges and septage by December 31, 1981. Because of these mandates, most of the municipal and regional sewerage authorities are preparing to make the change to a land based alternative of disposal. It is this requirement to find a land based treatment and/or disposal alternative which makes it necessary for the Plan to consider the quantities of sewage sludge and septic waste.

Table IV-7 estimates the amount of sewage sludge and septic waste produced by each municipality in the Ocean County District. The breakdown between sewage sludge and septic waste was arrived at from information developed by M. Disko Associates for the Ocean County 208 Water Quality Management Planning Project which was released in July of 1978. Through recent work in a number of counties a reasonable estimate of the per capita generation rate of these wastes in dry weights has been determined and applied to the population of the municipalities as estimated for 1980.

Since sewerage authorities report sludge generation with differing solids content, it is necessary to utilize an estimate of the dry weight per person per day of these wastes. In order to get a better understanding of the problem, the sludge and septage is first presented as 100% dry and then, in the table below, sludge quantities are presented as 25% solids and 4% solids based on typical processing techniques which are currently in use or are planned.

Based on the best information available, the Ocean County District produces about 36.7 dry tons per day of sewage sludge and septic wastes. Twenty-seven or 73.7% of this total is estimated to be sewage sludge and 9.7 tons or 26.3% is estimated to be septic tank cleanout wastes.

Utilizing secondary treatment as the normal level of processing for domestic wastewater, the solids content usually is in the

TABLE IV-7

ESTIMATES OF SEWAGE SLUDGE AND
SEPTIC WASTE PRODUCED BY MUNICIPALITIES
IN THE OCEAN COUNTY DISTRICT

<u>Municipality</u>	<u>Sewage Sludge Dry Tons/Day</u>	<u>Septage Dry Tons/Day</u>	<u>Total Dry Tons/Day</u>
Barneget	0.224	0.224	0.448
Barneget Light Boro	0.236	0.0	0.236
Bay Head Boro	0.179	0.0	0.179
Beach Haven Boro	0.543	0.0	0.549
Beachwood Boro	0.516	0.028	0.544
Berkeley Twp.	1.345	0.724	2.069
Brick Twp.	3.330	1.426	4.756
Dover Twp.	5.632	0.297	5.929
Eagleswood Twp.	0.153	0.051	0.204
Harvey Cedars Boro	0.175	0.0	0.175
Island Hgts. Boro	0.167	0.0	0.167
Jackson Twp.	1.503	1.444	2.947
Lacey Twp.	1.284	0.321	1.605
Lakehurst Boro*	0.734	0.006	0.740
Lakewood Twp.	2.411	1.033	3.444
Lavallette Boro	0.692	0.0	0.692
Little Egg Harbor Twp.	0.606	0.152	0.758
Long Beach Twp.	1.143	0.0	1.143
Manchester Twp.	1.168	0.389	1.557
Mantoloking Boro	0.066	0.0	0.066
Ocean Twp.	0.345	0.077	0.422
Ocean Gate Boro	0.190	0.0	0.190
Pine Beach Boro	0.164	0.0	0.164
Plumsted Twp.	0.013	0.626	0.639
Pt. Pleasant Boro	1.747	0.0	1.747
Pt. Pleasant Beach Boro	1.194	0.0	1.194
Seaside Heights Boro	0.988	0.0	0.988
Seaside Park Boro	0.635	0.0	0.635
Ship Bottom Boro	0.371	0.0	0.371
S. Toms River Boro	0.436	0.0	0.436
Stafford Twp.	0.541	0.291	0.832
Surf City Boro	0.341	0.0	0.341
Tuckerton Boro	0.153	0.229	0.382
Totals	29.225	7.318	36.549

range of 3 to 5%. The logical first step to reducing the sludge disposal problem is to reduce the volume by removing the water. Belt filter presses, centrifuges, plate and frame filter presses, and vacuum filters are the more established techniques for dewatering. A solids content of 25% is typical when utilizing these techniques.

The following table presents the three levels of solids content with conversions to cubic yards.

QUANTITIES OF SEWAGE SLUDGE PRODUCED
IN THE OCEAN COUNTY DISTRICT

<u>% Solids</u>	<u>Tons/Day</u>	<u>Cubic Yards/Day</u>
100%	27	25.5
25%	108	128.6
4%	676	802

From the above, the observation can easily be made that the quantity of sludge produced, collected and disposed of depends on the solids content. Considering the total quantity of the waste streams discussed earlier in this chapter, approximately 1800 tons per day, sludge wastes can impact the total waste stream by increasing it by anywhere from 1.5% to 37.5%. This excludes the impact of septic wastes.

An important point to note is that most sludge and septic wastes are disposed of in liquid form. This means that quantities will significantly be reduced via any disposal or treatment scheme which is implemented, be it drying, dewatering, composting or combustion. Even the most used technique today, disposal at a

landfill affects the volume of sludge that is disposed of through absorption, and leaching into the ground. But this characteristic of sludge and septage is not seen in the collection and haulage of the waste to the disposal site. Collection and haulage constitutes better than half of the economic burden of managing this waste. Therefore, the reducing of sludge and septic waste quantities by increasing the solids content prior to collection and transfer is an integral element in increasing the efficiency and decreasing the economic impact of management of this segment of the waste stream.

SUMMARY AND PROJECTIONS OF SOLID WASTE QUANTITIES IN THE OCEAN COUNTY DISTRICT

It can be seen from the preceding presentations that there is much more than just the residential waste stream to consider when contemplating a comprehensive solid waste management plan. Table IV-8 presents a summary of solid waste quantities in the Ocean County District in 1978 based on the best available estimates.

The projections of future solid waste quantities are based on the expected increases in the District's residential population and production in the industrial and commercial sectors. The expected population growth, as reported by the Ocean County Planning Board, is shown on Figure IV-1 and tabulated in Table IV-9. Also shown is the national trend for average pound-per-day waste production. The projected future quantities for all of the waste streams is shown on Figure IV-2. These estimated quantities are listed in detail on Table IV-10.

TABLE IV-8

SUMMARY OF SOLID WASTE QUANTITIES
IN THE OCEAN COUNTY DISTRICT DURING 1978

<u>Component of Solid Wastes</u>	<u>Estimated Tons/Year</u>	<u>Estimated Tons/Day</u>	<u>Estimated Lbs/Capita/Day</u>
Residential	347,174	950	4.4
Residential-Type Municipal	55,752	153	0.7
Commercial	132,000	362	1.7
Industrial	62,500	171	0.8
Institutional	24,619	67	0.2
Agricultural	27,253	75	0.2
Sewage Sludge & Septic Waste	13,396	36.7	0.166
Totals	662,694	1,814.7	8.166

TABLE IV-9

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

AVERAGED POPULATION PROJECTIONS

<u>MUNICIPALITY</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Barneгат	4,450	9,400	14,850
Barneгат Light Boro	900	1,050	1,200
Bay Head Boro	1,250	1,500	1,550
Beach Haven Boro	2,150	2,300	2,400
Beachwood Boro	6,900	8,650	10,150
Berkeley Twp.	20,500	35,500	51,500
Brick Twp.	56,500	66,500	71,000
Dover Twp.	67,000	82,500	93,000
Eagleswood Twp.	2,450	5,350	9,750
Harvey Cedars Boro	465	515	605
Island Heights Boro	1,800	2,100	2,500
Jackson Twp.	35,500	52,500	73,500
Lacey Twp.	16,800	29,000	39,000
Lakehurst Boro	3,205	3,550	4,100
Lakewood Twp.	41,500	50,000	56,000
Lavallette Boro	1,980	2,500	3,000
Little Egg Harbor Twp.	6,900	9,750	12,000
Long Beach Twp.	5,150	6,850	8,250
Manchester Twp.	17,500	32,000	44,500
Mantoloking Boro	435	490	545
Ocean Twp.	4,800	8,350	11,400
Ocean Gate Boro	1,525	1,700	1,950
Pine Beach Boro	1,975	2,400	2,650
Plumsted Twp.	7,700	12,500	14,850
Pt. Pleasant Boro	21,050	22,000	23,500
Pt. Pleasant Beach Boro	6,200	6,600	7,300
Seaside Heights Boro	1,650	1,700	1,800
Seaside Park Boro	1,975	2,300	2,750
Ship Bottom Boro	1,725	2,000	2,550
S. Toms River Boro	5,250	6,150	6,450
Stafford Twp.	8,850	17,200	22,500
Surf City Boro	1,515	1,800	2,000
Tuckerton Boro	2,825	3,500	4,100

Source: Ocean County 208 Water Quality Planning

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

ESTIMATES OF FUTURE WASTE PRODUCTION AND POPULATIONS

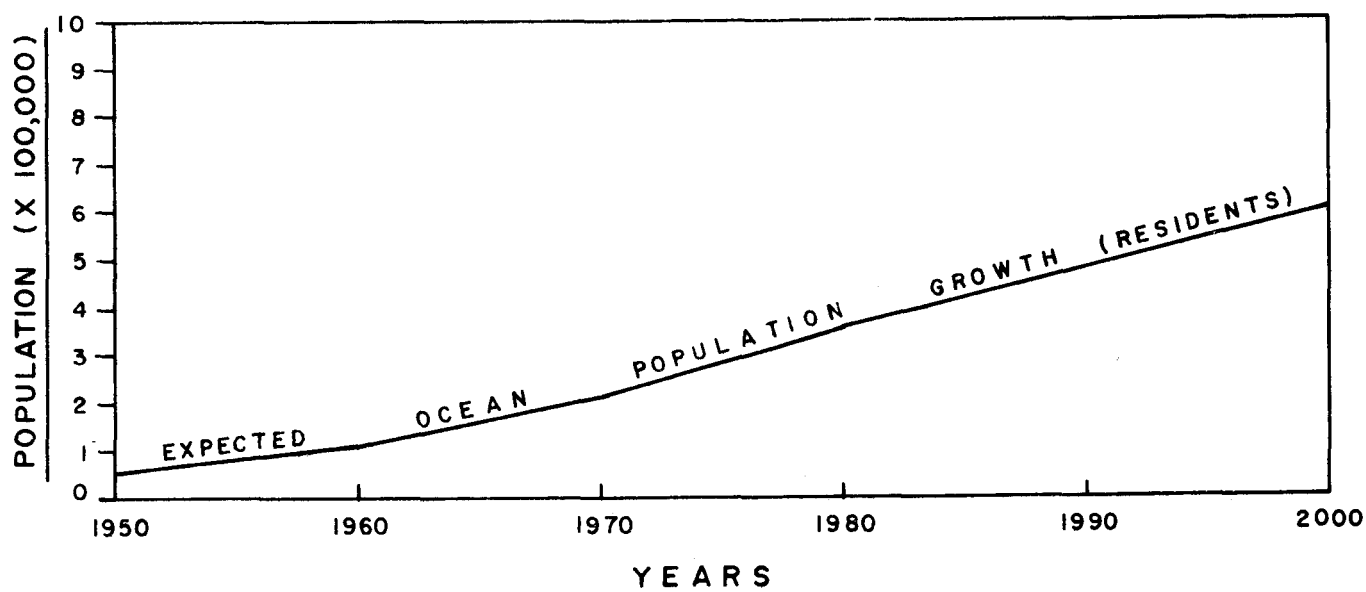
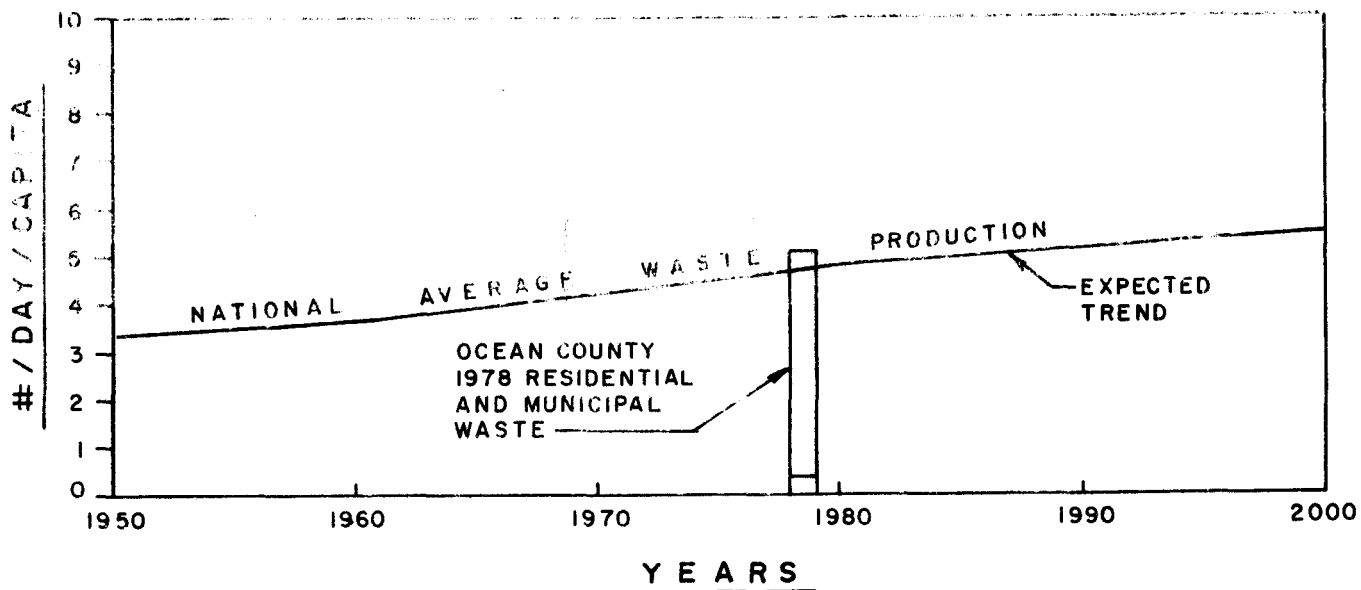


FIGURE IV-1
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TOTAL WASTE QUANTITY PROJECTION

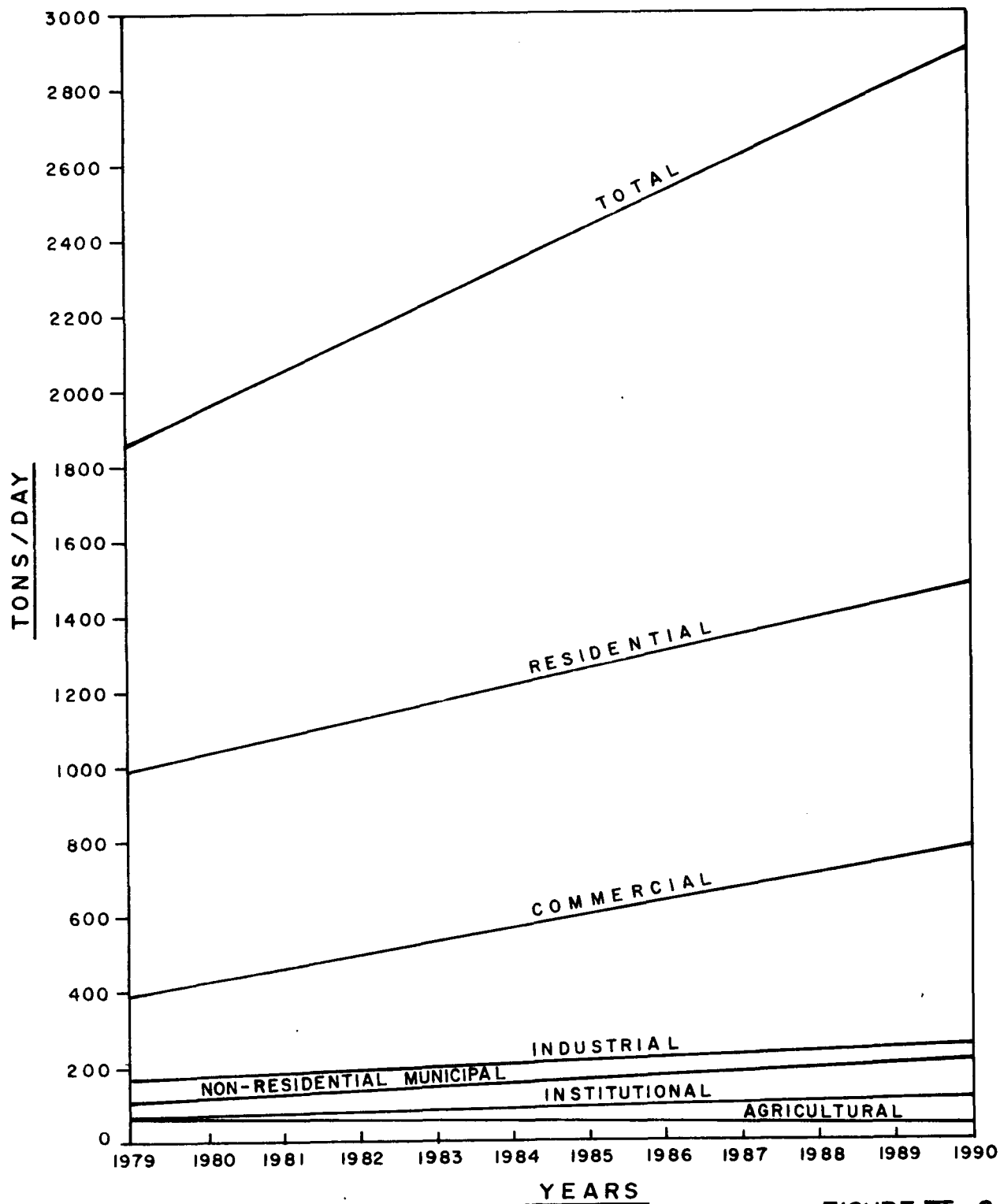


FIGURE IV-2
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

TABLE IV-10

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

ESTIMATED SOLID WASTE QUANTITY PROJECTIONS
(TONS PER DAY)

YEAR	RESIDENTIAL	NON RESIDENTIAL MUNICIPAL	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL	AGRICULTURAL	TOTAL
1979	999	157	395	176	72	65	1864
1980	1038	162	429	183	79	63	1954
1981	1078	166	464	189	86	60	2043
1982	1119	171	498	195	93	58	2134
1983	1160	176	533	201	100	57	2227
1984	1202	180	567	208	108	55	2320
1985	1244	185	602	214	116	53	2414
1986	1287	189	636	220	124	51	2507
1987	1330	194	671	227	133	50	2605
1988	1374	198	706	233	142	49	2702
1989	1419	203	740	239	151	47	2799
1990	1464	207	775	245	160	46	2897

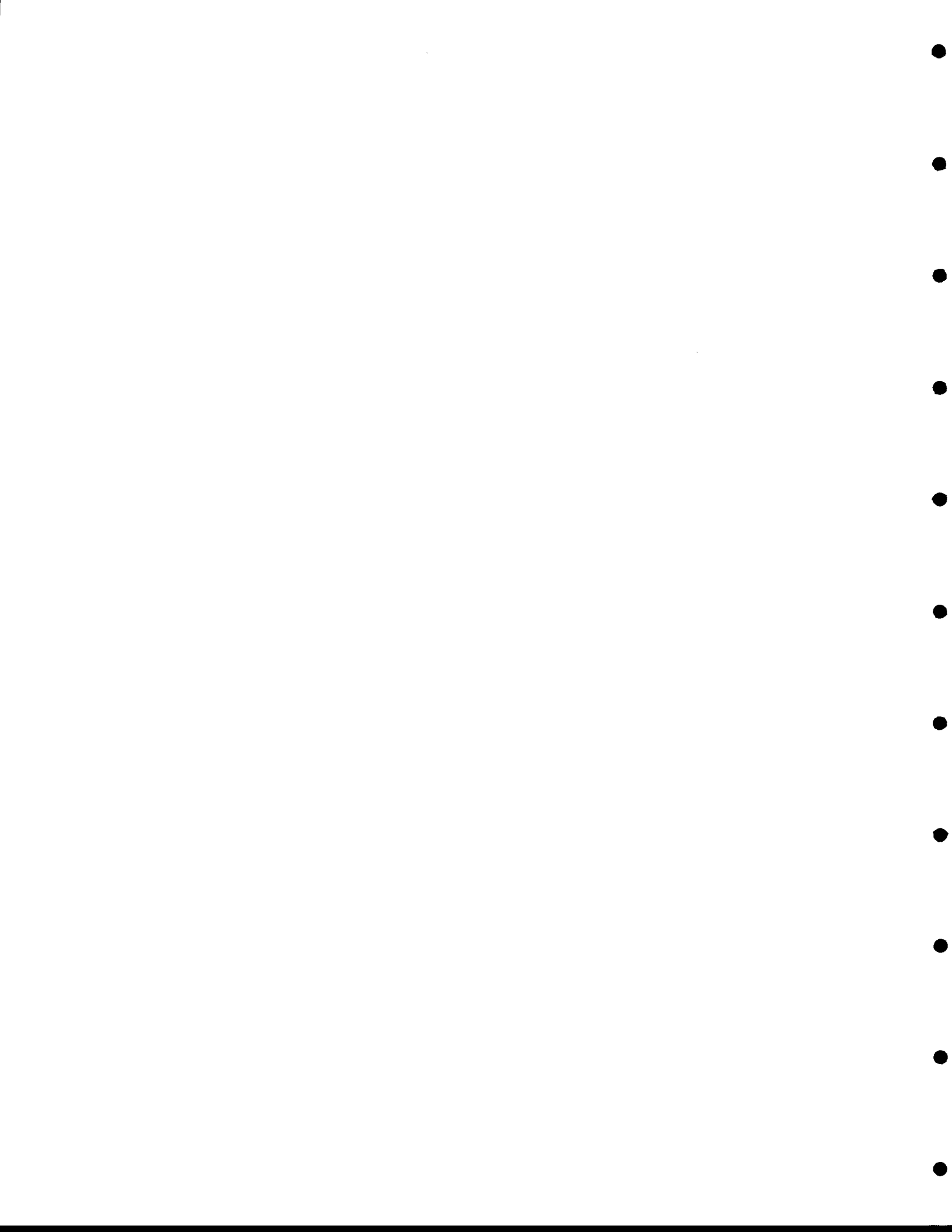
SUMMARY OF DISTRICT WASTE IMPORTATION AND EXPORTATION

A short evaluation will now be made of the quantity of residential solid waste which is either currently being imported into the Ocean County District from other districts and the quantity of waste which is being exported to other districts from the Ocean County District.

The Solid Waste Administration's 1977 summaries of waste importation and exportation is the best data base available at the present time. The information available should not be considered a completely accurate accounting of waste quantities that cross district boundaries. The Solid Waste Administration has stated on a number of occasions that information generated on its computer printouts should be used cautiously and checked with other data sources where possible. As M. Disko Associates is the consultant to the Monmouth County District and the Ocean County District, information on importation and exportation of residential wastes between the districts is based on the consultant's estimates.

With respect to waste importation, the SWA computer listings show that four districts dispose of varying quantities of residential solid waste in the Ocean County District. Burlington and Cape May Counties disposed of a combined quantity of about 10 tons per day in 1977. Mercer County disposed of approximately 113 tons per day. Based on M. Disko Associates estimates, Monmouth County disposed approximately 25 tons per day of residential solid waste in the Ocean County District.

With respect to waste exportation, the SWA computer listings show that the Ocean County District exported significant amounts of residential solid wastes¹ to two districts. In 1977, Ocean County exported about 15 tons per day to Gloucester County. Based on M. Disko Associates estimates the Ocean County District disposed of approximately 63 tons per day of residential solid waste in the Monmouth County District.



V. MATERIALS RECYCLING:
NATIONAL TRENDS AND ACTIVITIES IN OCEAN COUNTY

STRATEGIES FOR SECONDARY MATERIALS RECOVERY

There are a number of ways to reduce the problem of waste disposal. One option is to lessen the amount of waste that must be collected and disposed of. Strategies to accomplish this objective include the following:

- . Decrease the amount of packaging wastes
- . Reverse the trend towards planned obsolescence
- . Encourage the return of reusable containers
- . Separate wastes of value at the source
- . Separation and recovery at a central processing facility

The first strategy, to decrease the amount of packaging waste, is a very complex issue, involving many economic factors. In recent years we have seen the rise of self-service merchandising. The sales clerk does very little to promote the sale of the product. **Because** of the large number of similar products available on the market, the package often sells the particular brand of product. The more appealing the package looks, the more the package tells the potential consumer that he will be buying a superior product, the greater the probability that brand of product will be sold.

Increased packaging has also increased the variety of ways a product may be sold. For example, one may go to a hardware store to pick up a screwdriver. Instead of buying one, three are purchased because they are packaged and offered at a lower price.

Even with all the disadvantages that are associated with increased packaging, such as increasing waste generation and reducing the recyclability of the original raw materials because of the way in which many types of materials are incorporated in making various packages, there are certain advantages that can be pointed to. Pilferage is reduced because small items are placed in blister packs or larger containers which are harder to steal. Increased packaging increases the shelf life of some products. Finally, there is a whole advertising and packaging industry that has been developed to vie for the consumer's dollar.

Thus, it appears beyond the scope of possibility for any county plan of action to reduce packaging waste generation in the County. National trends indicate that the trend toward more packaging and more complex packaging has been increasing and will continue to increase as packaging technology continues to develop.

The second strategy, to reverse the trend towards planned obsolescence, is also difficult to implement on a county-wide basis. Many major appliances, when built years ago, were intended to last a lifetime. Today, products are so crafted, both in terms of the amount of work put into the products and the quality of raw materials used for the products, that they retain their utility only for a certain amount of time. The best example of this strategy is the personal automobile. The automobile manufacturer has a certain economic responsibility to keep the sales of new automobiles at an increasing or at least a stable level. It, therefore, as part of design consideration, builds a car which will after a certain

period of time begin to depreciate quickly, in order to bring the consumer back into the new car market.

Another facet of planned obsolescence is to make the product such that servicing is virtually impossible, or is so costly that buying a replacement product can actually be cheaper. This concept is especially valid in many of the smaller appliances. Children's toys are also good examples.

The third strategy, encouraging the return of reusable containers, is implementable, but its success depends upon the comprehensiveness of the approach. Mandatory regulation on a county-wide basis would be hard to implement, as these products too are produced regionally and nationally. A number of states passed "bottle bills" of various forms. Some require certain containers to be returnable for refilling while others require a deposit to be placed on the container as an incentive for the consumer to return the container to the store.

No strategy adequately deals with the problems unless all containers of a specific material are addressed. Considerable impact is lost if a bill is passed requiring that all soda and beer must be packaged in returnable containers while a whole host of other food and drink products are allowed to be packaged in disposable glass packages. The problem is even more complex when metal containers are examined. The ability to quickly produce and insure the quality of many food products depends on the ability to vacuum pack and cook these items

in metal containers. Handling of these containers is easier and less costly because they are not as fragile as glass. In the case of beer, soda, or other beverage products, the strength of the container and the ability of the containers to be cooled quickly are factors sometimes considered. In New Jersey there are a number of metal container manufacturers and an even larger number of glass container manufacturers who have an economic stake in causing the continuing proliferation of disposable containers. Storage of returnable containers has been pointed out as a problem. The grocer does not want to be bothered with the problem of storing empty containers where he once stored saleable stock.

The fourth strategy, separating secondary materials at the source, offers the most promise for implementation as a short and long term solution to a part of our solid waste management problem.

The manual separation of recyclable materials at the household or other generating source is, perhaps, the oldest and most widely practiced form of materials recovery. Significant amounts of the total waste stream can be diverted back into the materials market utilizing this strategy. One of the most appealing features of this strategy is that it does little to upset economic balances such as those briefly discussed above. Furthermore, the strategy requires an almost negligible amount of capital when compared to the tens of millions of dollars that must be spent on a central processing facility.

Source separation has generally depended upon the voluntary efforts of residents to separate and prepare materials according to prescribed guidelines. The materials most commonly recycled include: newspaper, all colors of glass, steel cans, aluminum cans, and bi-metal cans. It is usually requested that newspaper not be mixed with magazines or any other paper product. The recyclability of various paper grades depends on the freedom from contamination by other paper grades, plastics, metal and any other material. There is a direct relationship between the amount of contamination and the grade, utility, and value of a paper product that can be produced. In most cases glass must be segregated into the individual colors and the metal rings must be removed. A few glass manufacturers do allow green and amber glass to be mixed. Steel cans are usually accepted by de-tinners. The metal is shredded and chemically detinned before being sold to another market. A real problem in recycling steel cans developed with the advent of pull tabs. Can manufacturers started producing bimetal cans. Aluminum tops replaced steel tops on steel soda and beer cans because the pull tabs are easier to open when aluminum is used. Because of the introduction of the bimetal can, the simple task of segregating the different types of metal cans has become a harder chore. It has also decreased the market value of the metal product because the detinner finds the aluminum a highly undesirable contaminant to his operation. Aluminum can recycling has also been troubled with the problem of contamination. After the development of the seamless aluminum can, which was along with its lightness, a prime feature in recognizing it as being all-aluminum, the market began

to be showered with numerous versions of seamless steel cans, with steel or aluminum tops. Recognition became even harder when lighter gauge steel started to be used, and the surface of the can was so polished and shaped so as to resemble an aluminum can in almost every way. In summary, secondary material markets require a high degree of freedom from contamination of the waste to be recycled, and through a number of technological advances, the recyclers job has been made harder in terms of keeping recyclable elements of the waste stream separated in order to get the highest market value.

The way by which recyclable materials have been collected has historically fallen into two general methods. One is to set a central drop off area where the residents can bring recyclables at prescribed times and the other is to collect the materials at the curb after the resident has segregated and placed them there.

The central drop off center is usually staffed by one or more civic organizations or operated by the municipality. An effort is made by the operating personnel to keep the contamination down to an acceptable level. In order to reduce the haulage costs a certain amount of volume reduction is usually performed. The organization may either take the materials to market themselves via a truck borrowed from the municipality or a rented truck. The organization may also opt to contract the haulage out to a private company who will either take a flat fee or a percent of the income generated by the sale of the material. Source separation done in this way has historically received a very low level of participation. Key

reasons for this are: poor publicity, poor organization, inconvenience caused to the resident by having to store and then transport the recyclable waste and then have to segregate it at the site, voluntary nature of the methodology, and the site usually becomes an eyesore if the maintenance of the site is neglected.

The second method, curbside collection of recyclables, has become the preferred method because of the relatively high participation rates when compared to the drop off center. Participation is even higher when an ordinance is passed making it illegal to have recyclable materials included with the regular refuse. A complementary anti-scavenger ordinance is usually adopted because of the fact that once at the curb, the recyclable materials are easily collected by anyone.

There are a number of ways in which the curbside program can be implemented. Public notice is usually given either by a mailing to all residents or by advertising the initiation of the program in the local newspaper. The organization responsible for operating the program may either modify the normal refuse vehicles so that they have a separate storage area for the recyclables right on the vehicle or they can use their own trucks. Other options include borrowing the vehicles from the municipality, borrow the vehicles from the secondary materials dealer (ie, the newspaper collection trucks from Garden State Paper for example), or rent the vehicles from a private company. One last option might be to rent the vehicles from a private company. There are services available in the

area that will work with the community or the organization in setting up the appropriate publicity, local ordinances, set up the collection routes and schedules, provide the equipment, and provide the manpower. This is all done through a negotiated contract which could either guarantee a set per-ton net income to the municipality or the organization or could stipulate a certain percentage of the market price that would go back to the group or municipality. Interesting variations are added such as increasing the revenue with each jump in quantity of material recycled over a certain period.

It is oftentimes the practice with separate collection strategies to maintain a central storage area for the materials. The recyclables are stored until a sufficient quantity is reached to make it cost effective to transport the material to market.

The final strategy is to consider separation and recovery at a central processing facility. The recovery of salvagable materials in solid waste can be accomplished by source separation as noted above, or it can be achieved at a central processing facility where mechanized processes, such as shredding, trommeling, air classification, magnetic separation, eddy current separation, screening, froth floatation, optical sorting and ballistical separation, etc., are used to separate salvagable materials in solid wastes. The amount and type of material separated can also depend on the energy product that is to be produced and the available markets for materials. Energy products possible include: steam, electricity,

gas, oil, char, and various types of refuse derived fuel (RDF). A capital intensive central processing facility can be a major part of the solution to the solid waste disposal problem. However, no matter what strategy or combination of strategies is applied, there is always some portion of the waste stream which must be landfilled.

One school of thought suggests that source separation and central recovery facilities can coexist with no detriment to either of the recovery methods in terms of economic loss. The advantage with source separation is that the material does not get as contaminated as with major processing of mixed refuse. Usually source separated wastes can be used to make higher value and quality products than wastes separated after being totally mixed with other garbage and trash. Recycling to achieve the highest value product possible should be stressed. For example, suppose a newspaper can be recycled into new newspaper via a source separation program, or it can be processed into RDF at a central processing facility. Recycling the newspaper into new newsprint has more value than using it as an energy product. Therefore, if a market is available, the emphasis should be on recycling as much of the newspaper waste stream as possible into newsprint and designing the central processing facility so as not to be dependent on the availability of the entire newspaper waste stream in order to achieve the best economics possible. This type of planning should follow through on every other waste material that can be source separated. It is possible that in some cases that removal of a certain percentage

of a particular waste stream will enhance the processibility of the other stream and improve the quality of the resultant material and energy products.

One of the major advantages of centrally processing mixed wastes for recovery is that the individual resident is not required to separate the waste. The mixed solid wastes are simply collected by existing collection systems and hauled to the processing facility where the waste material is sorted into various components for recovery. A disadvantage of this strategy is that capital equipment must be used to separate the materials to insure freedom from contamination.

In summary, each of these two strategies have obvious advantages and disadvantages. Using both together can increase the amount recycled and the economic return on that volume that is recycled. While resource recovery and energy recovery facilities now typically take three to five years to implement, comprehensive source separation programs, with the right management, can be operational in months with minimal capital input and can be a real interim and long term partial solution to the solid waste disposal problem.

RECYCLING ACTIVITIES IN THE OCEAN COUNTY DISTRICT

The following section of this report details the recycling programs in the District on a municipality by municipality basis. According to the results of the recycling survey done by M. Disko Associates, as of January, 1979, only five (5) of the District's 33 municipalities have comprehensive recycling programs. The participation in municipal recycling programs has been decreasing. In the end of 1975, there were fourteen (14) municipalities with recycling activities. Part of the steady decline can be attributed to the Ocean County Girl Scout Council's ceasing their recycling activities in many of the municipalities. Some typical reasons for the failure of some of the recycling activities include:

- a. Lack of public participation and support
- b. Insufficient revenues
- c. Lack of manpower to man and maintain the centers
- d. Inability to get materials to markets
- e. Non-availability of markets
- f. Instability of market prices

A brief description of each of the major recycling operations in the District is included in the next section of this report.

BRICK TOWNSHIP

A recycling effort has been underway in Brick Township for 7½ years. The volunteer-operated center accepts glass, aluminum, paper, ferrous metals, tin cans, and rags. The revenues are donated to the Brick Township Boys Club for their use.

JACKSON TOWNSHIP

Glass is being collected and sold to the Brockway Glass Company at the Johnson Elementary School on Larsen Road. Local residents, teachers and students bring the glass to school and a municipal truck transports it to the Brockway Glass Company. The center is run on a volunteer basis with the help of a school custodian and has been operating for 6-7 years. Approximately 40 tons of glass is collected yearly with revenue being used for school projects. The program is successful and educational.

LAKEWOOD TOWNSHIP

The Environmental Commission of Lakewood conducts recycling activities in the yard adjacent to the Department of Public Works Garage. The center has been open for four years and accepts glass, paper, ferrous metals and aluminum. Recyclable materials can be dropped off Monday thru Saturday. On Saturday, the residents are paid 1 cent per pound for glass and 5 cents per pound for aluminum. Quantities and income data are not available.

POINT PLEASANT BOROUGH

Point Pleasant started its recycling center in the summer of 1972. It is manned by volunteers from the local Key Club, Boy Scouts and one paid supervisor. Materials can be dropped off on Saturdays 8:00 A.M. to 12 Noon. The center has 5 storage bins and dump trucks at its disposal to handle the approximately 70 tons of glass, 130 tons of paper, 1.5 tons of aluminum, and 15 tons of metal which pass through the center yearly. Residents

POINT PLEASANT BOROUGH, Cont'd.

who recycle at the center are paid half of the going market prices for the materials they bring in, though most is donated. The remainder of the revenues are divided between the Key Club, Kevettes and the Boy Scouts.

POINT PLEASANT BEACH BOROUGH

On Saturdays from 9:00 A.M. to 1:00 P.M., the Point Pleasant Beach Recycling Center accepts glass and aluminum. The center has been in operation for 7 years and this past year has handled 10 tons of glass. The center consists of a loader, trucks on a part-time basis, storage bins and a shed for cardboard storage. At the present time the municipality provides the manpower and equipment.

VI. SECONDARY MATERIALS MARKETS AVAILABLE TO THE OCEAN COUNTY DISTRICT

In any comprehensive waste management plan due consideration must be given to the markets available for recoverable products. Indeed, the economic feasibility of many capital intensive resource recovery strategies strongly depend upon the availability and stability of secondary material markets. The subsequent discussions will focus on the availability of materials in the waste stream, the availability of markets, and the current constraints on marketing the secondary material product.

MATERIALS AVAILABILITY

The main reason behind recovering some of the resources available in the solid waste stream is to reduce the amount of waste that must be disposed of. An increase in density of wastes in-place at the landfill often results with the implementation of one of a number of the recovery systems available. The amount of recovery ranges from a low of about 10% for the Recovery I facility in New Orleans to a high of 90% for a full resource recovery and energy recovery facility such as the ones being constructed in Monroe County, New York, and Wilmington, Delaware.

As can be seen here, there are wide ranges of recovery levels that can be implemented. The particular facility design will depend upon a number of factors. These would include capital available to build the facility, market availability, site specific cost-benefit analyses of each material or energy product which can be recovered, and the scarcity of landfill space.

Another motive to remove materials from waste is to dampen the effects of fuel shortages and depleting natural resources. According to the EPA in one of their reports to Congress on resource recovery and waste reduction, the energy equivalent of 400,000 to 500,000 barrels of oil per day (1% of the total U.S. daily energy consumption) could be recovered from municipal solid waste. Reportedly, 7 percent of the iron, 8 percent of the aluminum, 20 percent of the tin, and 14 percent of the paper consumed annually in the United States could be supplied from solid waste. Generally, it requires less energy to re-manufacture the products from recycled materials than it does to manufacture the product from virgin supplies. For example, it has been estimated that only 5 percent as much energy is required to manufacture a ton of aluminum right from recycled aluminum scrap than from ore.

The numbers above are impressive, but are also optimistic. One can never expect to fully recover 100% of every material or energy product. Table VI-1 presents one source's estimate of maximum recovery rates to be expected through source separation and resource and energy recovery. A number of facilities now operating (e.g., Franklin, Ohio) or under construction are able to attain the 90% recovery level without source separation. The success of the current facilities in attaining this level of recovery should be looked upon with a cautious eye. The technology does exist now to recovery energy and materials to this level, but the level of recovery to be implemented should be carefully weighed against the various factors which should be considered, which were presented at the beginning of this section.

TABLE VI-1

RECOVERY MIX FOR TOTAL REFUSE

<u>COMPONENT</u>	<u>TOTAL REFUSE (TR)</u> %	<u>SOURCE SEPARATION</u> % RECOVERY % OF TR	<u>RESOURCE RECOVERY</u> % RECOVERY % OF TR	<u>TOTAL RECOVERY</u> % RECOVERY % OF TR
<u>PAPER</u>				
Newsprint	8.7%	48.0%	15.0%	55.0%
Corrugate	11.4	40.0	15.0	55.0
Other Paper	23.6	20.0	-	20.0
TOTAL	43.6	29.2	6.9 ^a	36.1
<u>FERROUS METAL</u>				
Light (65%)	5.0			
Heavy (35%)	2.7			
TOTAL	7.7			
<u>GLASS</u>				
	9.4			
<u>ALUMINUM</u>				
	.6			
<u>OTHER REFUSE</u>				
	36.6			
TOTAL	100%			
RDF ^b				
<u>RESIDUE</u>				
TOTAL				

12.82%

16.9%

29.72%

58.98^c11.3^d

100.0%

TABLE VI-1 Cont'd.

RECOVERY MIX FOR TOTAL REFUSE

^aThe percent in the paper category pertains to handpicking at the recovery site. The remainder are technical coefficients for materials processing.

^bAir classified material to be used as dry fuel.

^cAfter removal of residue anticipated in combustion of RDF, but before any drying step.

^dIncludes ash from RDF and other inorganic residues not recovered.

SOURCE: "Solid Waste Planning in Metropolitan Regions", Michael R. Greenberg and Others, Center for Urban Policy Research, 1976, pp. 100-101, Modified by M. Disko Associates

As virgin material prices are forced up by new environmental controls and scarcity, the benefits relative to costs will look more attractive. As disposal costs increase because of inflation, increasingly limited nature of the space available for landfilling, and the higher haul costs to be expected as landfills close, the economics of recovery will become even more favorable.

The EPA has reported that in 1975 approximately 6% of the total residential and commercial waste generated in the United States was recycled. Eighty-eight percent of the total recovered tonnage is due to wastepaper recycling. While these percentages are low now, they are expected to increase in the future.

Recent changes in the recycling picture show positive proof that recovered materials will continually become more valuable. Aluminum prices have been going up continually. The typical price paid for glass cullet in New Jersey is expected to rise from \$30.00 per ton to \$40.00 per ton. Paper prices are cyclical, but generally increase over the long term.

MARKET AVAILABILITY - PROFILE OF THE INDUSTRY

The secondary materials industry is made up of a number of participants. Some of these participants are described below:

Junkman or Collector: The junkman is the smallest secondary materials operator. He usually collects recyclable materials from small commercial and industrial companies. His operation is marginally economical and his market is usually a larger salvage dealer.

Salvage Dealer: Salvage dealers usually handle metals, paper, and textiles. The salvage dealer seldom enters into long range contracts with suppliers or markets. Usually there is no processing of the material except for some occasional sorting.

Dealer-Processor: A dealer-processor is large enough to have processing equipment to upgrade the quality of the secondary materials. Usually, many small dealers will supply the dealer-processor and he in turn usually sells to manufacturers.

Broker: A broker coordinates the purchasing and resale of the recyclable materials between dealers and a final manufacturer or market without actually handling the material. He is valuable in his knowledge of "where to buy" and "where to sell" various materials.

Social Service Agencies and Civic Groups: This category is unusual because it bypasses all of the aforementioned middlemen and deals directly with a manufacturer. For example, glass or aluminum cans may be collected from a municipality through a collection drive and then delivered directly to the glass plant or aluminum company for recycling. The proceeds usually help the organization or group. Volunteer labor also aids in economic success. Most textiles discarded are collected by such Social Service Agencies and re-distributed for re-use.

The secondary materials industry has been always noted for its instability. The development of secure markets willing to accept recovered materials over a long time period is essential to the success of a resource recovery or a serious source separation project. Because of the erratic nature of some segments of the industry, the fate of many source separation projects has been controlled by market prices. In many instances when a program goes under, it has either lost interest in continuing operations or cannot recover when prices get better. The inclusion or exclusion of material processing lines in a resource recovery scheme is usually dependent on the availability of a secure market for the particular product.

There are many ways in which secondary materials can reach the end user. In some instances the final market receives reclaimed materials directly and applies the amount of processing necessary for introducing the resource as an input into the production line. Figures VI-1 through VI-4 will present the most common materials that are recovered, and typical ways in which secondary materials can reach the final market.

The intermediate steps between generator and final market in the figures can all be considered part of the secondary materials industry. Each are involved in any number of the following operations which are typical of the industry: 1) acquisition, 2) concentration, 3) purification or separation, 4) reduction of shape or size, and 5) preparation for shipment. The degree of utilization of these steps depends upon the material being recycled. The primary step involved in any salvage operation is sorting. Because sorting is so labor-intensive, there has been a trend in recent years to centralization. Smaller dealers and processors are merging in order to economically purchase equipment, reduce manual sorting, and upgrade processing operations. For example, small ferrous dealers are grouping together to purchase a shredder. The next part of this section will be devoted to an analysis of the salvage industry and to the recovery of specific materials found in municipal solid waste. A summary of the general marketability of these materials is shown in Table VI-2.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL PATTERNS OF NEWSPAPER RECOVERY

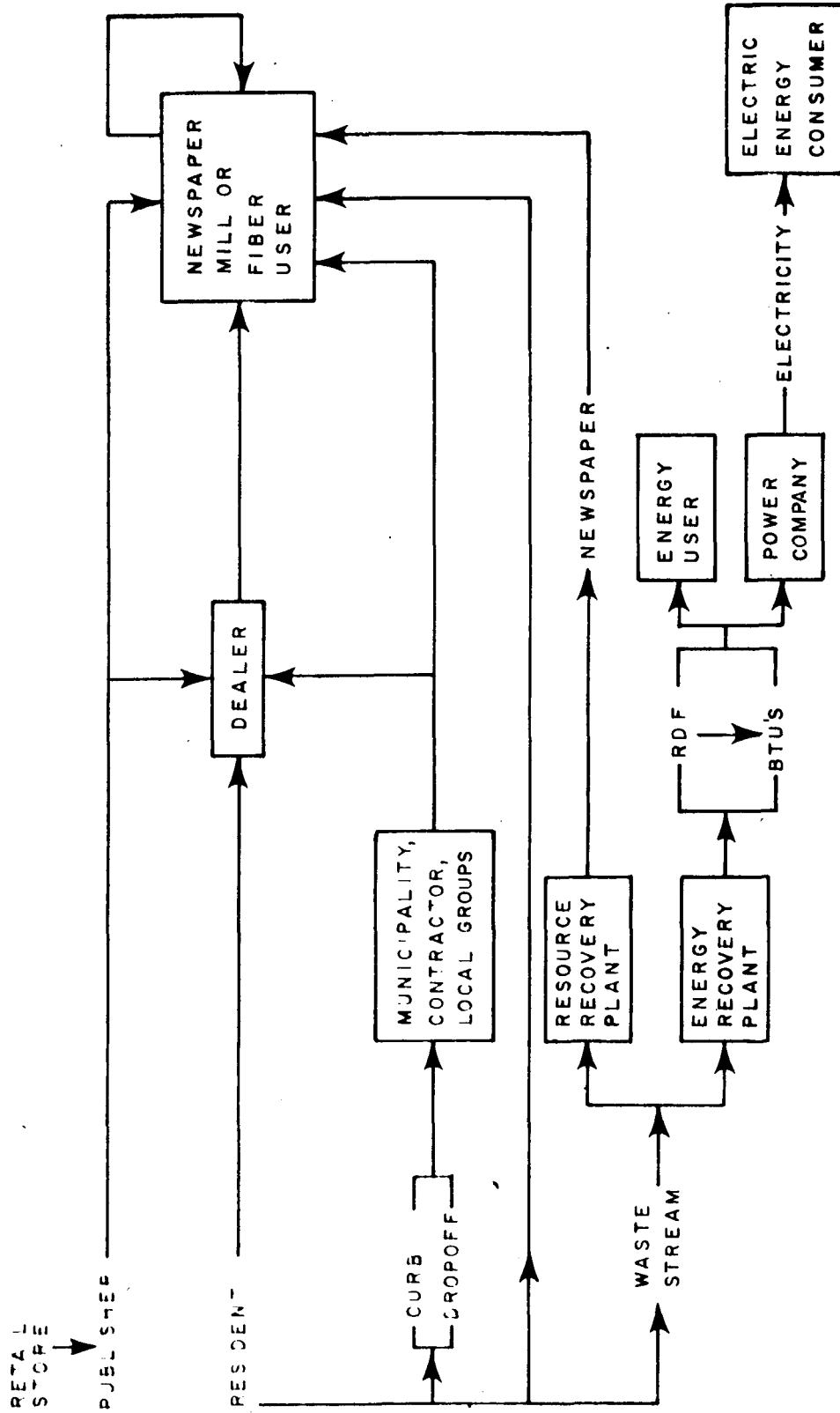


FIGURE VI-1
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OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL PATTERNS OF GLASS RECOVERY

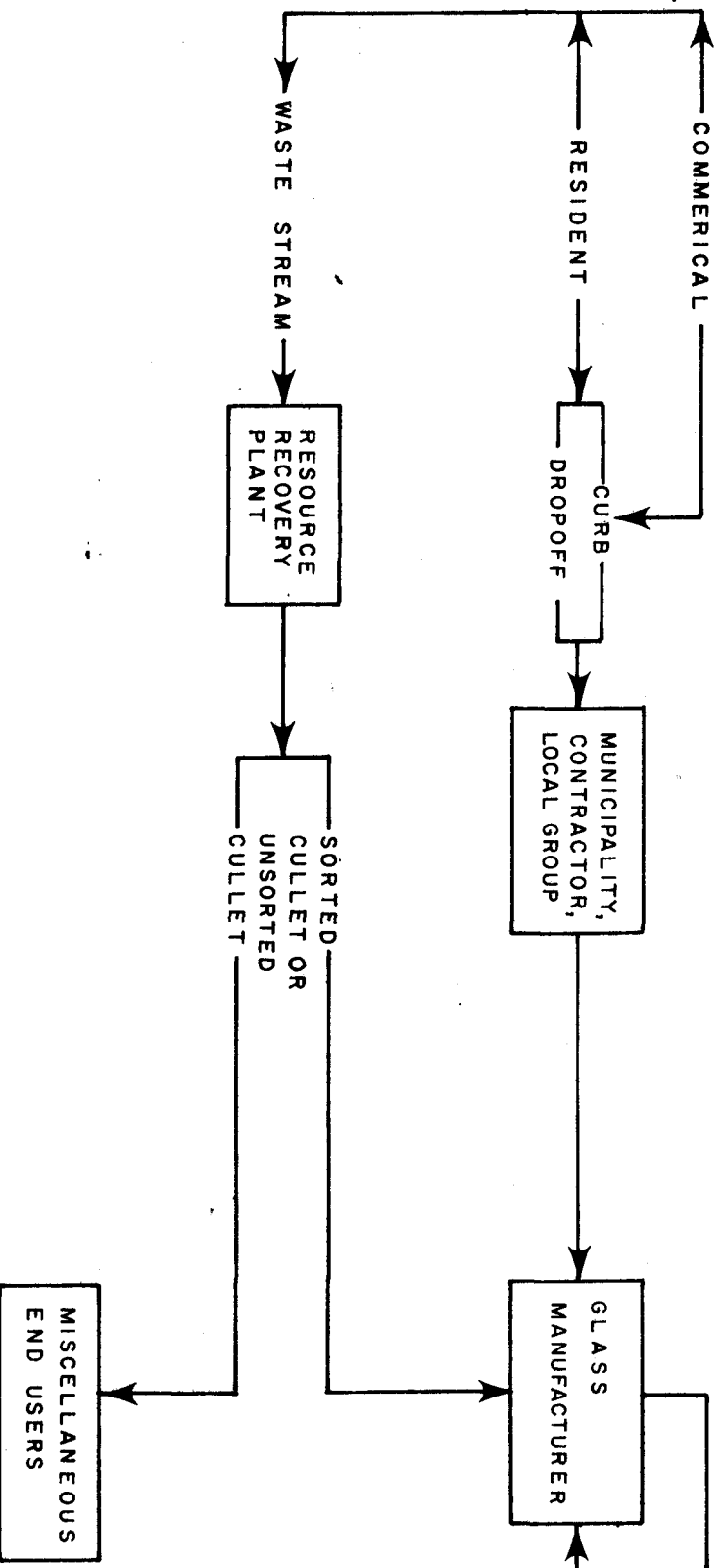


FIGURE VI-2
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL PATTERNS OF FERROUS RECOVERY

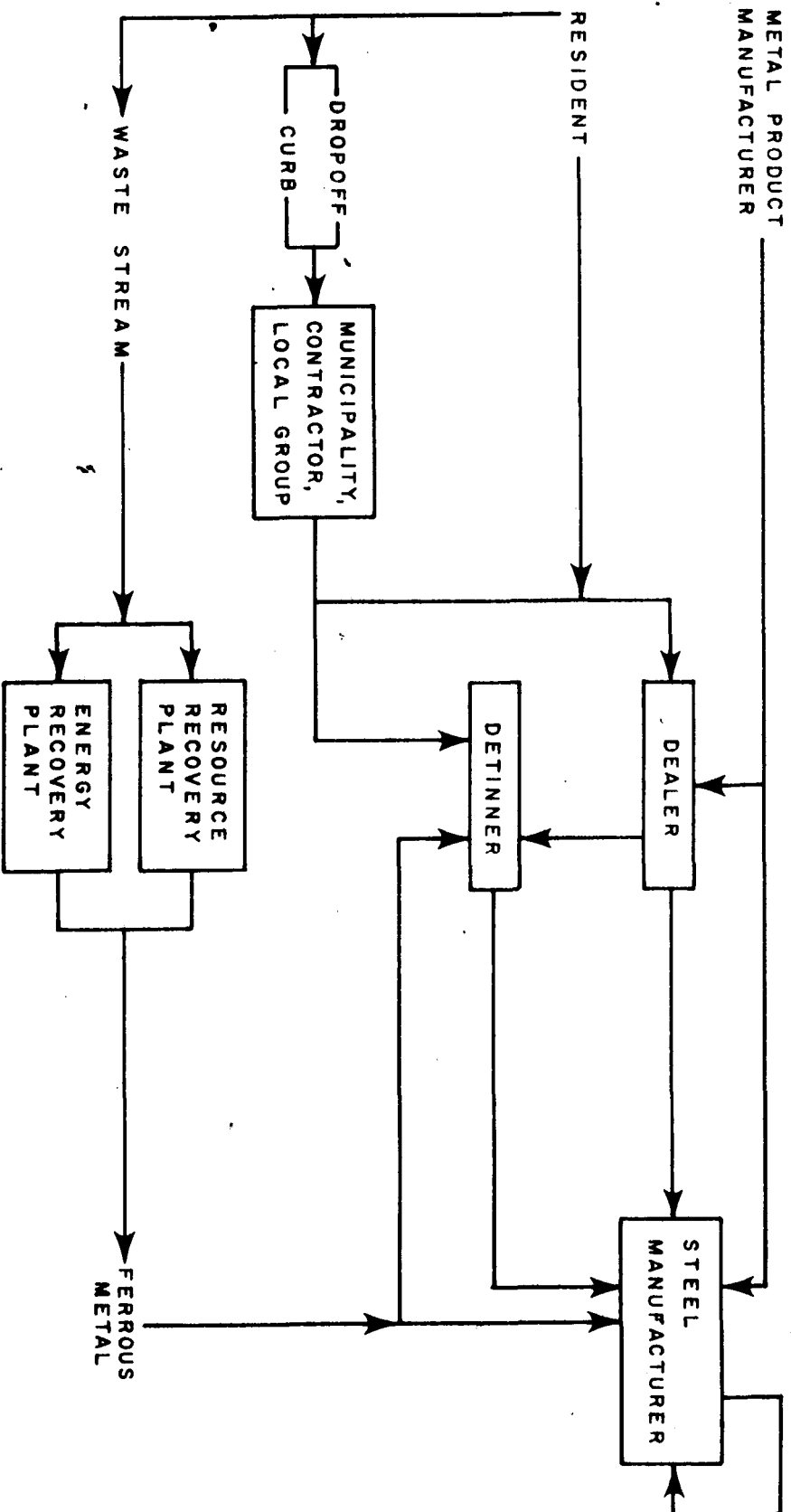


FIGURE VI - 3
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL PATTERNS OF ALUMINUM RECOVERY

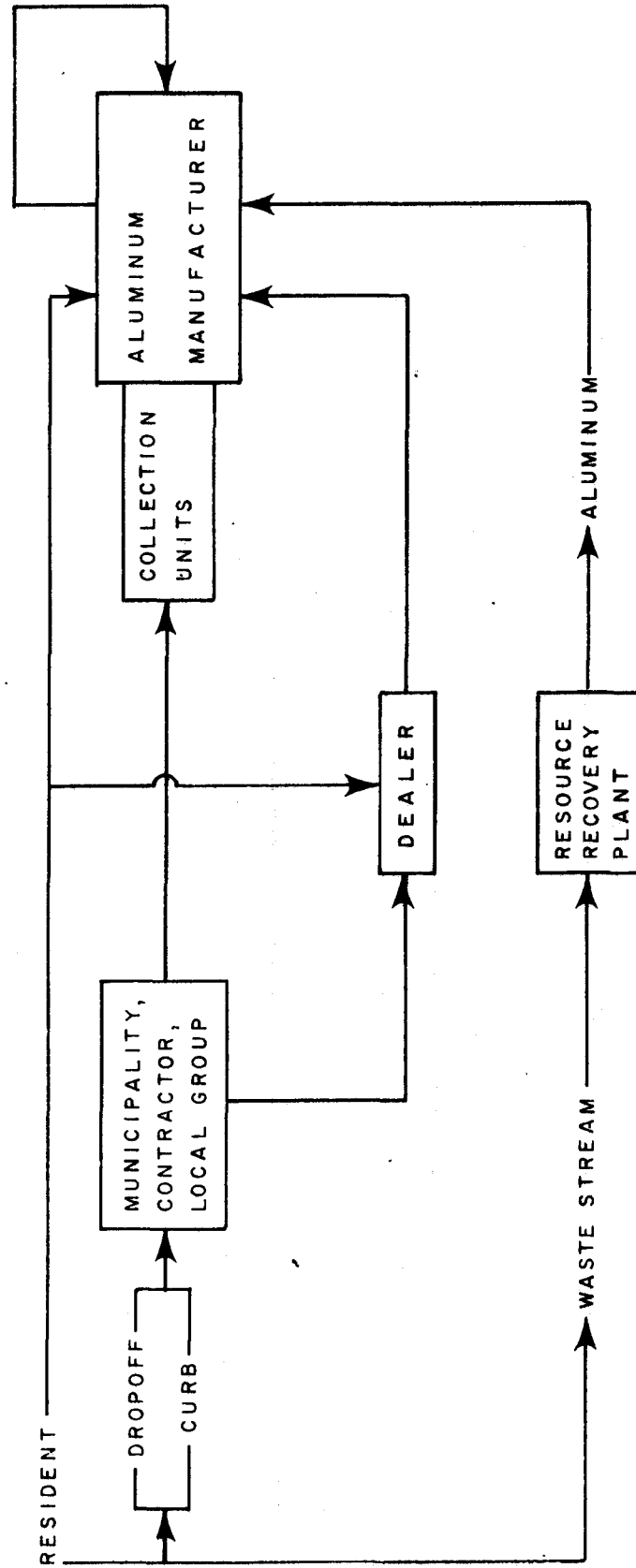


FIGURE VI-4
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CONSULTING ENGINEERS

TABLE VI-2

SUMMARY DATA ON MARKETS FOR SALVAGE MATERIALS
FROM MUNICIPAL SOLID WASTE IN THE OCEAN COUNTY DISTRICT

<u>MATERIAL</u>	<u>TYPICAL % BY WEIGHT IN SOLID WASTES</u>	<u>OVERALL MARKET PROSPECTS</u>	<u>MAJOR PROBLEMS IMPEDING MARKETABILITY</u>
WASTE PAPER	36% to 59%	Good to excellent for newsprint, high grade ledger, Fair to good for corrugated	Contamination; costs of collection and separation; incentives favoring use of virgin pulp. Short cyclical price changes which sometimes demise even the best program.
GLASS	7% to 15%	Good to excellent, prices expected to increase shortly	Contamination; cost of collection and separation; must be color sorted for use in bottle manufacturing.
FERROUS METALS	5% to 10%	Market currently down, huge surplus at local detinning plant, low prices	Bimetal problem still not resolved; other contamination; high cost of collection, separation, and transportation because of low density.
NON-FERROUS METALS	0% to 1%	Good to excellent, particularly for aluminum, lead, copper	High costs of collection, separation, and transportation.
RDF (VARIOUS TYPES)	65% to 75%	Good, may be more acceptable once more working experience with the fuel is gained	High ash content, boiler modification sometimes necessary, storage facilities necessary.

MARKETS FOR PAPER

One of the major manufactured products consumed in the United States is paper and paperboard, the largest single component of municipal solid waste. Municipal and commercial production of paper products amounted to 44,035,000 tons in 1975, according to the EPA; 56,660,000 tons are estimated for 1980.

In recent years there has been a decline in waste paper recovery. Paper consumption, however, has been increasing. The greater use of "disposable" paper products such as paper towels, tissues, disposable diapers, food packages, etc., has increased solid waste quantities. Products such as these are difficult to recycle. The Federal Food and Drug Administration, for instance, prohibits the re-use of any paper product that comes into direct contact with food for re-manufacture into a similar container. Very often, after initial use, disposable paper items are too contaminated for efficient or economical re-use.

Other factors have contributed to the decreased use of waste paper. One of the more major factors is the number of mills constructed that rely heavily on virgin raw materials for their production input. Reportedly, about 25 percent of the pulp mills in the United States are committed to the use of virgin materials in their production process. Their plants accept little, if any, waste paper as a production input. A ton of contaminated waste paper can damage many tons of finished paper. It can damage machinery and stop the production process. For these reasons, many mills will pay higher prices for virgin raw materials to be assured of finer, more consistent quality raw material.

The use of paper stock has increased in the field of newsprint recycling and reuse. Garden State Paper, Garfield, New Jersey, utilizes a patented de-inking process which enables them to use used newspapers as 100% of their raw material input. Currently they are accepting 650 tons of waste paper a day. They are very much involved in trying to motivate more communities to start newspaper recycling programs. Secondary dealerships connected with the facility are located throughout the State. A facility recently opened in Lakewood. The company has indicated that it can increase its throughput by four times if the paper was available. The company has recently been offering long term contracts assuring a measure of price stability and guaranteeing a market for the term of the contract.

Paper in the municipal solid waste stream accounts for about 40 to 60 percent by weight of the refuse and about 70 percent by volume. Residential paper wastes consist of newspapers, magazines, food packages and other disposable items such as towels and tissues. Commercial paper wastes consist of office paper, communications, and corrugated boxes and cartons. In most cases, once the paper from the residential, commercial, and industrial users enters the solid waste stream, it immediately loses its value as a source of recyclable input to a production process to make similar materials. In explanation, a high grade paper such as writing paper which is contaminated by contact with various substances in the municipal waste stream cannot be separated and re-used in the high grade

paper production process. It can be utilized in the manufacture of paper goods of lower quality. The exception to the above rule is that is some resource recovery facilities located across the country, newspaper and corrugated paper are handpicked out to be made into new newspaper or corrugated paper. An example of a facility involved in this type of operation is the Americology facility in Milwaukee.

The largest percentage of recycled waste paper is found in newspaper and corrugated paper. They are the easiest to separate and identify by residential and commercial consumers.

Within the five state region including, New Jersey, New York, Pennsylvania, Massachusetts, and Connecticut, there are about 140 paper mills, 80 paperboard mills, and 20 building paper and board mills. This number of mills in this area indicates the size of the market for waste paper. Because of the low value per ton and high transportation costs, the New Jersey markets for recycled paper are usually confined to the above-mentioned five-state region. In the Ocean County District, most of the paper that is recycled through residential recycling programs is delivered to very local markets in New Jersey. The bulk of the paper is sold to the following companies:

Lakewood Recycling Center, Lakewood, N.J.

C & R Waste Materials, Brick Township, N.J.

Generally, waste paper prices are proportional to the demand for paper stock which in turn is controlled by such factors as paper stock import and export levels, demand for construction materials, the availability of virgin pulp, and the demand for combination paperboard. Paper stock supply and demand are not controllable. Demand is controlled by the paper mills that use paper stock as raw input, however, the supply is independent of mill demands. Thus periods of high supply and low demand, as well as periods of high demand and low supply are common.

Table VI-3 gives selected waste paper prices on the New York market as reported in the "Paper Trade Journal" and the "Journal of Commerce". The complementary graph illustrates the most important components of waste paper recovery efforts, used newspaper. The graph vividly displays the cyclical nature of newspaper prices. An important time period to note is the end of 1974 and the first half of 1975. It is during that time period that many recycling programs failed because of very poor prices for recycled newspapers. With the rise back to reasonable levels, the second half of 1975, many recycling programs just did not have the resources or the backing to reactivate. Much of the public support of recycling was lost because of the instability of the program. This instability shows the need for guaranteed markets and prices in order for community programs to become stable and economically beneficial to the community or group. Currently door trade prices for waste newspaper are good.

TABLE VI-3

COMPARISON OF SELECTED WASTE PAPER
PRICES IN THE NEW YORK MARKET
 (IN DOLLARS PER TON)

<u>DATE</u>	<u>NO. 1 NEWS</u>	<u>OLD CORRUGATED CONTAINERS</u>	<u>NO. 1 SOFT WHITE SHAVINGS</u>	<u>MANILA TAB CARDS</u>
June 1973	6-16 ¹	18-28 ¹	55-65 ¹	115-125 ¹
January 1974	30 ¹	55 ¹	100 ¹	175-190 ¹
January 1975	26-27 ²	27-28 ²	90-95 ²	170-175 ²
June 1975	18 ¹	18 ¹	45-50 ²	130 ¹
January 1976	25 ¹	20 ¹	45-50 ²	145 ¹
June 1976	35 ¹	25 ¹	45-50 ²	200 ¹
January 1977	35 ¹	38 ¹	45-50 ²	205 ¹
June 1977	38 ¹	28 ¹	45-50 ²	190 ¹
January 1978	30-31 ²	15-16 ²	70-75 ²	175 ¹
June 1978	30-31 ²	10-11 ²	70-75 ²	170 ¹
Nov. - Dec. 1978	31 ²	N.A.	70-75 ²	170 ¹

SOURCE: ¹Paper Trade Journal

²Journal of Commerce

Prices listed are F.O.B. New York

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TEN YEAR ANALYSIS OF WASTE PAPER PRICES

No. 1 NEWS (NEW YORK MARKET)

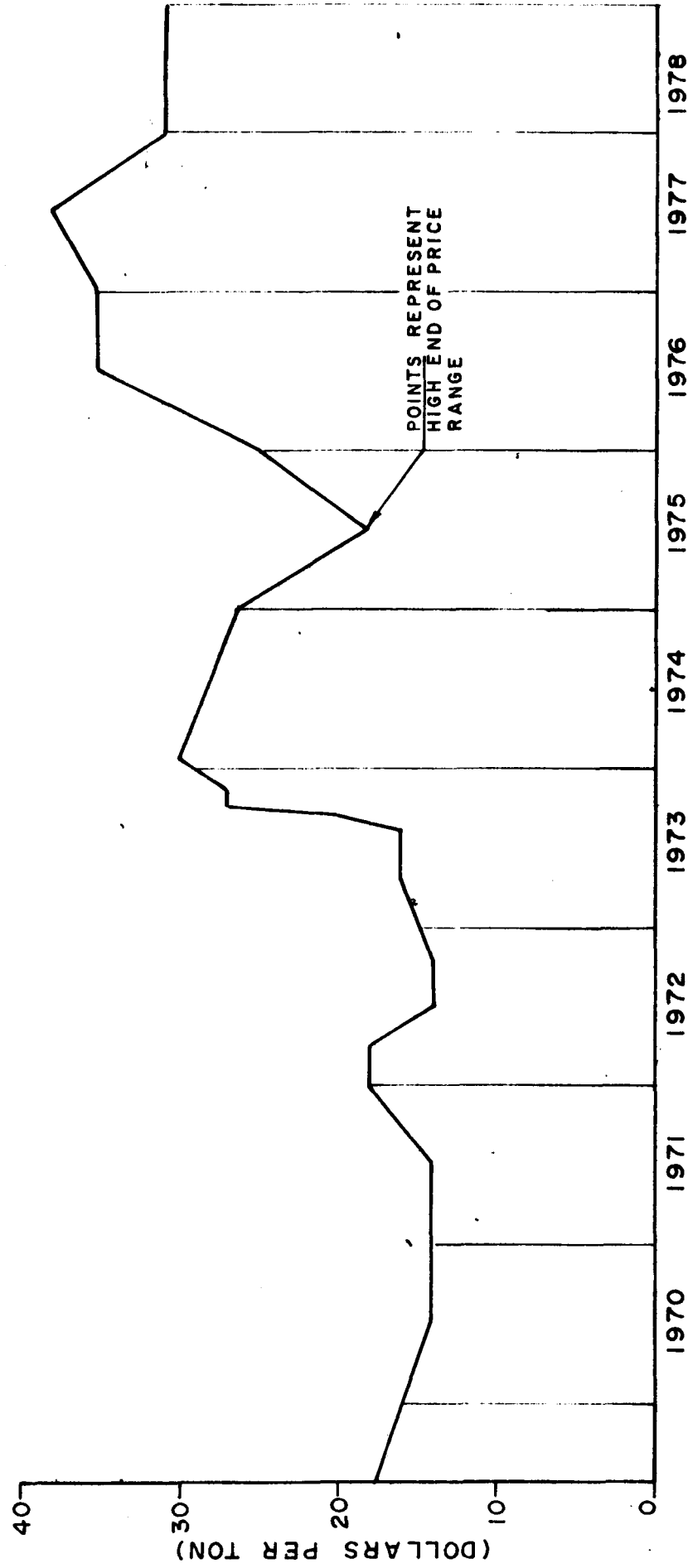


FIGURE VI - 5
M. DISKO ASSOCIATES
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MARKETS FOR FERROUS METALS

Much of the steel waste produced by industry is either reintroduced as a production material by the foundry or, in the case of a metal product manufacturer, is sold back to the steel mill.

Manufacturing of steel and iron products requires iron ore and ferrous scrap. Generally, ferrous scrap is classified into three groupings, "home scrap", "prompt scrap", and "obsolete scrap."

Home scrap is a by-product of the steel making process. It is recycled back into the production process at the steel mill.

Prompt scrap is the waste product of metal product production process. This scrap is either sold to a dealer or back to the steel mill for a relatively high price because it is of known composition and quality. Obsolete scrap is composed of products that have depreciated to the point of either not being wanted because of the availability of a newer or improved product, or because the product cannot perform the functions it was purchased to do. Obsolete scrap is the least desirable because it is of unknown quality and composition and is usually contaminated with non-metallic components.

The ferrous fraction available in municipal solid waste is considered obsolete scrap. The composition of the ferrous fraction is a mix of steel products with many types of contamination. Soft drink, food, and beer are usually coated with tin and can

have paper or other forms of labels, solder used in sealer seams, or have aluminum tops. White goods, such as refrigerators, dishwashers, clothesdryers, stoves, and the like, while composed for the most part of fabricated steel, have some contamination by enamels, plastics, glass and non-ferrous metals. Most of these contaminants can be removed manually. This is rarely done because of the high cost. The municipal solid waste stream can also be fed into a mechanical resource recovery unit where the products will normally be broken down to a size which will free the ferrous fraction from most of the other contaminants so the metal can be magnetically separated. The enamel is a special problem. The enamel coating, or frit as it is known, produces sulfur in the steel making process, a very undesirable element. Shredding usually removes all of the frit.

After mechanical processing there are still two major contaminants associated with the ferrous fraction, one is tin. Tin is an undesirable input to the steel making process because it creates brittleness and poor surface texture. In addition, tin causes deterioration of furnace refractories. Experience has found that if the tin content of steel is kept below 0.06 percent, problems do not occur. In 1968, the tin content of municipal solid waste was approximately 0.2 percent. More recent studies show that new technologies have enabled cans to be tin coated to a smaller gauge, thus reducing the tin content to about 0.15 percent. This reduction in tin content was brought about by the growing scarcity of tin in the world and higher prices.

In June 1975 tin was valued at \$3.42 per pound. By December 1978 the price has risen twofold, to \$6.73 per pound.

Detinning municipal ferrous scrap raises its value as a scrap input to the steel making process. Besides reuse for steel making, tin cans have two other major uses. They are a substantial source of tin in the United States. The large percentage of tin bearing steel scrap originates from can manufacturers. A very minor source is the input from recycling programs.

The largest use for salvaged cans is for precipitation iron in the refining of copper ore. For ores rich in oxides, a leaching process based on a copper-iron ion exchange process is used. Detinned cans serve as the source of iron. Ore is deposited on large piles of detinned cans and a 5 to 10 percent solution of sulfuric acid is percolated through the pile. The ore reacts with the sulfuric acid and copper sulfate is formed. When the copper sulfate reaches the detinned cans, ferrous sulfate is formed and copper precipitates on the cans. The precipitated copper is washed and sent to the smelting operation.

The other major contaminant is aluminum. The use of aluminum tops on steel beverage cans is another contaminant that must be separated before the steel can be recycled. Aluminum is also a detriment to the detinning industry as it lowers operating efficiencies. Hence, the market value of bimetal cans is lower than that of tin coated steel cans.

There are three types of steel furnaces utilizing ferrous scrap. Electric arc furnaces, which operate almost entirely on scrap, produced approximately 18.4% of all steel in 1973. Open hearth furnaces and basic oxygen furnaces use greater quantities of pig iron than do electric arc furnaces. Because of technical limitations, open hearth furnaces are limited to a maximum input of 70 to 80 percent scrap, and basic oxygen furnaces of 50 to 60 percent scrap. The percentage can be increased in basic oxygen furnaces if the scrap is preheated first. That would increase steel costs unless a corresponding drop in scrap prices made it economical.

Four industries in the New Jersey area, including the steel industry, the foundry industry, the ferro-alloy industry, and the export industry, create a demand for ferrous scrap.

The receptiveness to using ferrous scrap available in municipal solid waste by the steel industry has already been discussed. The use of ferrous scrap by the foundry industry is not optimistically viewed because of low-density bundles which result in great yield losses and impurities. The ferro-alloy industry appears willing to accept limited quantities of incinerated scrap. The export market for municipal scrap appears to be limited at the present time, but there seems to be high interest from industrialized countries like Japan.

At the present time, the major market for raw municipal ferrous scrap exists at detinning companies. Prices paid for ferrous scrap

vary with the demand for the material and the end use. M.R.I. Corp., of Elizabeth, N.J., a major detinner in the metropolitan area, pays 35 percent of the No. 1 bundle market price in Philadelphia. The experience of local recycling programs has been that they receive considerably less than this rate because of the small volume that municipal programs usually deal in, and the lower quality, more contaminated nature of the scrap delivered (i.e., bimetal cans, aluminum cans, obsolete scrap not coated with tin, paper labels). Fifteen to thirty dollars per gross ton has been the range of payment that local recyclers have been receiving. If inspection by company personnel indicate that bimetal cans are present, a lower price is paid.

There is another scrap metal dealer in the area who accepts scrap metal cans from municipalities in the Ocean County District. This dealer is:

Blewetts Scrap Metal, Farmingdale, N.J.

Currently, the ferrous metal market prices are low. Due to a number of complex market conditions, prices have been down for a long period of time. Ferrous prices are also cyclical, but the cycles are much longer than that of wastepaper.

MARKETS FOR NON-FERROUS METALS

Non-ferrous metals make up a small percentage of the solid waste stream, Typically, they account for only 0.6 to 1.0% of the total.

Metals usually considered for reclamation include aluminum, copper, and lead. Tin, although not recovered directly out of the waste stream, is recovered through detinning of tin bearing steel containers and prompt scrap. The economics show that even though the recovery of tin from the detinning process is a relatively small percentage, its value, \$13,460.00 per ton as of December 1978, as compared to the \$15. to \$30. per gross ton paid for can scrap, makes the recovery of tin well worth while.

The other non-ferrous metals are often mixed with other metallic substances as components to some kind of metal product. Expensive processing is required to segregate these materials. The prices paid for some of these non-ferrous components are high enough to justify added processing costs. Prices paid these metals as of December 1978 are as follows: \$380. per ton for scrap aluminum; \$1,060. per ton of scrap copper; and \$760. per ton of scrap lead. Table VI-4 gives a summary of the non-ferrous scrap metal prices over the past five years.

Approximately one-half of all the non-ferrous metal found in municipal solid waste is aluminum. The use of aluminum is now an accepted part of life. It's uses range from aluminum engines to storm windows and doors and siding, to all types of containers, foils and trays. It is estimated that there are 800,000 tons of aluminum yearly in the Nation's solid waste quantities, with only about 10 percent currently being recovered. Aluminum scrap is obtained from three sources: 1) internal production waste,

TABLE VI-4

PRICES PAID FOR NON-FERROUS METALS
IN THE METROPOLITAN AREA
(IN DOLLARS PER POUND)

<u>DATE</u>	<u>ALUMINUM INGOT</u>	<u>COPPER NO. 2</u>	<u>LEAD</u>	<u>TIN</u>
January 1974	\$0.29	\$0.67	\$0.18-0.19	\$2.95
June 1974	0.315	0.82	0.19-0.21	4.38
January 1975	0.39	0.37	0.24	3.36
June 1975	0.39	0.405	0.23-0.245	3.425
January 1976	0.41	0.40	0.19-0.20	3.02
June 1976	0.41	0.51	0.225-0.23	3.78
January 1977	0.48	0.46	0.255-0.26	4.15
June 1977	0.51	0.45	0.31	4.795
January 1978	0.53	0.445	0.31	5.55
June 1978	0.53	0.48	0.34	6.20
December 1978	0.53	0.535	0.27-0.39	6.73

SOURCE: Journal of Commerce

2) fabrication and conversion wastes, and 3) obsolete products. Approximately 80% of all recycled aluminum comes from internal production, fabrication and conversion scrap.

It is more economical to re-process aluminum scrap into new products than it is to produce new aluminum from raw materials. It takes 5% of the energy to remanufacture aluminum as opposed to manufacturing the product from raw materials. It takes 900 kilowatt hours of electricity to remanufacture a ton of product from old aluminum scrap while it takes 17,900 kilowatt hours of electricity to start from the utilization of raw materials to make new aluminum. This energy saving factor is a prime reason that scrap aluminum prices are relatively high.

The chief consumers of aluminum scrap are secondary smelters who convert scrap into secondary ingot; integrated producers who convert bauxite into fabricated aluminum products, and non-integrated producers who rely on scrap and primary and secondary aluminum ingot purchased on the open market.

The preceding table indicates that aluminum ingots sell for \$0.53 per pound. The typical price currently being paid to the local recycler is \$380. per ton or \$0.19 per pound. The difference goes to pay for the intermediate processing and handling needed to get the metal to a clean ingot form. Most of the major aluminum companies, Reynolds, Alcan and Kaiser, maintain outlets for the

purchase of scrap aluminum typically used by the residential consumer and deposited into the municipal solid waste stream. Reynolds was the first to buy obsolete aluminum scrap. In 1958 the company started collecting oil cans from service stations. Later, in 1969, the company started a successful aluminum can recovery system in Los Angeles. Individuals received \$.10 per pound when they brought their aluminum to the Reynolds Redemption Center. The other major companies followed suit. Mobile Recycling Vans are also utilized by the companies. These units make scheduled stops at convenient locations such as parking lots of shopping centers, municipal yards, and central drop off centers of larger recycling programs.

Most of the copper recovered from the municipal solid waste stream originates from the salvaging of white goods. Most of these items contain a certain amount of tubing and other copper components which are easily recognized and removed. A salvage price of \$1060.00 per ton makes manual recovery profitable.

Most of the lead that is reclaimed originates from the salvaging of battery plates and printers type. Because of the high density of lead, the \$760.00 per ton of scrap lead makes the reclamation effort well worth while.

In terms of the availability of non-ferrous materials in the municipal solid waste stream, aluminum is the only material which can be removed from the stream easily and in appreciable amounts.

MARKETS FOR GLASS

Glass is another component of the solid waste stream which recycling efforts oftentimes get involved with. It is easy to recognize, appears to be a large percentage of the refuse put on the street by the average person, and can have an impact on the litter problem.

There are three manufacturing segments of the glass industry:

1) containers (bottles and jars), 2) flat glass, and 3) pressed and blown glass. Container manufacturing contributes the greatest percentage of total production, about 75%. This amounted to about 11.3 million tons of glass containers in 1970. This represents an increase of 73% over the amount of glass containers produced in 1960.

Much of this production increase was due to the increased use of "one-way" disposable glass jars and bottles. The rate of growth has slowed somewhat in recent years because of many technological improvements in metal beverage containers, and the increasing use of plastic containers for 2 liter or quart sizes for beverages.

The raw materials needed for glass production are sand, soda ash, and limestone in addition to various percentages of cullet. Generally, glass manufacturers use internally generated cullet in their production process. Cullet is a desirable additive to the glass making process because it liquifies at lower temperatures, thus conserving fuel and production costs.

There are two basic types of cullet: "in-house" or internal cullet and "purchased" cullet. In-house cullet includes containers not meeting inspection tests, trimmings, and breakage. Glass plants rely heavily on the supply of in-house cullet because it is generally free of contamination and the raw material mix is known. The cullet is usually stored in an area on the plant site, so located as to be easily fed into the production process. Transportation costs are thus minimized. Occasionally glass companies make inter-plant cullet transfers to balance company cullet supplies. In the glass container manufacturing process, all internally generated cullet is consumed. When in-house cullet supplies are insufficient to meet production demands, the glass manufacturers use outside sources of supply.

Cullet recycled back to the glass plants from outside source is called purchased cullet. This generally included bottles and containers from municipal, contract, and local recycling groups, bottling companies and other large users of glass. The market is very good now in terms of sale of obsolete glass or glass cullet back to the manufacturer.

New Jersey, southern and northern, and the metropolitan area around northeastern New Jersey, has many glass container manufacturers who purchase glass from outside sources. The current trend seems to be an increase in demand for purchased cullet in this area. In 1974, the typical price paid for cullet was \$20 per ton. In 1976 the price was raised to \$30 per ton. At least one major glass manufacturer now is willing to pay \$40 per ton for cullet, if it meets up to specifications.

The ratio of cullet to virgin materials a glass manufacturer can use in the production of containers varies greatly. The current maximum is around 40-50% cullet to 50 to 60% virgin material. There are a few manufacturers who are able to increase the percentage to 75% cullet without affecting the quality of the product.

Adding cullet, besides reducing the energy usage and decreasing production costs, also has other advantages. It strengthens the glass product, and can help to reduce air emissions to within acceptable limits.

Two of the factors which retard the willingness of glass manufacturers to use more purchased cullet than they do at the present time are questionable quality of cullet supplies and cullet contamination. Contamination is usually present in the form of dirt or organic materials, metal rings and caps on containers, and other recyclables collected by the recycling operation but not properly segregated into the right containers by the participants of the program. There are three colors of glass most commonly found in the container industry: amber, clear and green. Blue is found very rarely. Some glass companies have very limited use for cullet that has been mixed in any of the three possible combinations. A number of glass companies, however, do accept and use cullet that has brown and green glass mixed. A certain amount of cullet mixed in this way will not adversely affect the production of the various colors of containers. Nevertheless,

the rule in glass recycling has been to color-sort all glass collected.

There is an electronic product now available on the market which can optically sort the glass by color in large volumes. The glass must be shattered into small pieces. Therefore, the separation technique has application only at a large scale resource recovery facility where glass along with the rest of the waste stream would be shredded and then separated into general components. The glass fraction can then be fed through the optical sorter to segregate the glass into the three colors.

There are a number of potential secondary uses that do not require strict color sorting and high cleanliness. For example, ground glass can be mixed with asphalt to produce "glassphalt" which could be used in road construction. It can also be used for producing glass insulation.

There is one market which source separation programs which recycle color sorted glass can take their materials that is close to the Ocean County District. This one is:

Brockway Glass Company, Freehold, N.J.

MARKETS FOR ENERGY DERIVED FROM SOLID WASTE

The recovery of energy from solid waste is not a new idea.

Atlanta, Georgia recovered waste heat for its incinerator as early as 1942. Miami, Florida started recovering heat in 1954, Chicago, Illinois, in 1963, Hempstead, Long Island, in 1964, and the U. S. Naval Station, Norfolk, Virginia, in 1966. Since that time, spiraling costs and increasing shortages of conventional fuels have made the recovery of energy from solid waste economically and environmentally attractive. There are many forms of energy which can be produced along with specialized processes to produce the fuel.

Steam recovery in waste heat boilers is the oldest technique. The modification of power plant boilers and industrial boilers to allow the burning of municipal solid waste components as a supplementary fuel in conjunction with coal, oil or gas, can be an effective method of solid waste disposal for a community and a low cost source of fuel.

The solid waste components to be used can be prepared in a number of ways. It can be inputted directly as is with minimum processing to remove those materials of no heat value and which can cause a number of maintenance problems. It can be processed and shredded so as to be a combustible organic fraction, Refuse Derived Fuel (RDF), as it is known in the industry. It can be further processed into a fine powder which can be spray injected the same way powdered coal is in coal fuel boilers or can be co-combusted in

oil or gas fired boilers with some modification to some spray nozzles.

Once the waste is combusted the heat produced can be put to work to produce steam in either a waterwall incinerator or a waste heat boiler. This steam can be sold for heating purposes or for powering industrial processes. The steam can be put through a heat pump and supply cooling for a number of clients. Or the steam can be put to work to drive steam generators to produce electricity.

The organic RDF is a relatively clean mixture of shredded paper, plastic, and wood products. These burnable materials have a per pound heat value about one-half that of coal. The heating value of the shredded, air-classified solid waste is about 5000 BTU per pound. The BTU value fluctuates with the moisture content of the refuse. If the light fraction is dried prior to shipment to the user, the fuel value would be more consistent and greatly enhanced. One company, Combustion Equipment Associates, reports that its Eco-Fuel II powdered RDF product has a heat value of over 8000 BTU's.

One negative aspect of RDF is that it produces significantly more ash than coal after combustion.

The organic fraction of solid waste can also be processed so as to produce a number of synthetic fuels. Most of these processing options involve pyrolysis. Pyrolysis is the physical

and chemical decomposition of organic matter brought about by the application of heat in the absence of oxygen or in a controlled oxygen environment. This destructive distillation produces three products, a gas, a tar or oil, and a char. The composition and relative quantities of these various streams depend primarily on the composition of the refuse input, pyrolysis temperature and pressure, and the length of time the refuse remains in the pyrolysis reactor. Heating values are generally more than half of that of a parallel gas or oil product currently being used in utility boilers.

The following table presents some relative energy values of various fuels being used in utility boilers as compared to a shredded RDF.

TABLE VI-5

COMPARISON OF HEATING VALUE OF VARIOUS FUELS

<u>FUEL</u>	<u>APPROX. HEAT VALUE</u>	<u>APPROX. COST PER UNIT*</u>	<u>APPROX. COST PER 100,000 BTU</u>
Shredded RDF	5,000 BTU/Pound	\$ 5.00/Ton	\$0.05
Coal	12,000 BTU/Pound	33.00/Ton	0.14
Oil (#6)	140,000 BTU/Gallon	0.46/Gallon	0.33
Natural Gas	100,000 BTU/Therm	0.33/Therm	0.33
	Interruptable Supply	0.27/Therm	0.27

*Cost values include allowance for ash handling for burning solid waste. Costs for coal, oil and gas are reported figures for industrial users. Natural gas and oil prices are courtesy of PSE&G Co., Newark, and coal prices are per unit train from Pennsylvania wholesaler, April 1979.

The use of solid waste as a supplemental fuel is becoming more widely accepted as the costs of conventional fuels continue to rise. Urbanized areas are finding the costs of hauling and disposing of increasing amounts of solid waste more exorbitant, the location of new landfills harder, and the depletion of space at local existing sites imminent. The use of the solid waste as a supplemental fuel is beneficial to the community in that a large volume of solid wastes are reclaimed. Landfill life is increased because only a small percentage of the original raw refuse is finally landfilled. In addition, the utility benefits in getting a stable supply of low-cost, low-sulfur fuel substitute.

MARKETING SECONDARY MATERIALS

The development of secure markets willing to accept recovered materials over a long period is essential to continued expansion of source separation and resource recovery projects. Just providing an ample dependable supply of secondary materials does not guarantee a market for the materials.

If widespread recovery of materials from solid waste and the subsequent development of markets to accept the material is to be successful, certain policies and use of recycled and virgin materials must be reviewed. Some of the policies are detailed below:

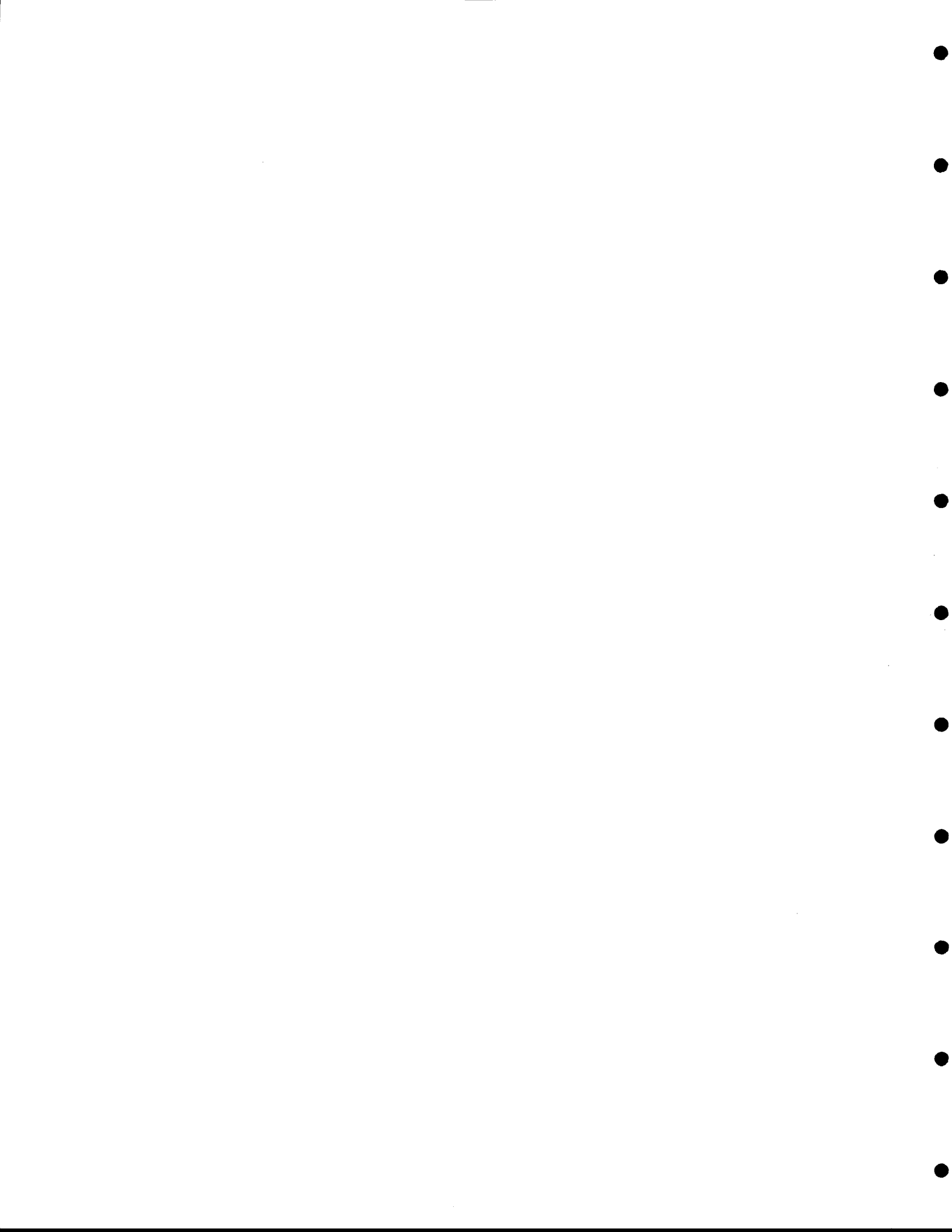
- . Discriminatory pricing practices which favor the transportation of virgin materials over the transportation of secondary materials must be changed to provide an incentive for use of recycled materials.

- . Depletion allowances, capital gains treatment, and foreign tax credits must be revised to include secondary materials.
- . Consumer conditioning by mass media advertising has taught the consumer that "newer is better." This has, in turn, decreased the demand for products with "used" or "salvaged" components. Consumers must be taught the value of recycled products.
- . The technology of processing the municipal solid waste stream must be improved so as to produce products which meet specifications of the individual markets.
- . New markets must be constantly searched for or created. As new uses are developed for solid waste, a greater demand for the materials should result.
- . Purchasing agents representing both government and industry generally purchase products only made from virgin materials. Pressure should be applied to induce the purchase of more products with secondary material content.
- . Products should be designed and produced which can be more readily recycled.

There are a number of obvious advantages that virgin materials hold over recycled materials.

- . Virgin materials usually occur in concentrations. Materials recovered from mixed municipal solid waste are less desirable from a re-use standpoint because of their intermixing with other waste materials.
- . Virgin materials are usually of known composition and quality. Materials from solid waste are contaminated with various oils, tars, dirt, etc.
- . The costs to acquire virgin materials (usually because of discriminatory tax and transportation policies) very often are the same as the costs to acquire secondary materials. When manufacturer has a choice between the two materials virgin raw materials usually is favored.

The acceptance of secondary materials as a substitute for virgin materials can be strengthened if some of the above-mentioned transportation, taxation and use practices are reviewed and altered.



VII. LEGAL, ADMINISTRATIVE AND FINANCIAL ASPECTS
OF SOLID WASTE MANAGEMENT IN THE OCEAN
COUNTY DISTRICT

The Solid Waste Management Act (Chapter 326, P.L. 1975) is the key piece of legislation behind the development and the implementation of the Ocean County District Solid Waste Management Plan. The Act has created a legal and administrative framework which can either stand by itself in the implementation of a district plan or can be used as supporting structure for a number of other pieces of State legislation which provide various legal, administrative, and financial powers to municipal and county governments. This chapter will not only present these tools, but will also detail some of the more important sections of current, State and Federal legislation related to solid waste management.

MUNICIPAL LEVEL

Before 1970, the responsibility of providing solid waste collections and disposal services was primarily with local municipal government. The municipality either provided the service itself, or contracted with a private contractor, or permitted each individual resident to hire a private collector. The larger more urban municipalities usually choose a private contractor who collects and disposes solid waste from almost all of the residences in the municipality or they operate their own municipally-funded collection and disposal system. The more rural communities are usually serviced by a number of small private collection

firms which provide collection services to individual residents.

Solid waste legislation on the municipal level goes as far back as 1948 when the "Incinerator Authorities Law of 1948" was passed. It enables one or more municipality to create an authority to construct and operate an incinerator facility to provide solid waste disposal services to municipalities within the Authority's district. The Authority is empowered to issue revenue bonds and to charge and collect fees from users of the incinerator facility. Land for the incinerator can be acquired by the Authority, by purchase, gift, or condemnation. This piece of legislation enabled a number of municipalities to develop a disposal strategy which none of them could feasibly do on its own.

In 1960, the State Legislature passed a comprehensive law dealing with municipal joint service contracts, entitled the "Consolidated Municipal Services Act." The law permits any two or more municipalities to enter into a joint contract to provide inter-municipal services such as solid waste collection , processing and disposal. The Joint Meeting, as it is called, has the authority to acquire real property by purchase, lease, grant or condemnation; to contract with other municipalities and/or persons not part of the Joint Meeting for the provision services; and to apportion the costs and expenses of the Joint Meeting among the contracting municipalities.

A third piece of legislation which permitted the inter-municipal provision of solid waste services, the "Solid Waste Management Authorities Law of 1968," very similar to the 1948 law, was basically created to allow the Quad Cities (Paterson, Clifton, Passaic and Wayne) to form an authority to develop a regional incinerator facility.

Inter-municipal agreements have not been very successful in the past. The main reason for the poor success has been siting problems for the facilities that have been planned. Table VII-1 lists selected New Jersey statutes concerning solid waste management on the municipal level.

COUNTY LEVEL

In an effort to aid municipalities solve their increasingly complex solid waste management problems, and to try to solve some of the siting problems, and to further the objectives of the State and Federal Governments to initiate and encourage regional solid waste disposal facilities, the State Legislature decided to pass the "County Solid Waste Disposal Financing Law" in 1970. The law was the first major piece of legislation that identified the county as a solid waste disposal region. The law permits any county to float general obligation bonds to finance the purchase, construction or improvement of solid waste disposal facilities and to enter into contracts with municipalities, incinerator authorities, joint meetings, and private solid waste disposal companies for the use

TABLE VII-1

NEW JERSEY STATUTES CONCERNING SOLID WASTE
MANAGEMENT AT THE MUNICIPAL LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTES</u>
N.J.S.A. 26:3-31	Enumeration of powers of local Boards of Health including regulation and control of the dumping of garbage.
N.J.S.A. 40:48-2.13	Act describes powers of municipality to enforce removal of garbage, trash, and debris from private lands for the preservation of public health, safety and welfare.
N.J.S.A. 40:48B-1 "Consolidated Municipal Services Act"	Any two or more municipalities, by ordinance, may enter into a joint contract, for a period not to exceed 40 years, to provide for the formation of a joint meeting for the provision of solid waste services. Powers of the Joint Meeting include: acquire real property by purchase, lease, grant, gift, or condemnation; to contract with other municipalities, not members of the Joint Meeting, or persons for provision of solid waste services; to acquire land in <u>any</u> municipality in the State except where governing body of such municipality, by resolution, finds that the operation or use of land would adversely affect its governmental operations. Costs and expenses of the joint operation are to be apportioned among the contracting municipalities. Each participating municipality may appoint a member to a management committee. The joint contract may be terminated upon the adoption of a resolution by the governing bodies of two-thirds of the participating municipalities.
N.J.S.A. 40:66-1	Municipalities permitted to provide for the collection and disposal of solid wastes and to operate and maintain incinerator facilities.

TABLE VII-1, CONTINUED

NEW JERSEY STATUTES CONCERNING SOLID WASTE
MANAGEMENT AT THE MUNICIPAL LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTES</u>
N.J.S.A. 40:66:-2	Municipalities permitted to construct incinerator facilities and to acquire property by purchase, gift, or condemnation.
N.J.S.A. 40:66-3	Municipality permitted to acquire by purchase, lease, or condemnation, unimproved lands, within or without the municipality, to be used for the disposal of solid wastes. No land can be acquired or used for such purposes located outside the municipality without the express consent of the governing body and the Board of Health of the municipality in which the land is located.
N.J.S.A. 40:66-4	Municipality may contract with any person for the collection and disposal of its solid wastes. Contracts exceeding \$2,500.00 must be by competitive bidding.
N.J.S.A. 40:66-5	Governing body of municipality may provide for solid waste services out of its general revenues or fix rates to be charged individual customers.
N.J.S.A. 40:66-6	Municipalities may, by resolution, grant to any person a franchise for the construction and operation, within its limits, of an incinerator facility for a period not to exceed 20 years.
N.J.S.A. 40:66-7	No municipality or individual is permitted to locate a solid waste facility in another municipality without first receiving the consent of the governing body in which the facility is located.

TABLE VII-1, CONTINUED

NEW JERSEY STATUTES CONCERNING SOLID WASTE

MANAGEMENT AT THE MUNICIPAL LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTES</u>
N.J.S.A. 40:66A-1 et.seq. "Incinerator Authorities Law of 1948"	Governing bodies of one or more municipalities may, by ordinance, create a solid waste incinerator authority. Powers are vested in the members of the authority who are appointed by the participating municipal governing bodies. Powers of authority include: acquire land for incinerator by purchase, gift, or condemnation, issue revenue bonds, use service charges and other revenues, charge and collect rates and fees, and enter into contracts for the collection, treatment and disposal of solid wastes. Every municipality within authority district must use the incinerator.
N.J.S.A. 40:66A-32 et. seq., "Solid Waste Manage- ment Authorities Law of 1968"	Governing bodies of one or more municipalities may, by resolution, create a solid waste management authority. Powers are vested in authority members who are appointed by the participating municipalities (one member from each municipality). Decisions of the authority are carried by majority vote, except in the following, which require the unanimous vote of <u>all</u> members: <ol style="list-style-type: none">1) selection and designation of sites2) decision to issue bonds3) fixing and determining rates and fees General powers of the authority include: issue revenue bonds, charge and collect rates and fees, acquire property <u>within</u> authority district by condemnation, enter into contracts for the collection and treatment of solid wastes, and grant host community payments in lieu of taxes. The services of the authority <u>will</u> be used by the owners and occupants of <u>all</u> lands, buildings and premises within the district and the State guarantees not to permit the

TABLE VII-1, CONTINUED

NEW JERSEY STATUTES CONCERNING SOLID WASTE

MANAGEMENT AT THE MUNICIPAL LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTES</u>
"Solid Waste Management Authorities Law of 1968"	operation of any competitive solid waste treatment facility within the authority's district.
N.J.S.A. 40:152 et.seq.	The governing body of any Township may, by ordinance, designate solid waste collection districts. Within each district, the Township committee may provide, either by itself or by contract, solid waste collection services, and may cause to be raised, within the limits of the special district, sufficient funds to pay for the service.
N.J.S.A. 49:63-43 et.seq.	Governing body of any municipality may enter into a contract with any person, firm, or corporation, public or private, for the collection of solid waste and the construction, maintenance, and operation of any solid waste treatment and disposal facilities. The length of the contract shall not be more than 20 years. After specifications are drawn, the municipality shall accept bids for the contract. The statute also permits two or more municipalities to enter into a joint contract for the provision of the service.
N.J.S.A. 49:90-1 et.seq.	The governing body of any borough may, by ordinance, create special solid waste districts. Within each designated district, the voters, each year, select a 5-member board of garbage commissioners and determine the amount of money to be raised for the ensuing year. This sum of money is assessed on all property within the district and collected as taxes. The commissioners are empowered to purchase, lease and convey real and personal property.

of its disposal facilities. The "Municipal Utilities Authority Law" was supplemental to permit County Utilities Authorities to collect, treat, and dispose of solid waste materials. The "County Improvement Authorities Law" was amended to permit County Improvement Authorities to acquire, construct, maintain and operate solid waste management systems.

By far the most important piece of solid waste legislation in recent years which places the weight of solid waste planning on the district (county) is the "New Jersey Solid Waste Management Act" (c. 326, Laws of 1975), which was signed into law on February 23, 1976 and became effective July 29, 1977. The Act requires each district to develop a district solid waste management plan.

According to the "Guidelines for the Development and Formulation of District Solid Waste Management Plans" published by the Solid Waste Administration of the New Jersey Department of Environmental Protection, "The district or joint district plan is required to insure that efficient and environmentally sound solid waste services, with maximum feasible resource recovery capabilities, are provided within the planning area. Each plan should reflect the combined and coordinated efforts of the State, district governments and agencies, municipalities, the solid waste industry, and interested organizations and citizens."

In order to fulfill the requirements of this plan and the Act, at least the following tasks must be completed:

- a. Meet the solid waste management needs of every municipality within the district,
- b. Be in force and effect for a period of ten years following adoption and must be reviewed and updated every two years,
- c. Designate a department, unit, or committee of the district to supervise the implementation of the solid waste management plan,
- d. Inventory the sources, composition and quantity of solid waste generated and projected to be generated within the district in each of the ten years following the year in which the plan is prepared,
- e. Inventory and appraise all existing solid waste facilities within the management district. In the event that a district is presently utilizing existing facilities located outside its boundaries and it anticipates the continued utilization of these facilities under its adopted plan, the district shall request that the host district, in which the facility is located, undertake the inventory and appraisal. Should the host district be a member of a different Group of districts, it shall use a portion of its first year grant to undertake this evaluation. The evaluation would be utilized by both districts in the development of their plans. If a district wishes to continue using a facility in another district, the exporting district must obtain the approval of the host district. The inventory and appraisal will include the identity, location, remaining capacity and life expectancy and environmental status,

- f. Identify every person engaged in the collection and disposal of solid waste within the district,
- g. Contain an analysis of existing collection and transportation systems with the goal of developing and implementing the most economic and energy efficient systems,
- h. Identify a solid waste processing and disposal strategy containing the maximum practicable use of resource recovery procedures, including high and low technology, and a plan for the environmental upkeep and suitable utilization of terminated landfill sites,
- i. Contain a site plan of all existing solid waste facilities located within the district that are operated and maintained in accordance with all applicable health and environmental standards and any additional sites and facilities that together will provide sufficient and environmentally sound resource recovery and disposal capacity to handle existing and projected solid waste generation,
- j. Contain a survey of proposed collection districts and transportation routes, with projected transportation costs from collection districts to existing or available suitable sites for solid waste facilities,
- k. Contain the procedures for coordinating all activities related to the collection and disposal of solid waste by every person engaging in such process within the solid waste management district. These must include procedures for entered into agreements, as provided in Chapter 326, between the solid waste

districts and persons engaged in collection and disposal, and the procedures for furnishing the solid waste facilities contained in the solid waste management plan, and

1. Contain the method or methods of financing solid waste management in the solid waste management district pursuant to the solid waste management plan.

The Act was again amended on January 10, 1978 to require that the solid waste management plan include an investigation of the sludge and septic waste management problem and detail the disposal options to be used once ocean disposal of sludges becomes illegal after December 31, 1981.

In order to provide an opportunity for municipalities, representatives of the solid waste industry, environmentalists, or other parties to input their ideas and concerns into the formulation of the district solid waste management plan, the Act required the organization of a solid waste advisory council in each district. The council includes municipal mayor or their designees, persons engaged in the collection and/or disposal of solid waste, and environmentalists. In preparation of the plan the district is required to consult and coordinate its activities with regional, county and municipal agencies concerned with environmental planning, water pollution control, transportation planning, water policy, water supply, zoning or land use within the district. Also, the district should consult with persons engaged in solid

waste collection and disposal within the district. Finally, the district should review all proposed or existing solid waste collection and disposal plans in any area of the district to determine the suitability of including same in the district solid waste management plan if it fulfills the purpose of the plan. Table VII-2 lists selected statutes which affect solid waste management at the county level.

STATE LEVEL

Before April, 1970, the New Jersey Department of Health (DOH) was responsible for regulating the health and environmental aspects of solid waste management. In a major reorganization of the executive branch of state government in April, 1970, the Department of Environmental Protection (DEP) was created. The solid waste functions, formerly under the jurisdiction of D.O.H., were assumed by the Bureau of Solid Waste Management, now the Solid Waste Administration, within the D.E.P.

The Solid Waste Management Act of 1970, with amendments which became effective on July 29, 1977, granted broad powers to the D.E.P. relating to the management of solid waste collection, processing, and disposal. More specifically, the following are its functions:

- a. Provides for environmental protection through the regulation and supervision of all solid waste collection and disposal facilities and operations.

TABLE VII-2

NEW JERSEY STATUTES CONCERNING SOLID WASTE
MANAGEMENT AT THE COUNTY LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTE</u>
N.J.S.A. 26:11-10	Enumeration of general power and duties of County Board of Health, including regulation and control over garbage and dumping of garbage.
N.J.S.A. 40:14B-70 Amendment to the Municipal Utilities Authorities Law	<p>In any county where the Board of Chosen Freeholders have established a municipal utilities authority, the Board, by resolution, may authorize the Authority to collect, treat, and dispose of solid waste in accordance with the "County Solid Waste Disposal Financing Law".</p> <p>The powers of the County Municipal Utilities Authority are vested in five Authority members appointed for five-year terms by the Board of Chosen Freeholders. The Authority is empowered to: Acquire, construct and operate solid waste processing and disposal facilities; issue revenue bonds; levy service charges; make and enforce rules and regulations concerning the operation of the facility; and acquire property by gift, grant, purchase, or condemnation.</p>
N.J.S.A. 40:37A-45 Amendment to County Improvement Authorities Law	Act amends and supplements the "County Improvement Authorities Law" (P.L. 1960, C. 183) to permit County Improvement Authorities to acquire, construct, maintain and operate solid waste systems for the purpose of collecting and disposing solid waste materials. The Improvement Authority may contract with municipalities for the use of its facilities.

TABLE VII-2, CONTINUED

NEW JERSEY STATUTES CONCERNING SOLID WASTE
MANAGEMENT AT THE COUNTY LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTE</u>
N.J.S.A. 40:37C-1 et.seq. New Jersey Industrial Pollution Control Financing Law	<p>Any county may create an Authority for the purpose of acquiring, constructing, improving, operating, etc., of industrial pollution control facilities within such county, subject to approval of such facilities by the Department of Environmental Protection.</p> <p>The Industrial Pollution Control Financing Authority shall consist of five members appointed by resolution by the Board of Chosen Freeholders of the county. Authority members shall serve for five years.</p> <p>The Authority is empowered to acquire and operate pollution control facilities, and to lease, contract, sell, purchase, such facilities. The Authority is empowered to issue revenue bonds to finance the industrial pollution control facilities. Industrial firms may contract with the Authority in order to obtain funds for pollution control projects at favorable interest rates.</p>
N.J.S.A. 40:66A-31.1 et.seq. "County Solid Waste Disposal Financing Law"	<p>Permits any county to purchase, construct, improve, or enlarge solid waste disposal facilities within said county either alone or jointly with any municipality, joint meeting or incinerator authority within the county.</p> <p>The county may provide and furnish its services to any municipality within the county.</p> <p>Counties are permitted to float general obligation bonds to finance any solid waste facility and to fix and collect rates and fees for services provided.</p>

TABLE VII-2, CONTINUED

NEW JERSEY STATUTES CONCERNING SOLID WASTE
MANAGEMENT AT THE COUNTY LEVEL

<u>TITLE</u>	<u>DESCRIPTION OF STATUTE</u>
"County Solid Waste Disposal Financing Law", Continued	<p>Counties may acquire by gift, grant, purchase, or by exercise of the right of eminent domain, any land within the county. Land owned by any governmental unit cannot be acquired without its express consent.</p> <p>Counties may enter into contracts with any government, corporation, or individual for the furnishing of disposal facilities, either by or to the county.</p> <p>The resolution of the Board of Chosen Freeholders to exercise the powers delegated to it in this statute must be submitted to the Commissioner of the N.J.D.E.P. The county is required to make any studies, borings, plans, drawings, etc., which the commissioner deems necessary. No county can proceed to exercise the powers of this statute without the Commissioner's approval.</p> <p>Counties may enter into contracts with municipalities, within or adjoining the county, joint meetings, incinerator authorities, and, on uniform terms, with all private solid waste collection and disposal companies for the use of its disposal facilities.</p> <p>Counties can assume entire cost either entirely by itself or share the costs with other participating governing bodies.</p>

- b. Registers all persons engaged in collection or disposal of solid waste.
- c. Develops a statewide plan and provides guidance for district plans.
- d. Reviews, approves, modifies or rejects district plans.
- e. Provides financial support or undertakes research projects in solid waste collection, disposal, limitation, or utilization.
- f. Provides funds for the preparation of district solid waste management plans.
- g. Arbitrates disputes between solid waste districts in development and implementation of management plans.

The Solid Waste Management Act also created a State Solid Waste Advisory Council. The Council basically has study and review responsibilities on matters relating to solid waste management. This includes the review of district solid waste management plans.

Another piece of legislation enacted in 1970 which has a significant role in solid waste management is the "Solid Waste Utility Control Act of 1970." The New Jersey Public Utilities Commission, which is now known as the Board of Public Utilities, was formed and received the following powers to regulate the economic aspects of solid waste management.

- a. The establishment of qualifications necessary to obtain a Certificate of Public Convenience and Necessity based on experience training, or education for all individuals engaged in solid waste activities.

- b. The issuance of Certificates of Public Convenience and Necessity to those individuals found to be qualified to engage in solid waste activities.
- c. The designation of specific franchise areas for collection and disposal.
- d. The regulation of rates and, upon a finding of excessive and unreasonable rates, authority to require that appropriate adjustments be made in rate structures.
- e. The authority has the power to revoke the Certificate of Public Convenience and Necessity for violations of BPU regulations or orders and violations of any rules and regulations relating to the protection of the environment.

A number of other state departments also have minor roles in solid waste management. The Division of Local Government Services of the Department of Community Affairs approves with the D.E.P., long-term contracts between local governments and other parties for the recycling of solid waste. The Department of Agriculture is permitted to license and regulate garbage-feeding hog farms and to conduct periodic inspections and examinations of the garbage feeding operation. The Department of Health enforces the Solid Waste Code of New Jersey and the requirements of the Solid Waste Management Act. The Department of Law and Public Safety assists in prosecuting violators of State statutes and rules and regulations concerning solid waste management.

On July 11, 1977 the necessary legislation was passed to form a

new state department, The Department of Energy. Through this legislation the Department of Public Utilities was abolished, and in its place a Board of Public Utilities was formed and put in the D.O.E. without changing its authority and independent of any supervision or control by the D.O.E. except as noted in the legislation.

In March of 1978 the department released a preliminary policy statement on "Solid Waste: Its Energy Conservation and Production Potential" as a working paper to be discussed and as a result of which a section of the State Energy Master Plan will be developed as required by the legislation.

Because of the energy potential of solid waste through energy recovery systems, combination resource recovery-energy recovery systems, and net energy conservation made possible through increased recycling, the D.O.E. has presented the following as its potential roles in the area of solid waste management in the State. The quote was taken from the preliminary policy statement. The appropriate sections of the "Department of Energy Act" are referenced as necessary. The sections do not refer to solid waste management specifically, but the D.O.E. has chosen to interpret the legislation broadly enough so as to include solid waste as one of its areas of authority.

"The DOE has the authority and responsibility to actively participate in the development and planning of resource recovery programs in New Jersey through the general powers "to coordinate authority, regulation and planning by the

State in energy related matters," granted to the DOE by the Department of Energy Act.¹ The DOE is responsible for maximizing the energy production and conservation potential of commercial and demonstration resource recovery programs by virtue of the Act's directive to "design, implement and enforce a program for the conservation of energy in commercial, industrial and residential facilities."² The DOE is also responsible for resource recovery research projects and resource recovery educational programs that increase efficiency of energy use and promote energy conservation.^{3,4}

In addition, since solid waste-based energy conservation and production systems can be considered energy facilities, the DOE has coextensive jurisdiction with other state agencies to approve permits in the siting of such facilities.⁵ The DOE is also directed to intervene in regulatory proceedings before other state agencies to ensure consideration of the Energy Master Plan and DOE regulations and rules.⁶ Furthermore, the Division has the authority to evaluate policies governing the establishment of rates and prices for energy and energy related matters, can make recommendations to the Board of Public Utilities, and can intervene before the BPU if necessary to ensure that changes will allow citizens, utilities and industry to move towards greater resource recovery from solid wastes.⁷ To advance these and related activities, the DOE has the authority to construct and operate experimental or demonstration solid waste facilities."⁸

Table VII-3 lists some of the New Jersey Statutes defining state powers and regulations in the field of solid waste management. The Solid Waste Management Act, the Solid Waste Utility Control Act of 1970, and the Department of Energy Act will not be described in the table as detailed coverage of the relevant parts of these pieces of legislation were presented previously in the text.

- 1N.J.S.A. 52:27F-2
- 2N.J.S.A. 52:27F-9g
- 3N.J.S.A. 52:27F-9h
- 4N.J.S.A. 52:27F-9j
- 5N.J.S.A. 52:27F-13c
- 6N.J.S.A. 52:27F-13a
- 7N.J.S.A. 52:27F-9
- 8N.J.S.A. 52:27F-9n

TABLE VII-3

SELECTED NEW JERSEY STATUTES CONCERNING
STATE POWERS AND REGULATIONS IN SOLID
WASTE MANAGEMENT

<u>TITLE</u>	<u>DESCRIPTION OF STATUTE</u>
N.J.S.A. 2A:170-33	Any person who unlawfully dumps refuse, garbage or debris, etc., on private property is a disorderly person.
N.J.S.A. 2A:170-67.1	Any person who unlawfully dumps refuse, paper, trash, garbage, etc., on a highway or public lands is a disorderly person.
N.J.S.A. 4:5-106.1	New Jersey Department of Agriculture empowered to license and regulate garbage-feeding hog farms and to conduct periodic inspections and examinations. Regulations include the satisfactory treatment of garbage before feeding farms or the importation of garbage for that purpose.
N.J.S.A. 13:9-23	Any person who permits or establishes any dump or area for disposal of rubbish, debris, or waste of any nature, which facilitates the origin or spread of forest fires shall be deemed to have created a fire hazard and a public nuisance.
N.J.S.A. Title 26	New Jersey Department of Health empowered to protect the health and welfare of the public and to establish a State Sanitary Code to achieve this end. With the creation of the Department of Environmental Protection in April 1970, most of the solid waste regulation and control functions were transferred from the Department of Health to the DEP

TABLE VII-3, CONTINUED

SELECTED NEW JERSEY STATUTES CONCERNING
STATE POWERS AND REGULATIONS IN SOLID
WASTE MANAGEMENT

<u>TITLE</u>	<u>DESCRIPTION OF STATUTE</u>
N.J.S.A. 27:5E et.seq.	Act describes State powers in regulation of junkyards adjacent to primary highways.
N.J.S.A. 48:13A-1 et.seq. "Solid Waste Utility Control Act of 1970"	Refer to text.
N.J.S.A. 52:27F-1 et.seq. "Department of Energy Act"	Refer to text discussions of legislation both on the county level and on the state level.
N.J.S.A. 13:1E-1 et.al. "Solid Waste Management Act"	Refer to text discussions of legislation both on the county level and on the state level.

FEDERAL LEVEL

At the Federal level, the most important piece of legislation which defines the national policies with regard to solid waste management and the framework in which to implement them is the "Resource Conservation and Recovery Act of 1976" (P.L. 94-580). The Act was approved on October 21, 1976.

The objectives of the Act are "to promote the protection of health and the environment and to conserve valuable material and energy resources by:

- (1) providing technical and financial assistance to State and local governments and interstate agencies for the development of solid waste management plans (including resource recovery and resource conservation systems) which will promote improved solid waste management techniques (including more effective organizational arrangements), new and improved methods of collection, separation, and recovery of solid waste, and the environmentally safe disposal of nonrecoverable residues;
- (2) providing training grants in occupations involving the design, operation, and maintenance of solid waste disposal systems;
- (3) prohibiting future open dumping on the land and requiring the conversion of existing open dumps to facilities which do not pose a danger to the environment or to health;
- (4) regulating the treatment, storage, transportation, and disposal of hazardous wastes which have adverse effects on health and the environment;
- (5) providing for the promulgation of guidelines for solid waste collection, transport, separation, recovery, and disposal practices and systems;
- (6) promoting a national research and development program for improved solid waste management and resource conservation techniques, more effective organizational arrangements, and new and improved methods of collection, separation, and recovery, and recycling of solid wastes and environmentally safe disposal of nonrecoverable residues;

- (7) promoting the demonstration, construction, and application of solid waste management, resource recovery, and resource conservation systems which preserve and enhance the quality of air, water, and land resources; and
- (8) establishing a cooperative effort among the Federal, State, and local governments and private enterprise in order to recover valuable materials and energy from solid waste."⁹

The most relevant subtitle of this Act to the present discussion is "Subtitle D - State or Regional Solid Waste Plans." The objectives of the subtitle are to assist in developing environmentally sound disposal methods and maximizing resource and energy conservation and recovery. These objectives will be accomplished through Federal technical and financial assistance to State or regional authorities for comprehensive planning.

In order for the State to be eligible for federal financial assistance for planning, the State must submit an approved plan. To be approved, the State plan must include the following as a Minimum:

- "(1) The plan shall identify (in accordance with section 4006(b)) (A) the responsibilities of State, local, and regional authorities in the implementation of the State plan, (B) the distribution of Federal funds to the authorities responsible for development and implementation of the State plan, and (C) the means for coordinating regional planning and implementation under the State Plan.
- (2) The plan shall, in accordance with section 4005(c), prohibit the establishment of new open dumps within the State, and contain requirements that all solid waste originating in other States, but not including hazardous waste shall be (A) utilized for resource

⁹42 USC 6902 (Sec. 1003)

recovery or (B) disposed of in sanitary landfills (within the meaning of section 4004(a)) or otherwise disposed of in an environmentally sound manner.

- (3) The plan shall provide for the closing or upgrading of all existing open dumps within the State pursuant to the requirements of section 4005.
- (4) The plan shall provide for the establishment of such State regulatory powers as may be necessary to implement the plan.
- (5) The plan shall provide that no local government within the State shall be prohibited under State or local law from entering into long-term contracts for the supply of solid waste to resource recovery facilities.
- (6) The plan shall provide for such resource conservation or recovery and for the disposal of solid waste in sanitary landfills or any combination of practices so as may be necessary to use or dispose of such waste in a manner that is environmentally sound."¹⁰

Section 4005 requires that an inventory of all open dumps in the country be made within one year after the criteria that a facility must meet to be recognized as a sanitary landfill are promulgated. A facility which does not meet those criteria will have five years to comply. If reasonable progress is made the facility may possibly be given additional time.

CRITERIA FOR ADMINISTARTING FACILITIES NECESSARY FOR THE IMPLEMENTATION OF DISTRICT SOLID WASTE MANAGEMENT PLANS

This discussion of criteria for evaluation of district solid waste management administrative systems assumes that the technical solutions developed will be engineered to meet all existing and anticipated health and environmental standards and regulations.

¹⁰42 USC 6943 (Sec. 4003)

The discussion is, therefore, concerned with the ability of the administrative structure, to plan, develop, finance, and operate these technical solutions within acceptable political and legal bounds. The following criteria should be considered in evaluating district administrative systems for solid waste disposal:

A. Financial Capabilities. While there are differences between the various technical alternatives for solid waste management in terms of capital, operation and maintenance, and replacement costs, the administrative structure must have the resources to meet these costs. Construction, operation, maintenance, and replacement costs for solid waste processing and disposal facilities do not, at present, qualify for Federal or State funding. According to EPA officials, the Federal Solid Waste Management Program does not anticipate the sort of federal funding such as is available in the water quality area, where combined federal and state grants may account for as much as 90 percent of the costs of constructing sewers, interceptors and sewage treatment facilities. Thus, the costs of implementing regional solid waste management systems will fall most heavily on districts, municipalities and/or authorities.

There are several alternative methods of financing the purchase or construction of solid waste facilities. All methods are not necessarily allowed under the law in each type of administrative structure. Table VII-4 lists these financing methods.

First, an administrative structure may decide to pay for such facilities out of current revenues, including revenue sharing,

TABLE VII-4

SUMMARY OF ALTERNATIVE FINANCING METHODS FOR
CAPITAL CONSTRUCTION OF SOLID WASTE SYSTEMS IN OCEAN COUNTY

<u>TYPE OF FINANCING METHOD</u>	<u>DESCRIPTION</u>	<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Appropriations from Tax Base	District would fund projects by yearly appropriations funded by taxes	Least expensive method of financing capital improvements. No bond or lease interest charges	Results in tax rate in- creases. Large capital expenditures must be accumulated because of the Caps Law.
General Obligation Bonds	Issued by the District and secured by taxing authority	Generally have a low interest rate. Com- monly used for long- term projects with large capital require- ments	Total bonded indebtedness is limited, based on tax base
Lease	Private investor builds facility and leases it to County. County repays initial costs plus interest	Lease purchase arrange- ments can be worked out. Lease offers flexibility in turnkey construction, start-up, and management of solid waste facility	Lease arrangement generally has highest interest cost, compared to bonds
Revenue Bonds	Bonds issued by authority. Revenue bonds are secured by the revenue source, and not by tax base	Revenue bonds do not count as part of County's statutory bonded indebtedness. Users of facility pay for costs	Interest rate is higher than rate for General Obligation Bonds

TABLE VII-4, Cont'd.

SUMMARY OF ALTERNATIVE FINANCING METHODS FOR
CAPITAL CONSTRUCTION OF SOLID WASTE SYSTEMS IN OCEAN COUNTY

<u>TYPE OF FINANCING METHOD</u>	<u>DESCRIPTION</u>	<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Revenue Sharing Funds	Use of Federal revenue sharing funds for capital requirements	No interest charges for bonds or lease. Large capital sums may be available. No tax rate increase	Limited to magnitude of available county revenue sharing funds. Revenue sharing funds may be already committed for other purposes

thus avoiding incurring any debt and any additional interest or debt service expenditures. An advantage of the "pay-as-you-go" plan is that, by holding down debt obligations, credit is conserved for other future needs. The disadvantages of financing solid waste facilities, out of current revenues, are: 1) the community may be deprived of essential solid waste services needed immediately, while sufficient capital is accumulated to pay for the facilities, 2) current taxpayers pay for solid waste facilities which benefit future users, thus, costs are not always equally distributed, and 3) savings on interest and debt service costs may be lost while waiting to accumulate sufficient funds to pay for the facility because of the inflation of construction and equipment costs which have been increasing at the rate of over 12 per cent per year.

A second financing alternative is to provide for the issuance of general obligation bonds to finance the purchase or construction of solid waste facilities. General obligation bonds place the so-called "full faith and credit" of the district behind the promise to repay the debt. The bond holders are assured that the county has the power to level ad valorem taxes without limit until the entire debt is repaid. Thus, general obligation bonds appeal to investors because of their relative security and because the interest received is exempt from the Federal income tax. The Freeholder Board may also pledge all or any part of the revenues derived by the district from the operation of the solid waste facility to repay the debt service. However, since all

direct debt of local governments must be issued as a general obligation bond , a county is prohibited from issuing revenue bonds which are secured entirely by the fees, charges, and other earnings of the project. However, the Dedicated Utility Funding Method appears to offer some flexibility in this regard.

Another financing alternative is a lease agreement where the leasing company purchases and holds title to the equipment during the term of the lease. The lessee pays rentals for the use of the equipment over a specified period. In solid waste management, lease agreements are usually arranged by local equipment representatives who place the financing with either a bank or leasing company. The use of leasing for financing solid waste equipment has been limited because of the higher interest rates compared to general obligation bonds or revenue bonds.

Authorities are permitted to float revenue bonds to finance the construction or acquisition of solid waste treatment and disposal facilities. Revenue bonds are obligations to finance self-supporting facilities. The bonds are secured solely by the fees, charges, and other earnings of the solid waste facility. Should these earnings prove inadequate to meet debt expenses, the sole remedy for the bond holders is a readjustment in the fees and other user charges to cover debt obligations.

There are two important advantages to revenue bonds: 1) revenue bonds are based on the concept that only the users of the solid waste facilities financed by the bond pay for the facilities

through user charges imposed by the authority, and 2) revenue bonds are not subject to statutory debt limits since they are not considered to be a county debt. The major disadvantages to revenue bond financing is that debt service charges are usually higher than those for general obligation bonds since the latter are deemed more secure because they are backed by the full faith and credit of the governmental unit selling the bonds.

Another financing alternative is to contract with a private firm to raise the capital, purchase the equipment, and operate a solid waste disposal system. This approach relieves the district of devoting capital funds for solid waste treatment and the commitment exists only for the length of the signed contractual agreement. It should be noted, however, that in order for the private firm to recover its capital investment, a relatively long-term contract may be required. Since the private firm must make a profit on its efforts and pays higher interest rates for its operating and capital monies, the cost of such financing is much higher than other alternative methods.

B. Regionalism. In general, the larger the population serviced, the lower are the unit costs of operating a regional solid waste disposal facility. This is due to a number of factors, including lower administrative costs, relatively lower maintenance costs, lower unit costs for capital construction, etc.

The administrative structure selected should service a population sufficient to reduce the unit costs of solid waste processing or disposal, and to plan, develop, and operate facilities on a district-wide or regional basis.

C. Ability to Acquire Land. The third criteria, and in many ways the most crucial factor, is the ability of the management structure to acquire and utilize land for the solid waste facility. Under existing State law (N.J.S.A. 20:1-1, et. seq.), State, county, and municipal governments, if unable to acquire land by agreement with the owner (s), may acquire land for valid purposes by petitioning the Supreme Court to appoint a three-member Commission to fix a reasonable compensation to be paid to the owner(s) for the land. Commissioners must be residents of the county in which the land is located and their report and recommendations are to be filed with the Court. The Court then determines whether the government can exercise its power of eminent domain.

Generally, local opposition to a proposed site prevents most solid waste facilities in New Jersey from being implemented. The local residents usually agree with the overall concept of regional development, however, in most cases they generally want the facility to be located elsewhere than in their municipality.

Acreage requirements will vary based upon the technical alternatives considered and other factors, including generation rates,

projected or anticipated useful life of the facility, etc. In general terms, for the Ocean County District a regional landfill would require 150 to 300 acres or more; a resource recovery processing facility about 10 acres; a transfer station about 5 acres. These figures would have to be modified, of course, based on site conditions, required buffering, anticipated waste quantities, etc.

In summary, the ability of the administrative structure to acquire property for a solid waste facility from a legal standpoint is not difficult. However, a major problem which must be overcome is the negative attitudes the general public has toward solid waste facilities, and, in particular, any proposal to locate the facility in their community.

D. Ability to Control Wastes Entering System. The solid waste disposal system selected and its design capacity will establish limits to the amounts and types of wastes that can be satisfactorily accepted. Therefore, in order to plan and effectively utilize the solid waste facility, the administrative structure should have control over the sources, types, and quantities of solid wastes that are discharged into the processing and disposal system.

A major problem which might arise in this area comes from another statute, the "Solid Waste Utility Control Act of 1970" (N.J.S.A. 13:1E-1 et. seq.), which empowers the Board of Public Utilities

(Public Utilities Commission) to regulate the rates and public utility aspects of the solid waste collection and disposal industry. The BPU has interpreted this mandate very broadly to include not only private solid waste collection and disposal operators, but public (municipal and county) operations as well. This interpretation was upheld in a New Jersey Superior Court decision rendered on December 2, 1971 (117 N.J. Super. 304). The Court "...held that, where county-owned solid waste disposal facilities serviced not only municipalities within boundaries of (the) county, but private scavengers (contractors) and private residents, the operation of the facilities by the county, including rates charged for the use of the services, were subject to the regulation by the Board of Public Utility Commissioners; the county, operating and managing its landfill sited, was (a) 'public utility', subject to the rate regulatory powers of the Board".

The decision further stated that "... the fact that a county-owned landfill site is used should not deprive the public of the protection provided by the Board's (BPU) regulatory powers. To hold otherwise would undermine the Board's ability to fulfill its duty as charged by the Legislature of 'setting forth and enforcing standards and rates for regulating (the) economic aspects of solid waste collection, disposal and utilization service'...".

The B.P.U. has taken the position that, once a publicly-operated solid waste facility is opened to private solid waste contractors and private citizens for their use at a specified rate or fee,

then the facility is considered a public utility which can be utilized by any private contractor or citizen in the State. The implication of this position is that the operator of the facility, once it is opened to a number of private contractors or private citizens, has no control over the amount, type and source of wastes entering the solid waste facility because any private contractor or private citizen may utilize the facility whenever he wishes. Thus, certain design capacities (projected useful life of the facility, capacity of the system to accept and effectively process wastes, etc.) may be reached or even surpassed by the uncontrolled and unlimited use of the facility. This could result in the overtaking of equipment and the accumulation of untreated wastes resulting in breakdowns and environmental and health problems.

A way to avoid this problem is to have the administrative structure limit the use of the solid waste facility to only those wastes that are generated within the district. In other words, the facility's use would be limited to the district's municipalities, private contractors contracted either by residents of the district, or by other public agencies (municipalities, the county joint meetings, authorities, school boards, etc.), or by district residents themselves. Rates charged by the district for use of the facility would still be subject to B.P.U for restriction of use permit. Such a permit would, in all likelihood, be granted if the district could show that the unlimited (or uncontrolled) use of the facility would exceed design capacities

and that the district in limiting the use of the facility, used reasonable and justifiable criteria for determining who would and who would not be permitted to use the facility.

E. Management Capabilities. The administrative structure should have the in-house or consultant resources to consider and incorporate into the existing system new technology that would affect the processing of solid waste. Similarly, the administrative structure must have the capability of evaluating the existing system and continually upgrading the operation to insure that health and environmental standards are being met.

The difference between a good operation and a poor one in many cases is related to the quality of the personnel that are directly involved in the day-to-day operations of the facility. In order to attract and keep qualified personnel, the administrative structure should provide adequate salaries and fringe benefits. Also, the manager or supervisor of the facility and other key personnel should have experience and educational background commensurate with their responsibilities.

ALTERNATIVE SOLID WASTE ADMINISTRATIVE STRUCTURES FOR OCEAN COUNTY

Table VII-5 lists a number of important concepts relating to the current legislative basis of available administrative structures. At present, there are four major State Statutes which regulate and permit county-wide administrative structure for solid waste management: 1) County Solid Waste Disposal Financing Law, 2) County Municipal Utilities Authority Law, 3) County Improvement Authorities Law, amended, and 4) The Industrial Pollution Control Financing Law. On a multi-municipal basis there are three major State Statutes concerning solid waste management: 1) Incinerator Authorities Law of 1948, 2) Solid Waste Management Authorities Law of 1968, and 3) The Consolidated Municipal Services Act. Table VII-6 presents some of the operational aspects of all seven alternative regional administrative systems.

TABLE VII-5

ALTERNATIVE REGIONAL ADMINISTRATIVE SYSTEMS FOR SOLID
WASTE DISPOSAL FACILITIES IN THE OCEAN COUNTY DISTRICT

<u>LEGISLATIVE BASIS</u>	<u>TYPE OF REGIONAL SOLID WASTE SYSTEMS PERMITTED</u>	<u>ADMINISTRATIVE DIRECTION OF SYSTEM</u>	<u>TYPE OF FINANCING PERMITTED</u>
County Solid Waste Disposal Financing Law	County Department, Contract with one or more municipi- palities, Contract with private company	Board of Chosen Freeholders	General Obligation Bonds, Yearly Appropriations, Revenue Sharing, Lease, Grants
County Municipal Utilities Authority Law	County Utilities Authority established by Freeholders	5 Authority members appointed by Freeholders	Revenue Bonds, Direct Purchase from Income, Lease, Grants
County Improvement Authorities Law	County Improvement Authority established by Freeholders	5 Authority members appointed by Freeholders	Revenue Bonds, Direct Purchase from Income, Lease, Grants
Industrial Pollution Control Financing Law	Industrial Pollution Control Financing Authority established by Freeholders	5 Authority members appointed by Freeholders	Revenue Bonds, Direct Purchase from Income, Lease, Grants

TABLE VII-5, Cont'd.

ALTERNATIVE REGIONAL ADMINISTRATIVE SYSTEMS FOR SOLID
WASTE DISPOSAL FACILITIES IN THE OCEAN COUNTY DISTRICT

<u>LEGISLATIVE BASIS</u>	<u>TYPE OF REGIONAL SOLID WASTE SYSTEMS PERMITTED</u>	<u>ADMINISTRATIVE DIRECTION OF SYSTEM</u>	<u>TYPE OF FINANCING PERMITTED</u>
Incinerator Authorities Law of 1948	One or more municipi- palities may create Incinerator Authority	5 appointed Autho- rity members if one municipality; One member appointed from each municipi- pality if multi- municipalities in Authority	Revenue Bonds, Direct Purchase from Income, Lease, Grants
Solid Waste Manage- ment Authorities Law of 1968	One or more municipi- palities may create Solid Waste Manage- ment Authority	5 appointed Autho- rity members if one municipality; One member appointed from each municipi- pality if multi- municipalities in Authority	Revenue Bonds, Direct Purchase from Income, Lease, Grants
Consolidated Municipal Services Act (40:48B-1)	Joint Meeting between two or more municipalities	One member appointed by each municipi- pality	Appropriations from member municipalities; Direct Purchase from Income, Lease, Grants

TABLE VII-6

OPERATIONAL ASPECTS OF ALTERNATIVE REGIONAL ADMINISTRATIVE
SYSTEMS FOR SOLID WASTE DISPOSAL FACILITIES IN THE OCEAN COUNTY DISTRICT

<u>LEGISLATIVE BASIS</u>	<u>SCOPE OF REGIONAL SYSTEM</u>	<u>CONTROL OF SOLID WASTES ENTERING SYSTEM</u>	<u>FACILITY SELECTION AND ACQUISITION</u>
County Solid Waste Disposal Financing Law	District may contract with local governing bodies and private firms, both within and adjoining the county, for use of its solid waste facility. Regional service area is de- fined by contracts	Through its con- tractual powers and a limited-use permit issued by the BPU, the county can con- trol the amount and type of wastes entering system	District may acquire land by gift, purchase, lease, or eminent domain. New Jersey Department of Environmental Protection must approve facility plans and site
County Municipal Utilities Authority Law	Service area is de- fined by participating municipalities and user agreements	Control is through contracts and user agreements	Authority may acquire property by gift, grant, purchase, lease or condemnation. New Jersey Department of Environmental Protection must approve of facility plans and site
County Improvement Authorities Law	Service area is de- fined by participating municipalities and user agreements	Control is through contracts and user agreements	Authority may acquire property by gift, purchase, lease or condemnation. Site selection requires approval of New Jersey DEP, municipalities representing 75% of population, and County Planning Board
Industrial Pollution Control Financing Law	Industrial firms within District area	Control is through contract with in- dustrial firms	Authority may acquire property by gift, purchase, or lease. Facilities must be approved by N.J.D.E.P.

TABLE VII-6, Cont'd.

OPERATIONAL ASPECTS OF ALTERNATIVE REGIONAL ADMINISTRATIVE
SYSTEMS FOR SOLID WASTE DISPOSAL FACILITIES IN THE OCEAN COUNTY DISTRICT

<u>LEGISLATIVE BASIS</u>	<u>SCOPE OF REGIONAL SYSTEM</u>	<u>CONTROL OF SOLID WASTES ENTERING SYSTEM</u>	<u>FACILITY SELECTION AND ACQUISITION</u>
Incinerator Authorities Law of 1948	Service area is de- fined by municipa- lities who become members of Authority. Authority may provide contract service to other non-member municipalities	Through contracts, Authority may con- trol wastes en- tering system	Authority may acquire land with- in or without District by gift, purchase, lease, or condem- nation. New Jersey Department of Environmental Protection must approve facility plans and site. All member municipa- lities must approve
Solid Waste Management Authorities Law of 1968	Service area is de- fined by municipa- lities who become member of Authority. Authority may provide contract services to other non-member municipalities	Through contracts, Authority may con- trol wastes en- tering system	Authority may acquire property within District by condem- nation, purchase, or gift. All member municipalities must approve of site location. N.J. D.E.P. must approve of facility plans and site
Consolidated Municipal Services Act (40:48B-1)	Region is limited to Joint Meeting member municipalities and non-member communities under contract	Control of wastes entering system by contracts	Joint Meeting may acquire property by purchase, gift, lease, or condemnation. All members of Joint Meeting must approve of site. N.J.D.E.P. must approve of facility plans and site

VIII. CRITERIA FOR SOLID WASTE DISPOSAL
MANAGEMENT PLANNING IN OCEAN COUNTY

GENERAL CRITERIA

Development of a viable plan for an environmentally acceptable and cost efficient solid waste disposal plan for Ocean County requires consideration of a number of planning constraints.

Briefly, some of these constraints include: 1) public attitudes towards solid waste management, 2) increasing solid waste quantities, 3) existing solid waste disposal systems in the County, 4) the legal and administrative systems available, 5) the technology of solid waste disposal, and 6) environmental constraints. The importance of understanding the planning constraints which impact Ocean County cannot be overstated, for it is only by working with these constraints that an effective solid waste disposal management plan can be implemented.

The contents of this report, as mandated by Chapter 326, P.L. 1975, addresses and defines in detail the existing solid waste collection and disposal systems, the legal and administrative framework for development of a viable plan, the technology of solid waste disposal including an investigation of materials and energy recovery, and existing and projected quantities of solid waste production in Ocean County.

The following key points summarize general policy considerations required for a successful solid waste disposal plan in Ocean County.

1. In order to implement a comprehensive solid waste management plan, the plan must be capable of overcoming public opposition to the location of a proposed solid waste disposal facility.
2. The proposed solid waste disposal system must have the capability of handling increasing amounts of solid waste in the future.
3. A comprehensive county-wide solid waste disposal plan must take into consideration the existing landfills within Ocean County. A county-wide system must allow gradual phase-out of smaller landfills as municipalities join a county system.
4. A county-wide solid waste plan must be founded upon the most practical administrative system available in order to make the system responsive, flexible and economically competitive.
5. Solid waste technology is in a state of continuing development. Disposal methods that have been sufficiently tested and developed to provide effective and efficient solid waste processing and disposal should be utilized in a county-wide plan. A cost effective system should be chosen for a county-wide disposal plan.
6. In developing a solid waste management plan for Ocean County, primary emphasis must be placed on protecting the County's

valuable natural resources, including the groundwater aquifers, and ensuring that environmental quality standards are maintained.

7. Future solid waste disposal activities should continue to review the markets and economics of resource recovery as technology develops.
8. The plan should stabilize solid waste disposal costs and transportation haul patterns for years to come and should be responsive to the needs of the county and the municipalities.

PUBLIC ATTITUDES TOWARDS SOLID WASTE MANAGEMENT

Historically, public opposition to the location of a solid waste disposal facility, no matter how well the facility is planned, is usually strong enough to prevent the locating and constructing of new disposal facilities. It seems everyone is in favor of having a site set aside for solid waste disposal, but no one wants it in their area or municipality. Hence, after one site is rejected by a municipality because of local opposition, a precedent is set whereby other municipalities then in turn refuse to allow the facility to be constructed in their community. Thus, in order to implement a comprehensive solid waste management plan, the plan must be capable of overcoming public opposition to the location of a proposed solid waste processing and/or disposal facility.

One method of reducing public opposition to proposed disposal

site is to utilize an existing landfill. A community that is already used to having a number of collection trucks on certain streets around the existing landfill facility may react favorably if Ocean County purchases and upgrades the facility. County operation of a facility will upgrade the environmental safeguards taken in the operation and will be more responsive to the needs of the host municipality. The County may offer concessions to the host municipality in lieu of taxes.

INCREASING SOLID WASTE GENERATION

Ocean County is experiencing rapid residential, commercial and industrial growth. In 1960 the resident population was approximately 110,000. The population almost doubled to 210,000 in 1970 and by 1980 it is expected to reach the 360,000 mark. By 1990 it is expected that the population of Ocean County will be close to half a million people. This population increase has accelerated the construction of residential dwellings, new schools, shopping centers, recreational facilities, sewage treatment and transportation systems. This rapid growth has, of course, been matched by a proportionate increase in solid waste quantities.

The development and design of a District-wide solid waste disposal strategy must take into consideration the increasing solid waste quantities. In addition, Ocean County has a unique problem in that during the summer tourist months of June, July and August, there is a very large increase in population and hence solid waste production. Any new system must be capable of efficiently handling this peak solid waste load.

CONSIDERATION OF EXISTING LANDFILL OPERATIONS

Currently most of the solid waste generated in Ocean County is disposed of in-county, in 12 municipal landfills and 2 large private landfills. Several municipalities have the capability of continuing to dispose of solid wastes they generate at their own facilities. However, the remaining capacities are limited in many of these. In addition, the more stringent environmental regulations associated with RCRA will, over a period of time, significantly increase costs of operating landfills. Faced with rising costs and budget caps many municipalities will turn to regional facilities. Therefore an appropriate solid waste management strategy would be to make available regional disposal facilities to municipalities as their current disposal sites are closed. The consideration of transfer station operations would be appropriate as the number of municipal landfills dwindles and the economics balance out. For the longer term, consideration of resource or energy recovery facilities will become more attractive at the regional disposal facilities because of higher disposal costs at the few remaining facilities, improved markets for materials, and as the cost of energy increases, the use of one form or another of energy produced from solid waste will be more economically sound.

LEGAL AND ADMINISTRATIVE CRITERIA

In order for Ocean County to operate a disposal system, an adequate administrative system with requisite financial, jurisdictional,

legal, and operational capability would be required. Some of the requirements of the administrative structure include the following:

- . The administrative structure must have sufficient financial capabilities.
- . It must service a population sufficient to reduce the unit costs of solid waste disposal and to plan, develop, and operate on a county-wide basis.
- . It must be able to acquire property.
- . It should have control over the sources, types and quantities of solid wastes that are discharged into the processing and disposal system.
- . It should have the necessary personnel and equipment to perform its duties.

Currently, there are six administrative structures available for regional solid waste management in Ocean County including the following inter-municipal and county-level structures:

LEGISLATIVE BASIS OF
ADMINISTRATIVE STRUCTURE

Incinerator Authorities
Law of 1948

Solid Waste Management
Authorities Law of 1968

TYPE OF REGIONAL SOLID
WASTE SYSTEM PERMITTED

One or more municipalities may
create Incinerator Authority

One or more municipalities
may create Solid Waste Manage-
ment Authority

LEGISLATIVE BASIS OF
ADMINISTRATIVE STRUCTURE

TYPE OF REGIONAL SOLID
WASTE SYSTEM PERMITTED

Joint Service Contract
(N.J.S.A. 49:48B-1)

Joint Meeting between two or
more municipalities

County Solid Waste Disposal
Financing Law

County department or agency

County Municipal Utilities
Authority Law

County Utilities Authority
established by Freeholders

County Improvement
Authorities Law

County Improvement Authority
established by Freeholders

In order to assist in the implementation of District Solid Waste Management Plans, the State has provided each district with funds to produce these plans. The Resource Conservation and Recovery Act 1976 also has provisions for providing financial assistance to the District for more advanced planning. Section 4008 (a) (2) of the Act authorizes assistance for items such as facility planning, feasibility studies, consultation, surveys, analysis, technology assessments, legal expenses, construction feasibility studies, and economic studies.

ENVIRONMENTAL CONSIDERATIONS

Ocean County places an emphasis on environmental quality and control. Any new solid waste disposal system cannot contribute to the degradation of any aspect of the environment. Ocean County depends entirely on groundwater for its potable water supply. Hence, anything that would have the slightest tendency to contaminate this water supply must be studied in great detail. To complicate matters, Ocean County's geologic structure is composed almost

entirely of Cohansey Sand, a relatively poor barrier to infiltration of contaminants. To understand the complex interaction of the physical, natural and environmental conditions and more importantly how these conditions are affected by solid waste disposal systems, a complete study of the conditions, is necessary.

Obviously, it is the geologic layers that are the barrier between the important groundwater and potential surface pollution. The more impermeable the material, that is the more it resists the seepage of water through it, the safer the groundwater is from surface pollution.

Other major natural conditions which must be carefully studied include the soils, topography, drainage, water supply and climate. In addition, many physical conditions such as existing wastewater treatment plants, other sources of pollution discharge and the intricate highway transportation system must be reviewed. These physical, natural, and environmental constraints are important because it is only by working within these constraints that a successful Ocean County solid waste disposal plan can develop and be successful from an environmental point-of-view. Appendix C of this report includes a comprehensive analysis of all of the environmental considerations associated with two existing landfills in the District.

TECHNOLOGY OF RESOURCE RECOVERY AND SOLID WASTE DISPOSAL

In light of recent fuel and material shortages, a new emphasis has been placed on recovering and utilizing valuable resources

in solid wastes that have traditionally been discarded, buried, and lost. Increasingly, solid waste is being considered as a source of material and energy recovery. With this new awareness has come a concerted effort on the part of business, industry, and government to develop the technology for recovering these resources from solid wastes.

The development of solid waste disposal and processing technology has advanced to a point where it is now technically feasible to separate many valuable components of solid waste for resale to secondary materials dealers. Ferrous metal, aluminum, paper for fuel, and glass can be readily reclaimed from solid waste. The techniques have been used for years in other industries. As more and more material is subsequently reclaimed, the portion of the total waste that requires ultimate land disposal is reduced. The trend is toward systems which can recover and reclaim valuable materials and energy from the refuse.

The vast majority of the equipment, technology, and concepts used in resource recovery are not new, however. They have been tried and tested in other industries before being adapted for solid waste processing. Processes heretofore never applied to processing solid waste such as high temperature incineration, pyrolysis, other forms of energy recovery, and various types of materials recovery systems are beginning to attack the solid waste problem.

An additional advantage to a materials recovery type of operation is that the various recovery operations can be phased in gradually over a period of time. For example, a front end processing system can be developed at a regional landfill site. The facility would initially develop a market for its initial energy or material products. Once the facility's economics reach an acceptable level, the more sophisticated phases of metals, glass and plastics recovery can be added.

While there have been great strides made in developing resource recovery technology, there are few full-scale operating plants in the United States. Thus, a careful evaluation of solid waste technology must be made to ensure that the equipment can and will meet solid waste disposal requirements in Ocean County in the future, prior to the expenditure of large amounts of public capital.

MARKETS FOR MATERIALS RECOVERED FROM OCEAN COUNTY'S SOLID WASTE

While the technology for separating and reclaiming certain components of solid waste, such as ferrous metals, glass, paper, and fuel is present today, these materials are of little value if there are no markets in which to sell the materials. Therefore, it is very important the district investigate the potential market for recovered materials in the State prior to initiating resource recovery activities in the future. Once the market has been identified the quality and quantity requirements should also be determined.

COST AND DEPENDABILITY OF SERVICE

Solid waste management costs are subject to inflationary trends. Costs of collecting and disposing of solid wastes have been increasing over the years. While public officials and the general public desire to keep these expenditures to a minimum, the fact remains that, with increased operating costs brought about by inflation, rising fuel and power costs, and more stringent environmental standards, solid waste management costs will increase in the future. The development of a regional, county-wide solid waste disposal plan in Ocean County will help to stabilize solid waste disposal costs and to insure long term dependability of service.

CONSTRAINTS PLACED ON SITING NEW SOLID WASTE FACILITIES

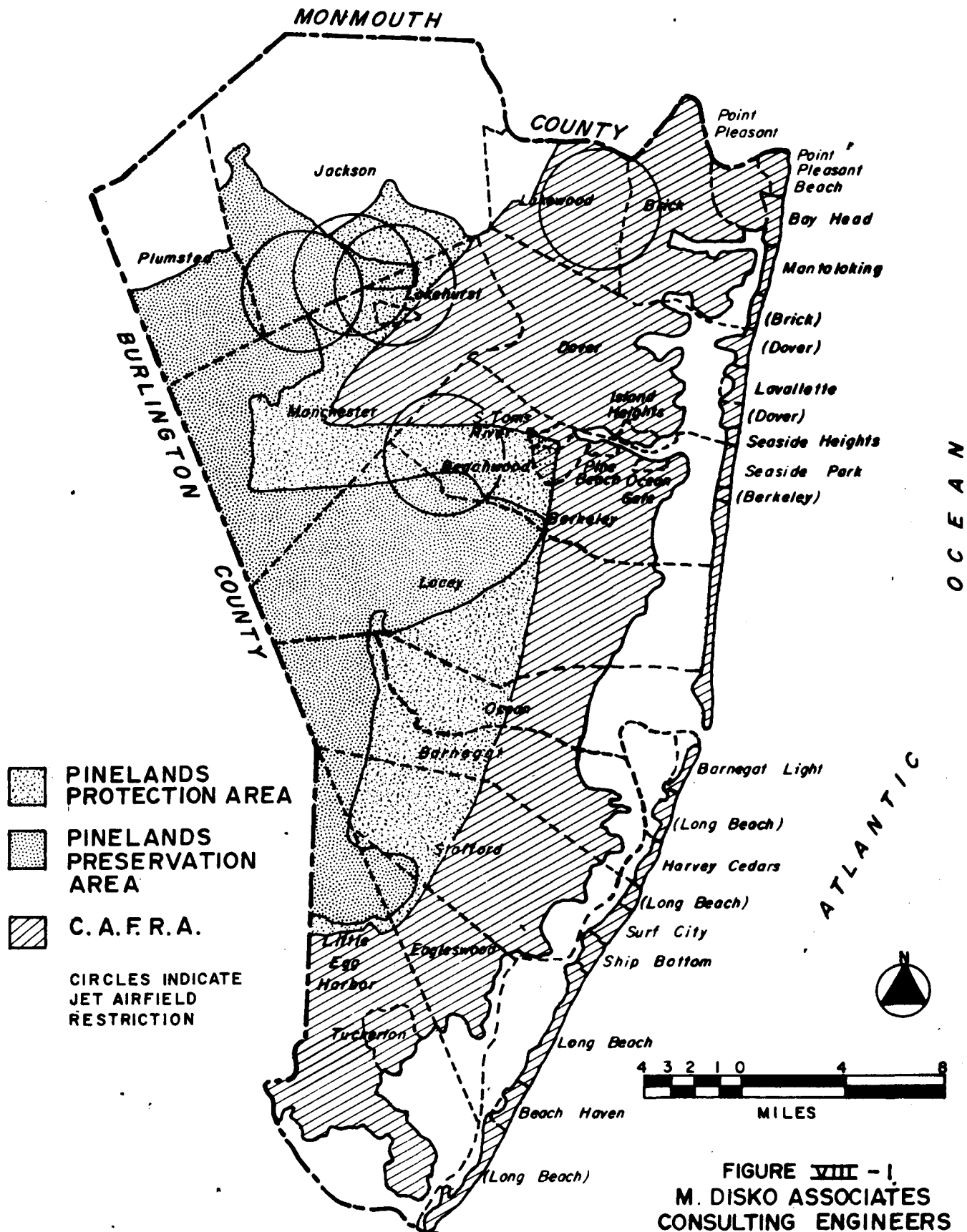
At first glance, Ocean County is a county that has large tracts of non-developed land that seem suitable for the location of a solid waste disposal facility. However, Ocean County has several environmental factors which impact and essentially negate the locating of a new facility in the County. As shown on Figure VIII-1 the majority of the land in the county fall into environmentally **protected** areas. The area generally east of the Parkway is in the Coastal Area Facilities Review Act (CAFRA).

The basic concepts of CAFRA state in part:

"that certain portions of the coastal area are now suffering serious adverse environmental effects from existing facility activity impacts that would preclude or tend to preclude those

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

CONSTRAINTS PLACED ON LAND SITE SELECTION



multiple uses which support diversity are in the best long-term, social, economic aesthetic and recreational interests of all people of the State; and that therefore, it is in the interest of the people of the State that all of the coastal area should be dedicated to those kinds of land uses which promote the public health, safety and welfare, protect public and private property, and are reasonably consistent and compatible with the natural law governing the physical, chemical and biological environment of the coastal area.¹"

Any person proposing to construct a facility in the coastal area must file an application for a permit with the Commissioner of Environmental Protection. The application must include an environmental impact statement. The Commissioner can only issue a permit if the proposed facility:

- "a. Conforms with all applicable air, water and radiation emission and effluent standards and all applicable water quality criteria and air quality standards.
- b. Prevents air emissions and water effluents in excess of the existing dilution, assimilative, and recovery capacities of the air and water environments at the site and within the surrounding region.
- c. Provides for the handling and disposal of litter, trash, and refuse in such a manner as to minimize adverse environmental effects and the threat to the public health, safety, and welfare.
- d. Would result in minimal feasible impairment of the regenerative capacity of water aquifers or other ground or surface water supplies.
- e. Would cause minimal feasible interference with the natural functioning of plant, animal, fish, and human life processes at the site and within the surrounding region.
- f. Is located or constructed so as to neither endanger human life or property nor otherwise impair the public health, safety, and welfare.
- g. Would result in minimal practicable degradation of unique or irreplaceable land types, historical or archeological areas, and existing scenic and aesthetic attributes at the site and within the surrounding region.²"

¹CAFRA (P.L. 1973 C.185) Sec 2

²CAFRA (P.L. 1973 C.185) Sec 10a-g

The "New Jersey Coastal Management Plan-Bay and Shore Segment", has added a level of stringent review for siting landfills in the CAFRA Zone. Relevant sections of the plan require that: solid waste conservation techniques such as recycling, resource recovery and energy recovery must be explored and proven non-economical before a landfill can be even considered; new landfills are prohibited from wetlands; and landfills located in upland areas must not impact groundwater with leachate. These policies make it extremely difficult to locate a new landfill facility in the CAFRA Zone.

In the area generally west of the Parkway, as outlined on Figure VIII-1, two Pine Barrens Areas have been identified for special environmental consideration. The Pinelands Preservation Area and the Pinelands Protection Area were contained in a recent report of the Pinelands Review Commission. Executive Order 71 establishes regulations associated with each area. The Pinelands Preservation Area has as its stated goals:

1. To preserve an extensive and contiguous undeveloped land mass in its natural state which would have as its purpose the preservation of a Pinelands wilderness containing the unique ecological features which have distinguished the Pinelands as being more than a large expanse of undeveloped forest.
2. To promote compatible agricultural, forestry, and recreational land uses within the framework of maintaining a wilderness area.
3. To prevent all development which is incompatible with the preservation of lands which are primarily undeveloped.
4. To provide a sufficient amount of undeveloped land to accommodate specific wilderness management practices, such as selective burning, which are necessary to ensure the maintenance of the area's ecology.

5. To protect and preserve the quantity and quality of existing surface and groundwater for the citizens of the State.

The Pinelands Preservation Zone is essentially unusable for the siting of a solid waste disposal facility. The Pinelands Protection Area is also environmentally protected but development is not precluded from this zone. The stated goals of the area are:

1. To maintain, through minimal disturbance, the essential vegetative character in order to afford existing and prospective residents the opportunity to live in a Pinelands environment.
2. To protect and maintain existing surface and groundwater quality for the region's current and prospective users.
3. To discourage piecemeal and scattered development.
4. To encourage settlement patterns that will accommodate agriculture, as well as appropriate commercial, residential, and other development which is compatible with the protection of the Preservation Area and the maintenance of a Pinelands living environment and reflective of the economic forces in and surrounding the Area.
5. To accommodate in an orderly way existing and future regional growth influences while being particularly sensitive to the potential cumulative adverse impacts of growth and development on the residents and the environment which includes one of the last unpolluted shellfish beds in the State.

The two solid waste disposal sites which are being presented as the nucleus of a solid waste management plan are in the Pinelands Protection Area. By upgrading the existing disposal sites to meet all new State Environmental regulations, the sites will become more acceptable land uses within such a sensitive area.

The final general constraint to be addressed is the proximity to airfields which can accommodate jet aircraft. The rules of

the Solid Waste Administration prohibits the location of any new sanitary landfill operation within 2.5 miles of the geographic center of an airfield. An exception can be made if an adequate bird control program is implemented. Neither of the two possible disposal sites proposed to be the nucleus of the Ocean County District Solid Waste Management Plan are affected by this constraint.

IX. ALTERNATIVES CONSIDERED FOR THE OCEAN COUNTY DISTRICT
SOLID WASTE MANAGEMENT PLAN

INTRODUCTION

In the presentation of alternatives considered for the Ocean County District Solid Waste Management Plan, the initial screening of the possibilities will be conducted on two levels. The first level will be the consideration of technical alternatives. The second level will be the consideration of locating facilities to maximize efficiencies and minimize costs for the entire District. Once the initial screening is completed, several practical alternatives will be presented for the Ocean County District. In the final section a selection will be made of the best alternative in terms of how it best serves the needs of the District during the ten year planning period.

TECHNICAL ALTERNATIVES

Sanitary landfilling is the only method of solid waste disposal being practiced in the District today, except for a number of small local recycling efforts. The use of sanitary landfilling in Ocean County will continue to be the most practical method of solid waste disposal for most or all of the ten year planning period. Even with the environmentally sensitive nature of the Ocean County District, sanitary landfilling, with the proper environmental controls, is the most economical technical alternative available to the District today. Much capacity is left in the two private landfills as well as at a couple of the larger municipal facilities.

A number of sites exist in the District where strip mining operations have been completed and the resultant barren land has no practical use. The use of a site like this would actually reclaim the land and eventually would allow it to become an asset to the County. The cost of operating an environmentally secure landfill is higher than the present costs of operating landfills which are not adhering to State regulations, but the costs are still much lower than the costs of operating more capital intensive resource recovery facilities.

DISCUSSION OF ALTERNATE TECHNOLOGIES

Volume reduction techniques could be employed to increase landfill life. They also improve the appearance and reduce somewhat some of the environmental problems associated with a typical landfill. The major disadvantage to shredding is that capital and operating costs can be significantly higher than a basic sanitary landfill. The cost for a shredding operation is estimated at \$4.00 to \$10.00 per ton plus the cost of disposal. Therefore, the technical alternative of shredding for the purpose of landfilling is not a practical alternative for the District. The economics do not make sense and the availability of large amounts of existing landfill capacity for disposal both weigh heavily against this alternative.

Baling is another volume reduction technique which has to be ranked low among the other technical alternatives that are available. The cost is prohibitive, the HMDC anticipates an initial

tipping fee of \$9.87 per ton at their new baling facility in North Arlington. Again, the availability of large amounts of landfill capacity in the District also diminishes the need for adding to the cost of landfilling by baling.

Composting of municipal refuse is a solid waste disposal method by which the organic portion of refuse is converted by microorganisms into a soil conditioner in a process known as aerobic digestion. Three factors weigh heavily against composting as a technical alternative. One is that the composition of waste in the District prevents the decomposition of a significant portion of refuse, especially if a waste stream other than residential wastes are also considered. The other two are high operating costs and limited marketability of the end product.

Ocean disposal of solid wastes is the lowest ranked of all technical alternatives to be discussed. There are no waste disposal sites along the Atlantic Coast which are designated for the disposal of municipal refuse. Furthermore, barging is a costly operation and again there is no net benefit to be derived from barging out to sea as opposed to sanitary landfilling.

Incineration without heat recovery is basically another form of volume reduction. Tipping fees at facilities such as these can be expected to be as high as \$20.00 per ton. The reductions in volume of 80 to 90% and 98 to 99% by weight of the combustible components that can be achieved through incineration can hardly

justify the many-fold increase in disposal fees in light of alternate acceptable strategies that can more cheaply and just as effectively take care of the waste disposal problem. Specialized forms of incineration such as fluidized bed and ultra-high temperature are not as well developed as the conventional forms of incinerators and are just as impractical as the conventional forms in the Ocean County District.

Heat recovery incinerators can be of the waterwall type or types with waste heat boilers. These types of incinerators can produce hot water for heating, steam for heating and manufacturing processes, cooling water if put through a heat exchanger, or if put through a steam turbine can produce electricity for a variety of uses. The sale of the steam for these purposes can offset the operating cost and reduce the tipping fees somewhat. Because of the character of the Ocean County District, the locating of an energy user who can accept a good portion of the product that would be produced by a heat recovery incinerator would be extremely difficult if not impossible. An interrelated complex of facilities producing refuse derived fuel (RDF) with an RDF-to-energy plant would also result in high tipping fees unless there was a market for the recovered energy.

Pyrolysis systems which convert solid waste into gaseous or liquid fuels are being demonstrated in a number of areas of the country. The technology is still being tested. There are few successful commercial operations in the United States which are presently

converting solid waste via the thermal decomposition process of pyrolysis into fuel products. Again, capital and operating costs are expected to be high, and the location of a user for the products of pyrolysis is even more difficult than for the products of a heat recovery incinerator.

Any other concept utilizing energy recovery or resource recovery is not practical for Ocean County at this time because of the limited availability of markets and the associated high capital costs.

Transfer stations are an extension of the transportation element of getting the waste from the generator to the ultimate disposal site. After a certain distance, determined by a number of local parameters, waste can be more economically transported via 70 cubic yard transfer trailers than with 20, 25, or 30 cubic yard refuse collection vehicles. The transfer station itself can be of a number of designs and a number of sizes which can be tailored to meet the needs of the area to be serviced. There is some potential for using transfer stations in the Ocean County District.

FACILITY SITING ALTERNATIVES

ALTERNATIVE 1: NO ACTION. The no action alternative involves allowing the present network of in-county and out-of-county disposal facilities to be utilized. The existing system consists of 12 municipal landfills, 3 private in-county landfills and 2 out-of-county private landfills. In the very near future it is expected

that the Solid Waste Administration will more strictly enforce its requirements for implementing environmental safeguards to upgrade existing landfills. It is unknown at the present time how many of the municipal landfills can manage the extra financial burden which will be placed on them to upgrade their landfills. A number of municipal landfills will be reaching capacity in the next few years. Some of the private landfills may also not be able to meet the financial burden of upgrading. Therefore, over the ten year planning period it can be anticipated that 13 municipalities will be searching for alternative disposal facilities without following a planned approach which would both benefit the municipality as well as the District as a whole.

ALTERNATIVE II: RESOURCE RECOVERY AND/OR ENERGY RECOVERY. For a resource/energy recovery facility to be economical, it is necessary for it to operate on a large scale. If a facility such as this was proposed, all of the waste from the County should be directed to the facility.

One facility located in the northern waste district with waste being transferred from the southern waste district or one facility located in the southern waste district with waste being transferred from the north would generate the required tonnages. A facility located in the center of the district to serve the entire district would also supply enough waste. Unfortunately, all of these options are unrealistic at this time because of the high capital costs associated with a resource recovery facility.

For at least the first half of the planning period, any implementation of any type of energy from waste facility, resource recovery facility, or any combination thereof is not a practical approach to solid waste management planning for the Ocean County District. The reasons include: availability of landfill space, unwarranted increase in disposal costs, and poor markets for energy and materials in the District. In the second half of the planning period, the District may wish to review the merits of implementing a resource recovery or energy recovery facility in the District. The economics may change in the future, more technologies may be proven, and the markets for energy and material products may develop in the District.

ALTERNATIVE III: ONE LANDFILL STRATEGY. Locating a new District operated landfill in Lacey Township is one possibility. It would be a centrally located environmentally secure landfill ready to accept wastes from municipalities who have either lost their disposal options because of exhausting their landfill capacity or being forced to upgrade, or because they find it more economical to transport their waste to a new facility. There are, however, many problems with this option. All of Lacey Township is within one or more environmentally sensitive areas. These include: the Pinelands Protection Area, the Pinelands Preservation Area, and the area protected under the Coastal Area Facilities Review Act.

Siting of a disposal facility in Lacey Township has been proposed earlier. During the spring and summer of 1975, a proposal for a

county-wide solid waste disposal and resource recovery facility to be located off of Lacey Road in Lacey Township was advanced. The proposed facility would have reclaimed several hundred acres of previously strip-mined land by sanitary landfilling. A front-end shredding plant would have been the first stage of a future resource recovery facility. As a result of local apprehension and opposition, the proposal was abandoned in October 1975.

Obtaining permits for new waste disposal facilities has become an extremely difficult task in recent years. Locating a District-operated facility at an existing site is a much more practical approach. Locating a District-operated landfill in the northern waste district and transferring the waste from the southern waste district or locating the landfill in the southern waste district and transferring the waste from the north seemed to be reasonable options under the one landfill strategy. A comprehensive plan for managing the solid waste of the District can have as its base one of these options. The difficulty occurs in encouraging distant municipalities to transport their wastes to a District-run facility or transfer station while local and less costly disposal options still exist. Local options can include using existing private landfills in or out of the County or making agreements with municipalities with municipal landfills with large enough capacities to handle the additional waste load without significantly affecting their remaining capacity during at least the ten year planning period. Implementation, therefore, is a problem with this alternative.

ALTERNATIVE IV: TWO LANDFILL STRATEGY A way to overcome the problems of implementing a District Solid Waste Management Plan in the Ocean County District is to propose two District-operated sanitary landfills, one located to serve the northern waste district, and one located to serve the southern waste district. This strategy involves taking over either municipally run or privately operated landfills with sufficient capacity to accept all the waste the district produces at least over the entire planning period and upgrading them to the requirements of the Solid Waste Administration. As municipalities lose their disposal options they can switch over to using the District-operated facilities. The District would eventually be firmly in control of most of the waste being produced within its borders. That being the case, the District would then be able to conduct additional studies during the latter part of the planning period to analyze the need for additional landfill space or the feasibility of implementing resource recovery or energy recovery facilities. The anticipated increased waste loads caused by significant increases in population, and with possible improvement in energy and materials markets, and with more proven technologies, the implementation of refuse processing facilities may become practical.

ALTERNATIVE V: ALTERNATIVE IV PLUS TRANSFER STATIONS Should Alternative IV be the favored alternative then the possibility exists for constructing one or two transfer stations. One on Island Beach and/or one on Long Beach Island would be the ideal siting. The feasibility of transfer stations should be carefully

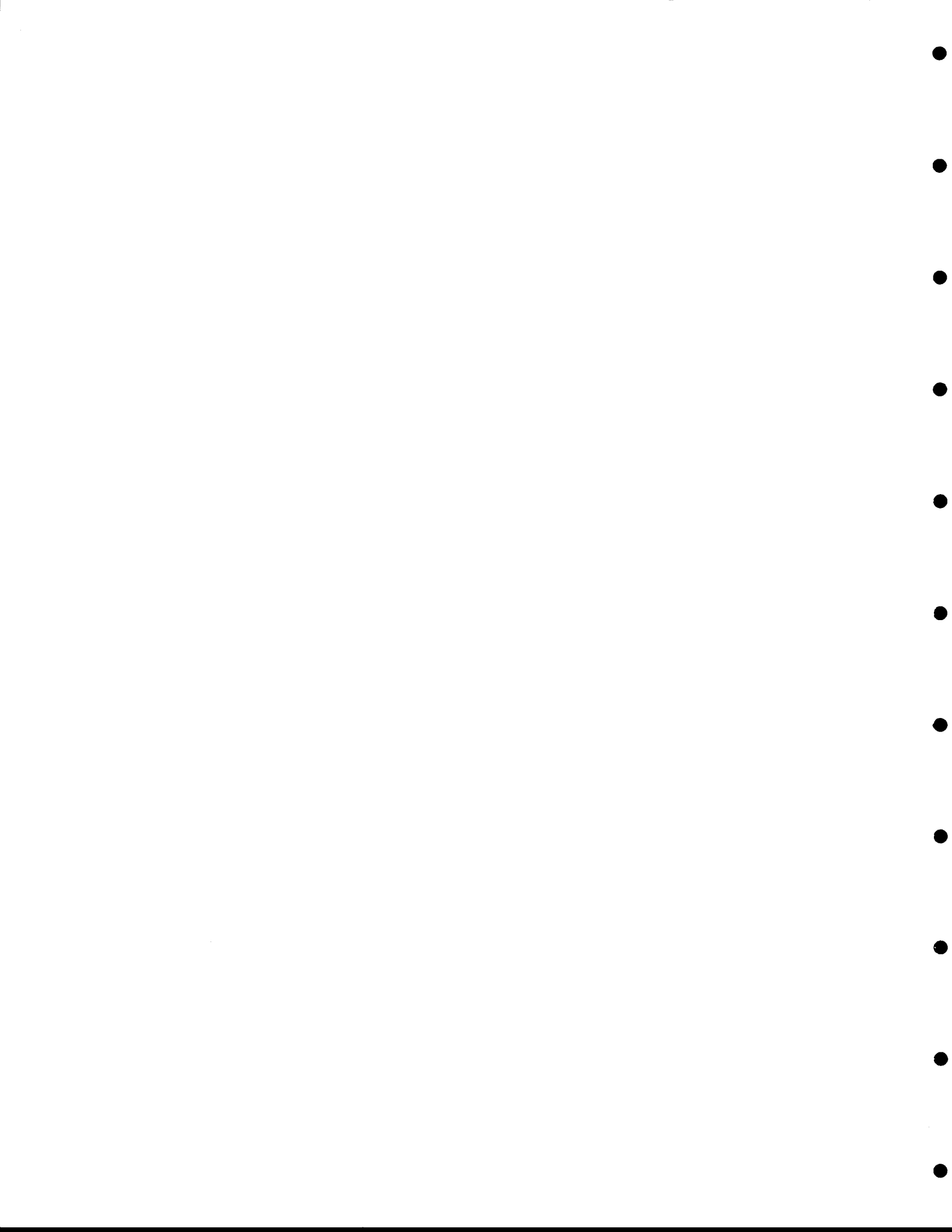
studied. At first look they appear to have good potential. Since the island communities experience extreme increases in population in the summer months, a reduction in the number of refuse vehicles crossing the bridges to the mainland may be of benefit in addition to reducing transportation costs. Problems can occur in siting and in sizing because of the varying populations.

SELECTION OF BEST ALTERNATIVE

The previous discussions presented technical and facility siting alternatives with some indication of their practicality and applicability to the Ocean County District Solid Waste Management Plan. In terms of technical alternatives, the most practical and applicable to the Ocean County District Solid Waste Plan at the present time is sanitary landfilling of refuse. Facilities of sufficient size are available to handle all the waste produced in the District for at least the entire planning period. Utilizing transfer stations to reduce the cost of transporting wastes from areas distant from landfill sites can also be acceptable and should be studied further. The implementation of energy recovery projects, including heat recovery incinerators, and resource recovery facilities should be considered again at a future date when more of the factors that go into developing a successful facility may become more favorable.

In terms of a facility siting alternative, Alternative IV is most advantageous to the County if the County can acquire two

facilities of sufficient size, one in the northern part of the District and one in the southern district. The alternative is realistic because it utilizes existing facilities thereby not introducing new transportation patterns for municipalities already using the facilities, it enables the District to eventually gain control of the disposal of the bulk of the refuse being produced in the District, and has a ready-made source of refuse for input to any energy or resource recovery facility which may be planned at some future date. Alternative V, incorporating transfer stations into the above strategy also bears careful investigation for possible longer term implementation.



X. SOLID WASTE MANAGEMENT
PLAN FOR THE OCEAN COUNTY DISTRICT

INTRODUCTION

The previous chapters of this report have dealt with topics such as defining the existing collection and disposal systems, studying the markets available for recoverable products, defining the existing recycling activities in the District, and analyzing the various legal, administrative and financial alternatives available to the District. Every effort has been made to deal with each subject in great depth. This chapter will present the solid waste management plan that evolved through the many months of work between the Ocean County SWAC, the Ocean County Planning staff, the Board of Chosen Freeholders, and the consultant.

The Ocean County District Solid Waste Management Plan has been developed to meet the solid waste needs of every municipality in the District for the next ten years. It is a plan that allows flexibility for change and for updating as new technologies become available. It will be reviewed and reassessed every two years by the Freeholders as required by the legislation of Chapter 326.

The Plan was formally presented to the Freeholders on February 25, 1979 and a public hearing was held on May 23, 1979. The Plan was subsequently revised to reflect recommendations voiced at the hearing. These revisions have improved the responsiveness of the Plan to the solid waste management needs of the District.

DESCRIPTION OF OCEAN COUNTY DISTRICT PLAN

The Ocean County District Plan is arranged in a set of three guidelines. A number of actions can be pursued under each guideline in order to achieve desired objectives.

The Plan has been developed to meet the waste management needs of each Ocean County municipality. The guidelines and the actions which can be pursued are presented in the following discussions.

GUIDELINE ONE - GENERAL PLAN FOR SOLID WASTE MANAGEMENT

The development of two regional landfill facilities located within the county for the disposal of residential, commercial and non-chemical industrial waste generated within the District is seen as the best way to assure the availability of disposal facilities for all the County's municipalities for at least the duration of the ten year planning period. All out-of-county wastes will be prohibited from all disposal facilities located in Ocean County.

ALTERNATIVE ACTION ONE

The purchase of the two large regional, existing, privately owned sanitary landfills is a practical solution. The two landfills are Ocean County Landfill Corporation in Manchester Township, and the Southern Ocean Landfill, Inc. in Ocean Township. Currently, these two landfills are private, B.P.U. regulated landfills which accept much of the solid waste being generated in the District.

There are several distinct advantages to the purchase of these two facilities:

- a. There should be minimal public opposition to the acquisition because the disposal sites are existing. The traffic and transportation patterns are well established. No new landfill sites are proposed.
- b. It is easier to upgrade an existing sanitary landfill than to locate, design, and get approvals for a new one. Historically, very few new landfills have been located in New Jersey if public opposition was vocal.
- c. The majority of Ocean County's land area falls in either the C.A.F.R.A. zone or the Pinelands zone. These environmentally sensitive areas virtually preclude the siting of a new landfill.
- d. The acquisition of the two landfills assures Ocean County of residue disposal when, in the future, the District considers the implementation of resource recovery.
- e. Since the landfills are existing, they have a steady supply of waste being disposed of there on a daily basis. It is important to have customers using a facility when it is established. When the District acquires these two landfills, they will have a "built-in" cash flow.
- f. The Ocean County Landfill Corp. site is in the northern part of the District and can very easily service all of the northern, more populated municipalities. The Southern Ocean Landfill Inc. is in the southern part of the District and is well situated to service the southern municipalities and Long Beach Island. In point of fact, four (4) municipalities currently use the O.C.L.F. site for residential waste disposal and eight (8) municipalities use the S.O.L.F. for their residential waste disposal. In addition, scores of private contractors collecting commercial and industrial waste also use the two landfills.
- g. The environmental problems associated with the two existing landfills can be systematically upgraded to meet current State regulations. If the two sites were to remain in private ownership, there would be no assurances of the private sector upgrading the sites in the foreseeable future. Upgrading to meet evolving Federal criteria could take many years. In the interim Ocean County could conceivably witness disposal of large volumes of sludges and other wastes in these landfills. The District is better able to assure the environmental upgrading of the two landfills in a timely fashion.
- h. Another advantage of District acquisition of the two sites is that through the legislation as outlined in Chapter 326,

P.L. 1975, the District will then be able to control the flow of solid waste to the sites. Further, the District will be better able to exclude out-of-county waste from entering the two landfills. Since these two sites are the major private landfills in the County, importation of waste into the District will be precluded when the two sites are owned by the District.

Therefore, as can be seen, there are many distinct advantages to the ownership of the two disposal facilities by the District.

There are some disadvantages also:

- a. By acquiring an existing landfill, the District inherits any environmental problems that the landfill might have.
- b. Since the locations of the two sites are fixed, the District has no flexibility in locating them.
- c. Since the landfilling operations are on-going at the two sites, the purchase price per acre will be higher than for virgin land.

ALTERNATIVE ACTION TWO

The acquisition and operation of the Ocean County Landfill Corporation can be undertaken by another public entity, namely the Township of Manchester. Manchester Township has expressed considerable interest in acting as an agent for the County in owning and operating the Ocean County Landfill Corporation which is located within its municipal boundaries. The Township envisions that it can provide all the advantages of public ownership outlined in ALTERNATIVE ACTION ONE above while also meeting some of its own needs. Some of these are:

- a. A new supply for road building materials.
- b. Eventual development of a municipal recreational center using lands now being used for the landfilling operation and a large tract of land owned by the municipality adjacent to the landfill.

- c. Host community advantages via providing municipal residents with free dumping privileges or at least reduced rates as allowed by law.

ALTERNATIVE ACTION THREE

As an alternative to takeover of the Southern Ocean Landfill by the County or an agency thereof, Ocean Township has forwarded a proposal to the County which it favors over the County takeover of the existing private operation. The Township of Ocean has offered to sell the County a parcel or parcels of municipally owned virgin land, sufficient in size to meet the landfill needs of municipalities in the southern portion of Ocean County.

The following are seen as disadvantages with the ownership and operation of the Southern Ocean Landfill by the County:

- a. Taxpayer's dollars are needed to upgrade a facility which has a number of environmental problems.
- b. The responsibility of upgrading should rest with the present owner.
- c. The capital expense is high when compared to the purchase price of virgin land.

The following are seen as advantages with development of a new regional facility.

- a. Operation of the facility can be in accordance with current regulations of the Solid Waste Administration.
- b. No identified or yet to be identified environmental problems are inherited therefore liability is limited.
- c. Cost of virgin land is estimated at twenty-five percent of that of the value placed on the existing operation.

A possible disadvantage in developing a new facility bears mentioning at this point. It is not absolutely clear how amenable various State agencies will be to permitting a new facility in the southern part of Ocean County.

One or a number of the above alternative actions will accomplish the objective of creating 2 modern regional landfills. Decisions regarding the alternative actions will be formulated during the fall of 1979 as part of the County's continuing planning. Implementation is anticipated during 1980.

Figure X-1 is the site plan of all existing solid waste facilities located within the district that are operated and maintained in accordance with all applicable health and environmental standards. The proposed regional landfill sites indicated on the figure are the heart of the Ocean County District Plan. These regional facilities, along with the existing sites, will be able to provide sufficient and environmentally sound disposal capacity to handle solid waste generated over the ten year planning period.

DELINEATION OF WASTE DISTRICTS

Not all of the District's 33 municipalities will utilize the Regional facilities when first implemented. Some of the municipalities, such as Stafford, Lakewood, Berkeley, Lacey and others may opt to continue to use their own landfills for the short term. Several landfills currently have ample room for additional landfilling. However, the District expects that when the

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

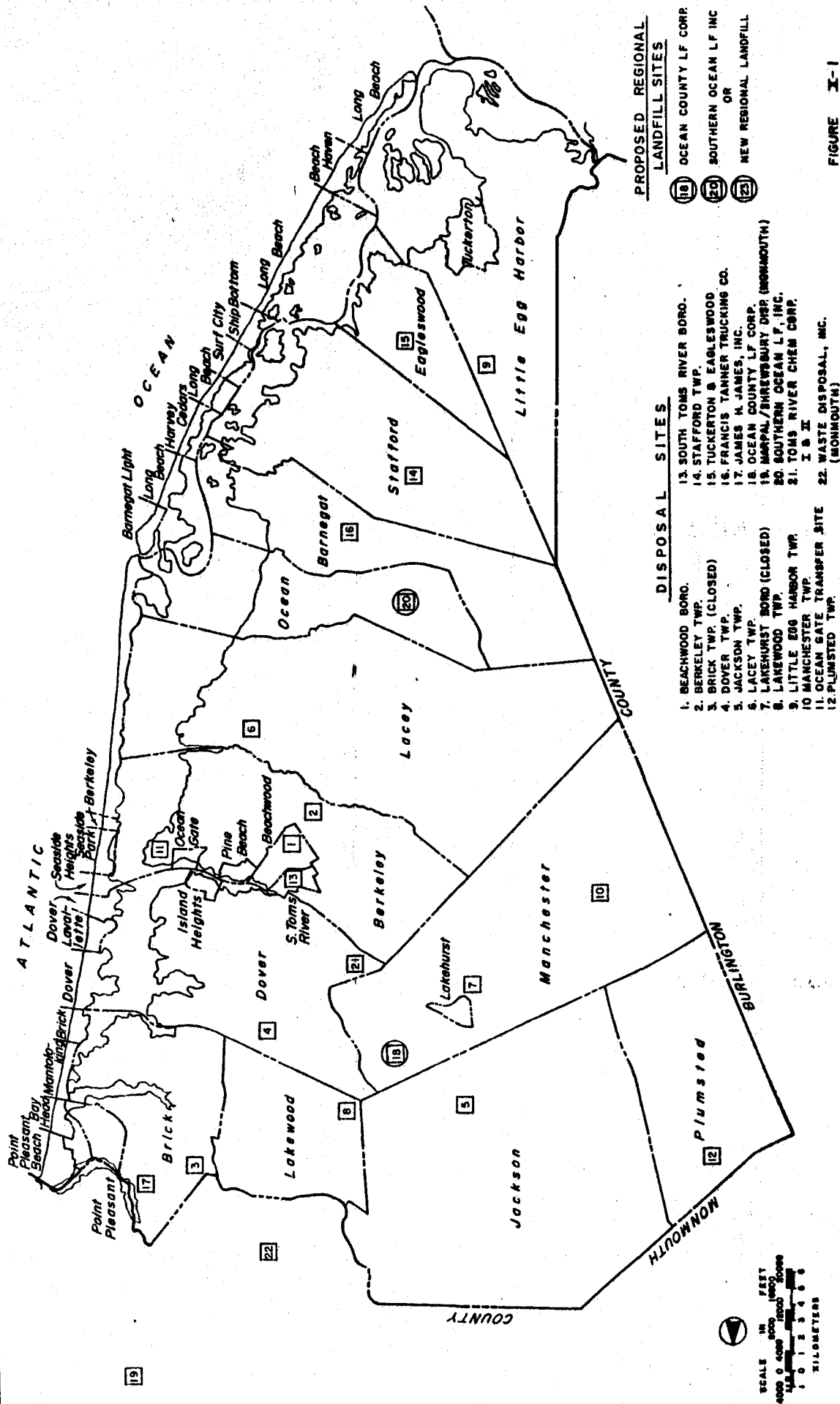


FIGURE 1-1
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

full force of environmental regulations are brought to bear against the landfills, and they are forced to spend large sums of money to upgrade, that they will seriously consider closing their landfills since the County will have provided them with an acceptable alternate. Of course, the Regional facilities will be designed to handle the eventual waste input from the residential, commercial, and non-chemical industrial waste streams from all 33 municipalities.

The preliminary distribution of the waste load between the sites is as follows:

NORTH WASTE DISTRICT

The following municipalities could use the O.C.L.F. site in Manchester:

Bay Head	Lavallette	Plumsted
Beachwood	Lakehurst	Point Pleasant
Berkeley	Lakewood	Point Pleasant Beach
Brick	Manchester	Seaside Heights
Dover	Mantoloking	Seaside Park
Island Heights	Ocean Gate	South Toms River
Jackson	Pine Beach	

Total of 20

SOUTH WASTE DISTRICT

The following municipalities could use the S.O.L.F. site in Ocean Township or a new Regional facility operated by the County:

Barneгат	Lacey	Stafford
Barneгат Light	Little Egg Harbor	Surf City
Beach Haven	Long Beach	Tuckerton
Eagleswood	Ocean	
Harvey Cedars .	Ship Bottom	

Total of 13

Municipalities could opt to use their existing sites for the short term. They can, of course, join the County system at any time. It is, however, the intent of the District that all landfills operating in Ocean County will be required to conform at the earliest practical date to Federal criteria governing classification as a sanitary landfill. While final regulations have not been promulgated by USEPA, criteria have been proposed pursuant to Section 4004(a) of the Resource Conservation and Recovery Act of 1976. The federal law requires that all landfills be evaluated considering federal criteria within one year after the criteria are promulgated. Any facility which does not meet the criteria will have, at most, five years to comply.

The location of the two existing sanitary landfills are geographically shown on Figure X-2. It is important to note that a new Regional facility may ultimately be the appropriate course of action decided upon and therefore Southern Ocean Landfill Inc. would not be considered as the focus of solid waste disposal in the South under the County Plan.

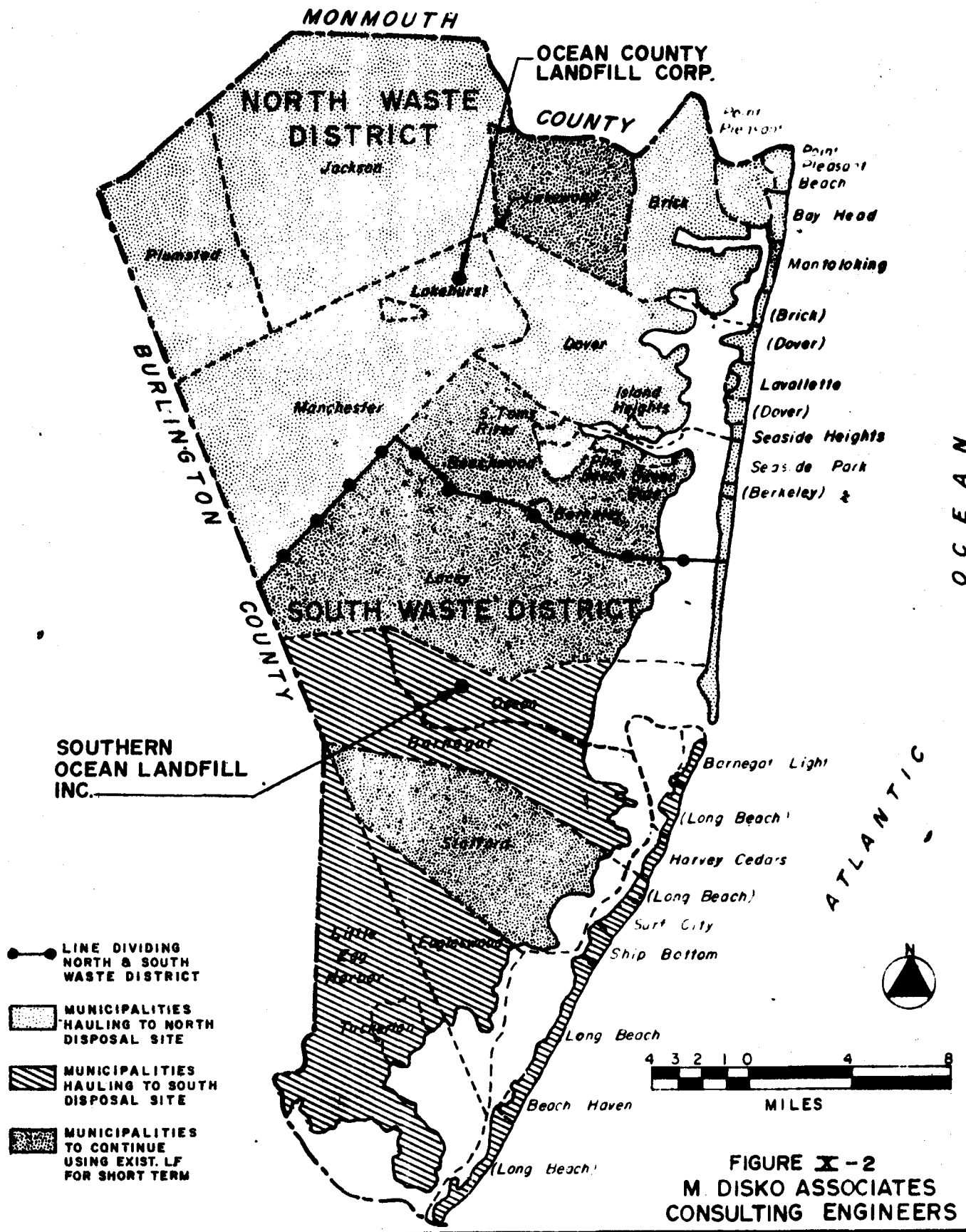
The line dividing the North and South Districts is not inflexible, The Plan allows the flexibility for municipalities who may be under contract with a particular existing landfill to continue to use the site until the contracts end.

GUIDELINE TWO - RESOURCE RECOVERY ELEMENT

Chapter 326 has as a requirement the eventual development of an implementable resource recovery system. The Ocean County Plan supports both high and low technology approaches to resource recovery. The potential for implementation of high technology

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

DISPOSAL STRATEGY USING TWO SECURE SANITARY LANDFILLS



resource recovery in Ocean County within the planning period will be further studied. Two actions are identified under this guideline. They are presented below.

ACTION ONE

A detailed investigation as to the proven resource recovery systems currently available and their potential for implementation in Ocean County will be made. With public control of most of the waste flow in the County, sufficient waste streams could be eventually directed to a resource recovery facility if a feasible system is implemented. Feasibility would be dependent upon consideration of technological, environmental, economic, and political factors.

After due consideration, Ocean County may opt to take the direction of phased implementation of high technology resource recovery. The advantages of this action is a much shorter time frame in which a resource recovery strategy can be implemented. Only marketable products would be recovered. Capital costs would be amortized over a longer period of time.

ACTION TWO

The County will continue to cooperate on developing the resource recovery strategy being implemented by Dover Township. Dover Township recently released a "Preliminary Feasibility Study for Solid

Waste Disposal/Energy Recovery System." The system consists of modular controlled air incineration units which can either generate steam or electricity. Markets have been identified and preliminary cost estimates developed. Dover Township has expressed willingness to include wastes generated in nearby municipalities. Dover Township is encouraged to continue their implementation program and to secure the necessary permits. This is viewed as complementary to the overall County resource recovery strategy.

The following benefits to be derived from the implementation of the system are identified which the Township feels it will gain:

- a. Immediate termination of the existing Dover Township landfill.
- b. Allows the township to develop the terminated landfill site into a recreational area.
- c. Allows the township to revitalize Kettle Creek which flows through the landfill site.
- d. Allows the design of a methane recovery plan.
- e. Recovers a valuable resource energy, through the combustion of solid wastes.

Dover Township also sees a number of benefits which the County would gain. These are presented below:

- a. Since Dover Township would reduce the volume of waste to be inputted into a regional landfill facility, an estimated 17% of the total residential waste produced by the County and 30% of the total commercial and industrial waste, operating capacity therefore, would be reduced, resulting in less operating equipment and personnel being required.
- b. Landfill life would be extended.
- c. The opportunity to monitor the viability of an in-county recovery effort.
- d. The amount of fossil fuels used by the energy market would be decreased.

Contingent on the success of the above action, Dover Township also has proposed that the system it intends to use could be implemented as part of a County program at the three regional waste water treatment plants operated by the Ocean County Utilities Authority, providing a location as well as a ready energy market. The success of the Dover project as well as the feasibility of similar facilities elsewhere in the County will be considered as part of the regional resource recovery study outline in Action One.

With respect to low technology resource recovery, source separation is the most practical approach. A number of programs exist at the local level currently in operation in Ocean County. Their impact on the waste stream is minimal but their efforts should be encouraged. The District should take a strong position in favor of source separation programs which are established on either a municipal or multi-municipal basis. A good example of a multi-municipal effort occurs in Monmouth County where six communities have banded together to form the Regional Resource Recovery Committee. This group is in the process of writing ordinances and preparing plans for mandatory collection of newspaper at the curb from all six municipalities.

A Regional Resource Recovery Program will be developed in Ocean County. Some possible actions which are recommended for the District include:

- A. The District Should act as a clearinghouse for information on the markets and current prices for the recovered materials and thereby aid the local groups.
- B. The District should encourage the remaining municipalities to begin recycling programs.
- C. The District should aid, wherever possible, the individual municipality's efforts at writing and implementing source separation or curbside collection ordinances.

GUIDELINE THREE - SLUDGE AND SEPTAGE MANAGEMENT ELEMENT

Another one of the responsibilities given to the Ocean County District under Chapter 326 is the comprehensive planning for the disposal of sewage sludges and septic wastes. The management of these wastes is becoming an increasingly critical problem because of State and Federal mandates which will prohibit ocean dumping by 1982 and the ever decreasing amount of land based alternatives available in Ocean County. Only one regional landfill, Southern Ocean Landfill Corp. now accepts septage and sludges. A general policy of the District is to restrict the use of available sludge disposal capacity to Ocean County municipalities for this facility or any future facility. Two actions are presented below. They incorporate both short and long term solutions to the management problem.

ACTION ONE

In addition to the Chapter 326 requirements, federal law and various other State regulations contain provisions requiring planning for sludge and septic waste management. Under Section 201 of the Federal Water Pollution Control Act, regional agencies are charged with the responsibility of planning and implementing sludge management facilities. Section 208 agencies have been given the task of planning for the treatment and disposal of septic waste. The apparent overlapping of

responsibilities appears to promote duplication of effort. A most logical approach in Ocean County would be a cooperative effort among the three planning agencies. A cooperative effort between OCUA, Section 208 planners, the Solid Waste Advisory Council and the Board of Chosen Freeholders can yield an implementable, long range sludge and septic waste management plan.

The end result can be the implementation of Facilities to treat and/or dispose of sludge and septic wastes. Disposal may be either at treatment plants, or at designated sanitary landfills. A number of alternative technologies including composting and codisposal will be considered.

The regional 201 planning agency, Ocean County Utilities Authority (OCUA) is on the State priority list for Federal funding to develop a comprehensive sludge management plan which would include septic waste management.

The Solid Waste Advisory Council has already indicated its support of the OCUA and its efforts to develop a plan. Full support however is contingent on a number of factors.

1. The ultimate management plan must include all areas of the County including areas in the western portion of Ocean County which are not considered to be in the service area of the OCUA.
2. Since the SWAC and the Board of Freeholders have been charged with sludge and septic waste management under Chapter 326, the SWAC should have a role in overseeing the development of the plan.
3. Septic waste management must be fully addressed and integrated into the ultimate plan.

Shorter term solutions are currently being developed by the OCUA. The regional plant which serves the Northern Service Area has been accomodating a limited amount of septice waste on an experimental basis. Federal funds are being applied for through the State for construction of a septic waste pre-treatment facility at the Authority's treatment plant for the Central Service Area. Construction of such facilities will help alleviate the periodic sludge and septic waste disposal problems which have recently plagued Ocean County.

ACTION TWO

Another strategy is to encourage sludge and septage disposal processes that have been developed by the private sector. Land based sludge and septic waste disposal facilities have been permitted in other counties in New Jersey. These facilities and the processes they use can be investigated. Methods suitable for implementation in Ocean County should be encouraged. Some of the technologies currently available which may be suitable in Ocean County include thermal reduction, soil injection, land spreading and composting.

The development of land based disposal facilities by the private sector can be complementary to ACTION ONE. It can provide ready alternate disposal options to the 201 agency which it may find acceptable and suitable to include as a part of its comprehensive disposal plan.

PROPOSED DISPOSAL STRATEGY

The planning strategy for the Ocean County Solid Waste Management Plan is illustrated on Figure X-3. The following steps describe the proposed strategy:

1. The existing solid waste disposal system consists of the 12 municipal landfills, 2 major private landfills in-county, and 3 out-of-county landfills. Figure X-2 illustrated the location of these landfills. The 1979 estimated average solid waste load is 2000 tons per day.
2. With input and guidance from the Solid Waste Advisory Council, the Planning Board, the Board of Freeholders, and the municipalities, the County would develop a system of two regional facilities for county-wide solid waste disposal. A decision would also be made on the appropriate study of resource recovery. This would occur in 1979-1980.
3. The District would initiate activities to monitor environmental factors, including surface and groundwater monitoring program. The Ocean County District would initiate design and construction activities to develop environmentally secure sanitary landfills. This would normally occur in the period 1979-1981. During this period, some municipalities would continue to use their existing disposal sites while the majority would begin to phase into the regional system. Also, during this period an evaluation would be made of the feasibility of mandatory source separation of materials recoverable from the residential solid waste stream. The feasibility of District coordination of such a program would be evaluated.
4. During the period of 1981 through 1990, Ocean County would oversee the operation of regional environmentally secure sanitary landfills. Depending upon the previous evaluations, an appropriate level of District input would be allocated to assisting the operation of a regional source separation program.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE MANAGEMENT PLANNING STRATEGY

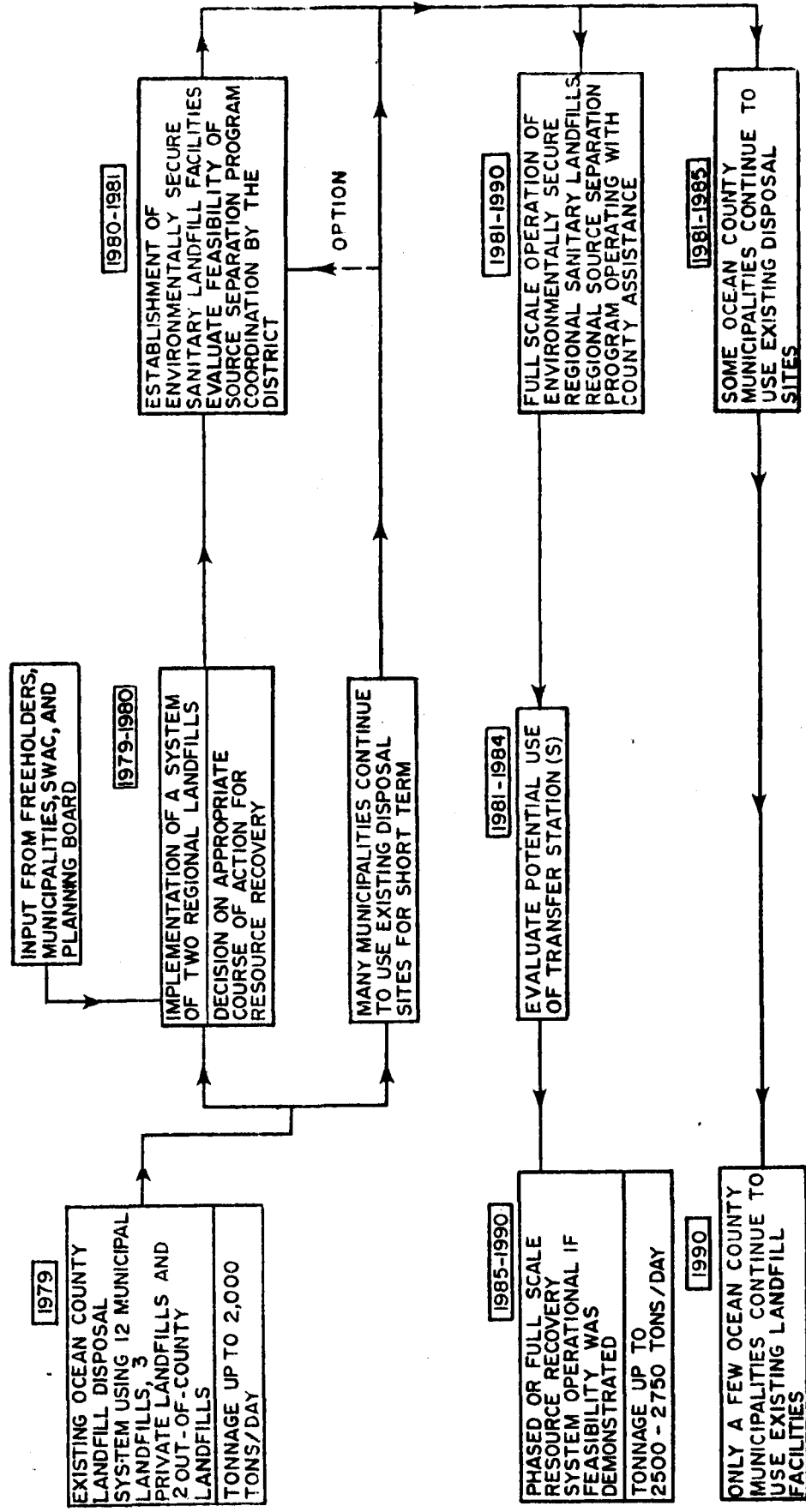


FIGURE I-3
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

5. During the period 1980 through 1984, Ocean County would evaluate the potential siting and use of transfer stations.
6. By the 1985 through 1990 period, the County tonnages are expected to be in the 2500 to 2750 tons/day range. Depending upon decisions made earlier in the 10 year planning period a full scale or phased resource recovery system may be operational during this time period.

IMPLEMENTATION OF THE OCEAN COUNTY DISTRICT PLAN

Figure X-4 illustrates the basic steps required to implement the proposed Ocean County District Solid Waste Management Plan.

A description of the important steps follows:

1. Once the plan is adopted by the Board of Chosen Freeholders and approved by the Solid Waste Administration of the New Jersey Department of Environmental Protection, a basic decision is required to determine the administrative structure required to manage facilities proposed for District operation. A County Department could be designated as the operating agency or some form of authority can be created as allowed under a number of New Jersey laws.
2. Concurrently with the above, negotiations must be initiated to implement the regional system of two landfills. A variety of ways can be used to achieve this end. Two existing private facilities can be purchased, or a municipality can act as the County's agent in the operation of the Ocean County Landfill Corp., and/or a virgin site can be purchased in the Southern portion of the County for development of a new regional facility.
3. After initial agreements are reached all applications necessary would be filed with the Department of Environmental Protection and the Board of Public Utilities. The permits as well as County policy will require that out-of-county waste be prohibited from coming into the District. Existing contracts would be honored until their expiration, but no new contracts would be allowed from out-of-district wastes.
4. Along with step number 3 above, engineering designs should be prepared for the 2 disposal facilities which will make up the base of the District management plan for solid waste. Environmental safeguards required by the State will be carefully designed. Environmental safeguards could include leachate collection and treatment, capping previously landfilled areas to reduce leachate production, constructing bottom liners, installing additional groundwater monitoring wells and gas vents, etc.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

SOLID WASTE MANAGEMENT - INITIAL IMPLEMENTATION STRATEGY

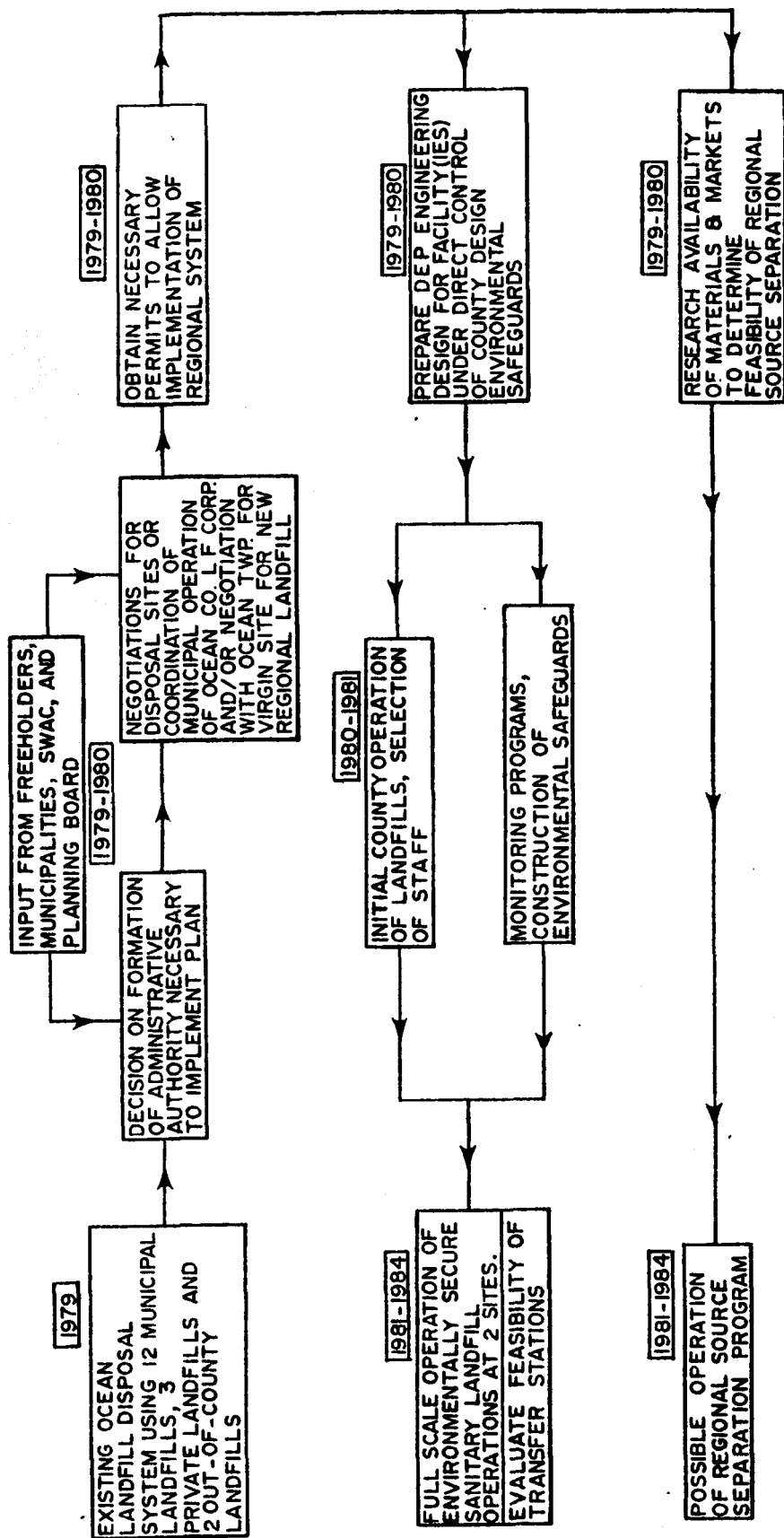


FIGURE I-4
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

5. A study should be made of the availability of materials and markets to determine the feasibility of a regional source separation program.
6. Once all the legal and administrative hurdles have been overcome, initial operation of the disposal facilities can begin. Staff for the facilities would be selected and trained. Initial construction of the monitoring program and development of environmental safeguards would begin.
7. By 1981, full scale operation of the regional sanitary landfill system could be underway. A study would be initiated to evaluate the feasibility of transfer stations on either one or both of the islands.
8. Based on the results of the study of the feasibility of a regional source separation program, a program with some level of County participation could be initiated around 1981.

In summary, the above discussions attempt to explain how the Ocean County District Solid Waste Plan attempts to coordinate all activities related to the collection and disposal of solid waste by every person engaging in such process within the District.

ADMINISTRATIVE AND FINANCIAL CONSIDERATIONS

The County of Ocean's favored alternative is the establishment of a County department run under the control of the Board of Chosen Freeholders to implement the solid waste management plan. The County department gives the strongest direct control to the Board of Chosen Freeholders. The enabling legislation for the County Department is the "County Solid Waste Disposal Financing Law" of 1970. This law was the first major piece of legislation that identified the County as a solid waste disposal region. The law permits any county to float general obligation bonds to finance the purchase, construction, or improvement of solid waste disposal facilities and to enter into contracts with

municipalities and private solid waste disposal companies for the use of the facilities. The key points of the legislation are highlighted below:

N.J.S.A.
40:66A-31.1
et. seq.
"County Solid
Waste Disposal
Financing Law"

Permits any county to purchase, construct, improve, or enlarge solid waste disposal facilities within said county either alone or jointly with any municipality, joint meeting or incinerator authority within the county.

The county may provide and furnish its services to any municipality within the county.

Counties are permitted to float general obligation bonds to finance any solid waste facility and to fix and collect rates and fees for services provided.

Counties may acquire by gift, grant, purchase, or by exercise of the right of eminent domain, any land within the county. Land owned by any governmental unit cannot be acquired without its express consent.

Counties may enter into contract with any government, corporation, or individual for the furnishing of disposal facilities, either by or to the county.

The resolution of the Board of Chosen Freeholders to exercise the powers delegated to it in this statute must be submitted to the Commissioner of the N.J.D.E.P. The county is required to make any studies, borings, plans, drawings, etc., which the Commissioner deems necessary. No county can proceed to exercise the powers of this statute without the Commissioner's approval.

Counties may enter into contracts with municipalities, within or adjoining the county, joint meetings, incinerator authorities, and, on uniform terms, with all private solid waste collection and disposal companies for the use of its disposal facilities.

Counties can assume entire cost either entirely by itself or share the costs with other participating governing bodies.

The administrative structure favored by Ocean County, the County Department, has the legal, administrative, and financial resources to effectively implement and maintain the solid waste plan. The important criteria that the administrative structure must meet include:

A. Financial Capabilities

The County Department has the financial resources to raise capital for the purchase, operation and maintenance of the facility. The specific financing mechanism will be discussed later in this chapter.

B. Regionalism

The County Department as the administrative structure insures the best geographical boundary in terms of political management, population and existing disposal patterns. The County boundaries, as the region serviced by the disposal facilities regulated through the County Department, has worked successfully in Monmouth County and it addresses the legal responsibilities as mandated by Chapter 326 of giving the County the prime responsibility for implementing a waste disposal plan.

C. Ability to Acquire Land

The County Department can acquire land by gift, grant, purchase, or by exercise of the right of eminent domain.

D. Ability to Control Wastes Entering the System

After implementation of the County plan, the County Department will petition the B.P.U. for a new tariff schedule. The tariff schedule would apply only to waste originating from within Ocean County. Thus, the tariff as approved by the B.P.U., would effectively prohibit out-of-county waste from entering the regional disposal sites. The precedent for this action has previously been set by the Monmouth County Reclamation Center in Tinton Falls with their tariff schedule which prohibits out-of-county waste from the Center.

E. Management Capabilities

The County Department has strong management capabilities because it can draw on the existing resources of the County Administration. For example, the planning, engineering, roads and public works, legal and financial resources of the County are available to the County Department.

In addition, the County Department enables the Board of Chosen Freeholders to maintain tight control. The legislation of Chapter 326 states that the Freeholders must review and update, if necessary, the Solid Waste Plan every two years. The County Department, as an arm of the County Administration, is most responsive to the Freeholders.

Under the favored alternative, the County Department, the County of Ocean intends to finance the acquisition of disposal sites through Dedicated Utility Funding. Under this form of financing, the County will float bonds to raise sufficient capital to acquire the sites it decides upon. The repayment of the bond would be financed through revenue generated from the on-going disposal operations at the sites acquired. The operation costs, as well as maintenance and replacement costs, would also be funded from revenues.

At the present time, the capital costs for acquiring the two private facilities, if that course of action is pursued, are approximately as follows:

<u>SITE</u>	<u>ACREAGE</u>	<u>COST</u>	<u>COST/ACRE</u>
Ocean County Landfill Corp.	303±	\$2.4 Million	\$8000.00±
Southern Ocean Landfill Inc.	283±	\$2.0 Million	\$7000.00±

These costs are based on recent real estate appraisals. Costs might be reduced through successful negotiation with current owners.

The cost of capital improvements to line landfill, provide ground-water monitoring, cap existing landfill areas, etc. in order to insure an upgraded, modern landfill operation would be in the range of \$15.000. to \$25.000. per acre. Small sections of landfill area could be developed as needed yearly to minimize capital costs.

If it is decided that Manchester Township is to act as the agent for the County in owning and operating the Ocean County Landfill Corp., the capital expense or acquiring and upgrading that facility is eliminated. If it is decided that a virgin site is to be selected for a regional facility for the southern part of the County, then aquisition costs will be significantly less. The ability to obtain the necessary permits for a new disposal facility is an important factor to consider, and one which hasn't been clearly defined as of yet.

ENVIRONMENTAL UTILIZATION OF TERMINATED LANDFILL SITES

Chapter III of this study contains a detailed discussion of terminated landfills. The termination of a landfill as required by law is presented, strategies for landfill termination are discussed, the authority, or the lack of it, given to the District to terminate a landfill is detailed, and the uses of terminated landfills are outlined. At the end of the section, Table III-6 presents data on terminated landfills in the District. The final column presents the present uses. Twelve out of the fifteen terminated landfills are being put to valuable use. The three other sites had been terminated within the last five years. It is possible therefore that the sites have not stabilized enough to allow an active use of them. Evolution of landfill gases and differential settlement of the surface makes many uses difficult within a short time frame. Care should be taken, however, to insure that these facilities are not creating negative

environmental impacts. As part of the Ocean County District Plan, an investigation will be made of the status of these facilities. The implementation of environmental controls, such as those suggested in Chapter III, are a necessary measure if indeed these recently terminated sites are significantly impacting the environment.

APPENDIX A

STATE OF THE ART REVIEW OF SOLID WASTE PROCESSING AND DISPOSAL METHODS

INTRODUCTION

Solid waste disposal has become a focal point of many local, county, state, and national planning and environmental agencies across the country during this decade. Much more information is now known about the composition of solid waste, its affect on surface and groundwater systems when land disposed, and the material and energy values within it.

Since the beginning of real environmental awareness in the early 1970's, the entire concept of burying solid waste and literally throwing away potential revenues and energy is being critically reviewed. Major facilities are currently being constructed across the country which are implementing recently developed techniques of material recovery and energy recovery.

There are a number of important factors which must be evaluated before any one method of processing and disposal is chosen. Some of these factors include:

- . Capital costs for equipment, site work and facilities
- . Annual operating and maintenance costs
- . Flexibility and adaptability to change
- . Availability and stability of material and energy markets
- . Availability of the waste load necessary to reach economics of scale

Note: This section has been developed for overall solid waste planning for Monmouth, Hunterdon, Ocean and Union Counties.

- . Ability to adapt existing solid waste collection systems to disposal method
- . Considerations affecting site selection and environmental protection
- . Public acceptance and support for method of disposal
- . Compatibility with present and future source separation programs

This chapter will now be devoted to a discussion of the various solid waste processing and disposal methods that are available today. Emphasis shall be placed on resource and energy recovery systems.

SANITARY LANDFILL

A sanitary landfill is a method of disposal whereby solid waste is placed on the ground or in trenches, compacted for volume reduction, and covered with soil at the end of each day's operation. There are essentially three methods of sanitary landfilling which are described as follows:

The Trench Method, or cut and cover method typically employs a series of parallel trenches that are excavated with a drag-line, bulldozer or other earth-moving equipment. Generally, the trenches are about 10 to 20 feet deep, about 20 feet wide, and 100 or more feet long. The refuse is dumped into the trench and compacted by rolling with heavy earth-moving equipment. The cover material used for the daily 6 inch cover and the final 2 foot cover is obtained from the next trench. When the landfill is completed, the site will consist of a series of long, parallel solid waste cells. An advantage of the trench method is that upon completion of the landfilling operation, the original topography of the site has essentially remained unchanged. The trench method cannot be used in areas of high groundwater.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

CROSS SECTIONS OF VARIOUS LANDFILLING METHODS

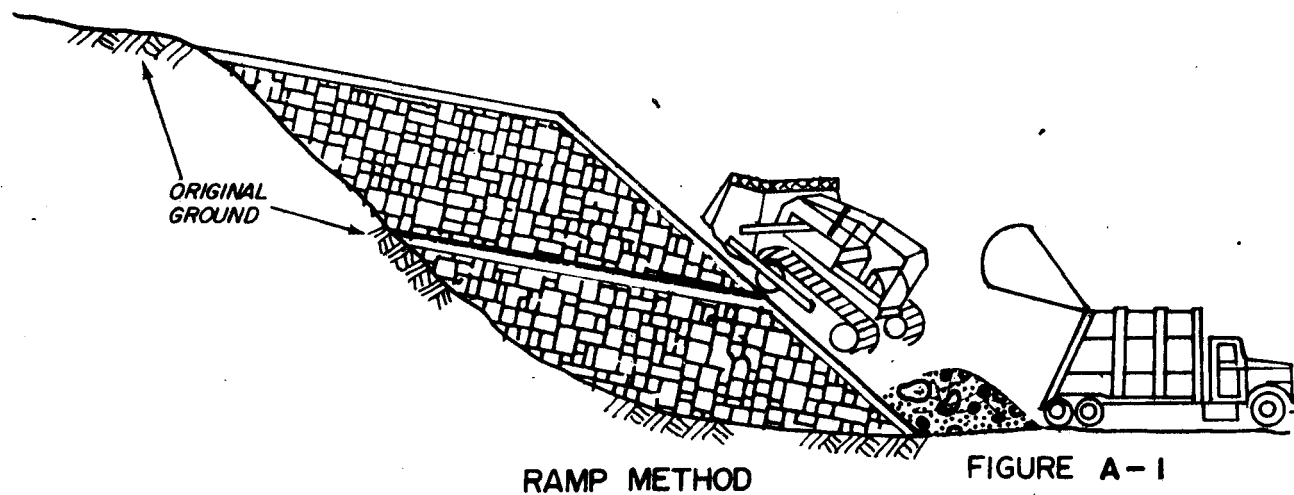
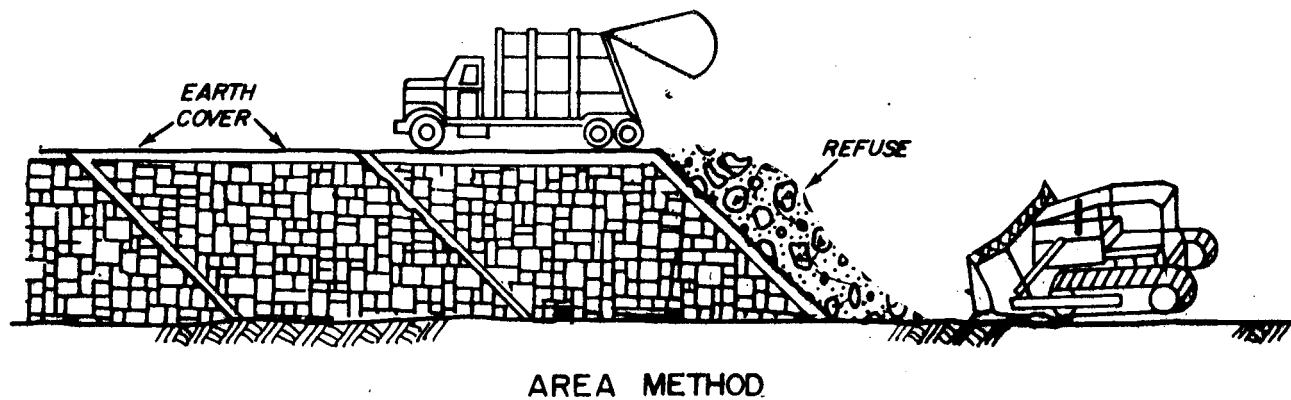
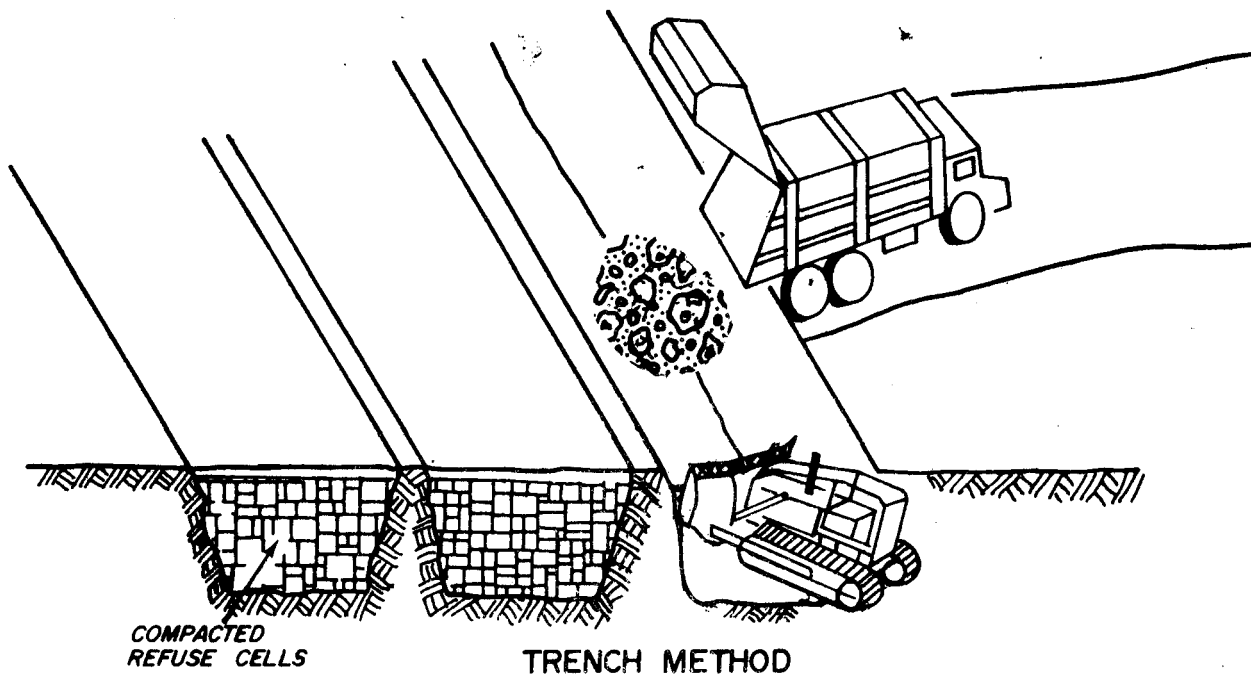


FIGURE A-1
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

The Area Method, or fill and cover method, is the most common method used in the District. This method consists of placing refuse on an essentially flat area, compacting the refuse with heavy equipment, and covering the refuse with soil. Generally, cells 10 to 12 feet high are created. The landfilling operation continues until the area has been utilized. Many landfills using this method employ several lifts to increase the volume of the landfill. This method is used to fill and reclaim low-lying land, quarries, ravines or other depressions. Cover material is either obtained from the landfill or it must be trucked onto the site.

The Ramp or progressive slope method is used where large quarries, canyons or ravines are available to be filled. This method is not used extensively in the District. The solid wastes are dumped onto a working face, compacted, and covered. The slope of the working face is usually about 1 vertical on 5 horizontal. Bulldozers push the refuse up or down the working face to maintain the slope compacting the material as work progresses. Cover material is obtained from the base of the working face or it is trucked onto the site from other areas.

Sanitary landfilling reduces the environmental hazards associated with open dumping. A well-run landfill will have a minimum of environmental problems. Such nuisances as blowing paper, insects, vermin, odors and fire hazards can be greatly reduced by simply covering the refuse at the end of each day's operation. However, groundwater pollution from leachate, methane gas dangers, odors, and insects can be a problem even in a well-run landfill. It is important to stress that a sanitary landfill, in one form or another, must be an integral part of any complete solid waste disposal scheme. Even if resource recovery is employed, a certain percentage of the waste will be non-usable residue which will require ultimate disposal in a sanitary landfill. Table A-1 lists some of the advantages and disadvantages of the sanitary landfill as a method of solid waste disposal.

TABLE A-1

ADVANTAGES AND DISADVANTAGES OF
SANITARY LANDFILL FOR SOLID WASTE DISPOSAL

ADVANTAGES

- . A sanitary landfill can be an economical method of disposal provided a large tract of land is available. Costs range between \$2.50 and \$4.50 per ton in New Jersey.
- . The landfill site can reclaim marginal land. When completed, mined areas or marginal land can be utilized for recreational uses or light construction.
- . Sanitary landfill is a reliable, proven method of solid waste disposal.
- . A landfill is necessary to receive residue from the other solid waste disposal systems, Pyrolysis, incineration, and complete resource recovery still have a small percentage of residue that must be landfilled.

DISADVANTAGES

- . The New Jersey Department of Environmental Protection has instituted environmental criteria that requires landfill operators to install monitoring wells, leachate collection systems, etc. The costs of landfilling, therefore, have increased in recent years.
- . Landfilling is wasteful. The refuse contains large quantities of recoverable metals and energy. Burying the refuse makes recovery of these potential resources nearly impossible.
- . The landfill operation can impact adjacent land uses.
- . The landfill can be visually objectionable if it is not buffered from roads, residential areas, etc.
- . The landfill requires large acreages of land. In densely populated areas, it is difficult to acquire the large areas of land necessary.

RECOVERY OF LANDFILL GASES

The generation of methane and carbon dioxide has always been a fact of landfill operation. There are currently a number of projects which are aimed at recovering this gas and processing it at a grade which can be commercially distributed. The projects are as follows:

Azusa, California - Azusa Land Reclamation Company - began operations in April 1978

Mountain View, California - City of Mountain View; EPA; Pacific Gas and Electric Company - in shakedown

Palos Verdes, California - Los Angeles County Sanitation District; Reserve Fuels, Inc. - operational

Staten Island, New York (Fresh Kills Landfill) - New York City Resource Recovery Task Force; Brooklyn Union Gas Company, Inc.; L. S. Wegman, Inc.; New York State Energy Research and Development Authority - plan to enter demonstration phase of project

One other facility, in Pompano Beach, Florida, will be discussed in greater detail. The facility is located on an existing privately owned and operated landfill with shredding capacity now serving an area around Pompano Beach, Florida. The U. S. Energy Research and Development Administration provided the funds necessary to construct the demonstration plant to show the feasibility of commercial production of methane from the anaerobic digestion of solid waste and sewage sludge. Preprocessing includes shredding, magnetic separation, trommeling and air classification prior to digestion. The facility will be operated by Waste Management, Inc., the owner of the landfill.

Parameters to be examined include temperature, residence time, ingredient mixtures, supplementary nutrients, and others. The initial mixture includes 95 percent solid waste and 5 percent sewage sludge. Gas produced is estimated to have a heating value of 550 to 750 BTU/standard ft.³ and is initially being used for process energy with the excess being flared.

VOLUME REDUCTION TECHNIQUES

One of the most recent advances in solid waste processing and disposal is the growing use of volume reduction techniques coupled with sanitary landfilling and/or resource recovery. Shredding, milling, pulverizing, and other size reduction operations take relatively heterogeneous solid wastes and shred them into a smaller, more homogeneous mixture, of relatively uniform size. The following types of size reduction equipment are in use:

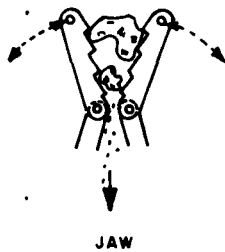
1) crushers, 2) shears, 3) shredders and chippers, 4) rasp mills, 5) drum pulverizers and 6) hammermills. The hammermill design is used in most of the volume reduction installations in the country.

Figure A-2 illustrates the various volume reduction techniques for solid waste processing which include the following:

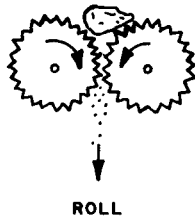
Crushers. Of the four types of crushers illustrated on Figure A-2 the impact crusher has the most universal application. The impact crusher is a form of hammermill which rips or tears the materials introduced to it between two surfaces. The jaw, roll, and gyrating crushers employ the force of compression to reduce the size of the influent waste material. These units function best when friable material is used. At the present time, their main applications are in mines and quarries. However, their application in the reduction of solid waste is most promising for materials such as glass, porcelain, etc.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

BASIC REDUCTION PRINCIPLES OF CURRENTLY MANUFACTURED SIZE REDUCTION EQUIPMENT



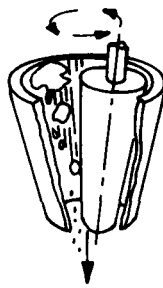
JAW



ROLL

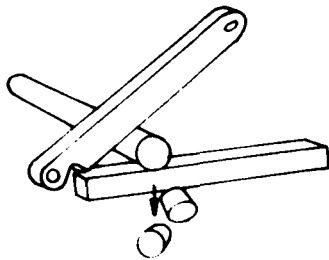


IMPACT



GYRATING

CRUSHERS



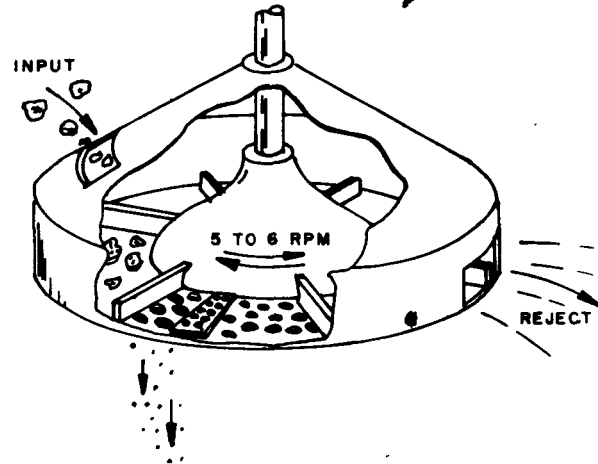
SINGLE ALLIGATOR-TYPE

SHEARS

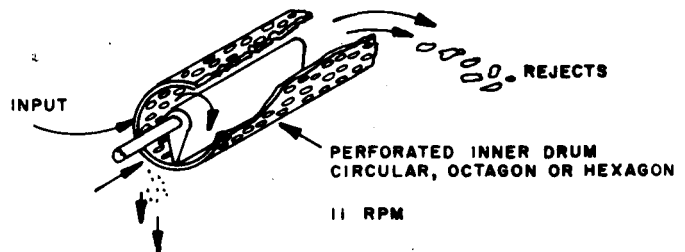


PIERCE AND TEAR TYPE

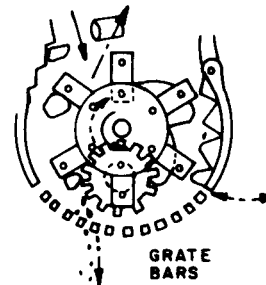
SHREDDERS AND CHIPPERS



RASP MILLS



DRUM PULVERIZERS



HAMMERMILLS

SOURCES: RECOVERY AND UTILIZATION
OF MUNICIPAL SOLID WASTE,
SOLID WASTE MANAGEMENT
REPORT SW-106, 1971

FIGURE A-2
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

Shears. The use of the single-blade shear in size reduction is directly applicable to solid wastes. The shear employs the use of shear forces to cut material introduced to it. Existing shears vary from the alligator-type shown in Figure A-2 to multiple-blade hopper types for large-scale processing. Primarily, the shear could be used to reduce bulky items like large appliances, lumber, demolition wastes, and junked automobiles. The single-bladed shears are most applicable for use on metals from a wide variety of sources. Multiple-blade shears are most commonly employed for continuous, automatic reduction of lumber products, furniture, and other oversized items.

Shredders and Chippers. Shredders and chippers which are suitable for use in the solid waste field are the pierce-and-tear shredder, the mobile waste chipper, and the large automobile-type shredder. The pierce-and-tear shredder operates using tension and shear forces to reduce the influent material. Through the use of overlapping fingers, which are relatively dull and operated at various pre-set speeds, the shredders pierce, tear, and shear the material introduced to them. The application of these units is best suited to fibrous or ductile material like paper and paper products. The mobile waste chipper is most functional for yard-type wastes such as branches and small trees because of the need for sharp blades to perform the cutting action. The larger shredders which are used to reduce bulky items like whole automobiles operate using the principles of tension and shear for reduction and are basically a type of large hammermill.

Rasp Mills. A rasp mill is a multi-purpose unit which employs all three forces used in size reduction: tension, compression, and shear. The illustration of Figure A-2 of the rasp mill shows the processes used in a typical unit. The unit is cylindrical in design with diameters in the range of 20 feet. Through the large input opening on the conical top section, a wide variety of solid wastes can be introduced to the unit.

The waste is reduced in size as it passes over the rasping pins. To bring the waste in contact with the pins, the internal rotor, which operates at 5 to 6 RPM, swings the heavy connecting arms around and moves the wastes to the pins. As the size of each particle reaches the proper reduction, it falls through the outlet at the bottom of the unit. Through the design of the unit, the mill has been made self-limiting. If an item is too bulky to be reduced by the unit, in time it will be moved to the exit port and rejected. At this time, most applications of rasp mills are in composting plants.

Drum Pulverizers. The drum pulverizer operates on basically the same process as the rasp mill. The basic unit consists of a rotary drum of approximately 10 feet in diameter and the pulverizing unit. The drum itself can be either circular, octagonal, or hexagonal in design and can revolve at speeds up to about 10 RPM. A churning effect can be produced with the unit by the addition of stationary or contra-rotating beaters or baffles. As the particles are reduced, they are forced through the openings in the drum and out of the unit. The exit holes can be graduated to obtain a rough size separation.

Hammermills. The hammermill design of equipment for size reduction is the most widely used in the solid waste field. The basic two designs of hammermills are the swing hammer and rigid hammer. Units can be designed for either a vertical or horizontal position. Each type of hammer can vary greatly in design. Swing hammers vary from the rectangular block design, to sharp choppers and flexible flails, to a ring hammer with multiple wearing corners. The rigid hammers can vary in design from the thin, sharp choppers to the wide, blunt impact-crusher type. A common practice with these units is to provide for clearance and adjustments to compensate for wear. An additional feature employed on some units are plate conveyor-type impact surfaces, which decrease wear and provide an anti-jamming effect.

The hammermill employs the forces of tension, compression, and shear to effectively reduce the size of the wastes. If the exclusion of durable bulky items is desired, the hammers can be designed to swing upward. This upward swing will cause any object not readily amenable to reduction to be thrown upward and out of the unit. Even though hammermills can accept a wide variety of materials, the adjustment of the feed rate is most critical for obtaining efficient operation.

SHREDDING AND LANDFILLING

The introduction of volume reduction techniques to landfilling has substantially improved the overall operation. Although originally practiced in Europe in connection with composting operations, there are many installations throughout the United States that have proven the value of shredding solid waste prior to landfilling. Some of the installations include Madison, Wisconsin; Pompano Beach, Florida; Tacoma, Washington; Vancouver, Washington; New Castle County, Delaware; Syracuse, New York;

DeKalb County, Georgia. In addition to these operating facilities, there are many that are in the planning or construction stages throughout the Country.

Shredding reduces solid waste to a homogeneous mixture of uniform particle size. There are many benefits to landfilling the shredded refuse, some of which include:

- . Landfill space is reduced, hence landfill life is extended.
- . Odors are reduced because food particles are scattered and absorbed by the paper refuse.
- . Fire hazards are minimized because of the great reduction in air spaces and voids.
- . Shredding reduces bulky items, such as refrigerators, to more manageable proportions.
- . The visual impact of conventional landfills is eliminated because shredding reduces large objects (refrigerators, mattresses, washing machines, etc.) to smaller, less objectionable pieces.
- . Vermin and insect problems are reduced because food particles are dispersed and absorbed by the paper.
- . Landfill settlement is reduced because of the reduction of the voids and the greater compaction densities.
- . Shredding enhances separation of metals for reclamation because of the small, uniform particle size and the general reduction of entrapments.
- . Decomposition of shredded materials is generally faster than ordinary landfilled materials, the shredded materials decompose to a relatively inert fill.
- . Drifting paper is reduced because the small, shredded paper components are not easily moved by the wind.
- . A shredding facility is the first step in resource recovery processing. Additional components can be added to reclaim materials after the shredding operation.

The cost of a shredding plant is in the range of \$2.0 to \$3.0 million for a 500 ton-per-day plant. Operating cost for the shredding and landfilling operation range from about \$4.50 to \$7.00 per ton. Costs for land acquisition are additional.

INCINERATION

Incineration is a process by which materials are reduced through controlled combustion, primarily to carbon dioxide, other gases, and ash or frit. Incineration is not a complete disposal operation; it is primarily a volume reduction process. The end products of incineration, the residues and the gases emitted into the atmosphere, require additional disposal or processing. Gas and particulate matter must be cleaned from the stack emissions, and the residue, which is inert and relatively free of organics must be landfilled. Volume reduction by incineration of municipal solid waste is approximately 75 to 90 percent and the weight reduction in the combustible portion is usually from 98-99 percent. Approximately 75-90 percent reduction, by weight, of the total incoming refuse can be achieved.

In typical conventional incinerators, refuse burns on moving grates in refractory-lined chambers, and combustion gases and entrained solids burn in secondary combustion chambers. Temperatures of about 1200°F to 1800°F are maintained by controlling the air flow. Higher temperatures in conventional incinerators result in the formation of slag (molten metal) on the grates and refractories.

Figure A-3 shows a schematic of a typical municipal solid waste incinerator. Many methods are being used to control stack emissions which are dominantly fly ash. Proper design and operation can prevent emission of odors.

There are several important criteria that should be considered when planning an incinerator facility. Some of these include:

- . Characteristics of the site
- . Physical plant layout and process design
- . Structural design of supporting systems
- . Facility to be located in industrially zoned area
- . Minimum impact with operation or appearance of surrounding buildings and land use
- . A comprehensive public relations program should be instituted

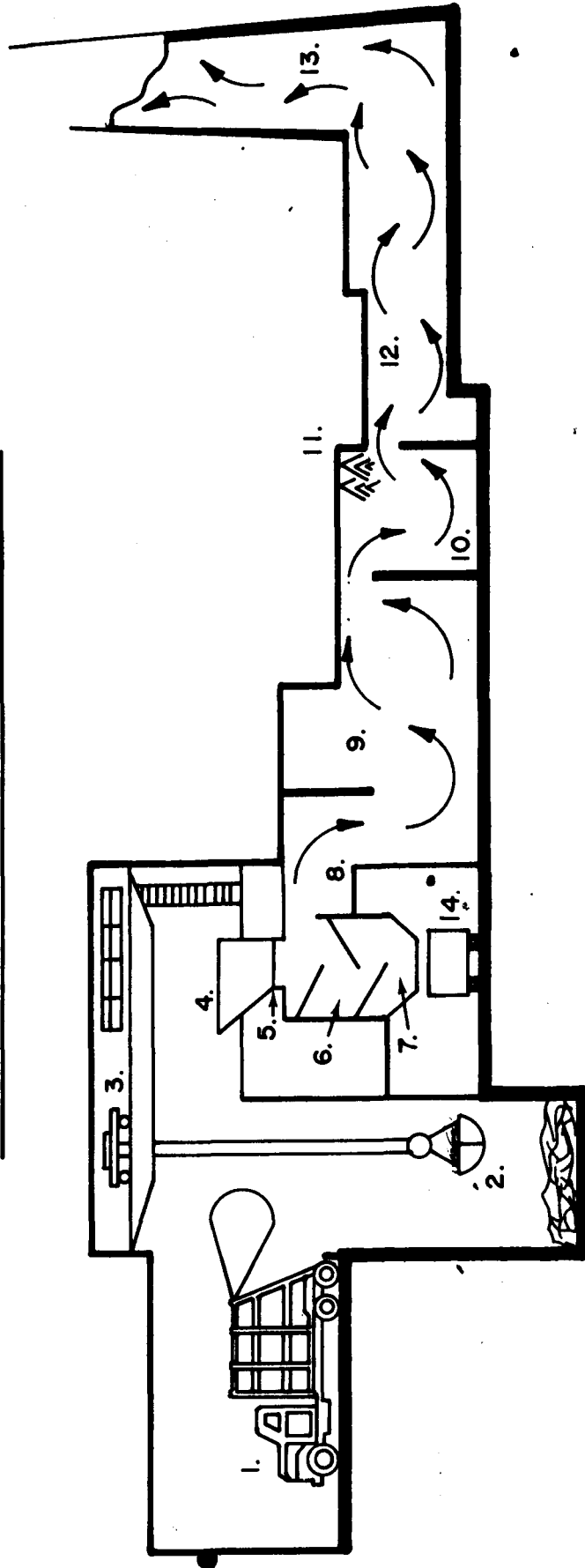
Air pollution abatement equipment necessary to meet local, State and Federal air pollution codes is very expensive. On smaller incinerators (under 400 tons-per-day) the cost of this equipment can double the capital cost of the facility and even on larger units, it amounts to an appreciable percentage.

Air pollution control equipment currently being used to meet the codes includes: mechanical cyclones, wet scrubbers, filter bag collectors, and electrostatic precipitators. These devices are efficient in removal of particulate matter. Smoke or submicronic particles can be eliminated by proper combustion control in the furnace, or by collection in bag filters and electrostatic precipitators. Odors can be controlled by wet scrubbers.

It is important in comparing the costs of air pollution control

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL REFUSE INCINERATION SYSTEM



LEGEND

- | | | |
|--------------------|-----------------------|------------------|
| 1. DISCHARGE FLOOR | 6. FURNACE | 11. WATER SPRAYS |
| 2. STORAGE BIN | 7. ASH HOPPER | 12. FLUE |
| 3. BRIDGE CRANE | 8. COMBUSTION CHAMBER | 13. CHIMNEY |
| 4. CHARGING HOPPER | 9. EXPANSION CHAMBER | 14. ASH REMOVAL |
| 5. HYDRAULIC GATE | 10. FLY ASH REMOVAL | |

FIGURE A-3
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equipment to include both capital costs and operating costs. For example, the initial cost of the high efficiency devices (scrubber, electrostatic precipitator, and fabric filter) are three to six times the cost of lower-efficiency devices (settling chambers, cyclones, multi-cyclone). However, while an electrostatic precipitator is high in initial cost, about twice the cost of a scrubber, the operating costs of an electrostatic precipitator are only about 30 per cent of those for a scrubber. Table A-2 gives efficiencies of removal for various air pollution control devices.

There are several advantages to incineration of municipal solid waste including:

- . Incineration is a volume reduction process. The residue, which is inert ash, is relatively stable and presents little environmental hazard. Landfill acreage requirements are reduced because the volume of waste requiring landfilling is small.
- . Since an incinerator facility can be sited on ten or twelve acres of land, as opposed to several hundred acres for landfill, it can be located in an industrially zoned area near the center of population. This reduces haulage costs.
- . Waste heat can be recovered in the form of steam from municipal refuse-burning incinerators. Municipal refuse averages about 10 million BTU's per ton.
- . The incinerator operation is independent of the climate or weather.

Some of the disadvantages of municipal solid waste incineration include:

- . Incineration is in a period of change and experimentation.

TABLE A-2

AVERAGE EFFICIENCY FOR AIR POLLUTION CONTROL DEVICES

<u>TYPE</u>	<u>VOLATILE METALS</u>	<u>MINERAL PARTICULATES</u>	<u>NITROGEN OXIDES</u>	<u>SULFUR OXIDES</u>	<u>HYDROGEN CHLORIDE</u>	<u>POLYNUCLEAR HYDROCARBONS</u>
None (flue only)	2	20	0	0	0	10
Water Spray Chamber	5	40	25	0.1	10	40
Mechanical Dry Cyclone	0	70	0	0	0	35
Wet Scrubber	80	90	65	1.5	95	95
Electrostatic Precipitator	90	99	0	0	0	60
Fabric Bag Filter	99	99.9	0	0	0	67

Removal efficiency in percent of weight

Recently, stringent air pollution codes have forced many incinerators, some only a few years old, to either spend millions of dollars to upgrade or close down.

- . Incinerators involve high initial capital costs and operating costs (\$7 to \$20. per ton for a 1000-ton-per-day facility). It is one of the most expensive methods of solid waste disposal.
- . Incineration wastes materials and energy that have potential value if reclaimed. Metals, glass, and energy in the form of paper can be reclaimed from municipal refuse for recycling. Incineration hinders and destroys much of this potential for recycling.
- . Incinerator residue ultimately requires a sanitary landfill for disposal.

In recent years, stringent new environmental regulations have forced many incinerators to upgrade their operation. As a result of this, technology in the incinerator field has advanced rapidly bringing forward many new designs and systems. Some of these systems include: 1) fluidized bed incineration, 2) ultra-high temperature incineration, 3) heat recovery incinerators, 4) development of air pollution control devices, and 5) pretreatment of refuse by shredding.

FLUIDIZED BED INCINERATION

A fluidized bed incinerator consists of a layer of inert material, usually sand and some fine ash which is suspended by an air stream entering at the bottom of the bed. Initially, air and a fuel (propane, oil, etc.) are fired and passed through the sand bed. This action pre-heats the sand particles to combustion temperature and acts to suspend the sand. Solid waste is injected into the bed and is efficiently incinerated. The combustion of the waste supplies enough energy to maintain

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL FLUIDIZED BED INCINERATOR

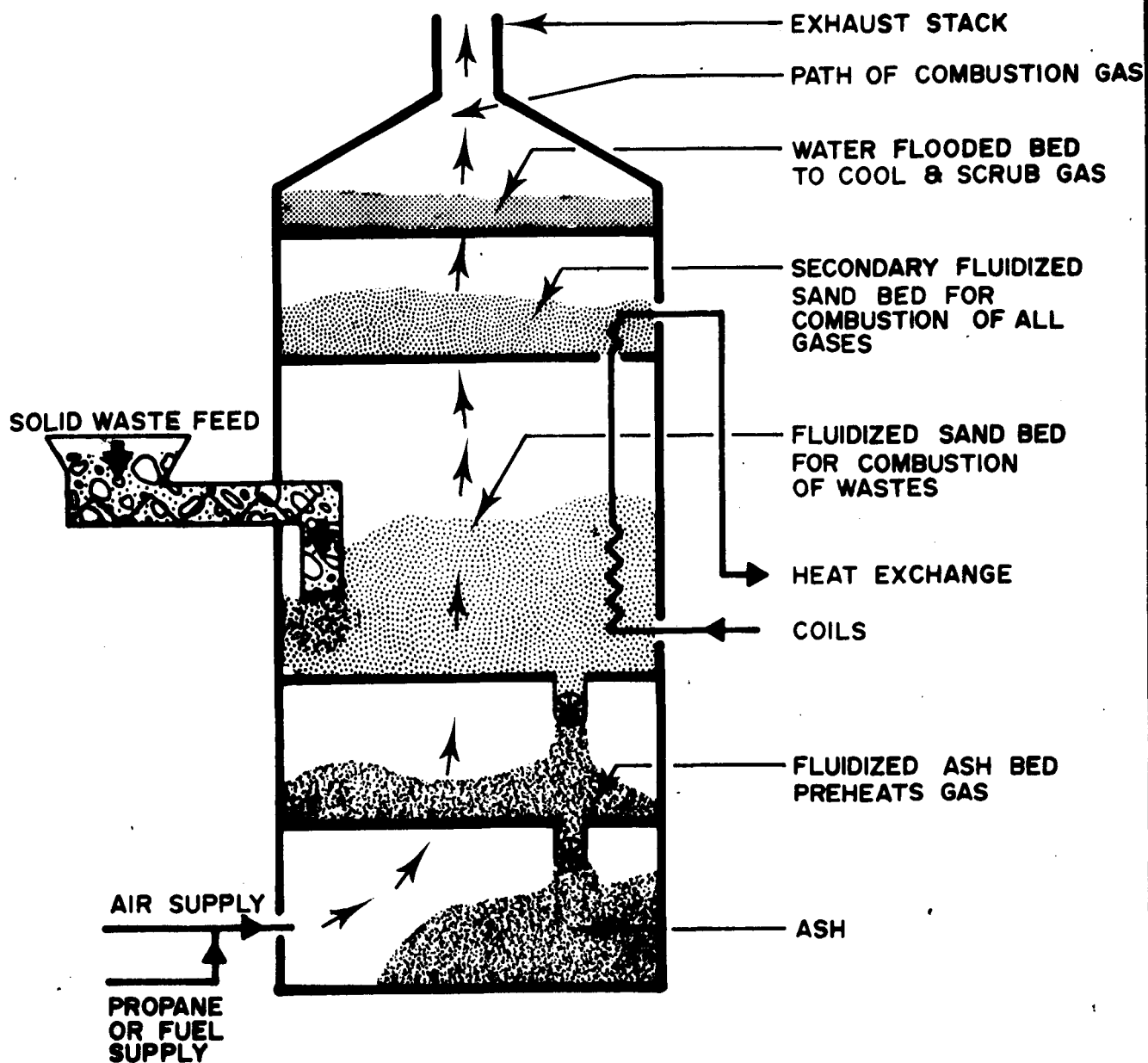


FIGURE A - 4
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the temperatures in the sand bed. The auxiliary fuel supply is only needed to initially heat the bed to the proper temperature and make up any small heat losses. The fluidized bed incinerator is still in the experimental stage. If perfected it will produce less pollutants to control and will be able to burn refuse rapidly and completely than conventional incinerators.

ULTRA-HIGH TEMPERATURE INCINERATION

Ultra-high temperature incineration is a combustion process in which temperatures in the range of 2600°F bring about nearly complete reduction of combustible solid waste. Reportedly, the end products consist of a gaseous combustion product and a molten slag. When quenched in water, the slag becomes an inert material, usable as a fill material or aggregate. The initial capital costs are high for ultra-high temperature, usually ranging between \$10,000 to \$20,000 per ton of rated capacity. At present, some engineers express a degree of uncertainty concerning full-scale municipal service in solid waste disposal at the present level of operational experience.

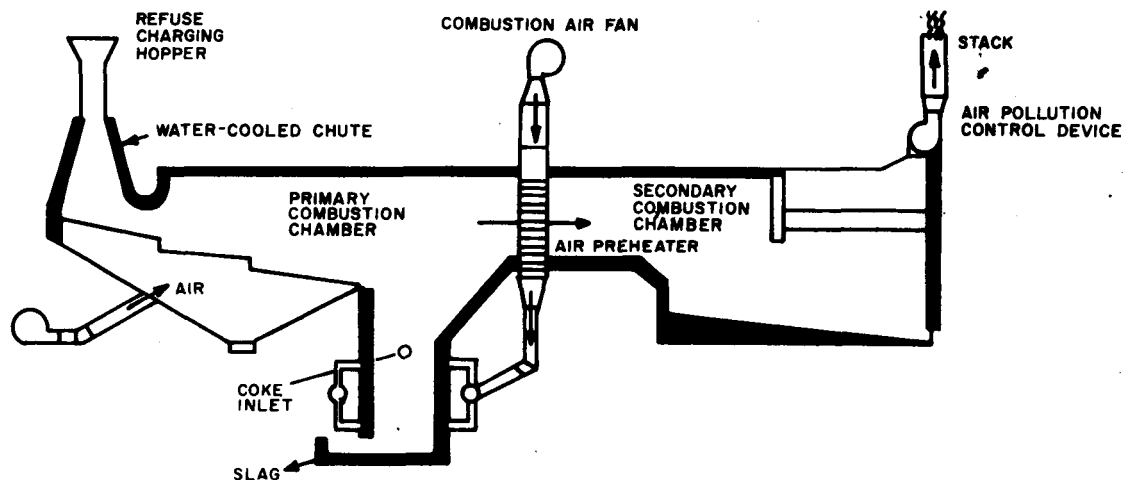
HEAT RECOVERY INCINERATORS

Incinerators in France, Germany, Switzerland and other European countries have produced steam for heating and/or electric power generation for many years. In this country, there is renewed interest in capturing and utilizing the heat from the combustion process.

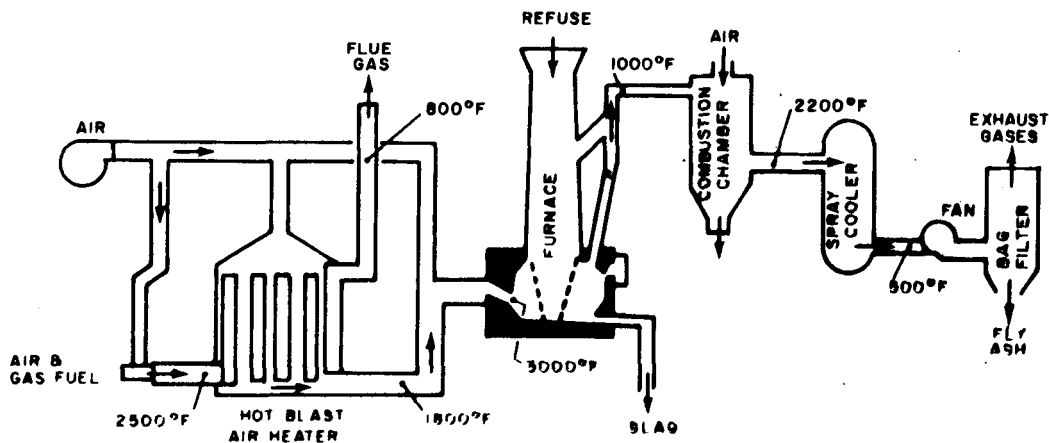
OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

ULTRA-HIGH TEMPERATURE INCINERATION SYSTEMS

FERRO-TECH PROCESS



TORRAX PROCESS



SIRA PROCESS

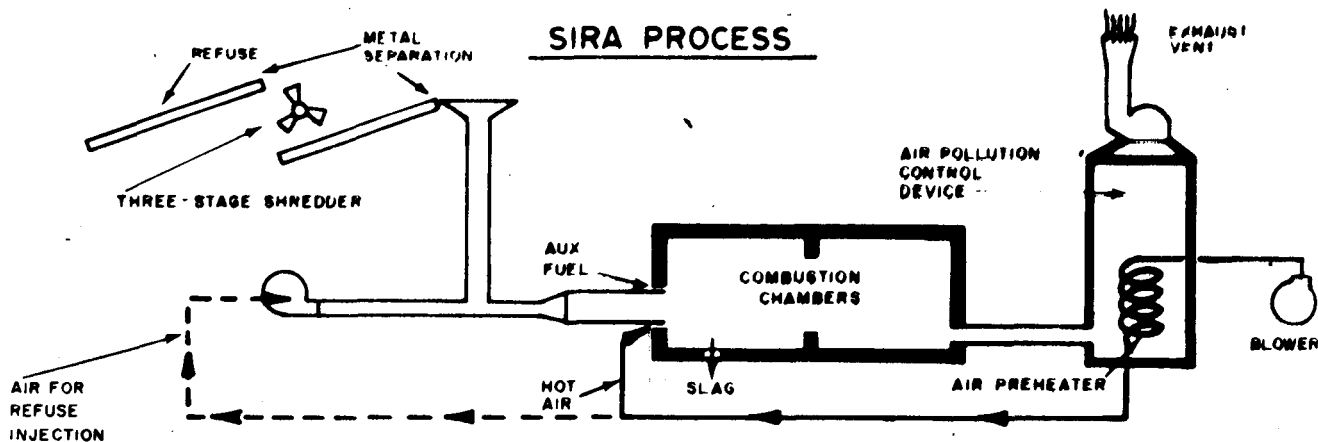


FIGURE A-5
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A refuse-burning incinerator that produces and sells steam usually utilizes an auxiliary fuel to maintain the steam supply. Because of the variable nature of solid waste input, (volumes, moisture, content, etc.) steam produced solely from the combustion of refuse experiences fluctuations which hinders its marketability. If, however, the facility uses an auxiliary fuel, coal or oil, to maintain the pressure during periods of low refuse combustion efficiency, then the steam becomes more marketable. The following will give information on some of the operating and proposed heat recovery incinerators in the country.

Akron, Ohio

Teledyne National is constructing a 1000 TPD waterwall incinerator for the City of Akron, Ohio. Steam will be produced along with ferrous metals recovery. A market for the ferrous metals has not been firmly established yet. Steam will be used by the University of Akron, 2 hospitals and by about 250 accounts in the Central Business District.

The capital cost of the facility will be approximately \$46 million. A tipping fee of \$3.50/ton has been initially proposed as the disposal charge. Operation of the facility will be contracted out. The facility is currently under construction.

Braintree, Massachusetts

The Town of Braintree is recovering energy by producing steam at its waterwall incinerator. The capacity is about 250 tons per

day. Steam is currently being marketed to a leather company and a cork company is interested in the steam. The Town would be able to blow off considerably less than 70% of the steam it currently produces if the proper arrangements can be made to run a steam line to the cork company.

The facility cost \$3.5 million to construct. The current tipping fee is about \$10 per ton.

Nashville, Tennessee

The Nashville Thermal Transfer Corporation, a quasi-public non-profit corporation, operates a \$24.5 million energy recovery plant in downtown Nashville, Tennessee. The facility started operations in June, 1974. Up to about the middle of 1976 the facility was constantly subjected to technical and financial problems. The major of these were keeping within EPA air emission requirements and corrosion of the boiler tubes. The installation of electrostatic precipitators at increased maintenance and the installation of hydraulic charging equipment to insure smooth fuel feed input and to maintain and regulate the steam input has solved these technical problems. The major financial problem was that operating expenses were not supplemented by a tipping fee. When Nashville Thermal Transfer Corporation was set up it was initially agreed that the City of Nashville and surrounding Davidson County would not be charged a disposal fee. In April, 1976 Nashville Metro government agreed to pay Thermal up to \$1.5 million annually for solid waste

disposal services. This works out to \$8.00 per ton for waste being accepted by the facility. As only about 20-25% of the waste being produced in the area is coming to the facility, it was decided that a \$2.00 per ton tipping fee be imposed at the area landfills and at the processing facility.

Currently the facility handles approximately 400 tons of municipal solid waste per day utilizing one boiler. Capacity can be doubled by starting up the second boiler. The corporation is in the process of developing markets for the steam which would be produced by the second boiler.

Steam and cooling water are currently being sold to 28 downtown Nashville buildings.

Niagara Falls, New York

Hooker Energy Company, a subsidiary of Hooker Chemical Company, is building a 2200 TPD waterwall incinerator with an on-site steam generator which will provide electricity for use by the Hooker Niagara Falls plant complex.

Municipal solid wastes from Erie and Niagara Counties will be used to feed the facility. The recovery units will cost an estimated \$65 million. The plants are currently under construction. They should be in operation by early 1980.

Saugus, Massachusetts

RESCO, a joint venture of DeMatteo Construction Company and

Wheelebrator-Frye, Inc. own and operate a 1500 ton per day waterwall incinerator in Saugus, Massachusetts. The plant opened in 1975. The plant basically incinerates the waste and recovers the heat value through the production and sale of steam. Scrap metals are removed at the back end of the system and sold to a metals broker. The plant currently is operating at 100 tons per day on a 24 hour schedule. A process flow description follows.

Trucks carrying municipal solid waste back up to a holding pit where they dump their load. The holding pit has a few days capacity in order to allow the plant to accept refuse during temporary shutdowns. Bulky items are fed to shredders by an overhead crane. The shredded waste is cycled back into the holding pit.

Refuse is put into hoppers by the overhead crane. The hoppers feed into the furnace on a continuous and even basis. In the furnace the refuse is burned on a system of three reciprocating grates. Refuse is dried on the first, and combusted on the second and third. Better than 99% combustion is typical.

Combustion gases and furnace radiation heat the waterwalls of the boiler. Boiler temperature of 1200° - 1800°F quickly turns the water into steam currently at about the rate of 200,000 lbs/hr. at a temperature of 850°F. The steam is sold to the General Electric Company's Lynn, Massachusetts plant.

The ash is passed through a trommel and a magnetic separator to remove the metals for sale to a scrap dealer.

The capital cost of this facility was about \$40 million in 1975. The tipping fee is now at about \$14.50 per ton. Ten communities including Saugus and part of northern Boston presently use the facility.

PYROLYSIS

The organic fraction of solid waste can also be processed so as to produce a number of synthetic fuels. Most of these processing systems involve pyrolysis. Pyrolysis is a physical and chemical decomposition brought about by the application of heat in the absence of oxygen or in a controlled oxygen environment. A high BTU content gas, oil or tar, and char are produced. The composition and the relative quantities of these various streams depend primarily on the composition of the refuse input, pyrolysis temperature and pressure, and the length of time the refuse remain in the pyrolysis reactor.

Compared to conventional incineration pyrolysis is relatively non-polluting, requires a small land area, has low operating costs, and produces many useful energy products.

There is only one full scale pyrolysis facility in operation today. A description of the history of that facility follows.

Baltimore, Maryland

The City of Baltimore now owns and operates a 1000 ton per day pyrolysis plant. The facility currently accepts about 600 tons per day of municipal solid waste over three shifts. In September, 1972, the Environmental Protection Agency awarded a grant to the City of Baltimore to demonstrate the production of a good BTU value gas through the pyrolysis of municipal solid waste. Ferrous metals and a glass aggregate were also to be taken out. The process was developed by the Monsanto Company, who also invested some funds in developing the facility. Other participants included the State of Maryland, the City of Baltimore and the Department of Commerce. After producing the gas product, the facility would burn the gas in a waste heat boiler to produce steam for a downtown steam loop. Monsanto experienced some operating problems during the shakedown period of January-September, 1975. After numerous modifications, Monsanto decided to abandon the project in February of 1977, not wanting to sustain any further losses.

The City decided to continue with the project on their own. In the seven months following, the plant has successfully generated steam. It received \$750,000 for the steam it had produced from Baltimore Gas and Electric Company. The plant manager estimates that the plant was shut down about 25% of the time during that seven month period. The City decided not to take out the ferrous and the glass aggregate because the market prices available for the

**OCEAN COUNTY DISTRICT SOLID WASTE
MANAGEMENT PLAN**
FLOWCHART OF MONSANTO PYROLYSIS SYSTEM

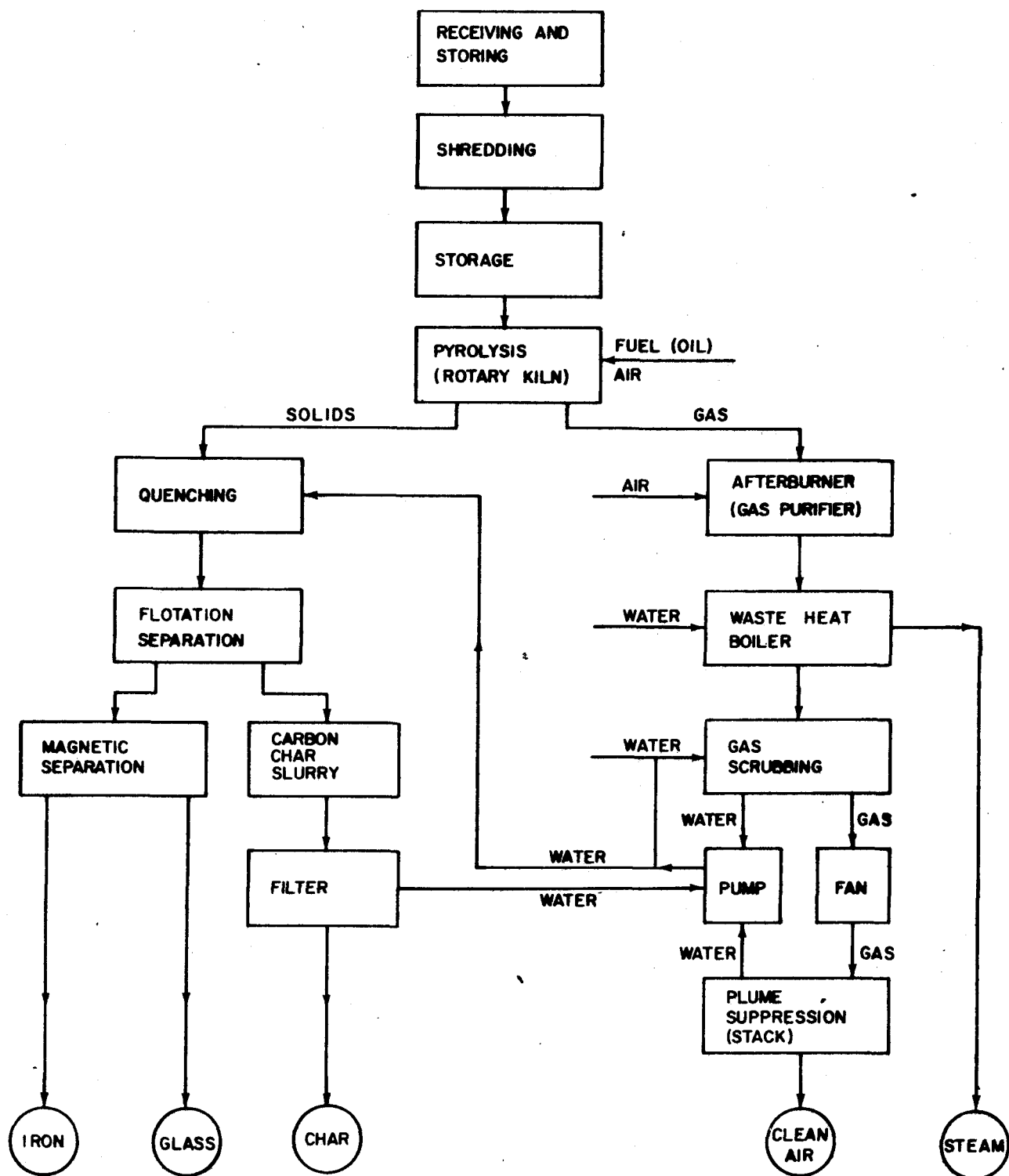


FIGURE A-6
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materials do not justify the extra processing necessary to take these materials out.

The facility is currently shutdown for installation of two electrostatic precipitators. The plant is scheduled to start pyrolysis operations in January, 1979. The City believes it will have no trouble becoming economically self sufficient.

Total capital costs for the facility has been about \$23 million with all of the modifications. The City is changing an \$8.00 per ton tipping fee but feels it can get away with \$4-5.00 per ton with the expected steam credits. Typical operating costs have run about \$1.4 million per year.

A demonstration pyrolysis facility whose chief product is a pyrolytic oil was constructed in San Diego County a couple of years ago by Occidental Petroleum Company with additional funds being supplied by the EPA and San Diego County. The 200 ton per day facility also removed ferrous metals, aluminum and mixed cullet. The plant was shut down in the middle of 1978 because of the inability to produce an oil with the quality standards necessary to be marketable. The oil contained too much solids and too much water.

Consideration is now being given to a number of alternative methods of waste disposal which may require modification of the facility to turn it into a commercial facility handling the solid

waste of a local community.

Again, limited operating experience is hindering the growth of pyrolysis as a significant municipal solid waste processing and disposal technique.

COMPOSTING

Composting is a method of processing solid wastes to produce a humus-like soil conditioner. Compost is useful as an additive or soil filler, but should not be considered a fertilizer.

Compost contains only about 1 percent of the primary plant nutrients which are nitrogen, phosphorus, and potassium. However, its nutrient value can be enriched by mixing with sewage sludge or chemicals.

Essentially a compost operation includes the following three steps:

1. Pre-sorting removes the non-compostable materials, such as metals and glasses. The metallic component can then be reclaimed for resale. Glass, aluminum, paper, cardboard, ferrous metals, and rags, comprising about 25 percent of the solid waste, are sorted out before the composting operation begins. The initial hand-sorting of the non-compostables has been one of the major problems with composting.
2. Organic materials are biologically stabilized by aerobic microorganisms. After the pre-sorting operation, the remaining material is shredded to reduce the particle size and produce a more homogeneous material for composting. The material is stacked in long narrow piles, called windrows, or placed in mechanical systems. The biological process is dependent on oxygen, moisture, temperature, and nutrients for the microorganisms. The more aerobic

the process, the faster the decomposition of the waste materials will be and the less odor will be produced. Mechanical systems with good air circulation and exposure require only six days to produce compost, whereas windrowing, with periodic overturning, takes six or seven weeks. Sewage sludges added to the waste can be beneficial from the standpoint of moisture, nutrients, and helping the biological process.

3. The final step is product finishing where curing, additional grinding, screening, and bagging occurs. At this stage, chemicals can be added to enhance the marketability of the final product. About 25 percent of the solid waste, by weight, entering a plant, will be rejected for the compost process. Of the remaining 75 percent, 1/3 to 1/2 of the latter becomes finished compost. Marketing of the final product and the initial hand-sorting have been the big difficulties in the successful use of the method in the United States on a large scale. Since a large percentage of the incoming refuse ultimately is rejected, a composting operation requires a landfill for disposal of the non-compostable materials.

A 1971 study produced by the U.S. Environmental Protection Agency indicated a range of composting costs of from \$3.85 to \$20.65 per ton. In addition to the costs incurred in the composting facility, it must be remembered that large quantities, by weight, of the incoming solid waste (glass, metals, plastics, etc.) must be landfilled. The composting facility may or may not have residue landfill on the premises. If not, the residues must be trucked to some other land disposal site.

Although there are many composting operations throughout the world, there is some risk in developing and constructing a composting operation. Most of the composting plants constructed

in this country have closed for reasons such as odor nuisance, or a lack of market for the end product.

SEPARATION TECHNIQUES FOR MATERIALS RECOVERY

At the beginning of this chapter, size reduction (shredding) was discussed in detail. Size reduction is the basic first step for most separation techniques for materials recovery. After shredding, the next step is to separate the various waste components for reuse or disposal.

Through the use of current technology and design, the majority of the waste materials can be recovered. Relatively simple separation techniques can be used to remove ferrous metals and the light fraction (paper and plastics). More advanced techniques can be used to separate aluminum, glass and non-ferrous metals. A brief description of some of these separation techniques follows:

- . Air Classification. The first separation process, which generally follows the shredding operation, is air classification. The concept of air classification is based on the principal that certain components of solid waste can be transported in a forced air stream. The portion of the waste generally capable of being air classified includes paper and plastic and light wood or yard wastes. This light fraction accounts for between 75 and 85 percent of the volume of solid waste. By separating it from the remainder of the waste stream, a smaller percentage of material is passed on for further processing. Typically, an air classifier is a vertical column in which solid waste is introduced at the top and air is drawn up from the bottom. The lighter materials, primarily paper and plastics, are drawn up out of the column into a cyclone where the air is then separated from the light materials. The heavy materials fall down through

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

TYPICAL MATERIALS RECOVERY SYSTEM FOR SOLID WASTE

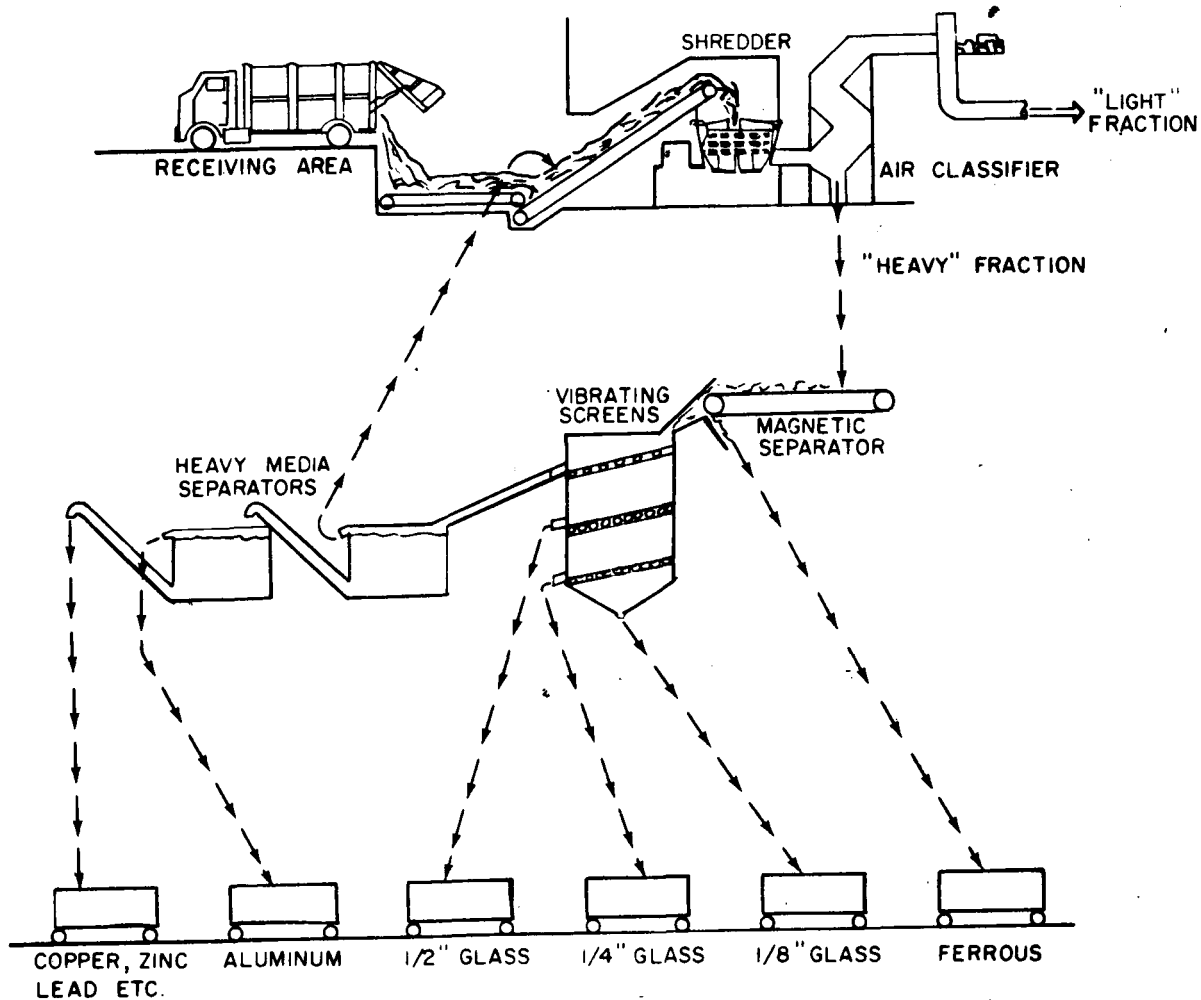


FIGURE A-7
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SOURCE: COMBUSTION POWER CORP.

the air classifier to a conveyor and are carried away for further processing. The velocity of the air stream through the air classifier can be adjusted to vary the proportion of light and heavy fraction exiting the classifier.

- Magnetic Separation. One of the simplest material separation techniques is magnetic separation of ferrous metal from shredded municipal solid waste. Essentially, there are two types of magnetic separators, the belt type and the drum type. The belt separator consists of a reinforced rubber belt which rotates around a magnet. Usually the magnet is suspended about the conveyor carrying the refuse in an in-line or cross-belt configuration. The magnetic particles are attracted to the magnet from the refuse and are moved to a receiving bin or secondary magnet by the moving belt. The sizes of the magnetic belts unit depends on the requirements of the installation. One disadvantage is belt wear. Generally, a belt will last from 4 to 6 months and then require replacement. The cost of a belt is usually 3 to 4 thousand dollars. Some manufacturers have designed stronger, more durable belts and one manufacturer uses stainless steel facings on the belt to reduce belt wear.

The second major type of unit is the magnetic drum. In a magnetic drum separator, a permanent magnet or electro-magnet is fixed inside a stainless or manganese steel drum. Particles are attracted to the drum and are carried to a chute or a secondary magnet by the rotation of the drum. A distinct advantage of a drum separator is that the shell will last for several years without replacement. Drums are manufactured in various diameters and widths to fit most applications.

The efficiency of the overall separation process depends on several factors: 1) the type of shredder, 2) methods used to reduce paper entrapment, and 3) the type of magnetic units utilized. A shredder that crushes cans and metal into a ball tends to entrap paper. Air classification prior to magnetic separation or the use of a multiple magnetic drum system to pick up ferrous metals and drop the paper can reduce contamination substantially. The strength and configuration of the magnetic unit is of course important.

- Size Classification Using Screens. Particles can be separated according to size using screens. The classification procedure can be as extensive as desired by using many screens of various sizes. The process utilizes vibrating screens that are usually stacked. Particles that fall through the top screens are retained on a level below. All entrapped particles are then vibrated into holding bins. The process is effective in sorting large non-metallics, glass, bones, grit, stones, etc.

- Gravity Separation. Gravity separation is a general grouping which includes flotation, rising current separators, dense media separation, and stoners. Gravity separators can perform in either the dry or wet stage. These processes are considered gravity separation units because the forces of gravity and the process of flotation are both used to separate a desired constituent.

In flotation separators the wastes are transformed to an aqueous slurry and introduced into the flotation unit. Air is introduced to the tank in a saturated water solution under pressure. When released to the tank, the air comes out of solution as very fine bubbles. These bubbles adhere to the lighter fractions or treated ones and raise them to the water surface. At the surface, they are mechanically removed, while the heavier materials are removed from the bottom of the tank.

Another separation process involves heavy-media separators in which density separation divides the fractions present. The operation centers around the density of the liquid in the unit. Particles with densities greater than the liquid fall to the bottom to be collected and particles with densities less than the liquid rise to the surface to be skimmed off. The density of the liquid can be varied to selectively float certain specific materials. The rising current separator is similar to the heavy-media separator in that certain materials sink and others float. This separation process uses a rising current of liquid into which the solid waste is discharged. The action of the current carries lighter materials to the tip of the tank, where they are skimmed off and the heavier particles sink to the bottom.

A dry gravity separation unit which primarily functions on the basis of differences in specific gravity is the stoner. Other factors which affect a stoner's operation are particle size and shape. The primary application of these units has been for removal of glass and non-metallics. The basic unit is a dry vibrating table which employs upward airflow through an inclined screen or perforated table. The air carries the buoyant light particles down the table, while the motion of the table carries the heavier solids to the top. Through particle size control, and selection of feed point, the influent stream can effectively be divided into solids of low, intermediate, and high specific gravities.

- Optical Sorting. Optic sorters separate materials based on color (surface light-reflectional properties). The

particles are introduced to an optical box which contains a number of photomultipliers for light, photocells, colored backgrounds, and compressed air jets. As the particles fall through the optical box, they are examined on all sides for color and compared to the colored background. If the color observed does not match the background color, one of the photomultipliers' voltage outputs will be changed. This voltage change signals the air jet and the undersirable particle is blown out a rejection chute. The acceptable particle then falls to a collection bin. The optical sorter has particular promise with respect to glass separation. By sorting glass into its three colors; clear, amber, and green, the price paid for the reclaimed glass will be increased. By operating two of these units in series, the three colors of glass can be individually separated. The only drawback to an optical color sorting process is it is yet unproven in large scale operation and its reliability has not yet been verified.

Inertial Separators. Essentially, there are three types of inertial separators including, ballistic separator, and inclined conveyor. A ballistic separator ejects material from a revolving rotor outward over a number of bins. The position of the bins is based on the ballistic properties of the solids at the velocity they are traveling when ejected from the rotor. The particle's aerodynamic and weight properties dictate how far the particles will travel before falling into a bin. Generally, the organic particles fall out first with the inorganic particles traveling the longest distance.

A separator is dependent on the elastic properties of the wastes involved. The material is transported by conveyor upward and ejected outward at the top against a vertical plate. Elastic materials bounce off the plate and are deposited in a receiving bin, while inelastic materials hit and fall straight down to a revolving drum which deposits them in a second bin. The separator process basically divides the waste into heavy, resilient particles, and light, inelastic particles.

The third type of inertial separator, the inclined-conveyor unit, functions by employing both the density and elastic properties of the wastes. Waste material is transported by conveyor to a point and then dropped onto a second inclined conveyor. The second conveyor is made up of plates which help to hold the light inelastic portion of the wastes. The light fraction is transported

up the conveyor and deposited in a receiving bin. The heavier and more elastic particles will bounce and fall down the conveyor into a second receiving bin.

- Advanced Separation Processes. Several separation processes have recently been developed which fall under the category of chemical/thermal separation. These methods include sweating, froth flotation, and cryogenic separation. Sweating involves raising the temperature of metals to their melting points in increments to melt one metal at a time. As a metal becomes molten, it flows out of the unit, while the others pass through to higher temperature compartments. In froth flotation, the material to be separated is floated on a layer of foam at the surface of the tank.

Another process, cryogenic separation, utilizes the principle that some materials become brittle at very low temperatures. By exposing the materials to a cold substance, such as liquid nitrogen, and then subjecting them to crushing or hammermilling, the brittle ones will shatter. Then, screening or flotation can be used to separate the material. This method has potential in the disposal of automobile tires. A study conducted by the University of Wisconsin has found that when tires cooled to their glass point (-80°F) are hammermilled, instantaneous fragmentation of rubber and complete separation of cord and steel will result. In addition, the original volume of the tire is reduced 82 percent.

The final method of separation is electrostatic separation. The principle applied is that particles of like charge repel each other. In effect, the refuse is charged and fed to a drum with a similar charge. The metallics and conductors that hold a charge are repelled into one bin while non-conductors (insulators) fall into a different bin.

There are a number of solid waste reduction and processing plants in the country that recover materials from solid wastes. Some of the facilities have already been discussed in preceding parts of this section. Most materials recovery facilities also produce some sort of fired or energy product. Because of the

integration of the ideas of materials recovery and energy recovery, descriptions of most of the major facilities will be presented after the discussion of energy recovery system at the end of the section. The emphasis will be on the processing being undertaken at the facility, availability of markets, capital costs, operating costs, system performance and present status.

ENERGY RECOVERY FROM MUNICIPAL SOLID WASTE

The heating value of the shredded, air-classified solid waste is about 5000 BTU's per pound (10 million BTU's per ton). The BTU value fluctuates with the moisture content of the refuse. If the light fraction is dried prior to shipment to the user, the fuel value is more consistent and greatly enhanced. The value of the solid waste as a fuel depends on several factors. The type of fuel it replaces (oil, coal, or gas), the cost of modifying the boilers, and the cost of firing the waste into the furnace must all be taken into consideration when accessing the net value for the waste. The processing of this "fuel" utilizes existing technology and commercially available equipment. A typical process is outlined below.

- . Receiving or Unloading Area. Solid waste is discharged onto a tipping floor where front-end loaders push the refuse onto conveyors which feed the hammermill. The tipping floor allows large, non-shreddable materials to be segregated out. The front-end loader also regulates the input to the conveyors.
- . Shredder. The shredder pulverizes all incoming refuse to a particle size about 2 to 3 inches square. The small

size is required, but necessitates almost daily re-tipping of the hammers. To reduce hammer wear, two stage shredding with air classification is sometimes used. In this case, the first shredder would reduce the particle size of the refuse to about six inches. Secondary shredding would then reduce the refuse to the desired inch particle size.

- . Air Classifier. After shredding all refuse is fed to an air classifier. Here, the heavier, non-combustible fraction of the solid waste is separated from the lighter combustible materials. The air classifier is a vertical shaft in which refuse is introduced at the top and air is blown up from the bottom. The lighter materials are carried up and away to storage and the heavier materials drop to the bottom for further processing. By removing the heavier components, several benefits are achieved. The heating value of the light "fuel" fraction is increased since metals, glass, and other non-combustibles are removed. Also, the transport of the material and the injection of the solid waste into the boiler is enhanced, and the quality of the resulting bottom ash is improved because the concentration of non-combustibles is greatly reduced.
- . Transportation. The light fraction is transferred to the power utility or industrial user by transfer trailers. The transfer trailers, each with a capacity of about 17 tons, unload the waste into a storage bin on the utility's or industry's property. The storage of the waste allows the user to provide an even flow-rate to the boilers.
- . Materials Recovery. The heavy fraction, comprising most of the metal, glass, dirt, and other non-combustible materials is further processed. Ferrous metals are magnetically removed for subsequent sale. Glass can be removed by vibrating screens. Heavy media separators can be used to remove non-ferrous metals such as aluminum. All non-usable residue is landfilled. At this point only a relatively small volume of material need be landfilled, since the bulk of the solid waste has been processed for energy recovery or fuel use.

Capital and operating costs for a system using solid waste as a supplemental fuel fall into three main categories: processing, transporting, and firing.

The processing facility would receive, convey, shred, classify,

and prepare the solid waste for shipment to the power utility or industrial user. The capital and operating costs for the processing facility naturally vary with the capacity and throughput volume. For example, a facility which would include two-stage shredding and air-classification, with a 250 ton-per-day volume would have a capital cost of about \$2,000,000. A similar facility, with 500 ton-per-day volume would have an expected capital cost of about \$3,500,000. The costs to the community also vary with the method of ownership of the facility and the method of financing. Additional costs incurred include labor, maintenance, and utilities. Generally, operating costs would range about \$6.00 to \$12.00 per ton for the facility. If ferrous metals are extracted, a possible additional revenue per ton of raw refuse can be obtained with a corresponding drop in operating costs.

Transportation costs are important because they must be deducted from the market value of the ferrous metal or light "fuel" fraction to get actual net revenue. Obviously, revenues realized from reclamation of various components of solid waste can be partially consumed by long transportation haul distances.

The costs of firing the solid waste and of converting an existing boiler for solid waste use vary with the type of boiler. Generally, the power utility or industrial user would finance the

necessary modifications since it would be installed on the user's property. Tangentially fired boilers require minimal capital expenditure for modification because of the port design. Horizontal and cyclone fired boilers require a more complicated modification and the costs could be expected to be greater.

The principal factor affecting the cost of the firing of the waste fuel is the main fuel supply. For example, if the solid waste were fired in conjunction with pulverized coal, a moderate increase in operating cost could be expected. If, however, natural gas or oil were used as the primary fuel, a significant cost increase could be expected because of the added bottom ash-handling resulting from the solid waste.

MATERIALS AND ENERGY RECOVERY SYSTEMS

M. Disko Associates conducted a thorough investigation of materials and energy recovery facilities, operating, in shakedown, under construction and planned. Facility representatives from across the country were interviewed. The information on the current status of their projects will be summerized in this section, which is intended to provide as much useful planning information about each facility as possible.

Ames, Iowa

A 50 ton per hour RDF facility came on line in November of 1975. The facility is extracting a ferrous metal product and selling it to Vulcan Materials Company under a 5 year contract. 84% of the

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

FLOW SHEET OF RESOURCE RECOVERY FACILITY AT AMES, IOWA

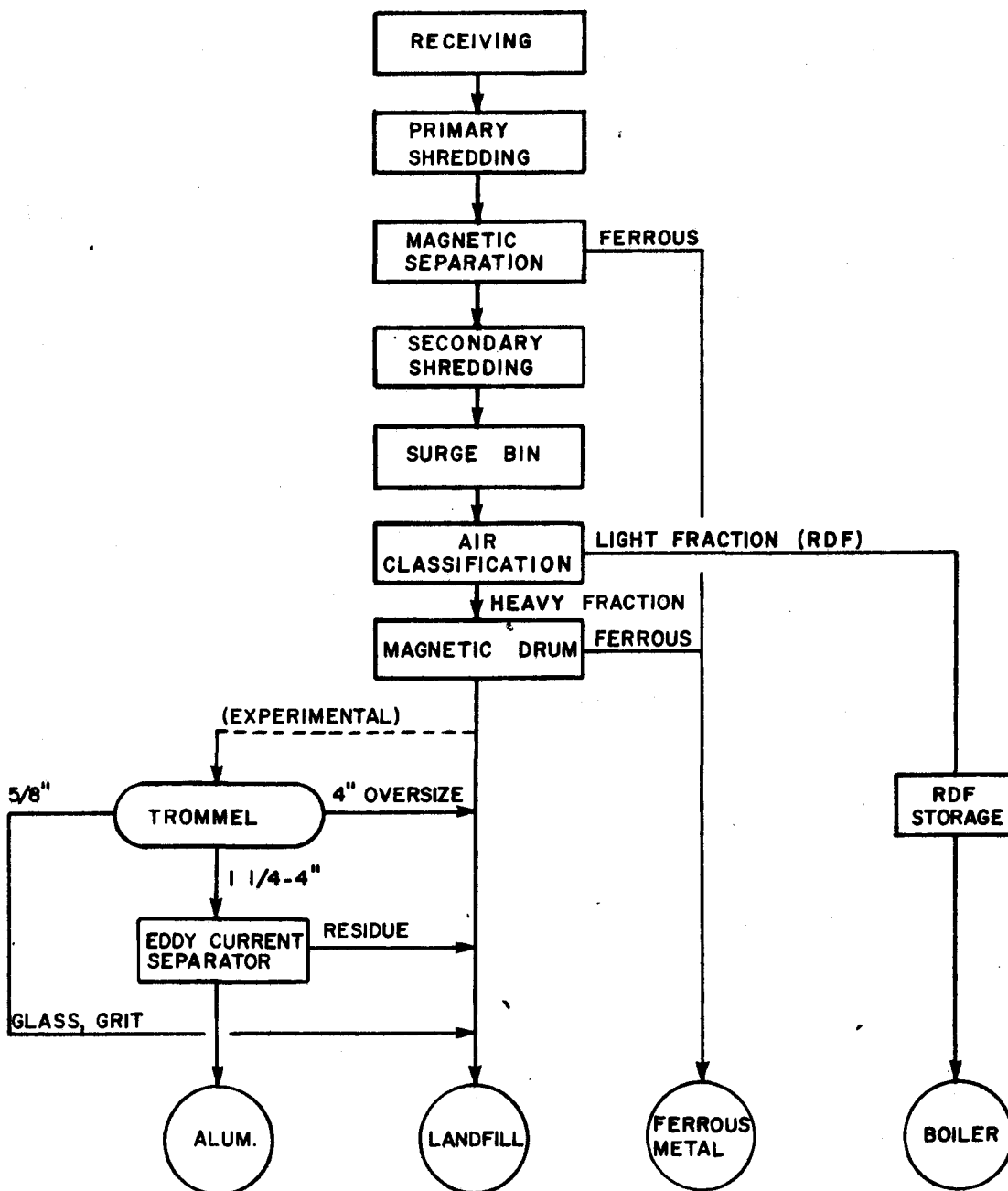


FIGURE A-8
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

material coming into the facility came out as RDF which is used in Ames Municipal Power Plant. The RDF is contaminated with about 4% glass. The facility is currently operating at about 250 tons per day, or about 60% of the capacity of one shift.

The facility cost \$6.3 million to construct. Disposal charges are based on a nominal \$1.00/truck plus a share of the differences in operating expenses calculated on a periodic basis.

City of Albany, New York

The City of Albany is building a 90 ton per hour RDF facility under the direction of consulting engineers. The processing consists of shredding, air classification, magnetic separation with an RDF product to be produced for use in a heat recovery incinerator. Ferrous metals will be recovered at both the front end and the back end. The designers have estimated that approximately 600 tons of RDF will be produced for 1500 tons of infeed. The steam produced from the combustion of the RDF will be used for heating and cooling of the state office complex in Albany, plus a number of urban accounts.

The facility will cost approximately \$22 million. Construction is nearly half completed and operations are expected to commence in the spring of 1980. The initial tipping fee will be approximately \$2.50 per ton. Operating costs are expected to be \$1.4 million per year.

Baltimore County, Maryland

The Maryland Environmental Service contracted out the construction of an energy recovery facility to Teledyne National. The facility is initially intended to be a demonstration project which will determine the marketability of the various types of RDF that can be produced. Once the testing is completed, the plant will go into commercial production of the most sensible form of RDF.

The facility cost \$9.0 million to construct, plus \$1.2 million for a transfer station.

Bridgeport, Connecticut

Combustion Equipment Associates' second facility, this one located in Bridgeport, Connecticut, is currently undergoing shakedown trials. The RDF plant has a design capacity of 1800 tons per day. The capital cost was \$60 million. An Eco Fuel II product will be produced at the facility. This product will be sold to United Illuminating Power Company. Other materials such as ferrous, aluminum and glass will be separated but the markets have not committed themselves as yet.

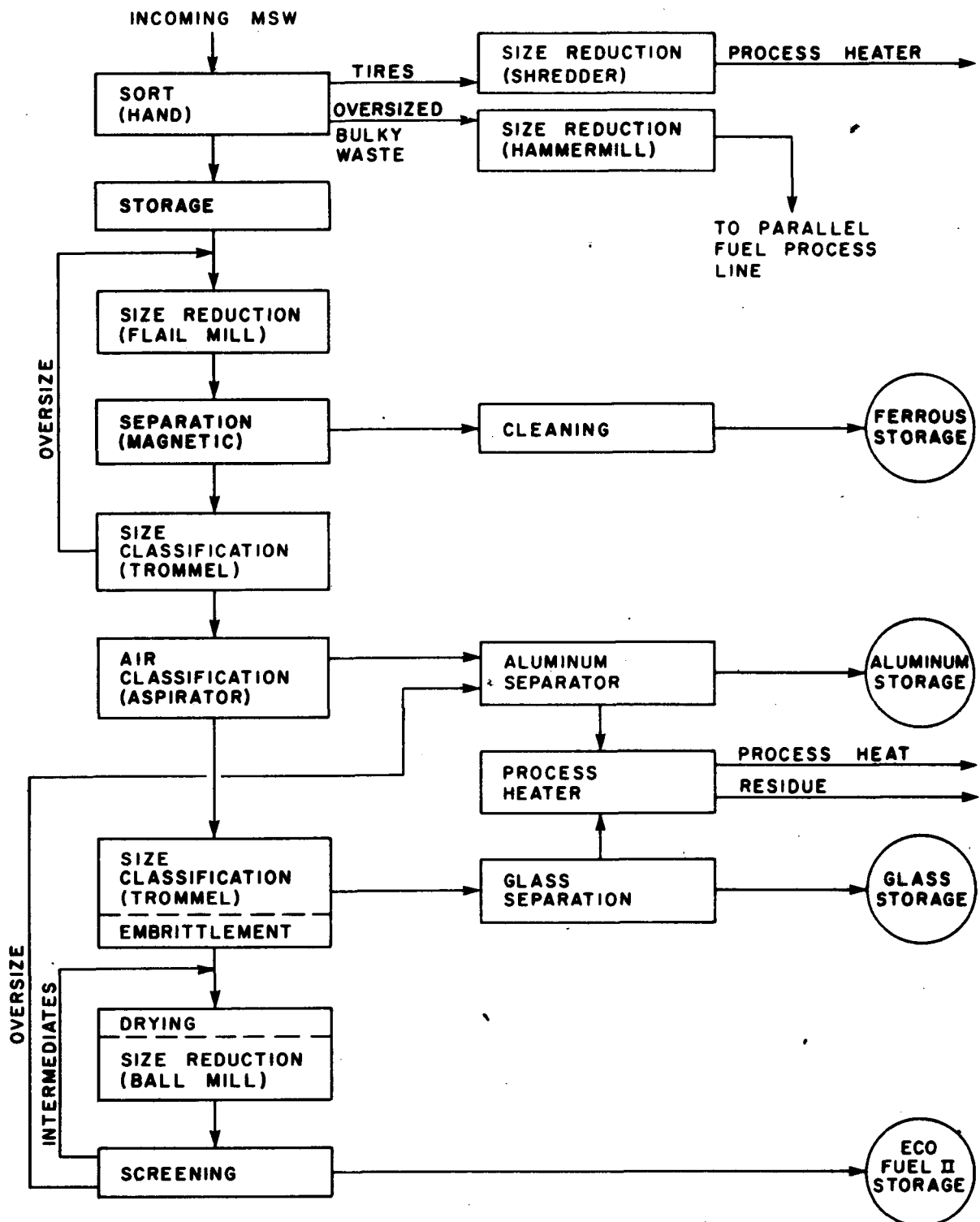
The initial tipping fee is set at \$15.00/ton. The facility should start normal operations in January of 1979.

Chicago, Illinois

The City of Chicago recently constructed a RDF processing facility.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

BRIDGEPORT RESOURCES RECOVERY SYSTEM COMBUSTION EQUIPMENT ASSOCIATES, INC.



SOURCE: COMBUSTION EQUIPMENT
ASSOCIATES

FIGURE A-9
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

The plant will recover ferrous scrap. The facility is sited next to Commonwealth Edison's Crawford Power Plant. RDF produced at the Southwest Supplementary Fuel Processing Facility will be sold to the adjacent power plant. The RDF will be pneumatically conveyed to receiving facilities at the power plant. The recovery unit has a capital cost of \$20 million.

In lieu of a tipping fee, operating costs will be covered by taxes imposed on the individual homeowner. The facility has a design capacity of 1000 TPD of which 500 TPD will be turned into RDF.

Dade County, Florida

The RR (Dade County) Construction Corporation, a company of Black Clawson/Parson and Whittemore, Inc. is constructing a 3000 ton per day facility in Dade County, Florida. The facility will be owned by Dade County, and initially operated by Black Clawson. Shakedown of the facility is expected in late 1980, early 1981. The plant will be primarily of the same design as the Hempstead, New York Black Clawson facility with the exception that the Dade County facility will direct the waste through primary shredding prior to depositing it into the hydropulpers. The reason for this is that the Hempstead facility will be accepting primarily household waste while in Dade County the waste stream will be 50% household waste and 50% trash, yard waste, white goods and the like.

The facility will produce an RDF which will be used in a power plant being built to complement the main processing facility. The power plant will burn the RDF to produce steam. The steam will run steam generators which will produce 77 megawatts of electricity. The electricity will be sold to the Florida Power and Light Company under a 20 year contract. Ferrous metals, aluminum, and color sorted glass are expected to be separated and sold.

The capital cost of the facility will be approximately \$82 million for the processing facility and \$18 million for the power plant. The tipping fee is now estimated at \$12.25 per ton. \$12.00 will go to paying for the bonds floated to construct the facility and \$.25 will go to operating expenses. Black Clawson intends to cover the rest of its operating costs with revenues from the sale of the products to be produced.

The facility described above will serve the northern one-half of the county. Initial design work is now in progress for a facility in the southern one-half of the county. The facility will primarily accept hospital wastes and hazardous agricultural container waste. The waste will be fed through a 50 ton/hour rotary kiln.

Detroit, Michigan

Combustion Engineering will own and operate a 3000 ton per day facility in Detroit, Michigan. Construction on the plant is

expected to begin in the near future. The facility will produce an RDF product which it will combust on site to produce steam and/or electricity for use by a local power utility, the Detroit Edison Company. Ferrous scrap will also be separated and sold to scrap markets.

The process flow is a basic design found in many facilities of this type. The refuse will be conveyed to a primary shredder after the heavier ferrous items and white goods have been picked out by the operator. After shredding, the waste will pass through a magnetic separator where the lighter ferrous products will be pulled out. The waste will then move to a trommel where small heavy particles will be sifted out. Larger lighter materials will be directed to an air classifier for separation into light and heavy fractions. The light fractions from the classifier will go directly to fuel storage. The lightest materials exiting the end of the trommel will undergo secondary shredding to reduce them to a size acceptable for combustion.

The capital costs of the facility are expected to be in the neighborhood of \$100 million. The tipping fee will be in the \$10-\$15 per ton range.

East Bridgewater, Massachusetts

Combustion Equipment Associates is designing energy recovery and resource recovery facilities at a number of sites on the East Coast. One of their first facilities is located at East

Bridgewater, Massachusetts. The site originally consisted of an incinerator. CEA added an ECO Fuel line with ferrous recovery to the facility. Eco Fuel is a CEA version of refuse derived fuel. The incinerator has a capacity of 1200 TPD. The Eco Fuel line has a smaller capacity, 500 TPD.

The Eco Fuel line is not producing RDF commercially. The line is only used for testing and training purposes at the present time. Eco Fuel produced at this facility is being tested first at United Illuminating in Connecticut. Another CEA facility currently in shakedown in Bridgeport, Connecticut, will eventually be supplying United Illuminating Power Plant boilers with Eco Fuel II on a steady basis.

The capital cost of these modifications and the Eco Fuel line was \$15 million. This cost is not typical at all of costs that would be accrued in building a more sophisticated plant of the type in Bridgeport, according to company officials.

The current tipping fee is approximately \$10.75 per ton.

Franklin, Ohio

The Black Clawson Franklin, Ohio Plant is one of the first capital intensive resource recovery plants of its kind. It started operating in 1971. It uses a hydropulping process to break down much of the paper product into fibers which sold as a base for roofing felt. Ferrous metals are recovered and sold to a scrapper.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

FLOWCHART OF BLACK CLAWSON MATERIAL RECOVERY SYSTEM

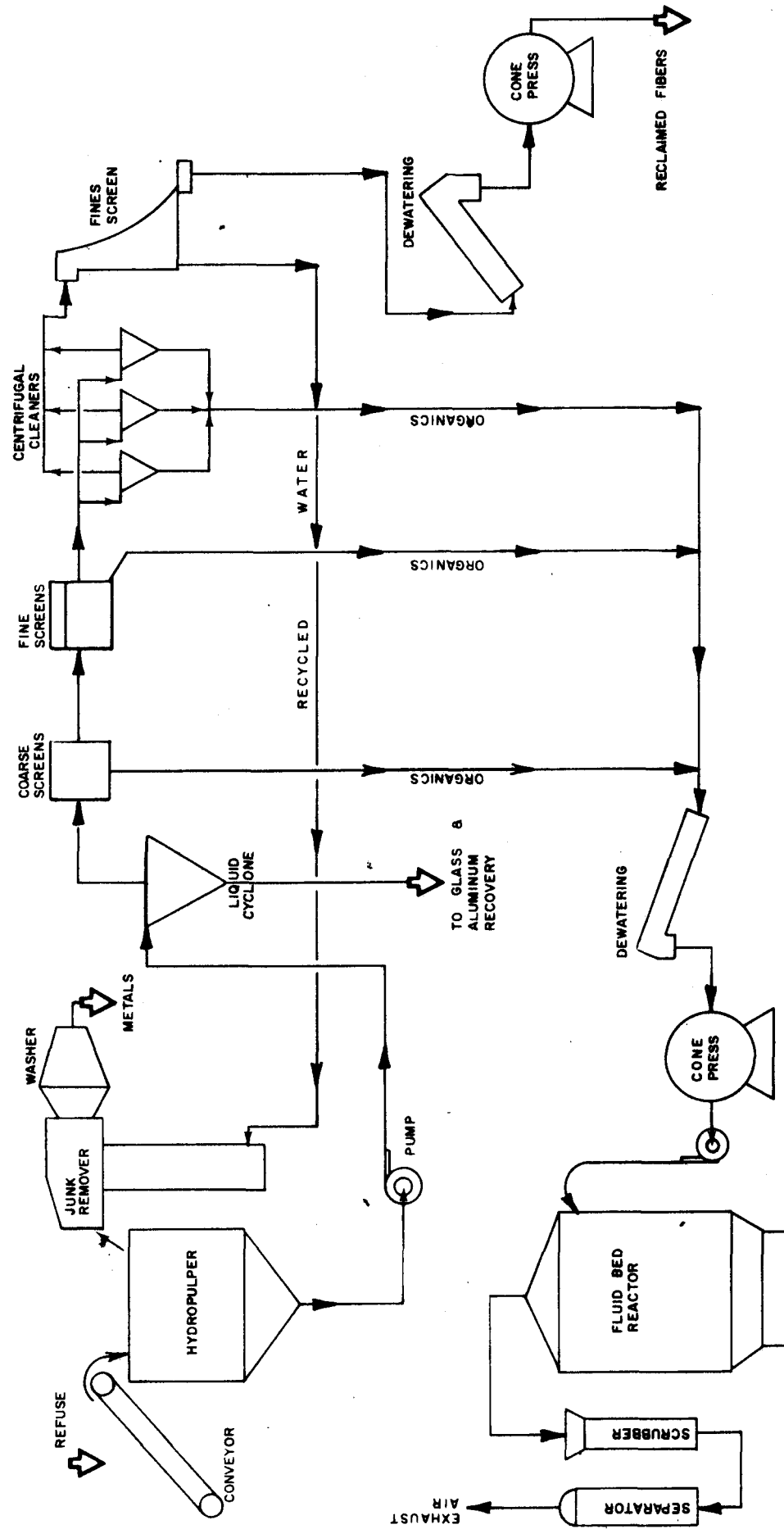


FIGURE A-10
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

Aluminum is sold to an aluminum company and glass is color sorted and sold to a bottler. The residue, about 10% by weight, is landfilled.

The 150 ton per day facility is currently being supplied with 50 tons per day by the City of Franklin. The tipping fee is approximately \$7.50 per ton. The capital cost of the facility was \$3.2 million.

Hempstead, Long Island, New York

The Black Clawson Company has built a resource recovery/energy recovery plant in Hempstead, Long Island. Aluminum, ferrous metals, color sorted glass will be removed from the waste stream and sold. A pulped organic product will be dewatered and combusted in a waterwall incinerator. The steam thus produced will power on site steam turbines to produce electricity. Enough electricity will be produced to supply the needs of about 15% of the households in Hempstead.

The capital cost of the facility is approximately \$85 million. The tipping fee is approximately \$15 per ton. The facility has been completed and is now in its shakedown and startup period. The capacity of the facility is 2,200 tons per day.

Lane County, Oregon

Allis Chalmers is constructing an RDF facility with scrap ferrous metal recovery in Lane County, Oregon. The process is a simple

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

FLOWCHART OF BLACK CLAWSON MATERIAL RECOVERY SYSTEM, HEMPSTEAD, NEW YORK

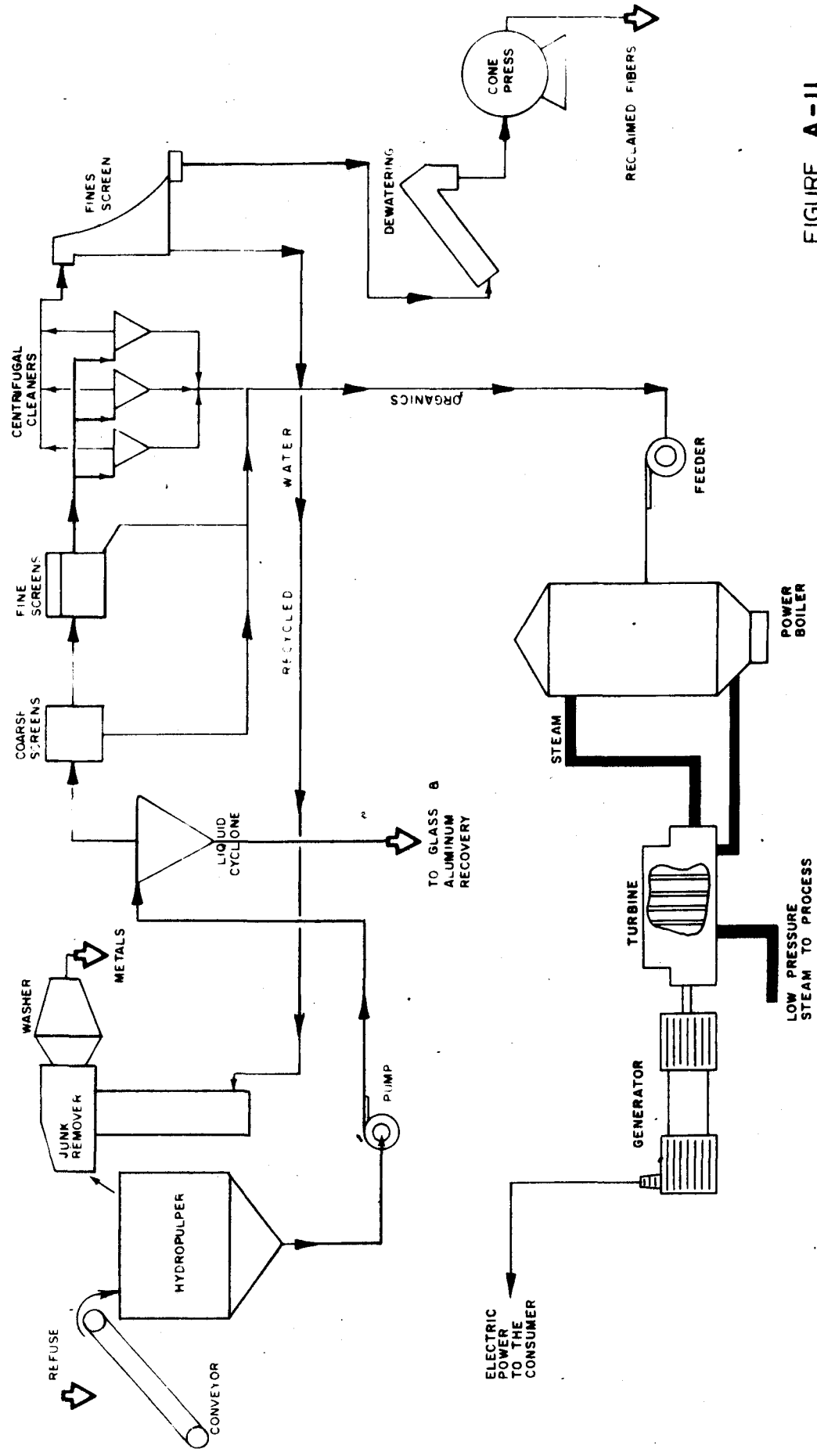


FIGURE A-II
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

SOURCE: BLACK CLAWSON

three stage scheme; shredding, air classification, and magnetic separation. The total cost of the facility is \$4.0 million including the resource recovery facility, central receiving area, and transfer station and transfer equipment.

The design capacity of the facility is 500 tons per 8 hour shift. The ferrous fraction has not been put out to bid yet. The refuse derived fuel will be hauled to the University of Oregon Physical Plant for test firing in wood fed boilers. The County has assigned an initial value of \$2.00 per ton to the RDF - the cost of hauling it to the market. If the test period ends with acceptable results, the University of Oregon Physical Plant will consider using the RDF on a permanent basis.

Western Waste Corporation will operate the facility. The company will charge the county \$4.14 per ton initially for operating the facility.

The facility is still in its shakedown period.

Madison, Wisconsin

The City of Madison, Wisconsin is having a 400 ton per day RDF facility built. The facility, which is scheduled for startup in January 1979, will separate out ferrous metals which will be sold to Wisconsin Chemical Corporation. The shredded RDF product will be used in Madison Gas and Electric Company boilers. The capital cost of the processing facility is estimated at \$2.5 to 3 million.

At the start of operations the facility will process 200 tons per day of municipal solid wastes.

Milwaukee, Wisconsin

The Americology Division of the American Can Company has constructed a 1500 ton per day facility in Milwaukee, Wisconsin. The plant opened May 18, 1977. The plant separates refuse into two fractions. The heavy fraction is processed to segregate newspapers, ferrous metal, aluminum, and glass. The light fraction is used as an RDF product at Wisconsin Electric Power Company. Currently, operations on glass and aluminum have been suspended pending some additional modifications. The following is a description of the process flow if all of the systems were operating.

Refuse is delivered to the plant and dumped on a tipping floor. A front-end loader pushes the waste into the conveyor at an even rate. Oversize and potentially harmful materials are removed at this point.

The waste moves to a picking platform where other unsuitable material is taken out by hand or with an overhead winch. Clean bundles of newspaper are also taken out at this point.

After the picking platform the waste is moved into a 1000 horsepower primary shredder. The waste moves via a conveyor into an air classifier which separates the refuse into a light fraction

**OCEAN COUNTY DISTRICT SOLID WASTE
MANAGEMENT PLAN**
MILWAUKEE RESOURCES RECOVERY SYSTEM
AMERICAN CAN "AMERICOLOGY"

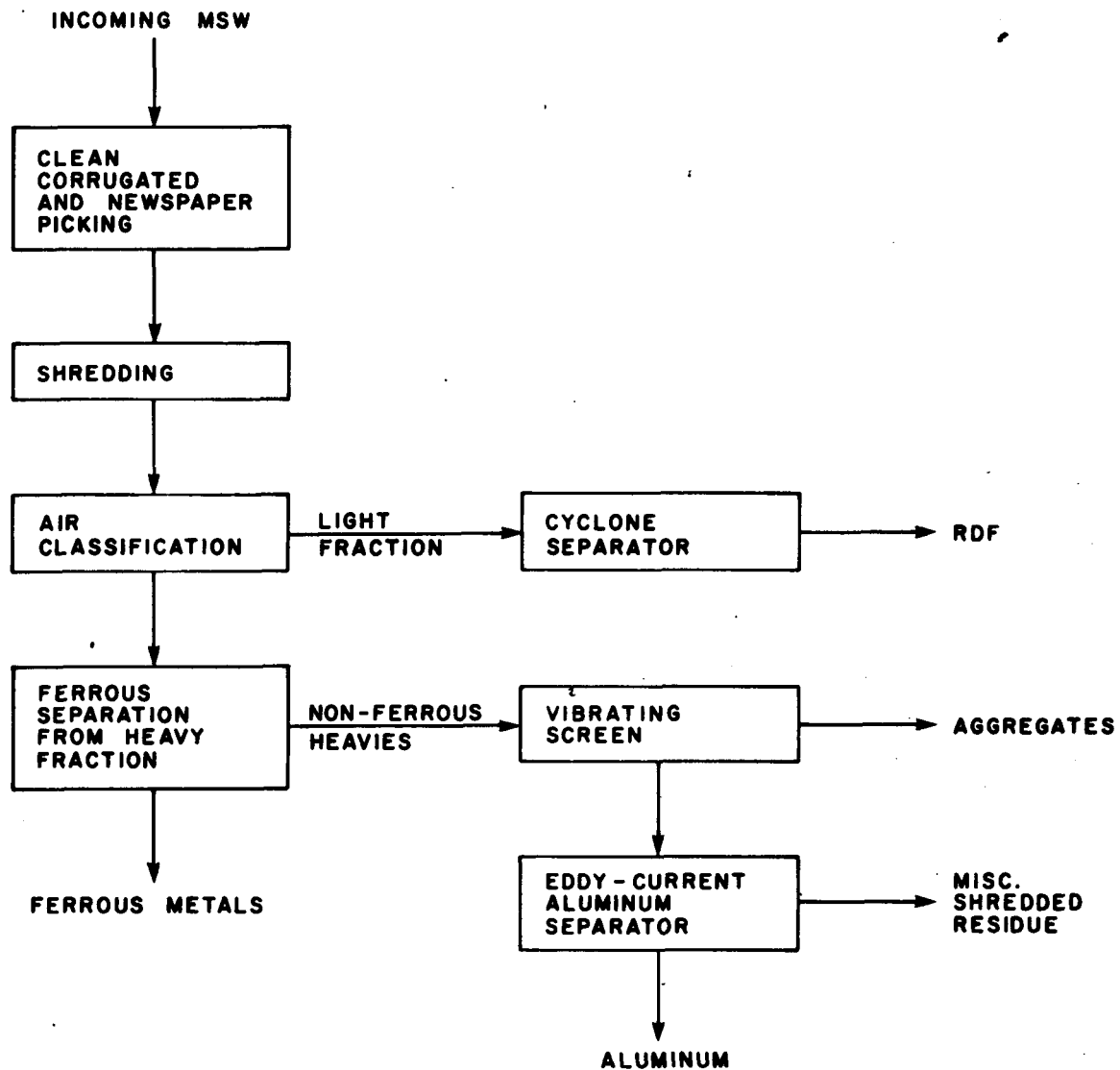


FIGURE A-12
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

and a heavy fraction. The light fraction goes through a secondary shredder and then is transported to the Wisconsin Electric Power Company's Oak Creek power plant. The net fuel fraction is now about 50% of the original waste stream.

The heavy fraction goes through a magnetic separation process to remove the ferrous metals for recycling. The rest of the heavy fraction proceeds to a trommel where a glassy aggregate in the form of shattered glass, small stones and ceramic pieces. This glassy aggregate can be added to an asphalt base to make a good paving material.

The remaining heavy fraction goes through eddy-current electrical separators to segregate the aluminum. The rest of the heavy fraction is landfilled.

As of this point the capital investments for the facility are as follows:

Original Plant	\$18.0 million
Receiving and Storage, WEPCO	4.2 million
Boiler Face Work, WEPCO	0.3 million
Revisions and Additions	<u>1.6 million</u>
Total	\$24.1 million

The tipping fee is now \$10.68 per ton to the city and \$12.55 to commercial accounts. The payment received for the fuel is derived from the price WEPCO paid for coal averaged over the previous three months, taking into account the difference in BTU values, and the

extra cost involved in burning RDF. In addition, Americology refunds to the city 10% of the gross price received for the fuel fraction as a revenue sharing plan.

As of October 1978 the facility was losing about \$3 million a year. They hope to break-even around 1980-81 as their systems are improved and find customers for some of the residues.

Monroe County, New York

The Raytheon Service Company, a subsidy of Raytheon Company, based in Burlington, Massachusetts, is currently constructing a resource and energy recovery facility in Monroe County, New York. The design capacity of the facility is 2000 TPD. The company has a 5 year operating contract with the county. Materials have been allocated to various markets by Raytheon via negotiation.

Ferrous scrap will be sold to Vulcan Metal Products. Aluminum will be sold to the Reynolds Aluminum Company. Glass will be sold to Owens-Illinois. The energy product, a shredded refuse derived fuel, will be sold to Rochester Gas and Electric.

The facility has a total cost of approximately \$50.4 million. \$28.4 is allocated for the actual construction of the resource recovery facility. The RDF receiving facility at Rochester Gas and Electric will cost an estimated \$8 million. The balance of the funds will be spent for engineering, startup, mobile equipment, etc.

The facility is currently under construction. Startup is scheduled for September of 1979. The tipping fee initially will be no more than \$4.50 per ton for the City of Rochester.

New Orleans, Louisiana

The National Center for Resource Recovery designed a resource recovery system which it has implemented in the form of a 650 ton per day facility in New Orleans, Louisiana. The facility cost was \$8 million. There is no energy being recovered at this facility. The facility, which is still partially in shake-down, was originally supposed to remove a ferrous product suitable for detinning, aluminum, glass and cardboard.

There are problems with the ferrous because of the unacceptable organics content. A letter of intent has been received from the Reynolds Aluminum Company for the purchase of aluminum. Glass quality is being tested by a number of glass manufacturers. Thus far Owens-Illinois, has found it acceptable. Paper and cardboard was being removed by a human operator and was sold to Johns-Manville for roofing felt. Newspaper was also being removed for sale to the Garden State Paper Company. Both of these operations were dropped because of low percentage recovery and low economic value compared to the operating input necessary.

About 90% of the waste that comes into the facility is currently being landfilled. The tipping fee is \$10.50 per ton of municipal solid waste.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

NEW ORLEANS RESOURCE RECOVERY PROCESS SCHEMATIC

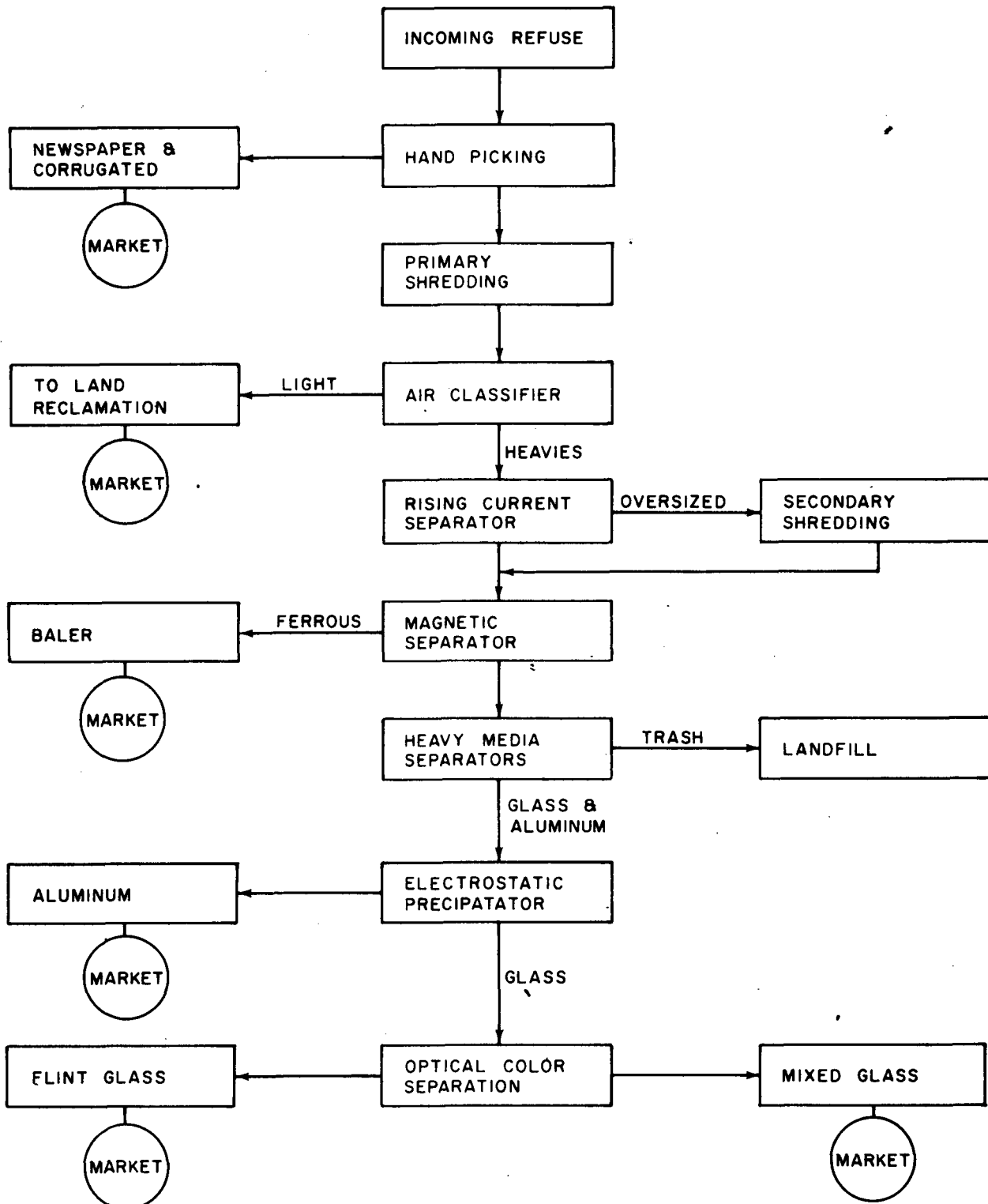


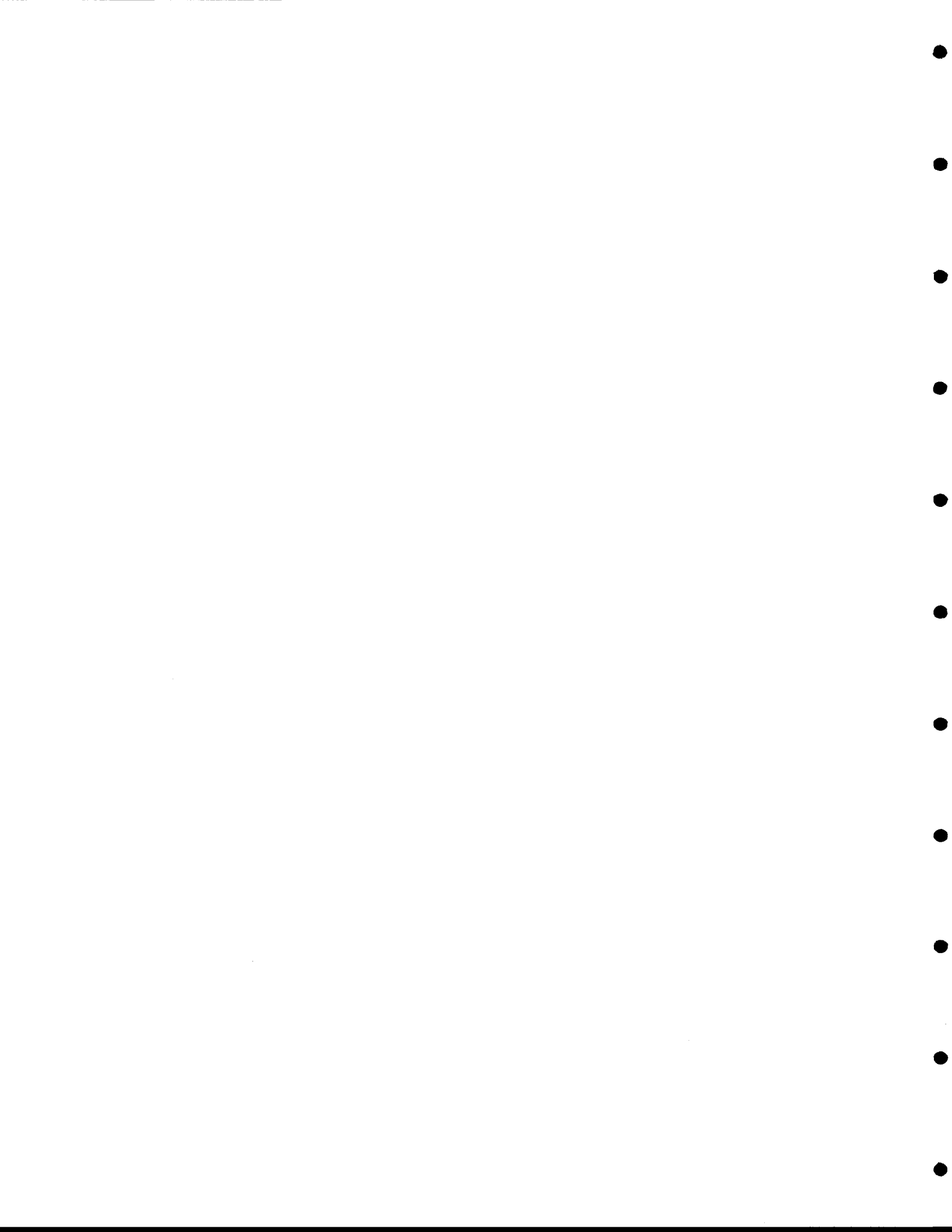
FIGURE A-13
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

Wilmington, Delaware

Raytheon Service Company was awarded a contract in August of 1978 to construct a resource and energy recovery facility featuring sludge processing and recovery by the Delaware Solid Waste Authority. There will be two processing facilities involved in this project. One will be the processing of 1000 ton per day of municipal solid wastes, in much the same order as solid waste will be processed in Raytheon's Monroe County, New York, facility. The one exception is that the heavy organics will be shredded, mixed with municipal sewage sludge, composted and pelletized at a separate but adjacent 350 TPD facility. The project is supported by \$25.1 million in Federal EPA grant money and \$6.4 million in grants from the State of Delaware. The rest of the estimated \$52 million needed to complete the project will be raised by the Authority through revenue bonds.

EPA is requiring a 1 year demonstration period during which time the facilities must simultaneously process sewage sludge and solid wastes, produce a humus product of high quality, and produce an RDF.

Raytheon has agreed by contract to guarantee a ferrous market for 20 years. RDF will be sold to a local utility through a 10 year contract. Residue is guaranteed to be less than 10% by weight by Raytheon. If Raytheon does not meet this standard, it is subject to stiff penalties. Operating costs in 1982 dollars are estimated to be about \$14.00 per ton. Construction of the facilities is expected to begin in September of 1979.



APPENDIX B

UTILIZATION OF SOLID WASTE TRANSFER STATIONS TO REDUCE HAULAGE COSTS

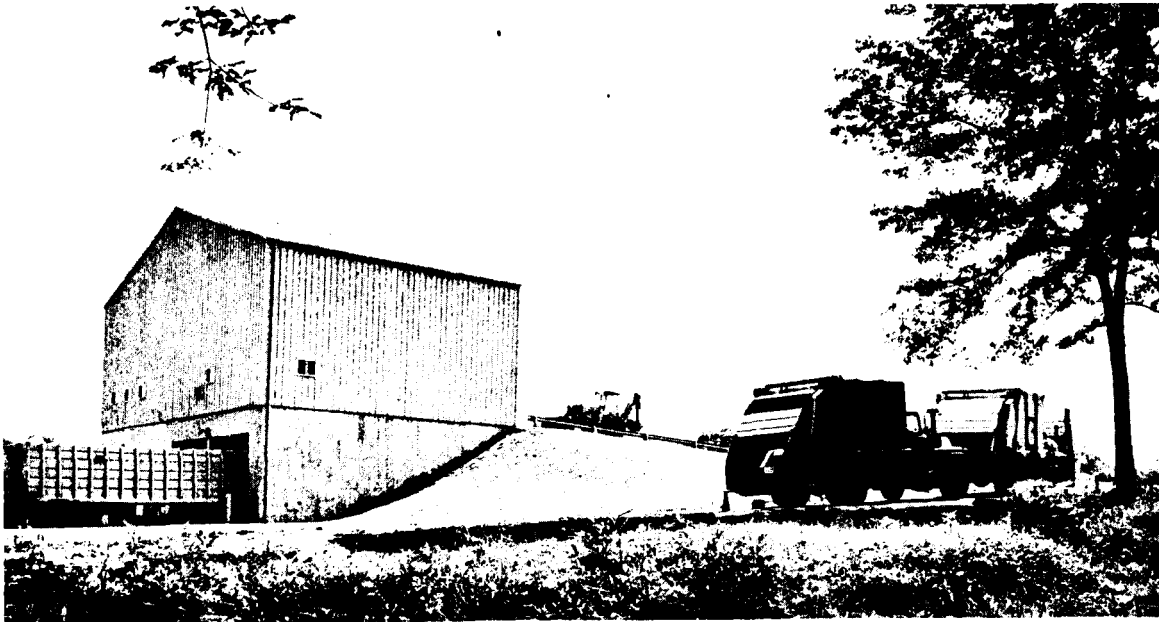
GENERAL CONCEPT

Solid waste transfer stations are an effective means of reducing the costs associated with hauling solid waste to disposal sites. As solid waste disposal sites are pushed further and further away from the centers of refuse generation, municipalities and counties are utilizing transfer stations to reduce and/or stabilize the costs of solid waste haulage. Figure B-1 shows photographs of a typical municipal solid waste transfer station in Summit, N. J.

A transfer station is not a disposal method, but a facility with the primary function of providing for economical transfer and haulage of solid wastes to the disposal site. The concept of transferring waste from many smaller collection vehicles to large-capacity transfer vehicles can be an economical solution to rising haulage costs. The savings, however, must recover the cost of owning and operating the transfer station and transfer vehicles.

Typically, a transfer station is a building in which regular collection trucks (10 to 25 cubic yards) dump the solid waste and return to the collection route. The refuse is then hydraulically packed into large (60 to 75 cubic yards) transfer trailers which make the long haul to the disposal site.

Note: This section has been developed for overall solid waste planning for Monmouth, Hunterdon, Ocean and Union Counties.



THE MUNICIPAL TRANSFER STATION IN SUMMIT, N. J., CONSTRUCTED IN 1971, IS A CLEAN, ECONOMICAL OPERATION THAT HANDLES ABOUT 150 TONS OF SOLID WASTE PER DAY. THE TRANSFER STATION, WHICH SERVES APPROXIMATELY 37,300 PEOPLE IN TWO MUNICIPALITIES, WAS DESIGNED BY M. DISKO ASSOCIATES.



DRIVER'S EYE VIEW OF FRONT OF SUMMIT'S TRANSFER STATION. FACILITY IS DESIGNED TO HANDLE UP TO FOUR TRUCKS SIMULTANEOUSLY. ALL ROAD SURFACES ARE PAVED. THE ENCLOSED DUMPING FLOOR REDUCES NOISE AND DUST PROBLEMS.

Savings from utilization of a transfer station are realized in the reduction of haulage costs. Disposal costs will not be affected. Greater efficiency is realized in collection because the packer trucks spend more time collecting the refuse while transfer trailers make the haul to the disposal site.

Some of the costs incurred for the construction and operation of a solid waste transfer station include:

- . The capital expenditures for land, structures, and equipment;
- . The labor, utilities, maintenance, and overhead costs at the transfer facility;
- . The labor, operating, maintenance, and overhead costs incurred in the waste hauling operation.

When a municipality or county is forced to make a long haul to a disposal site, the construction and operation of a transfer station has many advantages. Some of these advantages are outlined below:

- . Haulage costs to the disposal site are reduced because the number of smaller trucks hauling to the disposal area is reduced. This, in turn, reduces truck wear and tear, and maintenance costs. In addition, it allows the packer trucks to quickly return to the collection routes.
- . Labor costs are reduced because the driver of the transfer trailer is the only person that makes the time-consuming trip to the disposal site. After the collection truck, with it's one, two, or three-man crew, finishes loading, it drives to the centrally located, close-in transfer station, empties it's waste load, and immediately returns to the collection route.

- . The transfer station can be housed in an attractive building that allows the collection trucks to dump where odor, dust, and noise can be controlled. This allows a transfer station to be a good environmental neighbor that can be easily located on small acreage in an industrially or commercially zoned area.
- . The relatively small size enables the transfer station be built on small land parcels. Stations can be built on as little as 2 acres, but 5 acres is preferred to include buffer areas.
- . The number of collection trucks passing through other municipalities on route to the disposal site is reduced. Instead, fewer, less conspicuous transfer trailers pass along the major highways.
- . Clean-up services are improved and costs reduced. The central facility can also be used by residents to dispose of bulky wastes, trash, etc.
- . A transfer station offers a municipality flexibility in the event of being closed out of a particular landfill or disposal site. The municipality or region can haul to another site without major re-routing difficulty.

TRANSFER STATION EQUIPMENT COMPONENTS

There are a number of companies that manufacture transfer station equipment, including American Hoist and Derrick Company, Dempster Brothers, Inc., The Heil Company, E-Z Pack, Hobbs Trailer, Elgin Leach Corporation, Pak-Mor Hemisphere Corporation, Western Body and Hoist Company, and others.

The basic components of solid waste transfer station systems are described below:

- . Hopper. The hopper is a steel container into which the collection vehicles dump their refuse loads. The hopper may be used to funnel solid wastes directly into a transfer trailer, or to feed a stationary packer which compacts refuse into a

transfer trailer or roll-off container. The hopper generally has a volume of 10 to 30 cubic yards.

- . Transfer Packer or Stationary Packer. The packer consists of a charging box into which solid waste is deposited by gravity from a hopper. Supported by a steel frame, the packer head is moved by a double-acting hydraulic cylinder. The packer head forces the solid wastes into the transfer trailer or roll-off container which is coupled to the stationary packer. Different size packers are used with transfer trailer and roll-off containers. The units are generally not interchangeable. Under the piston-like action of the packer, solid wastes are crushed and compacted into the transfer trailer or roll-off container. The stationary packer is powered by an electrically-driven hydraulic system. A complete cycle of the packer's piston usually takes less than 1 minute to pack refuse and return to the initial position.
- . Compaction Transfer Trailer or Transport Trailer. The transfer trailer generally is built in a 60, 65, or 75 cy. yd. size, but other sizes are available. One type of trailer can be charged with solid wastes directly by gravity through a hopper into an opening in the top of the trailer. Solid wastes are moderately compacted by means of the pressure-plate ejection apparatus. A second type of trailer couples directly to the stationary packer. Use of the packer to ram solid waste into the trailer achieves high compaction. Some manufacturers make a unit that can be used either with a stationary packer or with an overhead hopper. The pressure-plate ejection apparatus is hydraulically operated from a power system provided by a wet-line connection to the tractor, or an auxiliary gasoline engine, mounted on the trailer. In New Jersey, the maximum gross weight of the loaded tractor-trailer must not exceed 73,280 pounds, plus a 5% tolerance, for a 5-axle rig, or 63,400 pounds, plus a 5% tolerance for a 4-axle rig.
- . Tractor Unit. A heavy-duty tractor must be used to drive the transfer trailer. The diesel unit must be capable of handling the loaded transfer trailers in the difficult driving situations encountered at a sanitary landfill operation.
- . Hydraulic System. The hydraulic system is used to power the cylinders in the stationary packer. The system is a complete, packaged unit, generally mounted on a steel frame. A high-pressure hydraulic pumping system is powered by an electric motor which

can be as large as 60 HP. Power requirements are 220/240 volts.

- . Push-Pit. A push-pit is essentially a trench or channel-like opening in the unloading floor of a transfer station. The push-pit is fitted with guide channels and a traveling, hydraulically-powered push-plate. Solid wastes are dumped from several smaller vehicles into the push-pit. The solid wastes are then pushed into a hopper where they fall into the charging box of the stationary packer. The main advantage of the push-pit is that it allows two or more smaller vehicles to unload without waiting to dump directly into the hopper.
- . Roll-Off Container. Roll-off containers are detachable, steel, rectangular-shaped containers. Their length generally ranges from 16 to 20 feet. Capacities range from 19 to over 40 cubic yards. Roll-off containers come with either a closed-top or an open top. The closed-top unit is made for use with a stationary packer. The roll-off container is constructed of reinforced steel plate and is picked up and transported by a tilt-frame trailer vehicle.
- . Tilt-Frame, Hoist-Haul Tractor. A tilt-frame tractor vehicle is used to unload the container, hoist the container onto the vehicle frame, haul the container to the disposal site, and dump the contents of the container. Essentially, the tilt-frame is a heavy-duty hoist or winch system which is mounted on a truck body. A typical unit is capable of hoisting up to 30,000 pounds of container and solid wastes. The truck is normally a 3-axle unit. Gross weight limits for a 3-axle rig in New Jersey are 53,800 pounds, plus a 5% tolerance.
- . Conveyor Systems. Conveyors are sometimes used to lift solid wastes into a hopper. The use of the conveyor eliminates the need for ramps and retaining walls necessary for a two-level gravity-dump operation. The conveyor systems are proven in use and are reliable. Use of a conveyor system in certain cases may reduce the construction cost of the transfer station. Normally, the width of the conveyor used would range from 4 feet to 6 feet, with the length as necessary to achieve the lift desired.

There are various layouts that can be utilized for a transfer

station operation. Some of the most common systems are illustrated in Figures B- 2 and B -3 and are described below:

System A The single level system illustrated is well suited to areas where a two story building would not blend with existing land use or zoning. This system is unique in that a conveyor is utilized to lift the refuse from the unloading floor to the charging hopper. Wastes brought in by the packer collection trucks are dumped directly on the conveyor or on to a concrete tipping floor where a front-end loader selectively pushes the refuse onto the conveyor. The reinforced conveyor lifts the refuse up to a hopper which feeds a stationary packer. The hydraulic packer rams the refuse into a transfer trailer.

System B This transfer layout is common in two story transfer stations. It is a two level operation in which packer collection trucks and transfer trailer operations are separated. Incoming waste is dumped on the upper level either directly into the hopper or onto a tipping floor where a front-end loader would then push the refuse into the hopper. The wastes are compacted into the transfer trailer by the hydraulic stationary packer, which is situated on the lower level. Although a larger building is required, the costly conveyor used in System A is eliminated. This two story setup is well suited to sloping terrain.

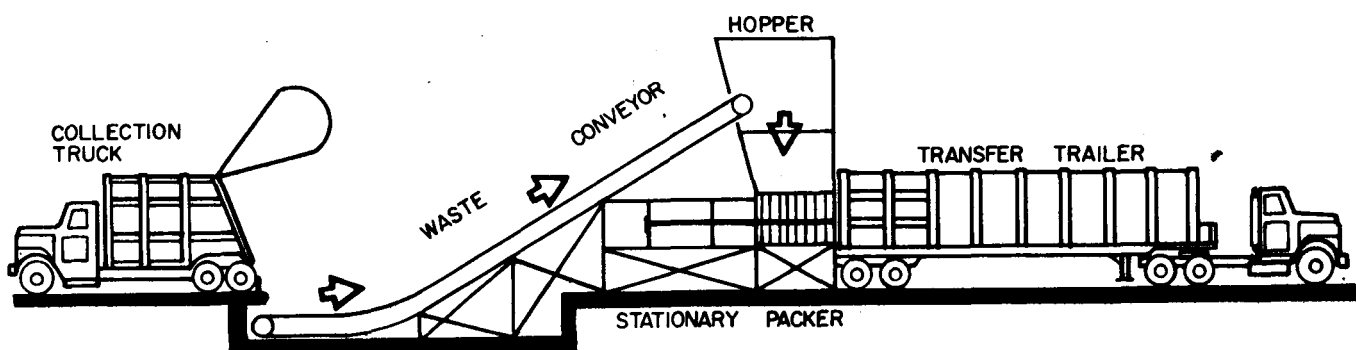
System C This transfer station design does not necessitate additional equipment other than the trucks and transfer trailer. The packer collection trucks enter the top level of the station and dump their refuse directly into the top of the transfer trailer located on the bottom level. A ram inside the trailer then pushes the refuse against the rear doors to achieve a mild compaction. One advantage of this system is that the transfer trailers can "drive-through" the station without being required to back-up. At the landfill, the rear doors are opened and the same internal ram ejects the refuse out the rear.

System D System D is a low volume transfer operation in which refuse is compacted by a stationary packer into a closed top roll-off container. The container is serviced on a regular basis by a tilt-frame truck. As with Systems B and C, the building is two stories high, and may not be justified if the station has a small through-put volume.

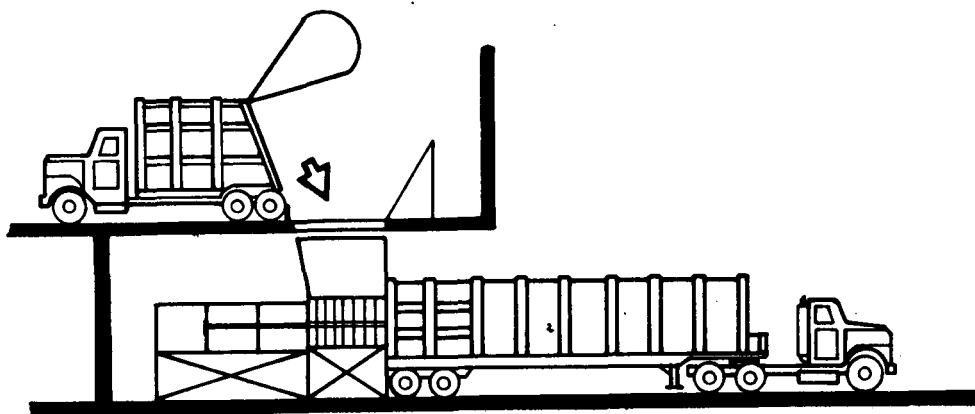
System E This system is well suited to small, clean-up operations where small trucks or automobiles would deliver

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

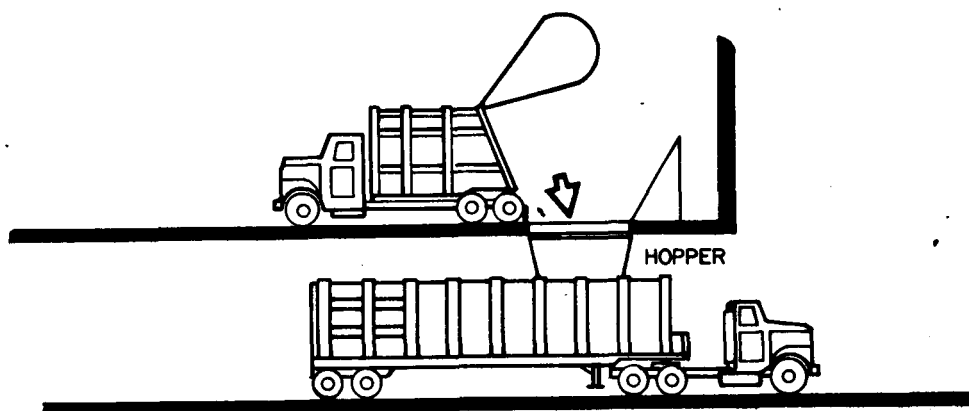
SOLID WASTE TRANSFER STATION SYSTEMS



- A. SINGLE LEVEL TRANSFER OPERATION USING CONVEYOR FEED TO A STATIONARY PACKER & TRANSFER TRAILER



- B. TRANSFER OPERATION USING GRAVITY FEED TO A STATIONARY PACKER & TRANSFER TRAILER

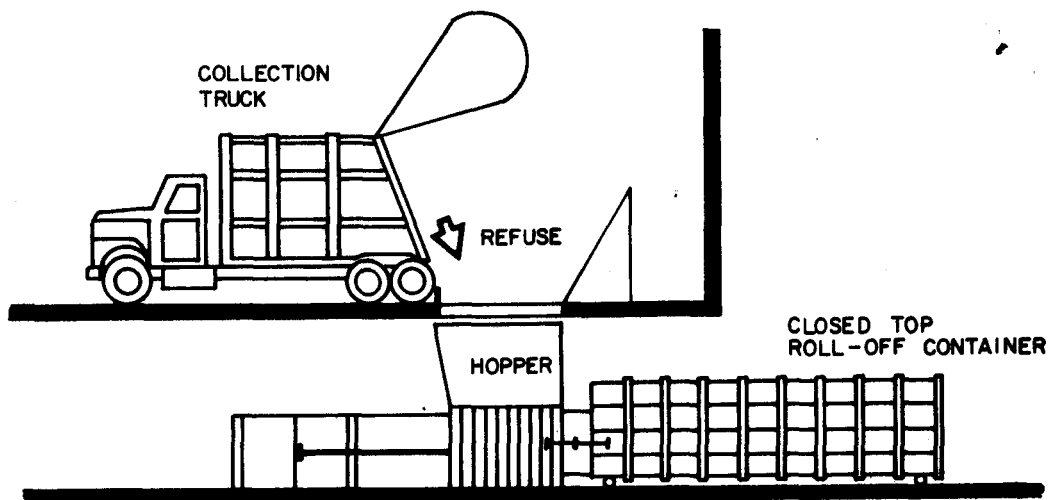


- C. TRANSFER OPERATION USING GRAVITY FEED TO A TRANSFER TRAILER

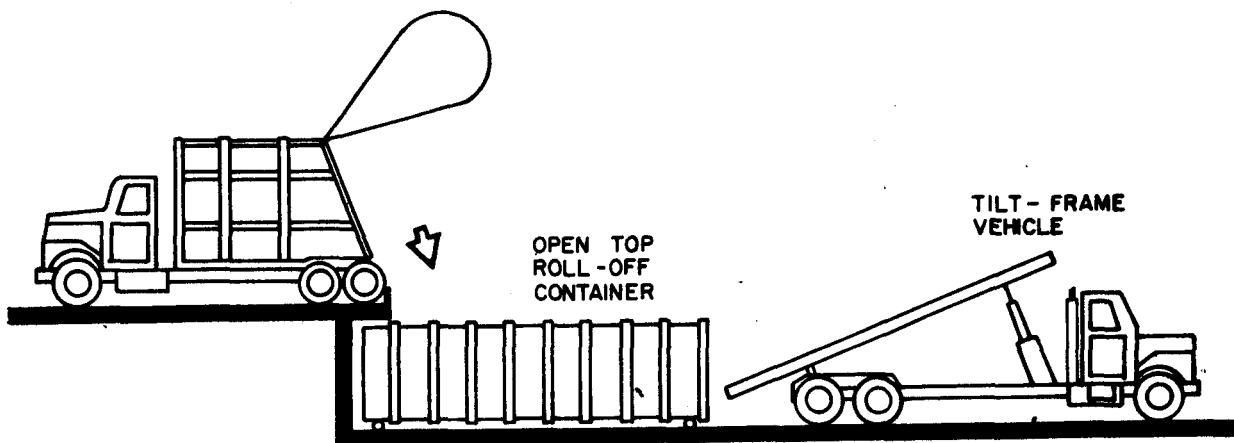
FIGURE B-2

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CONSULTING ENGINEERS

**OCEAN COUNTY DISTRICT SOLID WASTE
MANAGEMENT PLAN**
SOLID WASTE TRANSFER STATION SYSTEMS



**D. TRANSFER OPERATION USING GRAVITY FEED TO A
STATIONARY PACKER AND ROLL-OFF CONTAINER**



**E. TRANSFER OPERATION USING GRAVITY FEED TO A
ROLL-OFF CONTAINER**

FIGURE B-3
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

NOTE: TEXT CONTAINS DETAILED DESCRIPTIONS

small loads of uncompacted waste to a facility loading open-top roll-off containers. Occasionally, a backhoe might be employed to achieve a mild compaction of the wastes and to even the loads. The open-top roll-off container would be serviced by a tilt-frame truck.

DESIGN AND LOCATION FACTORS

The overall design and location of a transfer station is based on factors such as the anticipated through-put solid waste volume, the location of the site, and the equipment used.

Several factors which affect the site selection process include:

- 1) traffic accessibility; 2) zoning and existing land use;
- 3) proximity to collection routes; and 4) distance to the disposal site. Criteria affecting the selection and sizing of equipment include: 1) anticipated solid waste volumes;
- 2) transfer haul vehicles restrictions; 3) type of waste handled; 4) quantity and nature of incoming vehicles; 5) desired processing operations; and 6) peak load allowances (storage).

To maximize advantages, a transfer station should be located to minimize the haul between the collection points and the station. Since the station's operation is fully enclosed in an industrial type building, noise, dust and odor problems are minimized. This allows flexibility in siting the station which can easily be blended into a commercial or industrial setting.

Of major importance in locating a transfer station is access

to fast moving arterial roads and highways. A transfer station is ineffective if the transfer trailers are tied up in traffic. Also, traffic flowing to the station should not pass through heavily populated residential areas. Ideally, a station should be located on or near a route with existing heavy truck traffic where additional packer collection trucks would not be noticed.

In Ocean County, a transfer station would be housed in an attractive, industrial-type, sheet metal or brick building. These buildings enable the station to control dust, litter, odors, and birds so the facility will be an acceptable environmental neighbor. Often landscaping of transfer stations near residential areas can improve the appearance of the facility and reduce any visual impact.

ECONOMIC JUSTIFICATION OF A TRANSFER STATION OPERATION

A transfer station can offer potential savings if the costs involved in constructing and operating the station are recovered through savings in haulage costs. A transfer station will not lower the disposal costs. The transfer station concept minimizes the time necessary for haulage and maximizes the time spent on collection routes. Since the packer collection trucks only travel a short distance to unload at the station, they can

return to their collection routes while a transfer trailer makes the longer haul to the disposal site.

Generally a transfer facility is justified if the round trip haul distance to the disposal site exceeds 20 miles. However, each area must be studied individually to determine the break-even distance beyond which a transfer station saves money. Factors such as wage rates, type of access roads, collection truck capacity, and size of collection crews (i.e., one man, two men, etc.) influence the breakeven distance.

Although distance to the disposal site is important, often the round-trip travel time to the site is also an important factor. One of the most expensive aspects of refuse collection, labor costs, are keyed to time, not distance. Additional factors such as routes taken, traffic conditions, speed limits, time of day, etc., also influence travel time.

To arrive at a relationship that can be used to determine the economic justification of a transfer operation, a comparison must be made of haul by packer truck and transfer haul.

It is possible to calculate a cost associated with a packer truck with a one, two, or three man crew and compare it to a capital and operating cost for a transfer trailer and one driver. A series of lines can be generated, as shown on

Figure B-4 that represent the various haul combinations. By comparing the direct haul with the transfer and haul, the breakeven distance can be found beyond which a transfer operation is economical and saves money.

TRANSFER STATION AND EQUIPMENT COSTS

There are many factors which will determine the capital and operating costs for a transfer station. Some of these include; 1) type of building construction; 2) type of transfer system and related equipment; 3) location of facility; 4) throughput tonnage, etc. The processing equipment requirements vary from station to station. A gravity dump system into open top trucks requires the least capital expenditure for equipment while a stationary packer fed by a conveyor or pushpit would have substantially higher equipment cost.

The estimated cost of a transfer station facility, based on M. Disko Associates' design experience is shown on the following listing:

APPROXIMATE CAPITAL COST OF BUILDING SITE WORK EQUIPMENT AND VEHICLES FOR TRANSFER STATION IN THE NEW JERSEY AREA

<u>NOMINAL 8 HR. CAPACITY</u>	<u>ESTIMATED CAPITAL COST</u>
75 tons	\$200,000 to \$450,000
150 tons	\$400,000 to \$600,000
250 tons	\$500,000 to \$800,000

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN

COMPARISON BETWEEN PACKER TRUCK & TRANSFER TRAILER HAULAGE COSTS

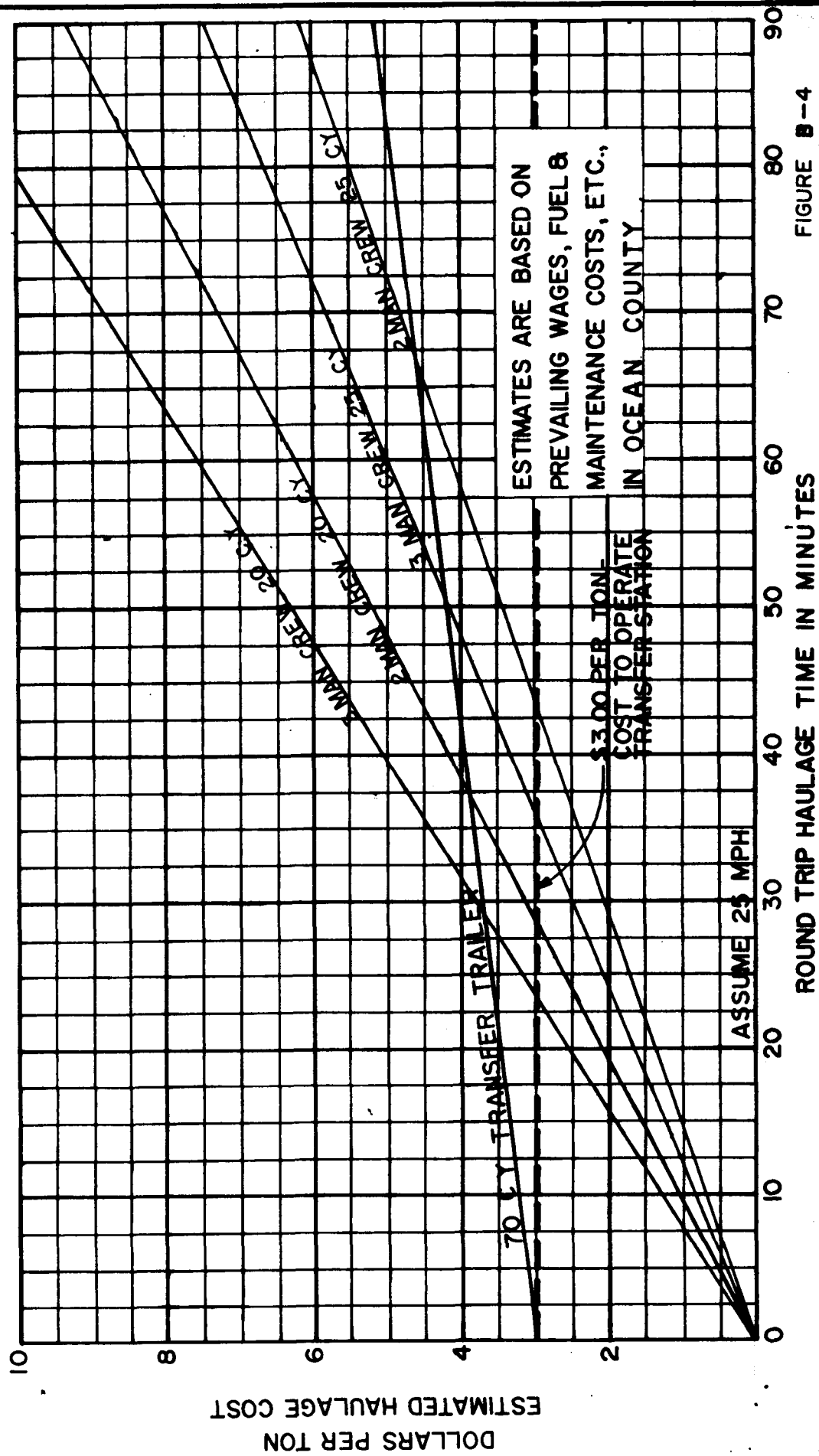


FIGURE B-4
ROUND TRIP HAULAGE TIME IN MINUTES

M. DISKO ASSOCIATES

Typically, overall cost of equipment, site improvements, and structures for a solid waste transfer station in Ocean County would range from about \$2,000 to \$6,000 per ton of 8 hour capacity, excluding land costs. Construction types can range from a simple facility without a structure to an enclosed facility with compaction equipment, offices, scale house, etc. The land required for a transfer station in the Ocean County area should be at least 2 acres, but usually about 5 acres are necessary to allow for a suitable buffer.

The overall cost of amortization, operation, labor and maintenance for a transfer station in Ocean County will be in the range of \$3.00 to \$5.00 per ton, depending on the round-trip haulage, but excluding any disposal charges.

Table B-1 lists the approximate costs and delivery times for various equipment components of transfer station systems. Cost ranges and delivery times vary according to the manufacturer and the specific equipment specifications.

TABLE B-1

APPROXIMATE COSTS AND DELIVERY TIMES FOR EQUIPMENT COMPONENTS

<u>ITEM AND DESCRIPTION</u>	<u>COST RANGE</u>	<u>REPORTED DELIVERY TIME DEPENDING ON MANUFACTURER</u>
Hopper - steel plate, reinforced	\$4,000 to \$10,000	4 months
Stationary Packer, complete with hydraulic system for transfer trailer	\$22,000 to \$30,000 plus up to \$5,000 to install	6 months
Stationary Packer, complete with hydraulic system, for roll-off containers	\$9,000 to \$20,000 plus up to \$4,000 to install	4 to 6 months
Transfer Trailer 65 cubic yards	\$20,000 to \$31,000 depending on equipment	3 to 6 months
Tractor Vehicle for transfer trailer, heavy-duty, tandem, diesel	\$25,000 to \$40,000 depending on equipment; add \$6,000 for automatic transmission	4 to 6 months
Push-Pit hydraulic components (does not include pit con- struction)	\$10,000 to \$15,000	6 months
Roll-off Container, 40 cy, open-top, steel plate	\$3,000 to \$6,000	2 to 6 months
Roll-off Container, 40 cy, closed-top, steel plate	\$3,500 to \$6,500	2 to 6 months
Tilt-Frame Vehicle heavy-duty truck 3-axle rig	\$30,000 to \$45,000 add \$6,000 for automatic transmission	3 to 6 months
Conveyor System, steel, reinforced, heavy-duty	\$700/foot to \$1,500/ft. depending on width and length	5 to 12 months

APPENDIX C

ENVIRONMENTAL DESCRIPTION OF THREE POTENTIAL SOLID WASTE DISPOSAL SITES

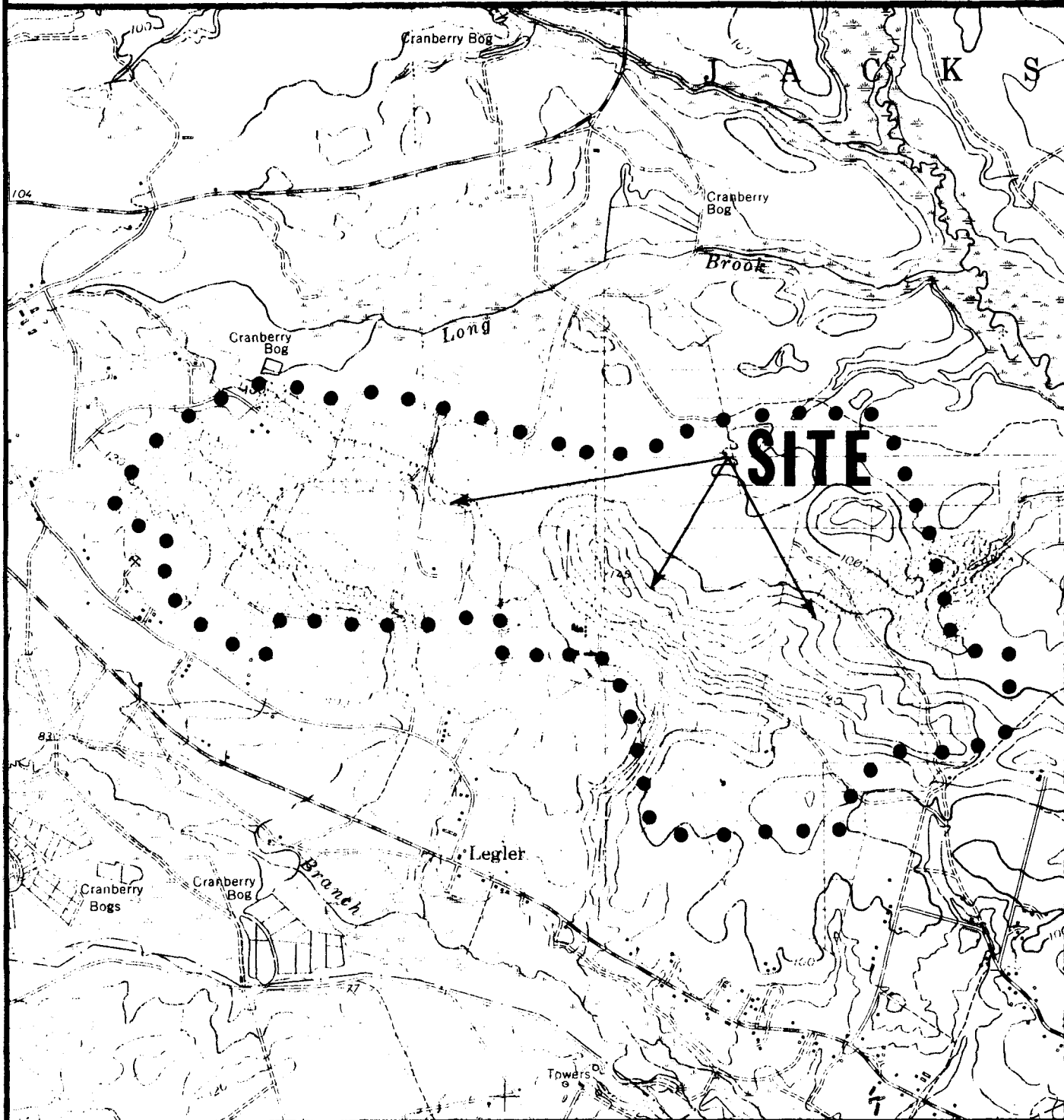
Three sites have been identified which have a good potential for use as a disposal site in an Ocean County solid waste disposal plan. The sites are the Clayton property in Jackson Township, the Ocean County Landfill Corp. in Manchester Township, and the Southern Ocean Landfill, Inc. in Ocean Township. These sites all have suitable and sufficient remaining open land to allow development of a long-term disposal system to handle the needs of Ocean County. A description of each of the three sites is included in the next section of this report.

1. CLAYTON SITE, JACKSON TOWNSHIP

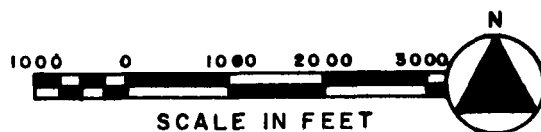
1.1 Location of Site

The Clayton site is the parcel of land which was formerly owned and mined by the Glidden-Durkee Corporation. It is located off County Route 571 in Jackson Township. Figure C-1 shows the site on a United States Geological Survey 7-1/2 minute quadrangle map. The site is bordered on the south by CR 571 and Lakehurst Avenue, on the west by Bowman Road, on the north by Long Brook and Grawtown Road, and on the east by Lakehurst-Whitesville Road. The total parcel is comprised of about 1,200 acres and it is zoned light industrial. At the present time, the Township of Jackson is operating a landfill in the southwest corner of the tract. This operation totals about 120[±] acres.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN LOCATION OF CLAYTON SITE



OCEAN COUNTY, NEW JERSEY



SOURCE: U.S.G.S. 7 1/2 MINUTE QUADRANGLE
FOR LAKEHURST, N.J.

FIGURE C-1
M. DISKO ASSOCIATES
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One environmental consideration of the Clayton site is that it is within the Pinelands Protection Area. This area, as designated by the Governor's Pinelands Review Committee draft report of October 1978, is an area which has as its goals:

1. To maintain the character of the region to afford residential growth in the Pinelands environment.
2. To protect surface and groundwater supplies.
3. To discourage piecemeal development.
4. To encourage development which is compatible with the protection of the area and the maintenance of the environment.
5. And to accommodate future growth while being aware of possible adverse impacts.

Another minor constraint on the site is that it is within 2-1/2 miles of a runway accepting jet aircraft at Lakehurst N.A.S. According to current State regulations, a landfill which is proposed within 2-1/2 miles of a jetport must institute a bird control program.

1.2 Sub-surface Geology

The geologic formations and deposits within Ocean County have been classified in geologic time into three periods: Cretaceous, Tertiary, and Quaternary. The Cretaceous Formations are found to lie on gneiss bedrock from the early Paleozoic or Precambrian Era. The bedrock surface varies from between 5000 feet below sea level at the southern tip of the County to 1000 feet below sea level in the northern parts.

During the Tertiary Epoch, one to sixty million years ago, many layers of sediments were deposited which comprise the near-surface geology of the County today. In the vicinity of the Clayton site, the sub-surface is comprised of Cohansey Sand from elevation +100 to about elevation 0; Kirkwood Formation from about elevation 0 to about elevation -100 feet below sea level; and Navesink Formation, Red Bank Sand, and Hornerstown Sand to about 350 feet below sea level. While these are the main formations that will be discussed in detail, there is also the Merchantville Formation, Woodbury Clay, Raritan and Magothy Formations down to the Pre-Cretaceous crystalline bedrock at about elevation 1500 feet below sea level.

The Navesink Formation is a greenish-black, semi-consolidated, greensand marl. It is a marine formation that was deposited on the continental shelf. It is characterized by fine to coarse-grained, rounded glauconite and some quartz grains. The interstices are filled with finely divided glauconite, calcium carbonate, and clay. The maximum thickness of the Navesink is 40 feet where it outcrops and about 100 feet thick in sub-surface deposits.

Red Bank Sand consists of an upper layer of yellow or reddish-brown, medium to coarse-grained, micaceous sand containing partly pyritized lignite. The lower layer is characterized by dark gray clay composed of clayey, micaceous, fossiliferous, glauconite sand or sandy clay. The formation attains a maximum thickness of 140 feet.

Hornerstown Sand is the oldest Tertiary formation in Ocean County. It is characteristically a massive green, semi-consolidated medium to coarse-grained, glauconite sand, silt and clay. The formation outcrops in northwestern Ocean County, but is typically 30 to 50 feet thick.

The Kirkwood Formation overlies the Navesink, Red Bank, and Hornerstown Formations in the vicinity of the Clayton site. The formation is comprised of two lithologic layers. The lower layer is a dark brown, pebbly, lignitic, micaceous ilmenitic, fine to very fine-grained quartz sand and silt. The upper layer consists of a light-gray to yellow-brown micaceous ilmenitic, lignitic, very fine to fine-grained quartz sand.

When the deposit is weathered above the water table, it changes color to a medium gray, yellow-brown or red-brown sediment. The Kirkwood Formation ranges in thickness from a minimum of 50 feet in the outcrop area to a maximum reported thickness of 800 feet in the vicinity of Atlantic City.

Overlying the Kirkwood Formation is Cohansey Sand. This sand is typically composed of yellowish-brown, unfossiliferous, cross-stratified, pebbly, fine to coarse-grained quartz sand. The sand is locally cemented with iron oxide. While dark gray and red kaolinitic clays are interbedded with the sands, generally several sand and clay beds are found at any given

site. The clay beds are 8 to 10 feet thick, but may be as much as 30 feet thick.

1.3 Surface Soils

The soils at the Clayton site consist of gravels, sandy gravels, and gravelly sands underlain by clayey sand or clayey gravel with sand and silt. In some areas clayey sand and clayey gravel are at the surface. The correlated agronomic series for these soils are Sassafras, Lakewood and Norfolk.

The majority of the site surface consists of an alluvial, stratified material deposited during the Quaternary Period. It is comprised of an assorted, relatively homogeneous material consisting of gravel and sand with small quantities of silt and clay. The gravel and clay are well defined and occur in layers and beds. However, the silt and clay are more likely to occur in isolated lenses or pockets. These soils have colors which vary from yellow and yellow-brown to a dull red. In some areas, the Lakewood soils are a bleached gray sand.

Underlying about half of the above surface soil at depths generally less than 10 feet is a stratified material consisting of gravel, sand, silt and clay in various combinations. These formations were deposited during the Tertiary Period. The formation is comprised of two layers; one is a mixture of clay and sand and the other is a mixture of gravel and clay and silt. Quartz and weathered chert are abundant in both, with white, yellow, red and orange colors prevailing.

Underlying the other half of the above surface soil and outcropping on some sections of the site is a marine stratified material deposited during the Tertiary Period. It consists of assorted, homogeneous material, ranging in size from a uniform medium to a coarse sand. The soils correlated with the Kirkwood consist of a fine, micaceous quartz sand, whereas those associated with the Cohansey consist of a medium to coarse quartz sand.

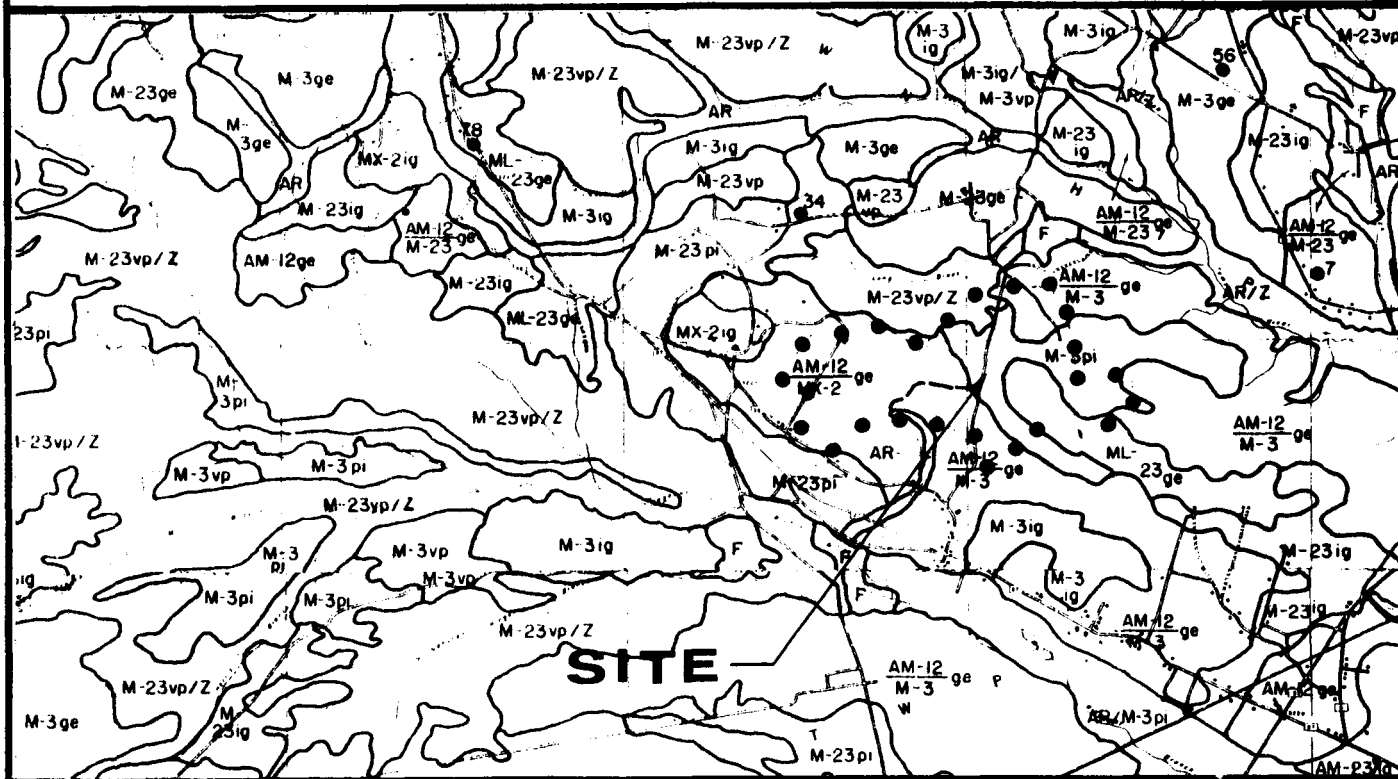
A small portion of the surface soil consists of poorly drained, intermingled swamp, or marine tidal marsh. The soils consist of assorted and relatively homogeneous materials composed predominantly of silty sands and sands. In areas of poor drainage, the formations have dark colors due to organic matter. Figure C-2 details the various locations of the soils groups.

1.4 Drainage and Topography

The site is bordered by the Long Brook branch of the Toms River on the north and on the south by the Ridgeway branch of the Toms River. Since the site was previously mined by Glidden-Durkee, Inc., the landfill is lower in elevation than the surrounding land and water falling in the area will pond and/or percolate through the top layers of Cohansey Sand. The surface and sub-surface soils are well drained.

Approximately one-half of the site drains to the Long Brook and half to Ridgeway branch, both tributaries of the Toms

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN AGRONOMIC SOIL SERIES FOR CLAYTON SITE



SOIL CLASSIFICATION

DESCRIPTION

AM-12 ge
MX-2

Gravels, sandy gravels and gravelly sands; in places extremely compact, underlain at depths of less than 10 feet with clayey sand or clayey gravel with sand and silt. Good to excellent drainage.

AM-12 ge
M-3

Gravels, sandy gravels and gravelly sands; in places extremely compact, underlain at depths of less than 10 feet with uniform, medium to coarse sand with a small amount of fines. Good to excellent drainage.

M-3 pi

Uniform, medium to coarse sand with a small amount of fines. Poor to imperfect drainage.

M-23 vp
7

Silty sand to uniform fine sands, containing ironstone in places; underlain by swamp or marine tidal marsh. Very poor to poor drainage.



FIGURE C-2.

**M. DISKO ASSOCIATES
CONSULTING ENGINEERS**

River. But as indicated earlier, the excavation of the site for mining purposes has locally disrupted the topography shown on Figure C-1 and it is probable that much of the site is now lower than the surrounding undisturbed topography.

1.5 Groundwater

As described in Section 1.2, the uppermost formations of the geologic cross-section at the Clayton site includes:

- Cohansey Sand (surface)
- Kirkwood Formation (underlying)
- Navesink Formation (underlying)
- Red Bank and Hornerstown Sand (underlying)

The Cohansey Sand water table aquifer and the Kirkwood Formation are the predominant water supply aquifers for Ocean County. The underlying Navesink Formation and the Red Bank and Hornerstown Sand are confining units to other aquifers and few, if any, wells draw water from this layer.

The Kirkwood Formation is one of the most important formations in Ocean County. The formation generally averages 60 feet in thickness but is as thick as 160 feet in the outcrop areas. The Kirkwood Formation outcrops north of the Clayton site in northern Ocean County. The Kirkwood Formation is heavily tapped by water supply wells in Ocean County.

The Cohansey Sand, which overlies the Kirkwood Formation in all but northern Ocean County, is a water table aquifer of the Coastal Plain. The Cohansey Sand is a valuable water bearing aquifer for shallow wells in Ocean County. It has more usable storage capacity and outcrop area subject to easy recharge than all other Coastal Plain aquifers combined.

There are several water supply wells within the vicinity of the Clayton site. There are three wells on the property which were used by the Glidden-Durkee Corporation while it was in operation at the site. About one mile to the southwest there is a New Jersey Highway Authority well, and about 5000 feet to the south there is a New Jersey Water Company well.

As can be seen, the site is situated over an important groundwater aquifer. To mitigate against any possible pollution of that aquifer, any proposed disposal facility would have to be designed with an impermeable clay or man-made liner to prevent any leaching of contaminants into the ground.

1.6 Climate

The Clayton site is located at approximately longitude $74^{\circ}20'W$ and latitude $40^{\circ}03'45''N$. The site experiences a climate of moderate temperatures and rainfall. With its location along the Atlantic Coast, fluctuations in temperature and rainfall can occur due to offshore factors. Table C-1 gives a summary of temperature and rainfall data for four weather stations

TABLE C-1

SEASONAL TEMPERATURE AND RAINFALL DATA FOR WEATHER STATIONS
IN OR NEAR OCEAN COUNTY, 1974

<u>PARAMETER</u>	<u>STATION</u> <u>NAME</u>	<u>JANUARY-</u> <u>MARCH</u>	<u>APRIL-</u> <u>JUNE</u>	<u>JULY-</u> <u>SEPTEMBER</u>	<u>OCTOBER-</u> <u>DECEMBER</u>	<u>YEARLY</u> <u>AVERAGE</u>
Temperature, OF	Chatsworth	38.0	61.8	72.0	46.3	54.5
	Pemberton	37.9	61.0	71.1	45.9	54.0
	Toms River	35.9	59.5	71.4	45.2	53.0
	Tuckerton	38.2	60.7	72.3	46.8	54.5
Rainfall, Inches	Chatsworth	3.88	3.35	5.20	2.72	45.47
	Pemberton	5.18	3.25	4.88	3.00	44.94
	Toms River	2.92	2.84	4.08	3.28	42.04
	Tuckerton	3.83	2.62	4.45	2.41	39.74

SOURCE: U. S. Department of Commerce
 National Oceanic and Atmospheric Administration
 Environmental Data Service
 New Jersey Annual Summary 1974
 National Climatic Center
 Asheville, North Carolina

surrounding Ocean County. Winds are predominantly northwesterly over the area.

1.7 Transportation Accessibility

Transportation access to the Clayton site in Jackson Township is good. The site is located off County Route 571 and all access from the County can be along County and State highways. Access from the Brick-Point Pleasant area would be along State Route 70 to County Route 571. Access from the central part of the County and most of Island Beach would be along SR 37 to CR 547 to CR 571. Access from Manchester and the western sections of the County would be along SR 70 to CR 547 to CR 571. These County and State routes have improved road surfaces and usually have one to three lanes in each direction. There are no major developed areas near the site which all truck traffic would have to funnel through.

2. OCEAN COUNTY LANDFILL CORPORATION SITE

2.1 Location of Site

The Ocean County Landfill Corp. is an active, private sanitary landfill located on State Route 70 in Manchester Township. As shown on Figure C-3, it is bordered on the northwest by SR 70, on the east by the Toms River, and on the southwest by County Route 571. The site is within the Pinelands Protection Area and development is regulated as explained in Section 1.1. Since the landfill is existing, there is data available from the New Jersey Department of Environmental Protection and the Board of Public Utilities concerning the operation.

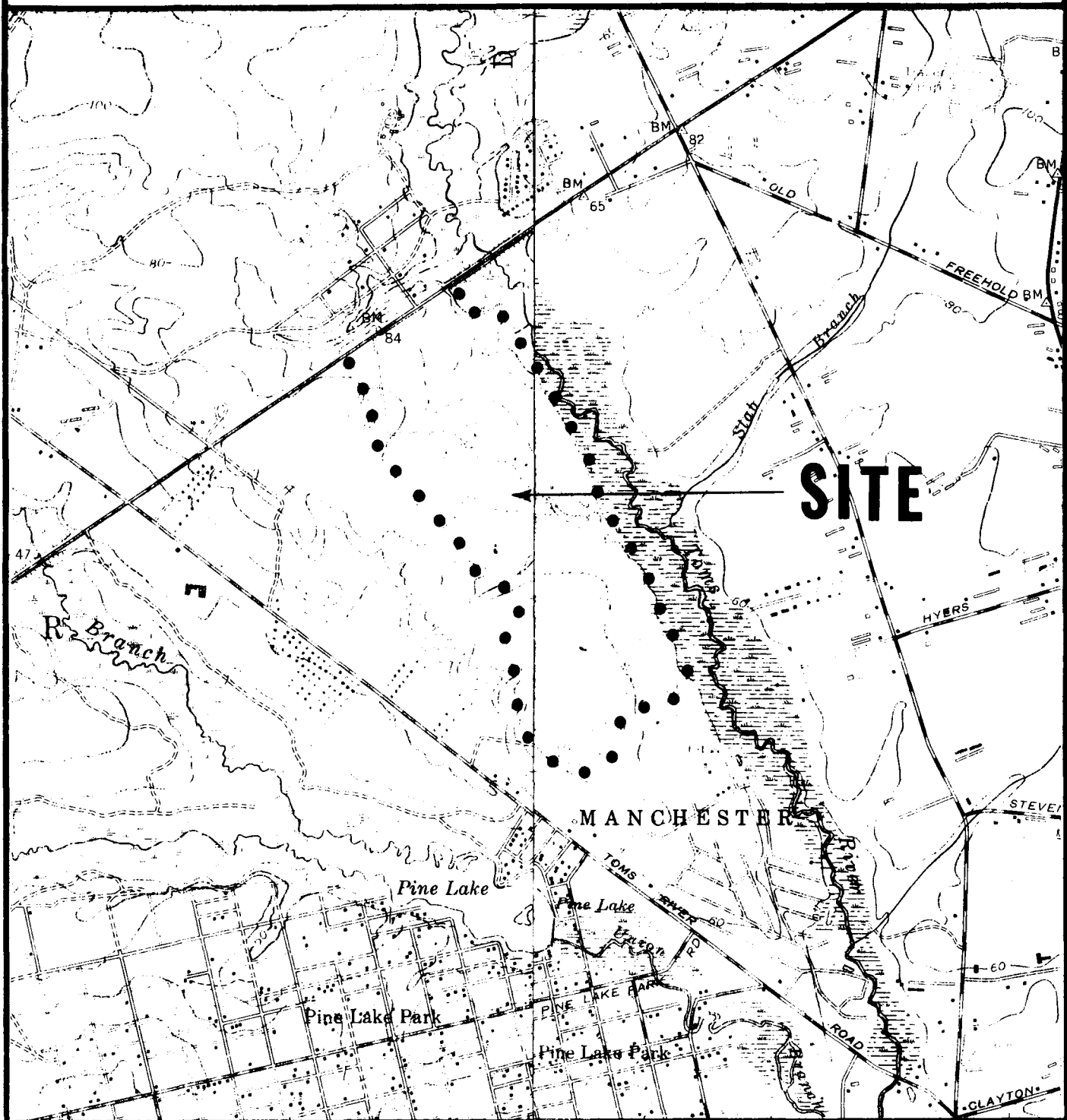
2.2 Description of Existing Landfill Operation

The Ocean County Landfill Corp. is a private corporation operating under the laws of the State of New Jersey. The N.J. D.E.P. Solid Waste Administration registration number for the landfill is 1518B. The property that the landfill is operating on is leased from the Atlantic Pier Company, Inc. of Belford, N. J.

The parcel of land is composed of about 400[±] acres. It is located in Block R11 on Lots 1, 3, 6-9, 15-18, 22-25, 29, 33, 769 and 770. As of 1972, the planned life expectancy for the landfill was 25 years.

The trench and area methods of landfilling are used at the landfill. It is reported that there are sufficient quantities

OCEAN COUNTY DISTRICT SOLID WASTE
MANAGEMENT PLAN
LOCATION OF OCEAN COUNTY LANDFILL CORP.



OCEAN COUNTY, NEW JERSEY



SOURCE: U.S.G.S. 7 1/2 MINUTE QUADRANGLE
FOR LAKEHURST AND
LAKEWOOD, N. J.

SCALE IN FEET

FIGURE C-3
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

of suitable material on-site for cover for the landfill. Landfill sources indicate that approximately 250 cubic yards of cover material are used daily for the landfill operation. The landfill has electricity and telephone on the site. Their hours are 7:00 A.M. to 4:30 P.M., Monday through Saturday.

As an indication of the volumes of solid waste entering the site, the following quantity of waste was disposed of at the landfill during 1976:

<u>Waste Type</u>	<u>Quantity</u>
Municipal (Household, Commercial, Institutional)	275,971 c.y.
Dry Sewage Sludge	200 c.y.
Bulky Wastes	5,146 c.y.
Liquid Sewage Sludge	7,548,860 gal.

Since the landfill is registered with the Board of Public Utilities, it has a tariff schedule as outlined below:

No liquid or soluble industrial materials accepted.

Residential Refuse	\$4.50/ton (Aug. 10, 1977)
Municipal Contracts	Negotiated
Refuse Deposited by Single Customer	\$1.00/30 gal. container
Commercial Refuse	\$4.50/ton
Septic Tank Clean-Out	\$0.06/gallon
Bulky Refuse (Furniture, Tires, Lumber, Stoves, Appliances, Bath Fixtures, Pallets, etc.)	\$4.50/ton
Oversized Bulky (Brush, Logs, Stumps)	\$6.00/ton
Concrete	\$3.00/ton
Wood	\$6.00/ton

Each landfill in New Jersey is inspected regularly by inspectors from the Solid Waste Administration in Trenton. These inspection reports give the number and severity of violations against the landfill and is a fair measure of how well a given landfill is operated. The violations against Ocean County Landfill Corp. are outlined in Table C-2.

2.3 Sub-surface Geology

Because the Ocean County Landfill Corp. is close to the Clayton site previously described, the sub-surface geology consists of Cohansey Sand on the surface, underlain by the Kirkwood Formation, underlain by the Navesink Formation, underlain by Red Bank and Hornerstown Sand. A description of these geological formations is included in Section 1.2.

2.4 Surface Soils

The soils at the Ocean County Landfill Corp. site are alluvial, stratified materials deposited during the Quaternary Period. The major soil types include the Cape May, Pensauken and Bridgeton. The surface consists of assorted, relatively homogeneous materials composed predominantly of gravel and sand sizes, with small quantities of silt and clay. The gravel and sand usually occur in well-defined layers, while the silt and clay occur more frequently in lenses. The soils have colors which vary from yellow and yellow-brown to a dull red. The soil usually has good to excellent drainage.

TABLE C-2

VIOLATIONS AGAINST OCEAN COUNTY LANDFILL CORP.

<u>DATE</u>	<u>INADE- QUATE COVER</u>	<u>MORE THAN 1 WORKING FACE</u>	<u>LITTER</u>	<u>PONDED SEW. SLUDGE</u>	<u>EROSION</u>	<u>DUST</u>	<u>ODORS</u>	<u>NO VIOLATIONS</u>
11/9/73	X							
1/10/74	X							
3/1/74				X				
8/9/74	X							
9/27/74								X
10/15/74	X							
11/11/74								X
1/7/75								X
2/7/75	X			X				
2/14/75	X							
2/26/75		X						
3/18/75		X						
5/14/75		X						
6/30/75		X						
9/16/75	X	X						
10/6/75	X	X						
11/26/75	X							
1/16/76	X	X						
3/12/76				X				
4/30/76	X			X				
5/26/76		X		X				
6/29/76		X		X				
8/16/76	X			X				
9/21/76	X	X						
10/19/76	X	X						
12/6/76	X		X	X				
2/2/77	X		X					
2/23/77	X	X	X					
3/3/77	X	X	X	X				
3/15/77	X	X	X	X				
4/6/77	X	X	X					
4/14/77	X	X						
4/29/77	X		X					
5/16/77			X			X		
6/6/77			X					
6/24/77			X					
7/21/77			X			X		
8/5/77			X					
8/18/77			X					
9/1/77				X				
9/22/77	X			X				
10/24/77			X					
11/18/77								X
11/30/77								X

TABLE C-2, Cont'd.

VIOLATIONS AGAINST OCEAN COUNTY LANDFILL CORP.

<u>DATE</u>	<u>INADE- QUATE COVER</u>	<u>MORE THAN 1 WORKING FACE</u>	<u>LITTER</u>	<u>PONDED SEW. SLUDGE</u>	<u>EROSION</u>	<u>DUST</u>	<u>ODORS</u>	<u>NO VIOLATIONS</u>
12/9/77								X
12/22/77								X
3/1/78								X
3/14/78	X	X						
4/11/78		X						
4/28/78								X
5/9/78								X
5/19/78							X	
5/24/78								X
8/9/78								X
9/15/78	X				X			
55 Inspections	25	18	14	12	1	2	1	12

Underlying the surface soil is a marine, stratified material deposited during the Tertiary Period and defined as Cohansey and Kirkwood Sand. The material consists of assorted, homogeneous soil, ranging in texture from a uniform medium to coarse sand. The Kirkwood soils consist of a fine, micaceous quartz sand and the Cohansey consists of a medium to coarse quartz sand. The surface drainage of this soil layer is good to excellent with good internal drainage. A soil map for the Ocean County Landfill Corp. site is included as Figure C-4.

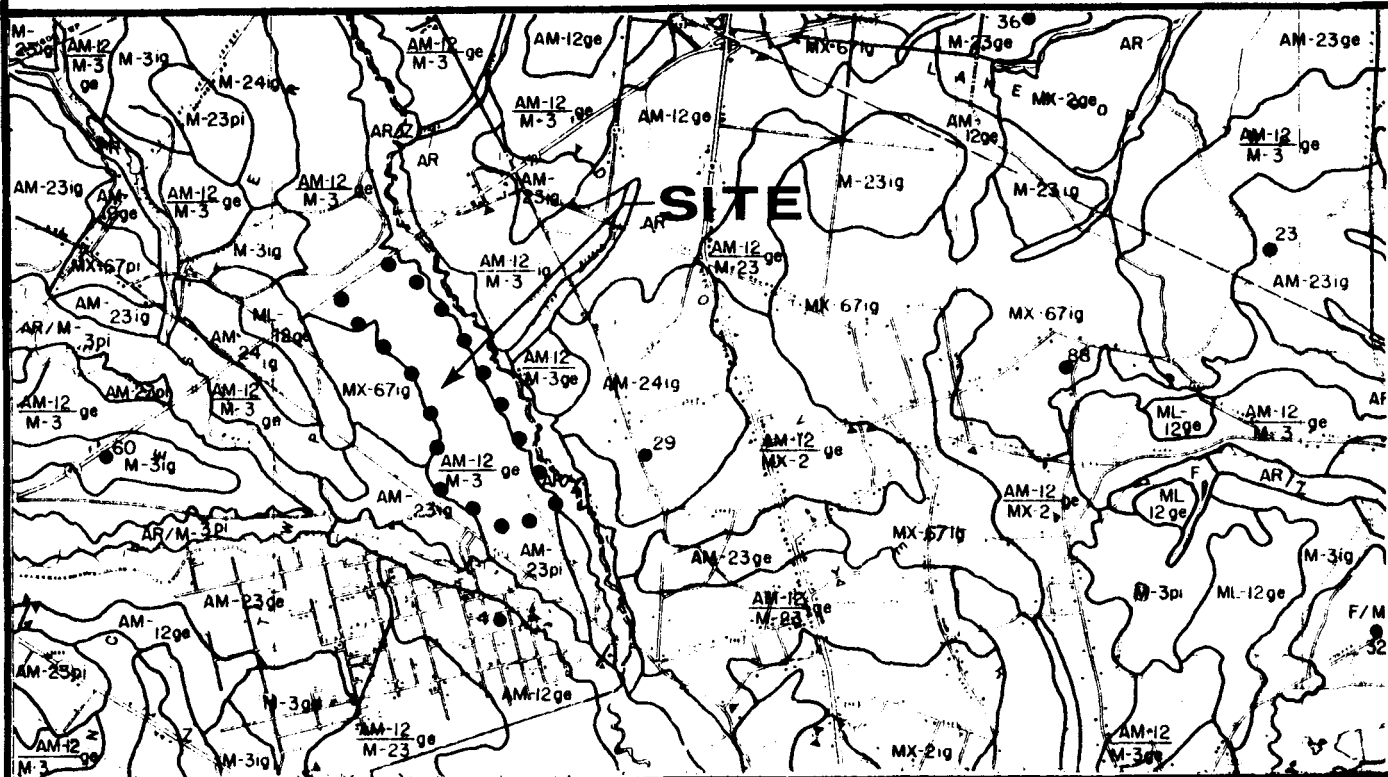
2.5 Drainage and Topography

Rain falling on the site drains to either the Toms River to the east or the Ridgeway and Union Branches of the Toms River to the west. However, the site is an active quarry pit and much material has been removed which has lowered the topography on the site. This has in effect dished out the site and most rainwater will pond on the property and eventually percolate down through the top soils to the groundwater. The approximate high elevation on the site is 80 feet. The elevation of the Toms River in the vicinity of the site is about 45 feet and the elevation of the Ridgeway Branch is about 35 feet. Figure C-3 shows the proximity of the site to the two rivers.

2.6 Groundwater

Since the Ocean County Landfill Corp. site is in close proximity to the Clayton site previously described, the groundwater

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN AGRONOMIC SOIL SERIES FOR O.C.L.F. CORP. SITE



SOIL CLASSIFICATION

DESCRIPTION

AM-12 ge
M-3

Gravels, sandy gravels and gravelly sands; in places extremely compact underlain at depths of less than 10 feet with uniform, medium to coarse sand with a small amount of fines. Good to excellent drainage.



SCALE IN MILES

SOURCE: ENGINEERING SOIL SURVEY, RUTGERS UNIVERSITY

FIGURE C-4
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

patterns are also very similar. The Ocean County Landfill Corp. site's surface formation is Cohansey Sand and that is underlain by the Kirkwood Formation, the Navesink Formation and Red Bank and Hornerstown Sands. Refer to Section 1.5 for a description of the hydrology of these formations.

There are few water supply wells in the vicinity of the Ocean County Landfill Corp. site. There are two wells approximately 5000 feet to the southeast servicing Cedar Glen Homes. There are two wells about 9000 feet to the west servicing Leisure Technology Corporation. The next nearest wells are about 2 miles distant.

2.7 Climate

The latitude of the Ocean County Landfill Corp. site is about 40°01'15" North and the longitude is 74°15' West. As mentioned previously, the site is close to the Clayton site and the climate will be the same. Refer to Section 1.6 for a description of the area's overall climate.

2.8 Transportation Accessibility

The Ocean County Landfill Corp. site has excellent transportation accessibility. The entrance to the site is directly off State Route 70 in Manchester Township. Access from the north, the Brick-Point Pleasant region, is directly along SR 70 or SR 88. Access from Jackson and Plumsted is by CR 571 to SR 70. Access from the central portion of the County is by U. S. Route 9 to CR 571 to SR 70. Access from Island Beach is via SR 37 to

U. S. Route 9 to CR 571 to U. S. Route 70. All of these transportation routes are improved highways with one to three paved lanes in each direction.

3. SOUTHERN OCEAN LANDFILL INC. SITE

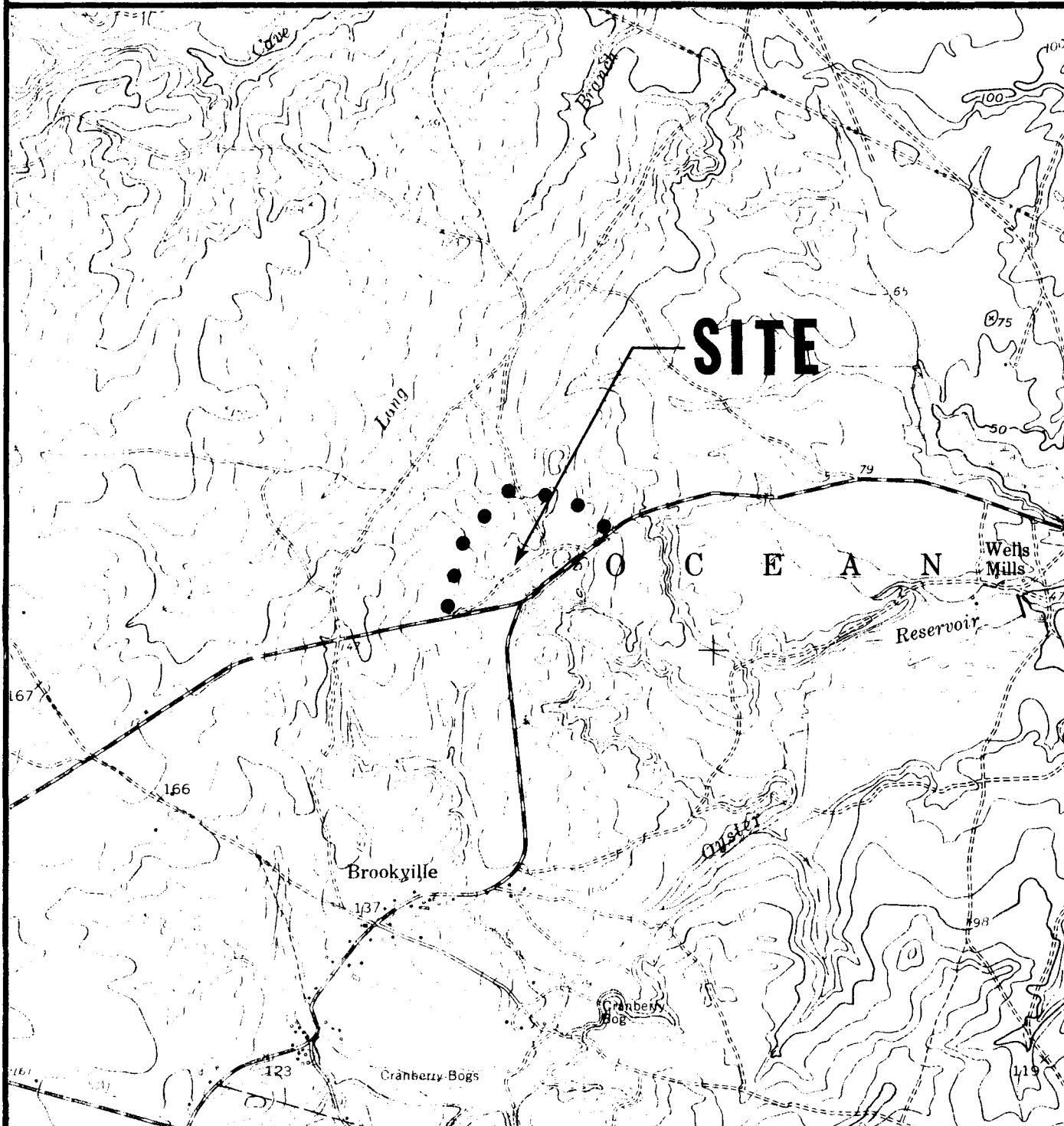
3.1 Location of Site

The Southern Ocean Landfill Inc. (SOLF) site is also an active, privately operated, sanitary landfill operating in the Township of Ocean in southern Ocean County. As shown on Figure C-5, it is located on County Route 532 at the intersection of County Route 611. It is bordered on the northwest by the Long Branch of the North Branch of the Forked River, and on the south by CR 532. The site is zoned rural. It is located within the Pinelands Protection Area and development is regulated as outlined in Section 1.1. Since SOLF is an existing sanitary landfill, there is data available from the Department of Environmental Protection and the Board of Public Utilities concerning its operation.

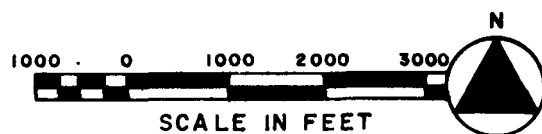
3.2 Description of Existing Landfill Operation

The Southern Ocean Landfill Inc. is a private corporation. The existing landfill is operated under the jurisdiction of the Board of Public Utilities and they currently accept solid waste from eight (8) Ocean County municipalities. The N.J. D.E.P. Solid Waste Administration number for the facility is 1520A. As of July 1977, the facility estimated it had 29 years of life expectancy with a total site of 283 acres of land owned by the Corporation. The parcel is in Block 6 on Lot 4, and they have been operating since 1972.

OCEAN COUNTY DISTRICT SOLID WASTE
MANAGEMENT PLAN
LOCATION OF SOUTHERN OCEAN LANDFILL INC.



OCEAN COUNTY, NEW JERSEY



SOURCE: U.S.G.S. 7 1/2 MINUTE QUADRANGLE
FOR BROOKVILLE, N.J.

FIGURE C-5
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

According to files at the D.E.P., the facility is registered to accept the following types of waste:

- Municipal (Household, Commercial)
- Institutional
- Dry Sewage Sludge
- Bulky Waste
- Tires
- Leaves and Chopped Tree Waste
- Tree Stumps
- Industrial (Non-Chemical)
- Septic Tank Clean-Out
- Liquid Sewage Sludge

The landfill is currently using the trench and area methods of landfilling at the site. As an indication of the amount of waste being deposited in the landfill, the following volumes were reported for the calendar year 1976:

<u>Waste Type</u>	<u>Quantity</u>
Municipal (Household, Commercial)	71,375 c.y.
Dry Sewage Sludge	500 c.y.
Bulky Waste	18,000 c.y.
Septic Tank Clean-Out Wastes	11,000,000 gal.
Liquid Sewage Sludge	18,000,000-gal.

The landfill has a tariff schedule on file with the Board of Public Utilities. These rates are outlined below:

<u>Material</u>	<u>Rate</u>
Loose Compactable Garbage	\$0.75 cy - \$1.00/cy
Compacted Garbage	\$1.00/cy - \$3.00 cy
Non-Compactable Trash (Demo, Furniture, Tree Stumps, Large Appliances)	\$2.50/cy
Septic, Sewage or Liquid Waste	\$1.00/200 gallons- \$1.75/200 gallons (depending on size of containers)

Bulky Refuse	\$2.50/cy or \$6.00/ton
Non-Toxic, Non-Flammable Chemicals	\$0.05/gallon
Contracts:	
Boro of Island Heights	\$5.50/family/year
Boro of Ocean Gate	\$5.50/family/year
Boro of Pine Beach	\$0.80/cy at site

As previously explained for the Ocean County Landfill Corp., the N.J. D.E.P. regularly inspects the landfills in the State. Table C-3 is a list of the violations against SOLF noted during the regular inspections.

3.3 Sub-Surface Geology

The sub-surface geology at the Southern Ocean Landfill Inc. site is similar in composition to the previously described sites. However, the depths at which these various formations occur are markedly different. The surface formation consists of Cohansey Sand as outcrop. In the vicinity of the SOLF site, the Cohansey Sand is about 185 feet thick. Underlying the Cohansey Sand is the Kirkwood Formation. This formation is approximately 265 feet thick. Underlying the Kirkwood Formation is the Navesink Formation followed by the Red Bank Sand and the Hornerstown Sand. A detailed description of the geologic characteristics of these formations is included in Section 1.2.

3.4 Surface Soils

The surface soil at the SOLF site consists of alluvial, stratified materials which were deposited during the Quaternary Period.

TABLE C-3

VIOLATIONS AGAINST SOUTHERN OCEAN LANDFILL, INC.

<u>DATE</u>	<u>INADEQUATE COVER</u>	<u>MORE THAN 1 WORKING FACE</u>	<u>LITTER</u>	<u>PONDED SEW. SLUDGE</u>	<u>DUST</u>	<u>NO WELLS</u>	<u>NO VIOLATIONS</u>
7/6/73							X
8/23/73							X
9/27/73	X						
11/2/73							X
1/7/74	X						
2/28/74							X
4/22/74	X						
6/27/74	X						
8/6/74	X						
8/19/74	X						
8/22/74							X
11/8/74						X	
1/3/75	X		X				
2/26/75							X
3/6/75		X					
3/14/75		X					
5/7/75		X					
6/3/75		X					
6/24/75							X
7/17/75		X	X				
7/29/75		X					
8/12/75	X	X					
9/3/75		X					
9/18/75		X					
11/21/75		X					
12/8/75		X					
12/23/75		X					
1/2/76		X					
1/27/76							X
2/18/76			X				
3/8/76							X
4/7/76							X
5/5/76		X					
6/21/76		X					
7/12/76		X					
8/23/76		X					
9/15/76		X					
10/4/76		X					
1/25/77	X	X	X				
2/28/77		X	X				
4/6/77		X	X				
4/21/77		X	X				
5/4/77		X	X				
5/23/77		X	X				

TABLE C-3, Cont'd.

VIOLATIONS AGAINST SOUTHERN OCEAN LANDFILL, INC.

<u>DATE</u>	<u>INADEQUATE COVER</u>	<u>MORE THAN 1 WORKING FACE</u>	<u>LITTER</u>	<u>PONDED SEW. SLUDGE</u>	<u>DUST</u>	<u>NO WELLS</u>	<u>NO VIOLATIONS</u>
6/22/77		X					
7/20/77		X			X		
8/3/77		X					
8/23/77	X	X					
9/13/77		X					
10/4/77							X
10/17/77							X
10/25/77							X
11/10/77							X
11/22/77				X			X
11/29/77				X			
12/22/77			X				
3/10/78			X				
3/21/78			X				
4/11/78			X				
4/18/78			X				
5/2/78							X
5/9/78	X		X				
5/25/78							X
6/6/78							X
7/24/78							X
8/7/78							X
9/18/78	X						
67 Inspections	12	30	15	2	1	1	20

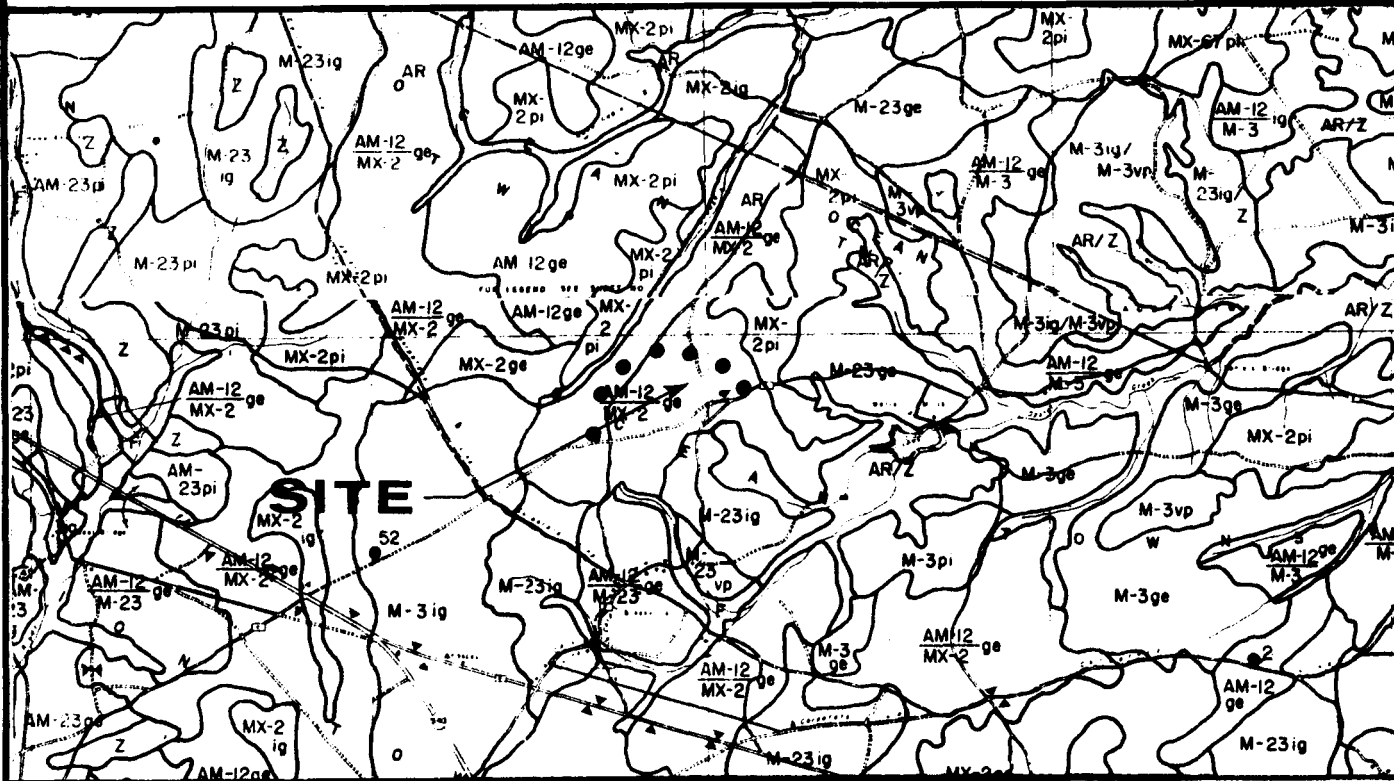
The soils are characterized by assorted, relatively homogeneous materials consisting predominantly of gravel and sand sizes, with small quantities of silt and clay. The gravel and sand usually are found in layers or beds while the silt and clay are more apt to occur in lenses or pockets. In most of the area, the mineralogical content is primarily quartz. Drainage through this surface layer is usually good to excellent.

Underlying the surface soils at a depth of less than 10 feet are an assortment of stratified materials, consisting of gravel, sand, silt and clay in various combinations. There are two textural types of importance; one is a mixture of clay and sand; while the other is a mixture of gravel and clay or silt. Both textural types appear as thick, stratified layers. These various soil mappings are illustrated in Figure C-6.

3.5 Drainage and Topography

The Southern Ocean Landfill Inc. site is bordered on the northwest by the Long Branch of the North Branch of the Forked River. On the south and east, several small tributaries of Oyster Creek are close to the site. The topographical elevation at the site varies from a high of about 160 to 140. From the topographical contours, approximately 75 percent of the overland drainage flows to Oyster Creek while the remaining area flows to the North Branch Forked River.

OCEAN COUNTY DISTRICT SOLID WASTE MANAGEMENT PLAN AGRONOMIC SOIL SERIES FOR S.O.L.F. INC. SITE



SOIL CLASSIFICATION

DESCRIPTION

AM-12 ge
MX-2

Gravels, sandy gravels, and gravelly sands; in places extremely compact; underlain at depths of less than 10 feet with an assortment of stratified materials, consisting of gravel, sand, silt, and clay in various combinations.



FIGURE C-6
M. DISKO ASSOCIATES
CONSULTING ENGINEERS

SOURCE: ENGINEERING SOIL SURVEY, RUTGERS UNIVERSITY

3.6 Groundwater

The groundwater patterns at the Southern Ocean Landfill Inc. site are very similar to those discussed in Sections 1 and 2 of this report. The elevation of the groundwater is, of course, variable but one source shows it at elevation 60[±] near the site. That would place the water table about 90 feet below the surface. The major sub-surface aquifers at the site are the Cohansey, which is the water table aquifer, and the Kirkwood Formation. The Navesink Formation and Red Bank and Hornerstown Sand are confining units to these aquifers.

There are no major water supply wells around the SOLF site. The nearest wells are about 3 miles away at Pinewood Estates.

3.7 Climate

The latitude of the SOLF site is 39°47'45" and its longitude is 74°17'45". The climate of the site is essentially the same as the two previously described sites. See Section 1.6 for the climate description.

3.8 Transportation Accessibility

Transportation accessibility to the Southern Ocean Landfill Inc. site is good from the central and southern sections of the County as well as Long Beach Island. From the central part of the County, access would be by either U. S. Route 9 to CR 532, or via the Parkway to CR 554 to CR 611 to CR 532. From the south and Long Beach Island, access would be via SR 72 to CR 611 to CR 532. All of these routes are improved highways with from one or two lanes in each direction.

SUMMARY

The environmental description of the three potential solid waste disposal sites for Ocean County indicates no environmental problem which cannot be solved through proper environmental engineering design.

The solid waste disposal management plan for Ocean County proposes establishment and operation of sanitary landfills. It is very important to note that the landfills will be constructed so as to meet all State of New Jersey environmental regulations. They will be "secure" landfills which have impermeable clay or man-made rubber or vinyl liners. Ground and surface water pollution will be eliminated. Adequate tree buffers will be maintained to shield the operation from neighboring land uses. Transportation congestion will not be a problem because truck traffic patterns are mostly already established.

The environmental problems associated with the existing landfills can be minimized through adequate re-engineering of the existing operations. Experience shows that a well run secure sanitary landfill is not an environmental problem to the community.

The economics of transportation haul for the proposed two-site solid waste disposal strategy are favorable. Ocean County's shape and overall size of the land area make the siting of two solid waste disposal sites a good strategy. By siting a disposal site in the north region to serve the northern municipalities and Island Beach,

and by siting a facility in the south to serve the southern municipalities and Long Beach Island, the transportation haulage distances and costs are kept to a manageable level.

The capital costs for the three sites vary with the size of the site and the existing land use. The current (Jan. 1979) approximate cost for the Ocean County Landfill Corp. is \$7,000 to about \$10,000 per acre. The price is high but it must be remembered that the site already has an existing, registered landfill in operation. In lieu of using this site in the north region, the County could acquire several hundred acres of land at the Clayton Site in Jackson. The price per acre for this land will be about the same as for virgin land in Ocean County. However, there are two distinct disadvantages to the site. First, it will require engineering before it would be approved by D.E.P. as a landfill and, secondly, it does not stop Ocean County Landfill Corp. from operating and attracting business away from the County facility. The Clayton Site is essentially a scarred area left by a strip mining operation and that will also influence the cost to purchase the land.

The Southern Ocean Landfill Inc. in the southern waste district has an asking price of about \$2,000,000 or about \$7,000 per acre. This price seems fair and reasonable considering the site is already registered to operate a landfill.

If the County were to opt not to purchase outright any of the sites, it could potentially lease or lease-purchase the sites. The lease or lease-purchase arrangement is advantageous because it would allow the County to operate the sites without the large, initial capital outlay which would be required to purchase them.

APPENDIX D

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT

Chapter 326 requires that the District Solid Waste Management Plan identify every person engaged in the collection and disposal of solid waste within the District. Based on information available in computer listings supplied by the Solid Waste Administration, the required list is presented below.

A-All-In-One Services	Bay Bridge Marine, Inc.
Acc-Rite Parts	Bedrock Stone & Supply Co., Inc.
Aetna Roofing Co.	Bells Septic Service
Ajay Appliance Sale	Bertolo, Fred
All American Holding Co.	Bil-Jim Construction Co., Inc.
Allen's Tire Service, Inc.	Bird Construction, Inc.
American General Cont.	Blair's Rental
American Supply Company	Bloom, Charles
Applegate, Calvin	Boltons Cesspool Service
Aqua-Land Pools, Inc.	Elmer Bouch
Atlantic Land Corp.	Brewer Contracting
Atlantic Lawn Care	James Brewster Builder
Aune, Bjarne	Brick Plaza, Inc.
B & B Masons, Inc.	Brick Township Bd. of Ed.
B & H Construction Co., Inc.	Bronx Baby Products, Co.
James Baldwin & Sons, Inc.	Ed Brower
Barney's Service Center, Inc.	Gene Brower

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

C. M. Brown	Colonial Septic & Cesspool Cleaning
Marion C. Brown, Inc.	Colony Market, Inc.
Browning-Ferris Industries	Alan Cooke Excavating Co.
Bruffy's Builders, Inc.	Corliss & Sons
Joseph Bryk, Inc.	Cor-Nel Contracting Corp.
C & L Sweeper Service Co.	Crestwood Village
C & R Waste Materials Co.	Curb-Line Construction Corp.
Caldeira Bros., Inc.	D & J Transportation Specialists
Captain's Inn, Inc.	D & V Wrecking Corp.
Cardinal Roofing & Siding	DCA of N.J., Inc.
Cedar Glen Homes, Inc.	DPS Landscaping
Central Jersey Associates	Dan-D, Inc.
Central Jersey Heat & Cool, Inc.	Davisab, Inc.
Ceramic Tile Supply Co.	DeAngelis Supper Septic
Chadwick, Joseph	Dee Lumber Co.
Chapman's Boat Sales & Service	Delta Lumber Co.
Charles, Paul	Demott & Aldrich Truck Co., Inc.
Christiansen Construction Co.	Dept. of Parks & Recreation (Berkeley & Lakewood)
Citation Aluminum Products	
Citta Enterprises, Inc.	Walter Dickerson, Jr., Builder
Clayton Block Co. Inc.	Dickson Supply Co.
Clayton Construction Co.	Dowling, Stanley
Clean Water Inc.	Downs Ford, Inc.
Colletti, Vincent	Dover Pools, Inc.

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

Dover Sewerage Authority	Hall Construction Co., Inc.
Eagle & Sons, Inc.	Stanley Hans Septic Tank Service
EASE Corp	Harmony Construction Co.
Emergency Septic Sewer & Drain	Hecht Brothers, Inc.
Excel Wood Products Co., Inc.	Holiday Lawns, Inc.
John Falkinburg	Holland & Son Excavating
Family Lawn Service	Homes of Distinction
Fluid Packaging Co., Inc.	House & Home, Inc.
Forked River Freezer	Hovsons, Inc.
Fred's Dump Service	Howell Sanitary Service
Freehold Cartage, Inc.	Harold R. Hurley
Michael J. Gavan General Contractor	Iario Inc.
Gaylord Aluminum Co., Inc.	IDS, Inc.
Glenn Construction Co.	Insulite, Inc.
Glen Rock Lumber & Supply Co., Inc.	Ippolito & Sons
Ray Gibson Bulldozing	J & E Roofing
H. Clay Glover Co., Inc.	Jackson Twp. Bd. of Ed.
Harold Goff Septic & Cesspool	Jackson Twp. Municipal Authority
Gold Bell Farms	Jamestown Village, Inc.
Gore Construction	Jersey Central Power & Light Co.
Greenbriar Assocation	Jersey Coast Cruiser Sales
Guardian, Inc.	Johnson Boat Basin
Guld Contractors, Inc.	J. A. Jones & Co., Inc.
Hagaman, Howard	C. S. Jones

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

Herman Kalthoff Builders	Manchester Service Corporation
Karchik & Son Disposal Ser., Inc.	Marousis Enterprises, Inc.
Kelly, Jr., Henry J.	Marpal, Inc.
James S. Kelly, Inc.	Martin Realty Development, Inc.
Keystone Mason & Excavating	Materials Hauling & Service
J.F. Kiely Construction Co.	Meadows Marina, Inc.
Klaus, Robert	Harry Megill
Kofield Construction Co., Inc.	Mercury Waste Oil Co.
Ray Kuntz Roofers	Bill Merz Contracting
Kunze, William F.	Middle Road Imports, Inc.
LVB Corp.	Middletown Septic & Pumping Co.
Lakewood Bd. of Ed.	Miller, Don E.
Lakewood Hardware & Supply Co.	Miner Landscaping Co.
Land O Pines Mobile Home Park, Inc.	Mister John Portable Sanitation
Larry's Landscaping	Mister Mattress
LE-ED Construction, Inc.	Mister Spray Tree
Leisure Village Association	Mobile Drudging & Pumping Co.
C. A. Lertch Wrecking Co.	Mokracek Builders, Inc.
Eugene E. Lezgus, Inc.	Morris Brothers, Inc.
Little Egg Harbor Municipal Utility	Morris, Terry
Leoffel's Waste Oil Service Inc.	A. Mullen, Inc.
Lopiccolo Backhoe & Dozers	Mullen & Mullen
MacDonald, William	Newco Chemical Waste System I
Manchester Municipal Building	N.J. National Bank

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

Nobel Construction Co.	James Racko Housewright
Ocean County Advertising Service	Ramras & Tatfel, Inc.
Ocean County Road Dept.	Remnant King
Ocean County Sewerage Authority	Reynolds Sanitary Service
Ocean Sewer & Septic	Richmark Contracting, Inc.
Ocean Twp. Municipal Utility Auth.	Ricotta & Ricotta, Inc. T/A PACI
Olsen Septic Service	Risden Beach Corp.
Paradise Craftsmen, Inc.	Riverwood Realty Co., Inc.
Parker Construction Co.	Riviera Beach Construction Co.
Parking Lot Cleaning	A. G. Rogers Co., Inc.
Par Point Construction, Inc.	Rollins Environmental Services
Patimike Service Co., Inc.	Roselle Excavating
Patton Construction, Inc.	Rosetto Bros., Inc.
Paul's Supermarket, Inc.	Royal Flush Septic Service
Alfred Pearce Lawn Service	Roy's Trucking
Leon Pedro	Rt. Airey Lawn Maintenance Inc.
Pineland Septic Service	Charles Rush Construction, Inc.
Pinewood Mobile Home Park	S & S Disposal, Inc.
Plumstead Twp. Bd. of Ed.	St. Vladimirs Russian Orthodox
Pomponio Trucking & Excavating	Sambol Construction Corp.
David W. Porter, Inc.	Sanitary Waste Carriers, Inc.
Potts & Wiese Excavating	Scheffler Landscaping
Qey Enterprises, Inc.	Eugen A. Schmidt & Sons
R.D.B., Inc.	Schroeder Bros., Inc.

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

Seaside Furniture Shop	Taylor Pumping Service, Inc.
Seems Disposal Service	H. E. Tegen & Co., Inc.
Sequia Construction Co.	Alan Thiele Tire Co., Inc.
Shady Lake Park, Inc.	Tiltonts Septic Tank Service
Shank	Timberlane Oil Salvage
Shore Carting, Inc.	Timko
Shore Lane Homes Corp.	Town & Country Landscaping
Simsen, Richard	Toms River Bd. of Ed.
Simpson Construction Co.	Toms River Country Club
Smith Tree Service	Toms River Lawn Maintenance
South Shore Construction	Toms River Plumbing Supply Co., Inc.
Stamos Nursery, Inc.	Trader's Cove, Inc.
Standard Lumber Co.	Transenviromental Corp.
Starlite Woodworking	Art Turner Rentals & Renovations
Sterns Transport, Inc.	Unex Conveying Systems, Inc.
A. E. Stone, Inc.	Unity Landscaping
Al Strubel	U.S. Home Corp., N.J. Div.
Suburban Fireplace & Garden Center	Dominick Vaccaro Landscaping
Surf Builders	Verona Industries
Surf & Stream KOA	Wall Paving Co., Inc.
Svenco	Wallach's Poultry Farms
T/A D. P. Ash Bld.	Joseph T. Walsh
T/A General Sewer Service	John M. Ward Associates
T/A Schuler Roofing	Waste Disposal Inc.
Tanner Trucking	Waste Technology Enterprises

LIST OF PERSONS ENGAGED IN SOLID
WASTE COLLECTION AND DISPOSAL IN THE
OCEAN COUNTY DISTRICT, CONTINUED

Whaley, James

Whalons, Inc.

Wilenta Bros. Carting

Winter Yacht Basin, Inc.

Woodward Construction Co.

Worrell Bros., Inc.

G. W. Wright, Jr., Inc.

York Automoline Co., Inc.

Anthony Zajac & Son

Theodore E. Zindell, Inc.

