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SOLID WASTE

A Coordinated Approach



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TO HIS EXCELLENCY, GOVERNOR WILLIAM T. CAHILL, AND HONORABLE
MEMBERS OF SENATE AND GENERAL ASSEMBLY:

The County and Municipal Government Study Commission is
pleased to submit its seventh report, *SOLID WASTE: A Coordinated
Approach*.

In conformance with its mandate to study the structure and functions
of county and municipal government, the Commission undertook this
study to determine the respective roles of municipalities, counties and
State agencies in managing the growing volume of solid waste in New
Jersey.

The principal goal of this report is to indicate a number of methods
for providing a more efficient and effective service while increasing the
recovery of valuable resources and reducing environmental pollution.
These include the optimal use of manpower and equipment, the provision
of intermunicipal collection services, and the establishment of regional
processing and disposal districts.

While this report details the need for coordinating the collection,
processing, disposal and regulation of solid waste, the Commission wishes
to emphasize the necessity of immediate attention to *solid waste disposal*.
Experts in solid waste management concur that improved technology
will reach a point in the next ten to fifteen years where it will be able

to handle much of the volume and composition of anticipated waste loads. In the meantime however, and in view of the inevitable time lags in applying such technology, the State is rapidly approaching a critical stage in solid waste disposal, as existing landfill facilities, the only presently feasible disposal method, are nearing maximum capacity and will not be capable of handling projected waste loads.

Attempts to locate area-wide sanitary landfill facilities are strongly opposed by citizens and public officials living in close proximity to the proposed facilities. That few people want sanitary landfill facilities, particularly those facilities of regional scope, to be located in their communities is understandable. However, the Commission feels that until other acceptable disposal techniques are available to handle large volumes of waste, sanitary landfill disposal is the one method presently capable of assimilating New Jersey's vast solid waste load.

Therefore, the Commission believes that concerned citizens and public officials at all levels of government in the State must reach some difficult, but necessary decisions in the coming months, especially in determining the location of regional landfill sites, in order to stem the disposal crisis and ensure that there are sufficient and environmentally acceptable sanitary landfill facilities to serve New Jersey's requirements.

This report is respectfully submitted by the undersigned.

/s/ WILLIAM V. MUSTO, <i>Chairman</i>	/s/ RICHARD J. COFFEE
/s/ ALFRED D. SCHIAFFO	/s/ ALAN AUGENBLICK
/s/ RICHARD R. STOUT	/s/ FRED G. STICKEL, III
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/s/ ARTHUR A. MANNER	/s/ DAVID NORCROSS

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Louis P. Gaeta, Director, Division of Public Movers and Refuse.

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Douglas R. Webb, Director, Division of Transportation Systems Planning and Arthur Finkle, Environmental Analyst.

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Dr. J. H. Harrison of the Division of Local Health Services and Michael Guarino assigned to the Bergen County Health Department.

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William D. McDowell, Executive Director; Clifford A. Goldman, formerly Acting Executive Director, and Chester P. Mattson, Administrative Assistant.

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Finally, the Commission expresses its appreciation to the following individuals:

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While the responsibility for this report and its conclusions and implications lies exclusively with the Commission, it is accurate to say that without the help of these many groups and individuals this report could not have been written.

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

Solid waste collection, processing and disposal problems in New Jersey are approaching a critical stage, while our capabilities of dealing with these problems fail to measure up to the task. The data developed in this study reveal that during 1971 a total of 7.1-million tons of solid waste was produced in the State and, if recent trends continue, this amount, as shown in Table S-1, will increase to over 22-million tons annually by the year 2000. This staggering amount of waste, confronting an inadequate management system, threatens New Jersey's environment and the health and welfare of its citizens. Solid waste problems are reaching crisis proportions in virtually every area of the State, yet the critical need for effective state-wide and regional approaches to waste management still goes unmet.

Presently, responsibility for collection and disposal of solid waste is fragmented among many jurisdictions. For example, 407 of our municipalities provide tax supported solid waste collection and disposal services, while 160 do not. Of the municipalities that provide services, 277 contract with private collectors for the service and 130 operate their own systems. Virtually every municipality bases its solid waste methods on antiquated procedures or on emergency measures that provide only short-term and inadequate solutions to pressing solid waste problems. As each local government attempts to manage the solid waste within its jurisdiction, the criteria for making decisions are limited to a small number of alternative and costly solutions. With few exceptions, cooperative efforts have either failed or have not been tried.

TABLE S-1
GENERATION OF DOMESTIC SOLID WASTE
IN NEW JERSEY
1970-2000

Year	Millions of Tons Per Year	Pounds per Capita per day
1970	6.9	5.0
1975	8.5	5.6
1980	10.5	6.4
1985	12.8	7.2
1990	15.6	8.2
1995	18.7	9.2
2000	22.3	10.3
Accumulated total (1970-2000) — 429 Million Tons		

Between 1960 and 1970, municipal solid waste expenditures increased 156 percent to become the sixth most expensive municipal service, totaling some \$49-million annually. Adding the expenditures of individual residents in municipalities not providing the service and the expenditures of commercial and industrial establishments for private solid waste services brings the total solid waste bill in New Jersey to over \$104-million.

Local units of government, acting on their own, simply lack the financial resources, scope of alternatives and expertise to plan, develop and implement efficient and effective solutions to their solid waste problems. Because most local governments have failed to make provisions in their planning and zoning ordinances for the acquisition of land disposal facilities, the problem of finding adequate and acceptable disposal sites is becoming increasingly more difficult. Completely developed municipalities with no remaining open space have no alternative but to haul their wastes to distant disposal sites, and those, in turn, are being filled up with waste much more rapidly than is necessary or desirable, posing the threat of an impending state-wide shortage of landfill sites.

With few exceptions, adequate plans have not been formulated to cope with the increasing amounts of solid waste and the decreasing unused disposal capacity. Although the New Jersey State Solid Waste Management Plan recommended that each county be the basic planning unit for solid waste management, at this time only four counties have developed county solid waste plans and none have been implemented.*

The management of solid waste in New Jersey consists largely of piecemeal, uncoordinated activities developed to meet the immediate needs of local governments with little, if any, regard for regional planning and coordination. For the most part the solid waste planning and management process is adversely affected by: the absence of area-wide structures; the lack of local initiative; the general inadequacy of State technical assistance; the total absence of State planning grants to counties and regional organizations; the failure of the State to establish guidelines for the preparation of regional plans; and the failure to implement regional solid waste processing and disposal operations.

Solid Waste Collection and Hauling (See Chapter II)

The greatest cost, between 75 and 85 percent of total solid waste expenditures, is required for the collection and haul of the waste from its source to the point of disposal. Approximately 60 percent of these costs are attributable to manpower. The Commission believes that these costs could be reduced and recommends a number of alternatives to increase the productive utili-

* Bergen County has been operating a regional landfill since 1955.

zation of manpower and equipment and to increase the efficiency and effectiveness of the collection function. These recommendations include: (Detailed recommendations at end of each chapter)

- *The Department of Environmental Protection (DEP) should design and assist local governments in the implementation of optimum collection districts based on sound engineering, analysis of existing transportation routes and systems analysis.*
- *The joint provision of either municipality operated or contract collection services within such optimum collection districts.*
- *The use of a centrally located landfill, transfer station, continuous vehicle schedule, or any combination of these to improve the utilization of manpower and equipment.*
- *The competitive enfranchisement of private collectors by the Public Utilities Commission (PUC) to provide solid waste services where municipal collection is not provided.*
- *A program of technical and financial assistance administered by the Department of Environmental Protection (DEP) to assist local governments in planning and developing more efficient collection systems.*
- *The Hackensack Meadowlands Development Commission in cooperation with DEP should develop a solid waste rail haul system to serve the northeastern region of the State where landfills will be exhausted by 1975.*

Solid Waste Processing (See Chapter III)

Technology to process and treat solid waste is many years behind that which is available for the management of liquid and gaseous wastes. While this technological lag is closing, due primarily to the effort of the federal government in fostering the development of new solid waste equipment, at present the only methods used in New Jersey to reduce the volume of waste requiring ultimate disposal are incineration and voluntary recycling. Currently, not more than 10 percent of New Jersey's domestic solid waste volume is treated by the three municipal and 6,400 small private operating incinerators, or is subject to recycling through the 114 public and voluntary organized recycling programs. The remaining 90 percent of our waste is merely dumped, unprocessed, at landfills.

Between 1970 and 2000 some 429-million tons of solid waste will be discarded in New Jersey—valuable resources in this waste are estimated to be worth over 6.4 billion dollars. The Commission, therefore, believes that solid waste processing operations, with the capability of reducing the volume of waste requiring ultimate disposal and thus conserving landfill acreage and max-

imizing the recovery of reusable materials, appear to hold the best answer to many of the State's solid waste problems.

Most processing techniques with recovery potential are unfortunately still in the development and demonstration stages. While these processes are being explored, the Commission recommends the establishment of a regional framework for planning and implementation of processing and recovery systems, including:

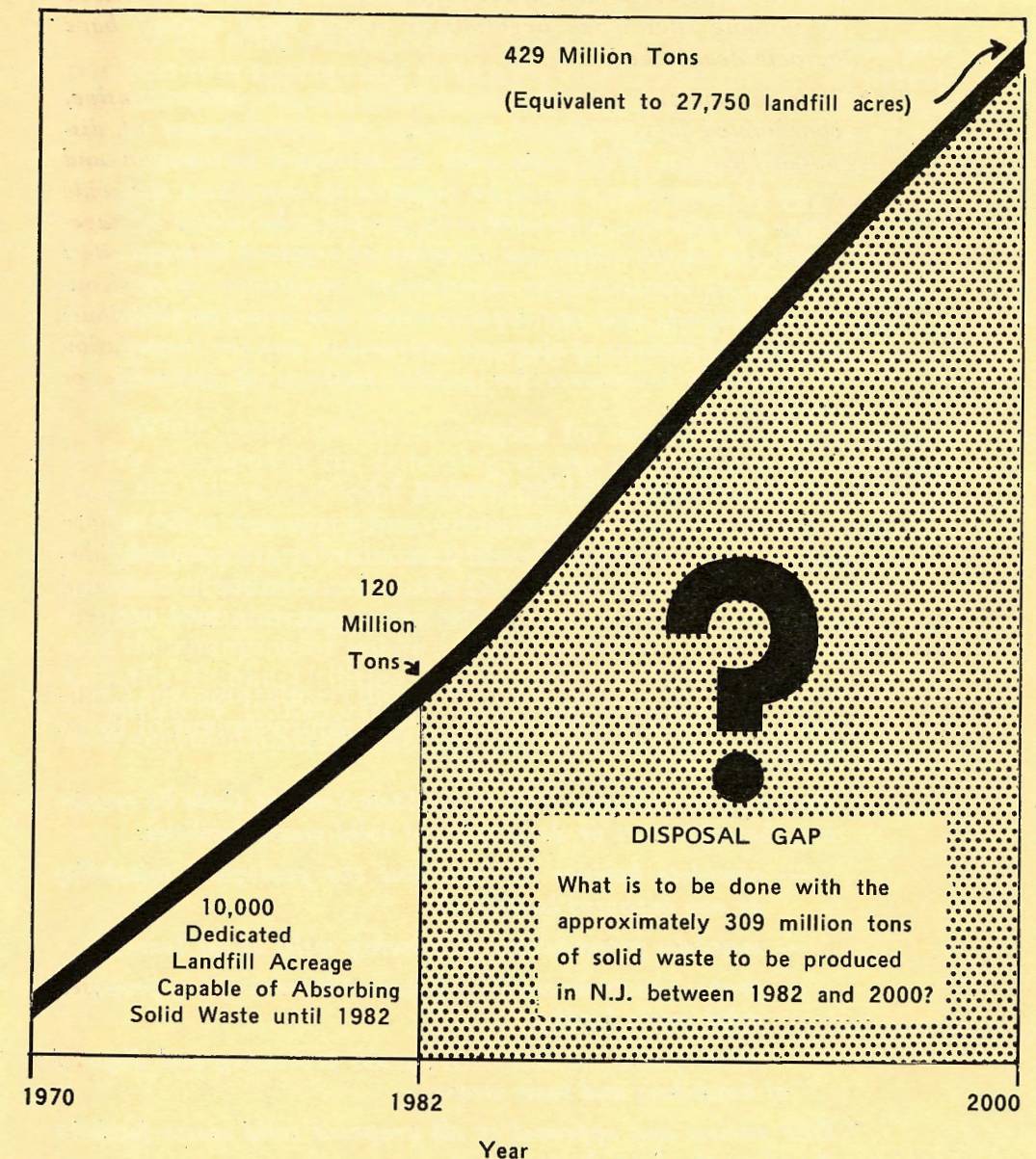
- *A demonstration program sponsored by the Department of Environmental Protection (DEP) to test the economic and technical feasibility of new methods and techniques for utilization of solid wastes.*
- *A program of technical and financial assistance administered by DEP to begin the preliminary planning of regional solid waste processing operations.*
- *After acceptable volume reduction and recovery processes have been identified by DEP and suitable sites for facilities have been identified in the regional district plans, DEP, the counties and the municipalities to be serviced by the facility should work out an equitable agreement with each host community in which a site is located.*
- *The establishment of a State Environmental Facilities Corporation with appropriate powers to aid counties and regional bodies in financing and constructing regional solid waste facilities.*

Solid Waste Disposal (See Chapter IV)

Approximately 90 per cent of the domestic solid waste generated in New Jersey ends up, unprocessed, in the 331 existing landfills. At the beginning of 1971 New Jersey had some 10,000 acres of unused landfill disposal capacity. During 1971 this unused acreage was being used up at the rate of about 750 acres per year. At this rate of use when combined with the projected increase in solid waste generation, dedicated landfill acreage will be exhausted in the State within the next 10 or 11 years, as shown in Figure S-1. More significantly, landfills serving 5 of New Jersey's 21 counties—Bergen, Essex, Hudson, Passaic and Union—which produce 48 percent of the State's annual volume of solid waste will be exhausted during 1975.

Figure S-1
THE DISPOSAL GAP

PRESENTLY COMMITTED LANDFILL CAPACITY vs. PROJECTED WASTE GENERATION



During its study, the Commission has found that the primary reasons for the failure to develop new solid waste landfill facilities have been the lack of planning and an inability to implement plans, primarily because of failure to agree on a site for the facility. Therefore, to avert a solid waste disposal crisis, the Commission makes the following recommendations:

- *Counties having suitable land for sanitary landfill facilities begin immediately to plan and procure these sites for disposal purposes.*
- *DEP be empowered to arbitrate disputes arising from the selection of suitable sites when negotiations among local officials have become deadlocked.*
- *State assume the primary responsibility for the comprehensive, coordinated and continued planning and development of disposal facilities. The State with its extensive jurisdiction and scope of operations should be required to coordinate the wide range of activities associated with proper solid waste management: the identification and selection of regional disposal sites; analysis of transportation alternatives; evaluation of environmental impact, land use considerations and social implications; cost-benefit analysis of alternate approaches; and the formulation of financing techniques for capital facilities of statewide or regional scope.*

Waste Regulation and Control (See Chapter V)

In order to ensure that existing and proposed solid waste facilities meet environmental quality standards; are properly designed, constructed and operated; and are reasonable in cost and conserve valuable resources, an effective regulation and control program is essential.

After reviewing existing standards and regulations, the Commission recommends the strengthening and improvement of these standards, including:

- *Strengthening Chapter VIII of the State Sanitary Code by requiring that operators or developers of solid waste facilities:*
 - *complete borings to determine the geological suitability of any proposed landfill site.*
 - *maintain groundwater monitoring wells at all landfills.*
 - *prepare an environmental impact statement of any proposed solid waste facility.*
 - *meet special requirements for the processing and disposal of hazardous and toxic wastes.*
- *DEP review and approval of all proposed solid waste facilities based on the data above.*

- *Development of a more effective enforcement program by providing DEP with more money and manpower, along with the increased use of local health officers, to ensure environmental protection.*
- *Development of efficiency standards by the Public Utilities Commission and the Department of Environmental Protection to ensure maximum service to the public at the lowest possible cost.*

Solid Waste Avoidance (see page 57)

As the solid waste problem in New Jersey reaches crisis proportions it is appropriate to inquire into the possibility of arresting and rolling back the amount of waste produced. Waste generation can be curtailed by restricting the amount of materials that enter the waste cycle, by recycling for example, and by designing products with longer useful life and that can be more readily recycled and reused. With the appropriate use of incentives (such as taxes and transportation rates that do not discriminate against recycled materials), constraints (such as a per-unit levy against manufacturers of disposable products), and the changing of public attitudes toward waste production, the generation of waste can be reduced.

While many of the strategies for waste avoidance require policy decisions at the federal level, the Commission recommends that the State and local governments in New Jersey encourage and assist voluntary recycling efforts by providing technical assistance, information and the donation of manpower, equipment and facilities. Also, the Department of Environmental Protection should evaluate the possible use of incentives, constraints and the changing of public attitudes to promote waste avoidance, and the Public Utilities Commission study the impact of discriminatory transportation rates which favor virgin materials over recycled materials as they pertain to waste avoidance.

Chapter I.

DIMENSIONS OF THE SOLID WASTE TASK

The present report, the first of several on local government functions on the Commission's agenda, attempts to examine solid waste management* as a system of activities involving collection of the waste materials, transporting them, treating them by a number of processes that reduce their bulk and separate out the salvageables, and their final disposal. In examining these activities, the Commission has reviewed the latest technological developments in the solid waste field, some of which have high promise for their cost-cutting and resource-conserving potential. The Commission has also reviewed current efforts by conservationists and concerned citizens to marshal the powers of the Federal and State governments to stanch the growing flow of packaging, throwaway containers, and similar materials that increase the volume of solid waste. The regulation and control of landfills and other aspects of solid waste activities were also examined. The main focus of the report, however, is on municipal, county and State governments and the roles they do and should play in solid waste management in New Jersey.

In a recent survey of New Jersey local officials conducted by the Commission, solid waste management was ranked as one of their "most pressing" problems. Of the 475 mayors who responded, 56 percent ranked collection and disposal of solid waste as their most important service problem in the near future. The topic, then, is a timely one.

Overall, New Jersey's solid waste problems can be summarized as follows:

- More and more wastes are being produced each year and are increasingly burdensome to local collection and disposal services. These do not include such wastes as the bottle tossed from the car window or the old sofa dumped by the roadside in dead of night, which are never processed and may remain an eternal blight on the environment. These burdens are growing, too.
- It is becoming more and more expensive to get rid of wastes.
- Landfill acreage is dwindling.
- As waste mismanagement continues, so do its cumulative adverse effects upon our health and our environment.

* For purposes of this study, "solid waste" is considered to mean "refuse" or "trash"—in other words, that which is collected by municipal trash services. It generally does not include sewage or sludge, and agricultural and industrial wastes.

Increased Generation of Solid Wastes

At present, as Figure I-1 shows, 7.1 million tons of solid waste are generated each year in New Jersey and that volume is increasing 3 to 5 percent per year.¹ The per capita volume averages out to 5 pounds per day and in a year's time, will approach *one ton*! Immense as these figures may seem, if present trends continue unabated, New Jerseyans will be forced to cope with more than 22 million tons of solid wastes during the year 2000. This predicted 210 percent hike over the span of a single generation should be ample warning to reasonable citizens to prepare now.

What does a typical garbage truck rolling over New Jersey roads now contain? From 40 to 60 percent paper (in the form of packaging, newspapers, office and home wastepaper and other paper discards); 10 percent glass bottles and jars; 2 to 5 percent plastic containers, 7 to 10 percent yard wastes, from 8 to 10 percent metal cans and tubes and 5 to 10 percent miscellaneous wastes. Organic food wastes account for only 5 to 7 percent of this volume.

It is germane, the Commission believes, not only to search for better and more efficient waste collection, processing and disposal systems capable of satisfying basic health requirements, conserving resources and minimizing environmental pollution, but it is also necessary to assess critically our society's need for all the packaging—paper, plastic, cans and jars, and to determine whether some means can be found to discourage the production of throwaway items, thereby reducing the size of the bundles set out at curbside.

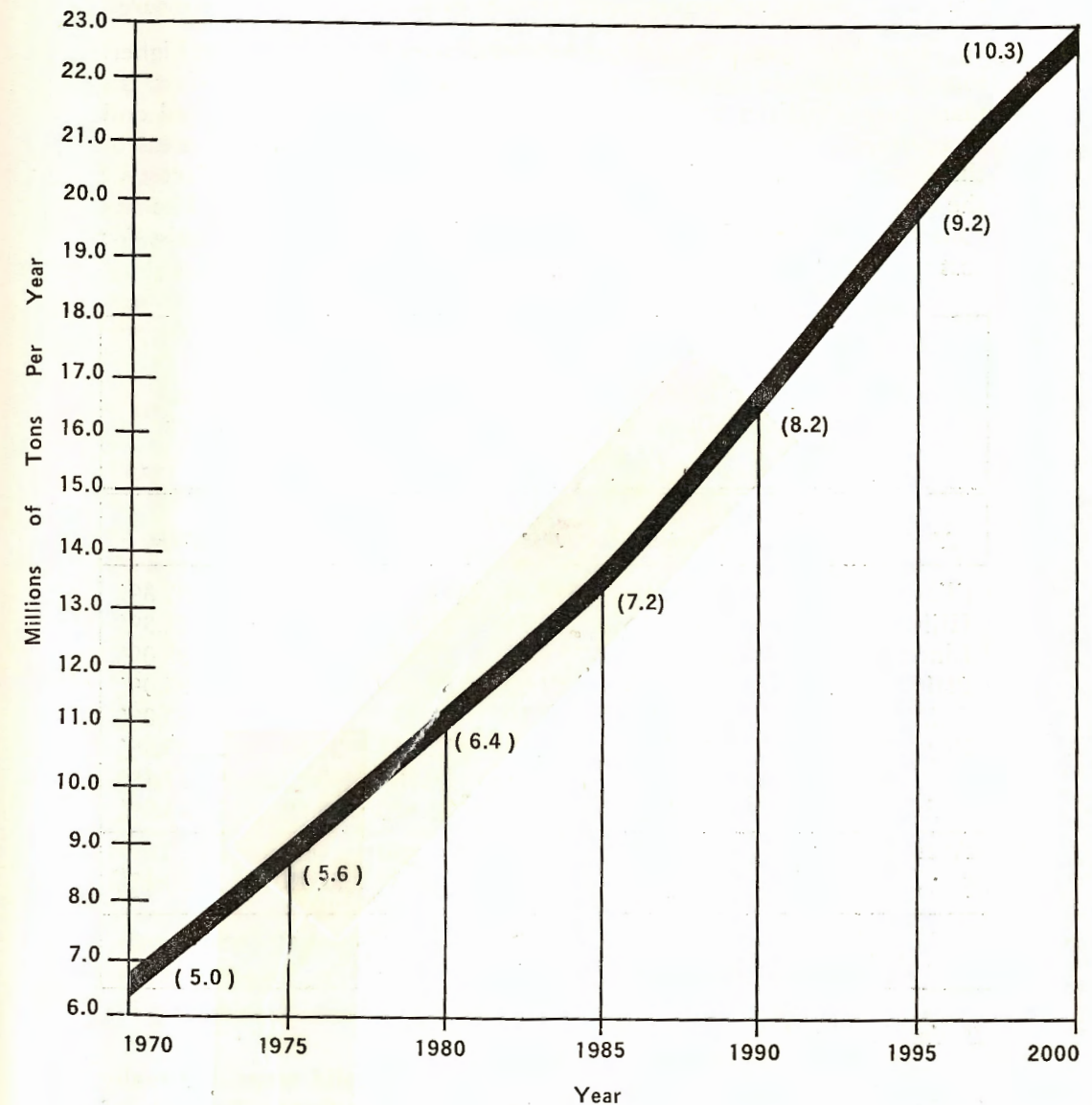
Increased Costs of Handling Solid Wastes

While the generation of solid waste has been rising steadily, the costs associated with the collection, processing and disposal of these wastes have been increasing at an even greater rate. In the municipalities that provide some form of tax supported collection and disposal, costs have spiraled from \$19.0 million in 1960 to over \$48.7 million in 1970.² This represents an increase of over 156 percent during the 11 year period. Yet these cost figures do not tell the entire story of solid waste expenditures in New Jersey. Approximately 160 municipalities do not provide municipal collection or disposal services to their residents. In these communities, the individual resident must obtain the services of a private refuse contractor. Taking these additional costs into consideration, expenditures for domestic solid waste services are estimated to be 104 million dollars per year. It should be noted that even this figure does not represent total solid waste management costs in the State. For example, the Department of Transportation spends over \$750,000 annually for litter control along the State's highway system.

This pattern of rising costs has been experienced by most, if not all, municipalities in the State. As shown in Table I-1, collection and disposal costs in eight Union County municipalities have increased an aver-

Figure I-1
GENERATION OF SOLID WASTE IN NEW JERSEY
1970 — 2000

Numbers in bracket = Pounds of Solid Waste Per Capita Per Day



age of over 99 percent since 1958, which is moderate compared with the 156 percent average of the rest of the State. The principle reasons for rising costs are: 1) increased quantities of solid wastes must be collected and disposed, as was just discussed; 2) hauling takes more time due to traffic congestion and the filling up of nearby landfill sites; 3) the price of land for solid waste facilities is rising; 4) additional measures are now required by State regulations to ensure environmental protection; 5) wages have gone up for sanitation workers; 6) maintenance and purchase of equipment are more expensive; 7) municipalities and contractors have ignored new techniques and methods which could make more productive use of manpower and equipment; and, 8) general inflationary pressures.

In order to prevent solid waste expenditures from rising even higher, some local officials have been forced to accept reductions in services. In many municipalities back yard pickup service has been eliminated and three-times-a-week pickups have been reduced to two. In some areas of the State once-a-week pickup is a common practice. However, most of the costs involved in present solid waste management are related to the collection and haul functions, where considerable possibilities exist for cost reduction while maintaining service levels.

TABLE I-1
COMPARISON OF 1958, 1964 AND 1970 DOMESTIC SOLID WASTE
COLLECTION AND DISPOSAL COSTS FOR SELECTED MUNICIPALITIES
IN UNION COUNTY³

Municipality	1970 Population	Basic Cost Per Household Per Year* 1958	1964	1970	% Increase
Elizabeth	112,654	\$13.48	\$14.88	\$26.60	97.3%
Hillside	21,636	18.73	21.46	23.30	24.3%
Linden	41,409	9.73	17.50	29.00	198.0%
Plainfield	46,862	24.00	30.00	54.00	125.0%
Rahway	29,114	18.19	23.45	33.30	83.0%
Roselle Park	14,277	10.47	12.64	21.50	105.3%
Summit	23,620	21.28	26.78	46.20	117.1%
Union	53,077	13.41	18.52	23.60	75.9%
Average Cost per Household		16.16	20.65	32.19	99.1%

* Frequency of collection, type of service, etc. have remained virtually the same in each of the municipalities during the period between 1958 and 1970.

Dwindling Landfill Acreage

Presently close to 95 percent of New Jersey's solid waste eventually is disposed of in the 331 operating landfills in the State. The rule of thumb in New Jersey is to fill to an average depth of 15 feet, including

earth cover and minimal compaction. One acre of landfill thus used can accommodate the wastes generated over a year's time by 10,000 persons. Using this as a guide, it is estimated that during 1971 approximately 750 acres of land were required to dispose of our wastes. Projections which take into consideration the increased per capita generation of wastes as well as population growth indicate that during the year 2000 some 2300 acres will be required annually. Between 1970 and 2000 an accumulated total of over 40,000 acres, a land area larger than Hudson County, would be required to handle the wastes generated by the population of New Jersey, if filled to the 15 feet average depth, unless some means is found to reduce the anticipated volume.⁴

While the need for more disposal facilities is increasing, there is no doubt that available landfill acreage is decreasing. In 1967 a State Department of Health survey indicated that there were 417 operating landfills in the State. Today that number has decreased to 331. The acreage presently available in these fills is only adequate to last until 1982, assuming continuation of present volume trends. New landfill sites are extremely difficult to obtain. They are bitterly resisted by citizens in even moderately built-up areas, and are generally barred by environmental protection laws in undeveloped areas, such as the wet lands. More remote sites have the added disadvantage of requiring greater hauling expenses.

Incinerators could be more extensively used to reduce the volume of wastes requiring disposal, but this approach has been expensive, often harmful to the air, and unpopular with residents of surrounding areas. Other solid waste processing techniques, such as pyrolysis, discussed in Chapter III, and the various experimental separation and recycling processes now being tested, may therefore prove more feasible than incineration.

Thus, as the generation of wastes continues to increase and the number of incinerators and available landfill acreage is decreasing, we are rapidly approaching a situation where existing disposal facilities will not be able to handle anticipated waste loads.

Adverse Health and Environmental Effects of Mismanaged Wastes

The adverse effects on public health and the environment caused by the improper handling of solid waste have been well established. Human, animal and plant diseases; rodent and insect propagation; fire hazards; and air and water pollution, can be traced in many instances to improper management of solid wastes. These effects have their most serious impact in areas of high population density, particularly in north-eastern sections of the State, where people live in close proximity to landfills.

These environmental and health problems are common to every area of the State. A 1971 survey by the Bureau of Solid Waste Management, N. J. Department of Environmental Protection, indicated that only 45

percent, or 149, of the 331 landfill operations in New Jersey were in full compliance with existing standards for sanitary landfills; with the remaining 55 percent operating below minimum standards. Similarly the 3 operating municipal incinerators and the thousands of private incinerators, in most instances, fail to meet current air pollution standards.

The magnitude of the problems associated with mismanaged wastes will expand as the generation of wastes increases and more areas of the State become developed. Ideally, a rational system of standards and controls supported by adequate monitoring and enforcement should provide the means for ensuring proper management. This report will suggest new legal powers and administrative resources necessary to develop such a system.

System Objectives

The purpose of a solid waste management system should be to collect, haul, process and dispose of solid wastes by the most efficient and effective means which satisfy fundamental health and esthetic standards, maximize the conservation of resources including land, minimize environmental damage, and minimize intrusion upon human settlements.

Given the popularly held but unrealistic assumption of the never-ending availability of natural resources, including open land suitable for dumping, there has been a failure on the part of the New Jersey public to invest the requisite time, money and effort in solid waste management. It has not occurred to many New Jerseyans that their governments could exploit the resource potential of wastes, or that they should be concerned with the manner of their disposal. Thus until recently, no serious attempts were made to develop new technology to recover resources from solid wastes and to reduce the environmental hazards of improper disposal. The typical objectives of solid waste management have been very minimal: to transfer the waste from the user's premises to some obscure dump at the least cost and with the least amount of public objection, and to prevent the unhealthy and unesthetic accumulation of wastes. Achievement of these minimal objectives still satisfies many people that their solid waste problems have been solved.

With our growing understanding of the relationship between man and his environment, and as we become more keenly aware of the finite limits to our land, water and air resources, and the perils in which we place ourselves by neglecting them, as well as the immediate problem of the unpleasantness of living in a deteriorating environment, has come the recognition that minimal objectives will not meet our waste management needs much longer. Additional requirements, described in succeeding chapters, must be established in order to achieve rational control over solid waste, including:

1. Improvements in the collection and hauling of wastes through new technology and new intergovernmental arrangements. (Chapter II)

2. Reduction of the environmental impact of solid waste disposal by processing, treatment and recovery prior to disposal. Greater reclamation of reusable materials from solid wastes, and greater utilization of heat and energy produced during the processing of solid wastes. (Chapter III)
3. Protection of land, water and air resources from contamination through solid waste disposal; planning and conduct of solid waste landfill operations so as to realize the best possible reuse of the site after landfilling is completed. (Chapter IV)
4. Development of private and governmental institutions with the necessary authority and expertise to deal effectively with the financial, jurisdictional, regulatory, legislative, political and technical problems associated with solid waste management. (Chapter V)
5. The reduction of the total volume of wastes requiring ultimate disposal, by minimizing the generation of wastes (including throw-away products) and by designing products, now discarded, so they can be reused. (See Waste Avoidance, Page 57.)

Chapter II.

COLLECTION AND HAULING

Solid waste management, as a public service, can be described in terms of its main functions. These include *collection*, or the picking up of the refuse from households, apartments and businesses on a regular schedule by a collection truck and crew; *hauling*, or transporting the collected waste from the collection route either directly or via a processing plant or transfer station to a landfill site; *processing*, or treating the collected waste by methods that reduce its volume, permit recovery of reusable materials, and/or render it organically inert; and *disposal*, or final disposition of either unprocessed waste or processing residues which cannot be recycled. Administrative aspects related to solid waste management, such as contract procedures or collective bargaining are not covered in this report, except as they relate to the performance of the functions mentioned above.

This chapter will deal with both collection and hauling, which in most parts of New Jersey are performed by the same crew and equipment.

Legal Setting and Present Practice

The New Jersey Legislature has authorized local governments to provide solid waste collection, processing and disposal services (N. J. S. A. 40:66-1 et seq.). Municipal governing bodies may acquire land for solid waste disposal within their own boundaries, and also outside their boundaries with the express consent of the governing body where the land is located. Townships are permitted to established special collection districts to service high density areas and all municipal governing bodies may, if they deem it more advantageous, contract with any person licensed by the Public Utilities Commission for the provision of solid waste services. Since municipalities are permitted, not mandated, to provide solid waste services, they may also choose not to provide them.

Tradition and this permissive legislation has resulted in a variety of collection methods and service standards in the State. 407 municipalities provide collection services, while 160 do not. Of the municipalities that provide collection services, 277 contract with private collectors for the service and 130 operate their own systems.¹ Since there are no State standards for collection, the frequency varies from three-times-a-week pickup to only once-a-week pickup (once-a-week pickup with proper storage is not necessarily too infrequent). A number of municipalities and private contractors provide, at increased cost, back yard pickup service (as opposed to curb side pickups). Some municipalities collect refuse from commercial establishments as well as residences, while others only provide resi-

dential service, requiring commercial establishments to make their own arrangements for collection. There are usually limits to the quantity and type of wastes that will be taken. Discarded appliances and other bulky items, for example, are picked up in some municipalities but not in others.

In nine townships, where only a part of the municipality is densely settled and the rest largely undeveloped, special collection districts have been established to provide municipal collection services to the densely populated areas only. Some less developed areas have contract service, while others require residents to make their own arrangements. Municipalities with incinerators or reclamation programs may require separation of combustible from non-combustibles, or of recyclable materials from other wastes. This separation must be maintained throughout the collection process, and it tends to increase collection cost, although savings may be realized through recovery of economically useful elements.

Developing More Efficient Collection Methods

Collection and disposal costs have become one of the most expensive items in the municipal budget and, as shown in Table II-1, their expenditures, as reported to the Division of Local Finance, have increased 156 percent in the period between 1960 and 1970. During this period the collection and disposal of solid waste has become the sixth most expensive item in the local municipal budget, trailing education, police and fire protection, roads and sewerage.

TABLE II-1
COMPARISON OF MUNICIPAL EXPENDITURES FOR SOLID WASTE
COLLECTION AND DISPOSAL 1960, 1965 AND 1970.*2

Year	Collection and Disposal Expenditures	% Increase over previous cited year
1960	\$19,025,590	
1965	\$25,692,351	35.0%
1970	\$48,749,234	89.7%
1960 to 1970		156.2%
* Includes expenditures for 407 municipalities which either provide municipal or contracted solid waste services.		

Collection is presently the largest cost component of solid waste management, on a functional basis, amounting to between 75 and 85 percent of total solid waste management expenditures, with manpower accounting for approximately 60 to 70 percent of total collection expenditures. Most local governments have done little if anything to reduce this

high cost item. Collection schedules have been left unchanged for years, crews have been idle for substantial portions of the workday while loaded trucks were on a round trip to landfill sites, and experimentation with techniques to speed up collection or reduce the size of crews is virtually nonexistent.

Usually, the collection crew consists of a driver and two loaders. After the collection vehicle is loaded, the entire crew, including the loaders, proceeds to the disposal site. As the distance between the collection route and the disposal site increases, due to filling up of close-in landfills, more and more time is required for hauling, during which time only the driver, but not the loaders, are actually working. A recent study prepared by the Newark College of Engineering revealed that non-productive truck travel from the collection route to the disposal site and back amounts to between 65,000 and 100,000 manhours per year for the City of Newark. This non-utilization of paid labor wastes between \$230,000 and \$387,000 per year, according to the study. Numerous other municipalities which haul their wastes to disposal sites over eight or ten miles away often through slow-moving congested traffic, are similarly penalized by the non-utilized time of collection vehicles and crews. Operations research on collection and hauling of refuse could greatly increase the efficiency of both functions.

At present, at least four alternatives are available, but seldom used, to increase the productivity of manpower and equipment:

1. operating a central disposal site;
2. operating a central transfer station;
3. developing a continuous collection vehicle schedule; or
4. a combination of alternative 1 or 2 and 3.

In addition, alternatives exist for speeding up collections on the route.

Operation of a central disposal site presumes the availability of close-in open land that could be used as a landfill. In Hunterdon County, for example, where ample open land still exists, solid wastes collected from 22 of the County's 26 municipalities are hauled to disposal sites located outside the county. If centrally located landfills were opened in the county to serve all municipalities, savings in manpower and equipment could be achieved. Similarly in Mercer County, Trenton and Lawrence Township presently pay \$5.50 per ton just to haul their wastes to a landfill site in Mt. Holly involving a 50 mile round trip. If the Mercer County Improvement Authority proceeds with plans to open a close-in landfill to serve all Mercer municipalities, Trenton and Lawrence could achieve a combined savings of over \$188,000 per year in haulage costs.³

The second alternative—that of operating a central transfer station—could be used in areas where no landfill sites are available. A transfer station is a facility where wastes are transferred from collection vehicles to

large over-the-road tractor trailers or to railroad cars for haul to distant disposal sites. Such transfer vehicles usually have from four to five times the capacity of collection vehicles, and rail haul, of course, could move many carloads of waste at once. Non-productive time would thus be decreased since the collection vehicle and crew would unload and immediately return to route service. Moreover, transfer facilities require little land and can be readily located in industrial areas. Savings gained in decreasing non-productive time would more than offset the costs of building and operating such facilities. For example, as shown in Table II-2, the direct haul of 75 cubic yards of waste would require 8 hours of crew and equipment time at a cost of \$176.00. With the use of transfer haul, the same amount of waste would require 2 hours of driver and equipment time at a cost of \$67.32. Thus transfer haul would result in a savings of over \$108.00 for every 75 cubic yards hauled.⁴ Collection crews would spend more time on the job, so that the job could be done by fewer men and equipment at an additional savings. Maintenance costs on collection vehicles would also be reduced since longer hauls would be eliminated.*

The third alternative cited for decreasing collection costs by reducing non-productive time, and one which can be used in any collection system, is the use of a continuous collection vehicle schedule. In this approach, collection crews are assigned to various vehicles throughout the work day. A collection vehicle enters a collection route on a predetermined schedule. After this truck is filled, another vehicle arrives and continues collection with the original crew while the first vehicle and a driver, not the entire crew, proceed to the disposal site. The process continues until the day's collection schedule is completed. This approach is easy to implement where collection is performed as a municipal service or contracted out to one or two private collectors capable of developing and maintaining such schedules, but even this does not eliminate the non-productive time of the collection vehicles driven to and from the disposal site.

A fourth alternative is a combination of transfer or central-site disposal with a continuous collection vehicle schedule. The procedure has the additional advantage over the continuous-collection alternative of eliminating much of the non-productive time of the collection vehicle. It has been shown (in Table II-2) that, when long hauls are involved, it is cheaper to haul by transfer vehicle than by collection vehicle. If central-site disposal is used, even the costs of transfer haul are eliminated.

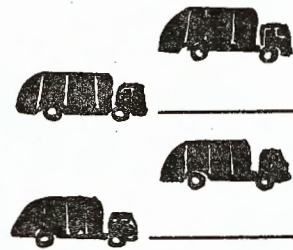
Suggestions for speeding up collections include: reducing the number of collection points by having several families place their trash at the same location; using automated equipment such as hydraulic lifts (possibly in

* The City of Summit has just recently opened a transfer facility. Preliminary data indicate that Summit will be able to recover the cost of the facility from receipt of user charges to private contractors and other municipalities using it. Improved utilization of manpower and equipment has enabled Summit to reduce expenditures for these items while maintaining the same level of collection service. Englewood has a similar facility and Plainfield is planning one.

Table II-2
DIRECT VS. TRANSFER HAUL OF SOLID WASTE

Direct Haul
(Capacity @ 18 3/4 cu. yds. — total 75 cu. yds.)

A.



A. 4 round trips @ 30 miles equals
120 Miles

2 hours per round trip
4 round trips equal
8 hours

+ Cost Per Hour @ \$22.00
8 hours X \$22.00 = \$176.00

PROCESSING
OR
LANDFILL
SITE

Transfer Haul
(Capacity @ 75 cu. yds.)

B.



B. 1 round trip @ 30 miles
30 miles

2 hours per round trip
1 round trip
2 hours

* Cost Per Hour @ \$33.66
2 hours X \$33.66 = \$67.32

Estimated Savings using Transfer = \$108.68 per 75 cu. yds. hauled

+ Includes estimated costs for labor, operation and amortization of collection vehicle

* Includes estimated costs for labor, operation and amortization of transfer facility and tractor trailer.

connection with dumpsters) and vacuum collection systems;* changing back yard pickup to curb side pickup; and using disposable trash bags instead of cans to eliminate the need to return the emptied can back to curb side. These would all have the effect of speeding collection and therefore reducing costs. Other possibilities, such as reducing the frequency of collections and the scheduling of collections during periods of minimum traffic congestion, may decrease collection costs, although, some might claim, at the expense of convenience. The selection of the best combination of collection methods and equipment to meet the requirements of a particular situation is largely a matter of engineering, cost analysis and consumer preference. A detailed cost analysis of collection and transportation alternatives should be made to determine optimal methods and equipment patterns. Yet, with few exceptions, municipalities have failed to do this, and unless they do, they will be faced with the dismal prospect of continued increases in collection costs.

Municipal, Contracted, or Private Collection?

Solid waste collection in New Jersey can be under three different auspices: 1) municipal collection, 2) municipally contracted collection, and 3) privately contracted collection. Table II-3 lists the municipal role in and the advantages and disadvantages of these collection systems to the municipality.

Proponents of municipal collection claim the following advantages:

1. With little competition among private collectors, contractors tend to charge excessive amounts.
2. Short contracts, usually for two to three years, retard or prevent contractors from investing in more efficient but costly equipment.
3. Municipal systems are less expensive because the municipality, unlike the contractor, does not operate on a profit making basis.
4. Contractors have been more susceptible to strikes and labor shortages, thus contractors experience more service disruption.
5. Municipal systems are more easily controlled by elected officials, thus better service is provided.
6. Municipal collection crews generally live in the communities in which they work and take pride in providing better service.

* The U.S. Department of Housing and Urban Development has recently funded a demonstration vacuum collection system at Jersey City's Breakthrough Site. Refuse is placed in a chute located on each floor of the apartment building and carried pneumatically to a central collection point and compacted into large containers. Periodically the containers are hauled to disposal sites.

Collection contractors generally argue the following points:

1. Contracted systems are less costly and provide better service since the contractors are professionals and well trained in collecting solid wastes. Because of the profit motive and their reliance on being successful bidders, contractors have more incentive to use labor saving techniques that cut costs to the municipality and increase profit margins to the contractor.
2. Under contract the municipality does not have to invest in costly equipment and repairs.
3. Administrative and overhead costs are either reduced or eliminated under a contract system and the municipality is relieved of the responsibility of day-to-day operations of collection services.
4. Contractors can react to emergencies more quickly and with less red tape than a municipal operation.
5. Contractors are not subject to the overstaffing and payroll padding that sometimes occurs in government, pushing up costs of service.
6. Municipalities, being monopolies, have little incentive to cut costs.

Both viewpoints have their exponents, but comparative cost data are inconclusive. There are some indications that municipal collection in medium density municipalities may be less costly and more effective. For example, data from a recent study in Bergen County of 23 municipalities show that with the manner of collection, backyard pickup, and the number of collections per year held constant, the average annual per capita costs were: municipal owned and operated collection—\$9.03, municipally contracted service—\$14.20, and independent collectors contracting with individual property owners—\$15.71. Thus, in the Bergen County survey, the average annual per capita cost of municipal collection was \$5.17 less than municipal contracted collection and \$6.68 less than privately contracted collection.⁵

Similarly, a detailed analysis of collection costs in Phillipsburg which has been operating its own collection system since 1963 reveals that the average annual collection cost after eight years of operation was \$47,987. The average annual cost is \$6,013 less than it cost the municipality to have its waste collected in 1962 under contract with a private contractor. Included in the annual costs were purchases of six new compactor trucks, the cost of maintaining these trucks, the wages of collection crews which increased approximately \$.50 per man-hour over the period, and the eight year inflation of overall costs. Still the municipality saved an average of over \$6,000 per year during the eight year period while maintaining the same service level.⁶

TABLE II-3 TYPE OF COLLECTION—ADVANTAGES AND DISADVANTAGES		
Type of Collection	Municipal Role	Advantages—Disadvantages
Municipal Collection	The municipality owns and operates the collection system. It purchases and maintains collection trucks and equipment and employs supervisory personnel, drivers, crew members and others connected with the collection operation. The municipality must either operate its own disposal site or contract for the use of a private one.	Over the long run municipal collection may be the least expensive of the three collections systems for most municipalities. Municipal officials have more direct control over the operation. For example, they are in a good position to hear complaints and to effect needed changes. However, more responsibility is required of the municipality, including responsibility for purchase and maintenance of equipment.
Municipally Contracted Service	Periodically, depending on the length of the collection contract, the municipality must let bids for the collection of its solid wastes. The municipality must establish specifications—number and type of collections, number and type of collection vehicles, composition of the collection crews, and method and location of disposal sites, for which the contractor is responsible. During the term of the contract, the municipality is responsible for ensuring that these specifications are carried out by the contractor.	When a municipality awards a collection contract, it is reasonably sure that the cost of collection will remain constant throughout the duration of the contract period. However, depending on the competition for the contract, a new contract will generally increase in cost. Municipal officials have less control over the operation. For example, while they receive complaints about the collection service, the official is virtually at the mercy of the contractor who may claim that rectification of the problem is beyond the specifications of the contract.

TABLE II-3—Continued
TYPE OF COLLECTION—ADVANTAGES AND DISADVANTAGES

Type of Collection	Municipal Role	Advantages — Disadvantages
Private Contracted Service	With the exception of ensuring that health standards are met, the municipality has virtually no role. The resident or business contracts individually with a private scavenger. This type of collection service is common in rural, less developed areas of the State.	Because the municipality has virtually no role in the collection and disposal of wastes, municipal expenditures in this area are nonexistent. Provision of the service is the responsibility of the individual resident. Generally, this is the most costly of the three types of collection systems and as development and population increases it becomes more costly and confusing because several scavengers may be servicing residents on the same block.

A recent study prepared for the Monmouth Shore Refuse Disposal Committee comparing the 1969 costs for collection and disposal with 1965 costs in 21 Monmouth County municipalities, concluded that on the average contracted collection service in 1965 was 42.6 percent less expensive than municipal collection; however, in 1969 with the rapid increase of contracted service costs, municipal collection on the average was 9.5 percent less expensive than contracted collection.⁷

On the other hand a number of larger cities including Boston and San Francisco have switched from municipal to contracted collection. In 1932 San Francisco awarded collection franchises for the entire city to two private collectors. Both cities maintain they are better off with private collection than they would be with a municipal operation. Similarly, the City of Minneapolis is beginning to phase out its municipal operation and gradually replace it with private collection. The City of New York is also considering changing from municipal to private collection. A recent study conducted by the Office of the Mayor indicates that private contractors collect refuse at \$17.50 a ton which is about one-third the cost of municipal collection at \$49.00 per ton!

The limited and contradictory data presented above do not lead the Commission to a firm position in support of any collection system as being consistently least expensive. In addition, the lack of uniform accounting procedures makes cost comparisons such as these imprecise.⁸ The Commission recommends that, before a municipality reaches a decision about the system best suited to its needs, a detailed study be made to examine the costs and benefits of each system in that particular municipality as well as intermunicipal and regional opportunities. The State Department of Environmental Protection should assist municipalities in making such studies.

In 160 municipalities in New Jersey, collection of solid waste is entirely the responsibility of the individual resident. In these communities any number of contractors, usually with a few trucks, inadequate management and little if any engineering talent, provide service to individual residents. To cite two examples, Bethlehem Township (Hunterdon) with a population of 1,385 is served by 8 private contractors and the City of Plainfield (Union) with a population of 46,862 is served by 43 private contractors. This type of service provides no assurance to the residents that health or environmental standards will be met, or that reasonable efficiency will be provided, or that the collection service will be dependable. Municipal or municipally contracted collection or enfranchisement, on the other hand, encourages professionalization and more efficient service. The Public Utilities Commission (PUC) which has been charged with regulating the economic aspects of solid waste management, has been primarily concerned with the reasonableness of rate structures, qualifications of collection and disposal operators, and competitiveness of bidding procedures. The PUC is also empowered to designate specific

franchise areas to be served by one or more designated collectors and operators. The competitive franchise technique has not been used by the PUC but holds the promise of achieving more economical and effective contracted collection services by eliminating duplication of services in areas serviced by numerous contractors. Contractors operating under a franchise would have more of an inducement to invest in better equipment and facilities and develop more efficient collection schedules since they would have a virtual monopoly in the franchise area.

Recommendations

Existing collection services can often be improved at little cost to the taxpayer; as has been shown, it is possible to realize savings while improving service. The Commission presents the following recommendations on solid waste collection and hauling:

1. *Collection districts have traditionally been set up and operated on the assumption that they have to be coterminous with political boundaries. Optimal use of manpower and equipment may well suggest otherwise. The Department of Environmental Protection (DEP) should assume or be given the responsibility of working with municipalities to determine optimum collection districts based on engineering, economic and systems analysis.*
2. *For the 160 primarily rural municipalities that let their residents contract individually for collection service, the Commission recommends municipally contracted services where the municipality lets a single bid for collection and disposal services for the entire municipality. This will contribute to eliminating duplication of routing and scheduling, and the provision of a uniform service. While the cost of the service could be paid either out of municipal revenues or user charges, the individual resident should achieve a net savings.*
3. *The enfranchisement of private collectors, together with the power of the PUC to regulate rates to prevent excessive and unreasonable charges, would go a long way in upgrading contracted collection services while ensuring reasonable rates. PUC should exercise its enfranchisement power in accordance with the following guidelines:*
 - a. *Franchise areas must be compatible with the optimum collection districts established by DEP. (See Recommendation 1.)*
 - b. *Franchises should be awarded under open competition for a limited time period. A franchise of five to seven years duration would enable the contractor to amortize his equipment while ensuring periodic competition for the franchise.*

c. *All contractors should be required to post performance bonds to insure continued collection service in the event the terms of the contract are not met.*

4. *The PUC through the use of its licensing powers should require that private contractors demonstrate minimal efficiency capabilities before they would be licensed. For example, the PUC could require the use of a continuous vehicle collection schedule.*
5. *To facilitate better collection services, DEP should develop a program of technical assistance to local governments. One potential source of technical assistance is the State's universities and colleges which should be encouraged to provide technical services and training programs to municipal engineers, sanitation personnel, and interested citizens. Such assistance, which may be partially available under the Intergovernmental Personal Act, is needed to aid local governments in the following areas:*
 - a. *in developing programs to substantially reduce the amount of material that enters the waste cycle, for example, by encouraging recycling and reuse.*
 - b. *in planning and developing methods to reduce the non-productive use of manpower and equipment and duplication of services.*
 - c. *in the selection of the best combination of collection methods and equipment to reduce collection time thus cutting down on collection costs.*
 - d. *in deciding whether municipal or contracted collection would provide better collection services.*
 - e. *in developing joint purchasing programs for solid waste equipment, and*
 - f. *in designing model specifications for collection and disposal contracts and specifications for purchasing collection equipment.*
6. *Great savings could be realized through changes that would make hauling of solid waste more efficient. Serious consideration should be given to transfer facilities and vehicles, especially by those communities whose round-trip hauling time takes 30 minutes or longer. In addition, a demonstration rail haul project should be developed to move solid waste out of the northeastern New Jersey area. Funds should be sought from the U.S. Environmental Protection Agency for such a demonstration project, either by DEP or by the Hackensack Meadowlands Development Commission.*

7. To carry out the additional workload suggested in recommendation 1 and 5, DEP should seek approval of the Budget Bureau, the Governor and the Legislature for additional solid waste management staff, to include civil engineers, economists and systems analysts.

Chapter III.

PROCESSING

Waste processing is an intermediate step between collection and ultimate disposal, which is carried on primarily for the purpose of reducing waste volumes and consequently the disposal loads, and enabling the recovery of useful materials that would otherwise be wasted.

All waste reduction processes leave a residue that either undergoes a secondary process or requires final disposal and most processes also yield heat and materials that have some economic value, offsetting and sometimes exceeding the added cost of recovery. There are other, indirect benefits which justify the added expenditures for waste processing, including the conservation of resources through resource recovery; extension of the useful life of disposal sites; reduction of the potential for environmental pollution; and savings in haul costs by decreasing the number of trips to and from disposal sites. Figure III-1 indicates solid waste processes either currently available or promising to be of future value.

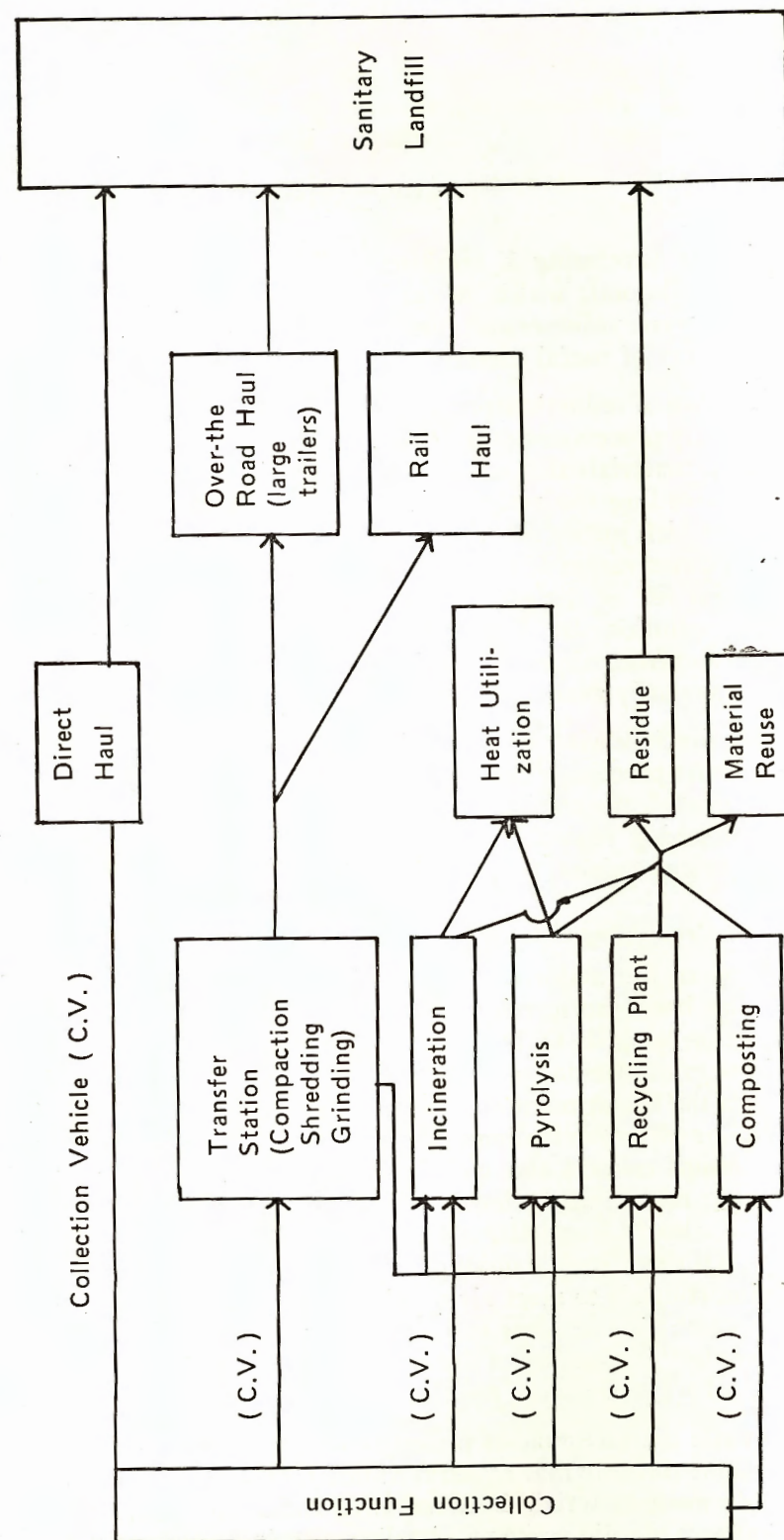
In the following sections of this chapter, consideration is given to the present processing operations in the State, processes currently being demonstrated, the need for volume reduction facilities, the impediments to establishing regional processing facilities and recommendations for developing a regional framework for processing and recovery systems.

Present Processing Operations in New Jersey

One of the major factors contributing to New Jersey's solid waste crisis has been the scarcity of processing facilities and the almost total reliance on landfill. Only *three* of New Jersey's 38 municipal incinerators are in operation today, and they do not meet new air pollution requirements of the Department of Environmental Protection (DEP). The major reason the 35 other incinerators have been closed is that they failed to meet design criteria and emission standards. In addition to the three operating municipal incinerators, there are some 6,400 private incinerators in schools, hospitals, apartments, shopping centers, and industrial plants. Of these, only a small percentage have obtained permits to install emission controls to meet air quality standards. The others are likely to fall short of requirements and will either be closed down or be required to upgrade. The closing of these incinerators will increase the volume of untreated waste that will require disposal.

While the incinerators presently in operation in New Jersey reduce the volume of waste that requires disposal, they lack the ability to recover reusable waste material. Between 1970 and 2000, approximately 425-430 million tons of solid waste will be discarded in New Jersey. Potentially 75

Figure III-1
SCHEMATIC OF SOLID WASTE HANDLING TECHNIQUES



to 80 percent of this waste could be reused, resulting in the recovery of over 6.4 billion dollars worth of valuable resources that under present conditions would be disposed of in a landfill.¹

There is a solid waste process currently in use in New Jersey that does recover reusable material—recycling. While most recycling efforts in New Jersey are voluntary, they do provide indirect benefits to governmental solid waste systems in that they help to reduce the volume of waste that requires collection and disposal. However, all 114 of New Jersey's recycling programs, voluntary and publicly assisted, now recover only about 5 percent of the total amount of waste generated and it seems obvious that only a greatly expanded public role in recycling could increase this amount significantly. With increase in waste generation averaging 3 to 5 percent annually, the net effect of both incineration and recycling on the total volume of waste is virtually canceled out by each year's increase in volume.

Solid Waste Processes Currently Available or Being Demonstrated

In recent years some new techniques have been developed to control the mounting volumes of solid wastes. The U.S. Environmental Protection Agency is currently funding a number of demonstration projects to test the economic and technical feasibility of volume reduction processes which will maximize recovery of valuable resources and decrease environmental pollution. These processes are considered below.²

Compaction

Compaction is the process of reducing the volume of solid waste by compressing the waste. Volume may be decreased substantially—up to two-thirds—saving temporary storage space, making for easier handling and transportation, and (if the waste stays compressed) reducing the requirements for landfill acreage. A number of compaction systems are in use: compactor collection trucks which have the capability of compressing 60 cubic yards of refuse into 20 cubic yards and tripling their collection capabilities are widely used in New Jersey. In another compaction system, refuse is forced into metal containers located at the generating site, usually a commercial establishment such as a supermarket or an institution like a hospital, and stored until dumped into the collection trucks where it regains much of its original volume.

A third compaction system designed for use in apartment buildings and now commercially available for the single family home, as well, forces the refuse into heavy paper or plastic bags, which are then sealed and deposited in the collection truck, with the result that the initial reduction in bulk is retained. However, if the bags are to be incinerated, they must be broken open to avoid delayed combustion in the furnace and a highly increased unburned combustible loss. In the fourth system, the refuse is compressed into large portable metal containers or trailers, such as the transfer operation described in Chapter II, which are then picked up and

carried to the disposal facility for unloading, after which they are returned to the pickup site. Larger systems compact solid wastes in specially designed presses which form stable bales, and reduce the volume of loose, uncompacted refuse by as much as 10 to 1. The bales are then transported to a landfill on flatbed transfers or trains.

In the compaction systems discussed above, there is no reduction in the weight of the refuse and except in the systems using sealed bags or bales there is only a temporary decrease in volume. The refuse remains in a putrescible state, is inflammable and odor and vermin problems are not eliminated. A considerable amount of liquids may be produced by compaction and these may cause contamination problems.

Composting

Composting involves the controlled microbiological decomposition of organic solid wastes into an inert material resembling coarse coffee grounds, which is suitable for use as a mulch, soil conditioner and nutrient for agricultural and gardening purposes. Properly carried out, this decomposition is odorless; if the material to be composted is first ground up and then run through large digesters, the breakdown can be complete in 48 hours. The major advantage of this process is the recovery and return to the soil as humus, essential components such as nitrogen and minerals that would otherwise be pollutants.

Composting has been practiced for centuries by individual farmers in many lands, and has recently enjoyed popularity among organic gardeners. As a large-scale solid waste reduction process carried out by governmental policy, however, composting is still in its infancy. Municipal composting has been practiced extensively in Europe, particularly in West Germany, but has not been popular in the United States because no appreciable market has yet been developed for the compost. Recently, two privately operated composting plants servicing Houston, Texas were forced to close down because of odors and the lack of markets for the composted material. Even in West Germany, the nine composting plants accept and convert only about two-thirds of 1 percent of the German domestic refuse into compost. (An equivalent figure for New Jersey's annual volume of refuse would amount to 47,570 tons.) Another shortcoming of composting is the required separation of inorganic wastes which would not break down in the process; on the other hand it should be noted that the end product of composting is not dumped, but used to replenish the soil. Although little used at present, the future role of composting could be much more extensive if the marketing and separation problems can be satisfactorily resolved.

Shredding, Grinding and Chipping

Shredding, grinding and chipping are processes, much like compacting, which reduce the volume of solid wastes and make it easier to handle. However, problems may arise if the waste processed by these methods is incinerated, because the finely ground material has been found to pack and burn too slowly.

One justification for the added cost of grinding is that landfill space is conserved. A pilot project carried out by the City of Madison, Wisconsin indicates that the density of unground refuse, compacted by a bulldozer at a landfill to a depth of six feet, is about 500 pounds per cubic yard. The same refuse after grinding can be compacted to a density of 900 to 1100 pounds per cubic yard. In addition, it was found that grinding garbage with other refuse resulted in no appreciable odors, insects or vermin, even though it lay uncovered for six months.

Individual home garbage grinders have been used in some areas. This method requires the separation of the food products in the refuse from most of the other materials. Since the former comprises only a small percentage of the total refuse and is the least bulky to handle, the saving in disposal costs is relatively small. Some communities have prohibited the use of garbage grinders because of the added load on sewage disposal systems into which the ground material is discharged.

Incineration

Incineration is a process (not a method of ultimate disposal as is sometimes thought) which results in a substantially reduced volume of solid waste which has been burned and which should not contain any degradable organic materials. While the residue must still be disposed, because it is organically inert, it can be accomplished with less environmental and health hazards, although not with complete safety. Volume reduction varies with the type, efficiency and proper operation of the incinerator and ranges from 50 to 90 percent of original volume. In addition to reducing the burden on landfills, other advantages of incineration are: 1) little land is required for incinerator construction; 2) central locations to minimize hauling costs are often feasible; 3) heat generated by the incinerator can be converted to the production of energy; and 4) some specially designed incinerators can burn dehydrated sludge from sewage treatment plants along with solid waste, a significant factor at a time when sludge disposal problems are growing rapidly.

There are a number of drawbacks to incineration. First, it requires a greater capital investment than most other processes. Second, it requires a great deal of precision, as improper operation may damage the incinerator furnace and create serious environmental problems of smoke and odor. Moreover, because of the sophisticated equipment, a thoroughly trained and experienced staff must be recruited to ensure proper operation. Third, some components of solid waste with recovery potential, such as fiber, are destroyed by incineration. Fourth, incineration can not be a short term expedient because facility construction requires a long lead time, as much as four years, from initial planning to date of operation. Finally, it should be noted again that incineration does not eliminate the need for a sanitary landfill or other means of disposal since the incinerator's residue and other wastes which are not combustible still require disposal.

Incineration is presently undergoing much experimentation and development, necessitated by more stringent air pollution standards. Questions have been raised especially about the ability of incinerators to safely burn plastics and other materials which emit combustion gases harmful to man and his environment.

Pyrolysis

Pyrolysis is the process of subjecting solid waste to high heat in the absence of oxygen, essentially resembling the production of coke and charcoal. Combustion does not occur and substances in the waste are broken down and may be converted into usable forms without any apparent contribution to land, water or air pollution. Solid waste residues have been found to be useful as briquetted fuel, soil conditioner, and activated charcoal filter medium. Liquid residues of pyrolysis are a source of potentially usable chemicals, and gases are usable as fuel. This process has also been demonstrated to be feasible for the disposal of scrap tires and plastic materials which have caused considerable disposal problems in the past.

Presently the use of pyrolysis in solid waste management is still in the demonstration stage. However, if it lives up to expectations, the process has promise for relatively inexpensive, effective treatment of solid waste resulting in maximum recovery of economically valuable materials and reducing ecological dangers.

Salvaging and Resource Recovery

Salvage is the separation and removal of materials with reuse value from the rest of the waste material. The salvaged materials—most often scrap metal, glass and paper—are then reused in manufacturing new products. Generally, the amount and type of material that is salvaged is directly related to the cost of salvaging operations and to the resale price of the salvaged material. For example, until recently a large volume of waste newspaper was collected from homes and salvaged. However, with current low prices for wastepaper and high collection costs, the paper is now generally picked up as trash along with other household wastes. Salvage is most readily carried out where the waste material is homogeneous and of significant value, most frequently in industrial and commercial operations. Salvage operations generally center around high value, high density scrap metals including over 26-million tons of scrap iron which are salvaged and sold in the United States each year. (By way of comparison, it should be recalled that *all* of New Jersey's solid waste totals 7.1 million tons, annually.)

The secondary materials industry has complained to Congress that the low price of salvage is artificially depressed by subsidies, such as preferential freight rates, given to virgin materials industries as discussed in more detail in the waste avoidance section at the end of this report.

The total volume of salvageable material in municipal waste systems is large, but widely dispersed and intermingled with garbage and non-salvageable trash. Because the cost of separating the salvageable material has been prohibitive, the separate collection of reusable and non-reusable waste materials is practiced in only about 20 New Jersey municipalities. In these communities, the individual resident is required by ordinance to sort and separate his wastes. The materials must then be collected separately (although not necessarily in separate trucks or pickups), returning the reusable materials eventually to recycling plants or hog feeding farms and hauling the non-reusable material to a disposal site. However, because of the inconvenience to the resident and the higher cost of separate collections, combined collection without recycling is the general practice. This practice, too, may be changed in the future by force of circumstances.

Several complete recycling and reuse plants are either planned or being demonstrated in the United States. For example, a Delaware firm is planning a recycling plant in that State which will convert 500 tons of solid wastes and 230 tons of sewage sludge per day into resalable products. Capital costs for the facility are estimated to be about \$8-million, and operating costs are expected to be offset by revenues from the sale of recycled materials. Another company has recently opened a recycling plant in Franklin, Ohio, where solid wastes are ground and then mixed with effluent from a sewage treatment plant. Reusable materials are then separated by magnets and gravity. The plant has a capacity of accepting 150 tons of raw wastes per day (the amount produced by 50,000 people) and converting them into reusable materials. Projections indicate that a 1,000 ton per day unit would cost approximately \$10 million to construct, and depending on markets, operating costs could be offset by the sale of recoverable materials. These recycling plants hold much promise for the future, once the technology is sufficiently demonstrated and markets for the recycled materials are developed.

Reclamation of waste is not limited to inorganic materials, for example, organic materials can also be reclaimed, but must be kept separate from other wastes. The New Jersey Department of Agriculture licenses the feeding of garbage (food wastes) to livestock at 154 farms in the State. Also usable, but seldom utilized in today's economy, is the heat generated from incineration (the U.S. Environmental Protection Agency is presently funding a demonstration project in St. Louis to test the feasibility of burning domestic solid waste along with coal to produce electricity); the soil nutrients and decomposition gases obtainable from composting operations; and the filled and covered land left behind by sanitary landfill operations.

The answer to most of our solid waste problems appears to be recycling, reuse, and reclamation. According to experts in solid waste, within the next 10 to 15 years, processes will be available to solid waste management systems that maximize resource conservation and material recovery.

Developing Regional Processing Facilities

To recapitulate, at present not more than 10 percent of New Jersey's solid waste volume is treated by the few municipal and small, private incinerators or is subject to recycling through the efforts of voluntary organized recycling programs. Approximately 90 percent of the waste is merely collected and dumped raw at landfills.

Solid waste processing operations, with the capability of reducing the volume of waste requiring ultimate disposal and maximizing the recovery of usable materials, appear to hold the best answer to many of New Jersey's solid waste problems. Unfortunately, most processing techniques with recovery potential are still in the development and demonstration stages and will require a long lead time before adequate performance, economic justification and ability to meet environmental quality standards is assured. Thus conversion to processing techniques requiring expensive capital investment is not warranted at this time.

Table III-1 below shows how economies of scale operate in a selected compaction system. Similar savings, shown in Table III-2, are projected for the Franklin, Ohio recovery system described previously. On a given tonnage per day capacity basis, both capital costs and operating costs decrease as the size of the unit increases. (Too much centralization, of course, would result in long haul distances for the peripheral communities.) Thus, while the various processes are being developed and demonstrated, the Commission believes that New Jersey communities should prepare to use them effectively by planning now for a framework of regional service districts to take advantages of economies of scale. Processing technology is likely to be expensive, and the economic returns from processing as of this moment are not generous. If processing systems are to work well, optimum service districts will be essential.

Regional processing facilities have some additional advantages. Larger service areas have a greater number of potential sites, greater savings in planning and design costs, an easier task of monitoring and abating pollution, and better chances of obtaining federal and state financial aid.

Unit Capacity tons/day	Total Cost of Unit	Unit Cost Per Ton Capacity
300	\$730,000	\$2,433
600	1,400,000	2,333
1500	3,330,000	2,220

* Data furnished by equipment manufacturer.

TABLE III-2
ECONOMIES OF SCALE IN THE FRANKLIN, OHIO
RECOVERY SYSTEM†

Unit Capacity tons/day	Capital Costs (millions)	Capital Costs Per Ton Capacity	Operating Costs* Per Ton
200	\$2.9	\$14,500	\$4.00 to 4.50
500	5.9	11,800	2.00 to 2.50
1000	10.9	10,900	-.50 to 1.00

† Data furnished by equipment manufacturer.
* Figure includes operating costs, estimates for amortization and credit for the sale of recovered materials. Operating costs for the 1000 ton unit may be totally offset by the revenue from selling the recovered material.

To its satisfaction, the Commission has found that the climate of opinion among local officials is shifting strongly in favor of larger service districts. Our surveys show that local officials, as indicated in Table III-3 below, are willing to provide solid waste services on an intermunicipal, regional or county-wide basis. The table gives an indication of how these local attitudes have changed, probably in response to perceptions of the severity of the solid waste problem (see page 1). In 1967, only 19 percent of the Mayors surveyed thought that solid waste was such a great problem that they would be willing to provide joint services. Yet, three years later, 86 percent of the Mayors indicated they were willing to do so.

TABLE III-3
COMPARISON OF MAYORS' ATTITUDES TOWARD JOINT
SERVICE PROVISION, 1967 AND 1970³

Mayors' responses to the question:
Would you be willing to provide this service jointly?

Service	Mayors Responding Affirmatively			
	1967		1970	
	%	#	%	#
Solid Waste	19	90	86	409
Sewage	33	157	84	399
Public Health	9	43	65	309
Education	14	67	49	233

In determining criteria for optimum solid waste processing districts, consideration should be given to:

- making each district a contiguous geographic area, capable of maximizing economies of scale.

- avoiding unduly long travel distances from collection routes to the processing facility, and from there to disposal sites.
- encouraging not only the processing, but the disposal, within the district, of wastes generated therein.
- providing that all waste processing in the district be under one management, regardless of the method or methods used. (For example, composting and recycling might both be used within a district, but both operations should be under a single management and both should extend services district-wide.)

Impediments to Establishing Regional Facilities

While several attempts have been made in New Jersey at cooperative landfill ventures between municipalities, there have been few successful attempts to deal with comprehensive solid waste problems on an inter-municipal or county wide basis.*

Failure to develop regional facilities can be attributed to the following factors 1) lack of planning, 2) inability to implement the plan once it is developed (primarily because of failure to agree on a site for the facility); 3) inadequate public understanding of the problem, and 4) lack of funding.

To date there has been almost a complete lack of planning at the inter-municipal or county level for the implementation of regional processing or disposal facilities. Four counties have developed plans and are in the process of trying to implement them. The others either have outdated plans or are trying to secure the needed funds to begin their planning efforts. During the course of this study, the Commission analyzed attempts to solve solid waste problems through intermunicipal or county-wide efforts in order to isolate the major problems encountered, so that similar obstacles might be avoided in future efforts to deal with solid waste processing and disposal on an area-wide basis. The cases included: 1) the attempt by the Lower Passaic Valley Solid Waste Management Authority (Quad City) to construct an incinerator to serve the municipalities of Paterson, Clifton, Passaic and Wayne, 2) the attempt by Joint Meeting Number One to develop an incinerator to serve seven Essex County municipalities, and 3) the attempt by Union County officials to develop an area-landfill in Linden. In all three cases, the stumbling block to implementation of regional facilities was site selection.

The site selection impasse, the Commission found, was bound up with citizen hostility toward the idea of being a neighbor to a solid waste facility, particularly a regional one. No one wants to live next door to this type of facility because in the past, incinerators and similar

* For example, Sparta Township (Sussex) operates a landfill that is used by neighboring municipalities and Flemington and Raritan (Hunterdon) operate a joint landfill facility. Summit's (Union) new transfer facility is used by New Providence and numerous private contractors. Bergen County operates a county wide landfill system.

types of land uses have been eyesores, and worse. Obviously even the most modern and inoffensive facility will not be welcome just anywhere, even by the most enlightened homeowner, but it should be possible all the same to expand the possible choices of sites. An education campaign capable of showing the public the dimensions of the solid waste problem, the requirements for its satisfactory management, and the designs and prototypes of facilities that have demonstrated they can meet environmental and esthetic requirements should go a long way toward overcoming public opposition.

A final problem which will have to be overcome is the funding of regional solid waste facilities. As new processing technologies are developed and sufficiently demonstrated to be incorporated into solid waste systems, large capital outlays will be required to build regional processing facilities. Traditionally the sole source of revenue for financing solid waste collection and disposal services throughout the State has been general municipal revenues. This method is barely self-sustaining in the maintenance, operation, and replacement of existing equipment and sanitary landfill sites. It is not likely that these revenues will be adequate to provide for regional processing initially costing millions of dollars. Therefore, additional sources of capital funds will be needed.

Federal Role and Approaches Elsewhere

Presently, the U.S. Environmental Protection Agency, Office of Solid Waste Management, has limited grants available for solid waste planning, but with the exception of demonstration grants, has no money available for the construction of regional solid waste facilities. It is anticipated, however, that after a number of solid waste processes have been successfully demonstrated and recommended for use, the federal government will begin to provide construction grants. As the level of federal funding becomes apparent, the N. J. Department of Environmental Protection will be able to determine what level of State funding will be required to develop the regional processing systems. In developing regional processing and disposal facilities, *it is recommended that the State of New Jersey establish a program, much like New York's Environmental Facilities Corporation (E.F.C.), to aid counties or regional bodies in financing and constructing regional solid waste facilities.*

The E.F.C., providing managerial and technical assistance not readily available to local governments, is enabled by law to float bond issues at more favorable rates than local governments and can thus provide financing for the design and construction of a solid waste plant to the point where it is turned over to the local government as an operating facility, thus eliminating the need for local governments to get involved in its design and construction. Presently the Corporation is under contract with the Town of Brookhaven to develop a massive regional sanitary landfill operation which, upon completion, will be developed into several recreational facilities.

The State of Maryland has a similar program. The Maryland Environmental Service Corporation performs essentially the same services as E.F.C., but is further empowered, upon a request from the Secretary of the Department of Natural Resources (similar to DEP), to go into a region and develop or upgrade a solid waste facility with or without local approval, when local initiative is lacking.

The State of Connecticut has recently contracted with a major company to develop and manage a statewide solid waste processing and disposal system with a major emphasis on resource recovery. By planning and developing a statewide system, Connecticut officials hope to operate a system which will increase environmental quality at the lowest possible cost.

Recommendations

A. In New Jersey, local governments should be given every opportunity to deal effectively with their solid waste problems, including site selection and the development of area-wide facilities, as detailed in the following recommendations. *The Commission believes, however, that in the absence of local initiative and in view of decreasing opportunities for acquiring suitable processing and disposal sites, State government must ultimately assume the responsibility for ensuring an efficient, on-going process of solid waste collection, treatment and disposal. Thus the Commission foresees an emerging State role in the arbitration of differences between local units, especially as related to the selection of disposal sites and in the definition and planning for optimal districts as a basis for coordinated service provision by local governments. The Commission urges that these activities be initiated now before the opportunities are foregone for a systematic approach to this important function.*

B. *In order to ensure the recovery of materials, to reduce environmental pollution and to achieve economies of scale, the Department of Environmental Protection (DEP) should be charged with the responsibility, in cooperation with the affected local governing bodies, of establishing optimum processing and disposal districts. In developing these districts consideration must be given to present and anticipated volume of wastes, existing collection and transportation routes and costs, proposed technology, sound engineering and systems analysis. In most instances these districts may be coterminous with county boundaries. However, the Commission believes that in order to achieve optimum service, district boundaries should not be arbitrarily drawn to coincide with county boundaries. In some instances inter-municipal or inter-county districts may be more desirable.*

C. After establishment of optimum service districts, DEP should:

1. *develop a supporting role, including technical and financial assistance, to start the preliminary planning of regional solid*

waste processing facilities, using wherever possible planning grant funds made available by the Federal Environmental Protection Agency. Another potential source of funds for planning and research and development is the imposition of a registration fee for solid waste collectors, haulers and disposal operators who are required to annually register with DEP. A \$25.00 registration fee would bring in approximately \$100,000 annually which could, in turn, be used to provide grants to local governments, private collectors and landfill operators to experiment with new methods and plan for more effective waste management.

2. *establish minimal criteria to ensure adequate planning.*

Preliminary plans should include the following:

- a. an inventory of the composition and quantity of wastes now generated;
 - b. projections of the amounts and composition of wastes to be generated;
 - c. an inventory and appraisal of existing solid waste systems, public and private, operating in the service district;
 - d. provision for the development of adequate management and administrative capabilities to plan, implement and operate the system;
 - e. analysis of existing collection systems and transportation routes;
 - f. a survey of potential sites for the facility along with projected transportation costs from collection routes; and
 - g. development of a public education and information program to keep the public apprised of the project.
3. *develop a reasonable timetable for the completion of the various planning elements described above. If the timetables are not met, DEP should be empowered to develop the plans itself and assess the costs to the local governing bodies in the districts.*
 4. *develop the capability for critical evaluation of new processing techniques for recommendation to the districts.*
 5. *after acceptable volume reduction and recovery processes have been identified by DEP, the Department should provide technical and financial assistance to the districts in order to identify suitable sites and to start preliminary engineering designs for facilities.*
 6. *require the filing of all studies, plans and designs with the Department for its review and certification as to the environmental impact of each proposed project.*
 7. *once these preliminary engineering studies have been completed and sites have been identified, DEP, and the local governments*

to be serviced by the facility should work out equitable arrangements with the host communities. For example, a host community may be given payments in lieu of taxes or reduced rates for the processing of its waste as compensation for accepting the facility.

8. After the sites have been procured, low interest loans should be made available by the State to assist in the preparation of engineering plans and designs for the construction of the facilities. DEP should develop enforceable guidelines, assisted by the requisite State legislation, and the expertise to ensure that engineers, consultants, and contractors engaged on solid waste projects perform in a manner consistent with the public interest. Once the plans and designs are completed, grants by the State and federal government should be available to assist in the construction of the facilities.

D. The Commission has previously stated its support for the extension of authority to local governments in borrowing for capital construction. Recently proposals have been advanced for a New Jersey Municipal Credit Corporation which would help in financing the construction of needed facilities including solid waste processing facilities. The powers of such a Municipal Credit Corporation would feature: a municipal bond bank, authorized to purchase bonds issued by local governments and thus guarantee that the desired funds would be raised; a state guarantee fund, to lend financial backing to local bond issues; and a debt management service, which would help local governments get improved bonds ratings, stimulate bids on their bond issues, and offer advice on bonds and the bond market.

Because of its significance to solid waste management, the Commission urges that the appropriate State agencies consider and evaluate the impact of a Municipal Credit Corporation on the State's and local governments' position in the bond market.

The Commission believes that these recommendations should be considered along with those made in the discussion of the other sub-functions. For example, all facilities must be able to meet environmental and health standards, maximize recovery of materials and be reasonable in cost.

Chapter IV.

DISPOSAL

While collection and processing techniques affect the volume and nature of solid waste, the residue from processing operations and the unprocessed wastes still require disposal. Landfills are necessary, then, regardless of whether any processing takes place. According to the American Society of Civil Engineers, sanitary landfill is "a method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume and to cover it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary". Unfortunately, most present landfills in New Jersey do not measure up to this definition.

Present Landfill Operations in New Jersey

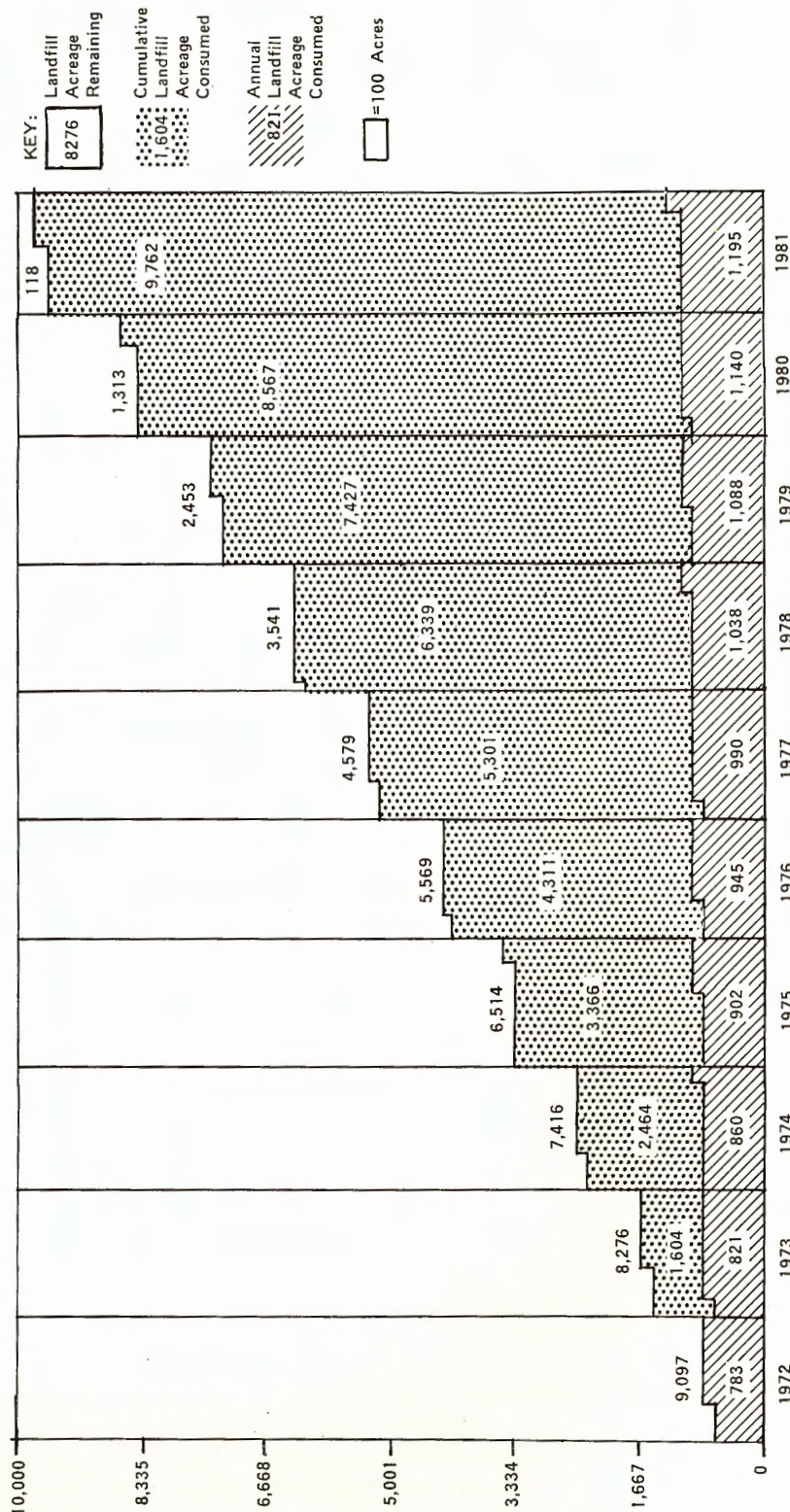
As indicated earlier, approximately 90 percent of the solid waste generated in New Jersey ends up, unprocessed, in the 331 existing landfills. In addition, the residues and non-combustible wastes from municipal and private incinerators eventually are disposed of in landfills.

Private enterprise plays a large role in the operation of New Jersey's landfill sites. Of the 331 sites, 166 are owned and operated by municipal governments, 2 are owned and operated by county governments; but 125 are owned and operated by private contractors and the remaining 38 are either municipally owned and privately operated or privately owned and municipally operated.¹

At the beginning of 1971 there were in the State some 10,600 acres not yet used for landfill operations but committed to such use. During 1971 this acreage was being used up at the rate of 750 acres per year. As the per capita generation of wastes increases, accompanied by increased population, additional burdens will be placed on the unused landfill capacity so that by 1980, if we continue to dispose of waste as at present, without processing to reduce the volume, annual landfill operations will consume over 1,150 acres. At this rate, as shown in Figure IV-1, *all land that is presently committed to landfill operations will be exhausted during the early part of 1982.*² Some of these landfills may be forced to discontinue operations because of unpreventable risk of ground and surface water contamination. The Wetlands and Riparian Laws in particular have provisions that may curtail future landfill operations in coastal marsh areas. Any such discontinuances would only hasten the time when presently designated landfills would be used up. This would require new sites to be acquired—a difficult task politically given the public distaste for

Figure IV-1
COMPARISON OF AVAILABLE LANDFILL ACREAGE WITH THE
CUMULATIVE RATE OF USE OF EXISTING LANDFILL ACREAGE³

1982 — Acres Remaining 118, Acres Needed 1,252
Landfill Deficit = 1,134



landfills—or more intensive use of present sites, an option which may not always be feasible from engineering or environmental health standpoints.

Another problem with the existing acreage is that most of it is located where the solid waste isn't—namely, in the less developed areas of the State. Conversely, in such urban counties as Essex, Passaic and Union, little or no landfill acreage remains, so that the solid waste collected there must be transported for disposal across county lines and often for considerable distances. (See Table IV-1). As landfill acreage gradually disappears, the problem of transporting wastes will become increasingly more difficult for these urban counties, and for the rapidly developing adjoining

TABLE IV-1
EXISTING LANDFILL ACREAGE AND
RATE OF USE BY COUNTY⁴

County	1970 Population	Presently Available Landfill Acreage (Jan. 1972)	Rate of Use: During 1972 Acres/yr.
Atlantic	175,043	532	19
Bergen	898,012	444	97
Burlington	323,132	1,505	36
Camden	456,291	131	49
Cape May	59,554	600	6
Cumberland	121,374	147	14
Essex	929,986	0	102*
Gloucester	172,681	421	19
Hudson	609,266	649	65
Hunterdon	69,718	2	7**
Mercer	303,968	0	35*
Middlesex	583,813	883	62
Monmouth	459,379	879	50
Morris	383,454	1,598	42
Ocean	208,470	820	24
Passaic	460,782	0	52
Salem	60,346	316	6
Somerset	198,372	43	23**
Sussex	77,528	242	8
Union	543,116	0	59*
Warren	73,879	668	8
Total	7,168,164	9,880	783

* Denotes Counties where available landfill acreage is less than that required for amount of wastes generated; therefore, wastes must be transported out of the county.
** Denotes counties where existing landfills will soon be exhausted.

Table IV - 2
USE OF EXISTING LANDFILL ACREAGE⁵

	Available Acres Beginning 1972	Rate of Use During 1972 Acres/Yr.	Available Acres Beginning 1973	Rate of Use During 1973 Acres/Yr.	Available Acres Beginning 1976	Available Acres Beginning 1980	Available Acres Beginning 1982
Group 1	1,093	375	718	394	0	0	0
Group 2	2,553	88	2,465	92	1,650	0	0
Group 3	4,087	207	3,880	217	3,196	1,308	0
Group 4	1,084	87	997	91	716	328	0
Group 5	1,063	26	1,037	27	952	817	118
Total	9,880	783	9,097	821	6,514	2,453	118

Counties included in groups:

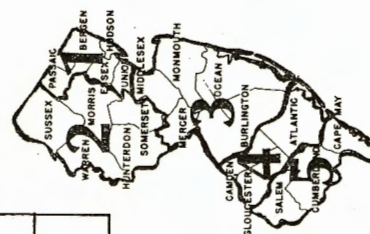
Group 1 — Bergen, Essex, Hudson, Passaic, Union

Group 2 — Sussex, Warren, Morris, Hunterdon, Somerset

Group 3 — Mercer, Middlesex, Monmouth, Ocean, Burlington

Group 4 — Camden, Gloucester, Atlantic

Group 5 — Salem, Cumberland, Cape May



COUNTY KEY MAP

areas, as well. Table IV-2 indicates the trends in New Jersey's landfill capacity, assuming that: a) no new land is committed to this use; b) that future solid waste volumes attain predicted levels; and, c) that the presently predominant practice on dumping unprocessed waste continues.

During 1975, the table shows, available landfill acreage in the north-eastern counties (Group 1) would be exhausted and the municipalities would have to seek disposal sites elsewhere, to the west and south. Combining the wastes generated from the northeastern counties (Group 1) with the northwestern counties (Group 2), the landfills in Group 2 would be exhausted during 1980. Thus, the municipalities in Group 1 and Group 2 would have to haul further south to the Group 3 area whose landfills would be exhausted during 1981. During the following year this process would exhaust landfill capacity in all but the three southern-most counties, where presumably the entire State would be disposing of its wastes. Assuming no new sites were made available, even these sites would be exhausted in the early months of 1982. This discouraging timetable could be accelerated if some of the present sites were forced to cease operating because they could not comply with health and environmental regulations.* What would happen then? Would New Jersey's wastes have to be sent out of the State; if so, where? Or would some hard and painful decisions have to be made to commit more land for landfills, against local wishes and possibly contrary to sound land-use planning? The Commission feels that only by the immediate adoption of a comprehensive, coordinated approach to solid waste management can we avoid such consequences and the accompanying responses which are often formulated under conditions of crisis.

Sample Disposal Patterns in New Jersey

A critical test of creative solid waste management is now taking place in the Hackensack Meadowlands. The setting: 20,000 acres of marshland, located at the heart of the New York-Northeastern New Jersey metropolitan area; much of it already a major rail, truck, air and sea transportation center, much of it totally undeveloped, and much of it in the process of being covered over with landfill. According to a recent survey by the Hackensack Meadowlands Development Commission, 118 New Jersey municipalities now haul 36,000 tons of solid waste per week to landfills in the Meadowlands District, with another 6,000 tons per week brought in from New York City. Many of these municipalities are in Bergen, Essex, Hudson, Passaic and Union Counties which together produce 48 percent of the State's annual volume of solid waste. By the end of 1975, the unused capacity of existing landfill sites in the Meadowlands District will be

* Recently the PUC granted permission to the operator of a 102-acre landfill in Morris County, servicing over 80 municipalities, to close the disposal facility because of the lack of adequate material to cover the solid waste as required by the State Sanitary Code. The closing of this landfill will reduce the amount of available landfill acreage shown in Tables IV-1 and 2, and increase collection and haul costs because of longer haul distances to other disposal sites.

exhausted.* Yet the Meadowlands Commission is mandated by law (N.J.S.A. 13:17-10) to guarantee to these 118 municipalities that they may continue to dispose of at least their 1969 volume of solid waste in the District by sanitary landfill or some other method, indefinitely. With the realization that existing landfills will soon be exhausted, the Meadowlands Commission, in August 1971, announced plans to construct a 6,000 ton per day incinerator at a cost of \$125 million. Immediately a number of questions were raised concerning the proposed incinerator. First, the design and construction of the facility would require a lead time of four to five years before it would be operational. Second, residues and non-combustible items estimated at 2,000 tons per day would still require disposal. Third, with the generation of wastes increasing, by 1980 the incinerator would be able to handle only 50 percent of the waste generated in the area. Finally, approximately 1,000 tons of soot a year would be released into the atmosphere by the incinerator compounding air pollution problems in the area. After considering the proposal, the U.S. Environmental Protection Agency (EPA) has recommended that the Meadowlands Commission explore other alternatives including compaction and rail haul.

One of the main reasons for the scarcity of available landfill acreage has been the failure to plan for and develop new landfill sites—a situation closely related to the unpopularity of landfills. In Hunterdon County, for example, 4 of the county's 26 municipalities use 3 existing disposal sites located in the county. Of the other 22 municipalities only 1 or 2 can demonstrate a lack of suitable land for a landfill operation, but all are opposed to having a landfill located within their borders. Consequently all 22 transport their wastes out of the county. Lambertville's wastes are hauled approximately 65 miles round trip to a landfill in Burlington County. Union County, as shown in Table IV-3, has only 2 landfills, each used only by the municipality where it is located. The other 19 municipalities, which generate approximately 72 percent of the solid waste in the county, must take their refuse to sites in Hudson, Middlesex and Morris Counties. The average round trip haul distance for those municipalities is 27.8 miles and each trip takes more than 2 hours. The Commission seriously questions the economic feasibility of hauling wastes in the collection vehicle for more than 20 or 30 minutes. Yet, attempts by Union County to establish a close-in landfill to serve its municipalities have not been successful. In Camden County, 10 of the 35 municipalities, generating approximately 41 percent of the solid waste, presently get rid of their wastes in Gloucester and Burlington Counties. Recently the City of Camden exhausted its landfill and now uses a landfill in Mt. Holly (Burlington County). Camden County officials are currently assessing the feasibility of establishing a regional landfill within the county.

* The Hackensack Meadowlands Development Commission's plans call for extensive areas of commercial, industrial and residential development; excluding such areas, as well as wetlands designated for conservation, as future landfill sites.

Municipality	Type of System	Number of Collectors	Location of Disposal Site	Round Trip Miles to Disposal Site	Round Trip Hours to Disposal Site
Berkeley Heights	P	4	Edison (Middlesex)	32	2.5
Clark	P	10	"	27	2.0
Cranford	P	8	"	31	2.5
Elizabeth	C	1	Elizabeth (Union)	6	.66
Fanwood	P	2	Edison (Middlesex)	27	2.0
Garwood	M	M	"	30	2.0
Hillside	C	1	Kearny (Hudson)	17	1.66
Kenilworth	M	M	"	25	2.25
Linden	M	M	Linden (Union)	6	.66
Mountainside	P	4	Kearny (Hudson)	34	2.66
New Providence	P	2	Edison (Middlesex)	37	2.5
Plainfield	P	43	"	22	1.75
Rahway	C	1	"	22	1.75
Roselle	C	1	"	30	1.75
Roselle Pk.	C	1	Kearny (Hudson)	25	2.0
Scotch Plains	P	7	Edison (Middlesex)	30	2.25
Springfield	C	1	Kearny (Hudson)	25.5	2.0
Summit	M	M	Parsippany-Troy Hills (Morris)	28	2.0
Union	C	1	Kearny (Hudson)	24	1.75
Westfield	P	20	Edison (Middlesex)	32	2.5
Winfield	C	1	Kearny (Hudson)	30	2.0

Average Round Trip Miles (excluding Elizabeth and Linden) = 27.8 miles
Average Round Trip Time (excluding Elizabeth and Linden) = 2.07 hours
Key: M — Municipal System
C — Municipal Contract with Private Collector
P — Residents Contract with Private Collector

County and Regional Landfill Operation—Little Action, Much Frustration

To date, only one New Jersey county has become involved in sanitary landfill operations. In 1955 Bergen County established a sanitary landfill to serve its 70 municipalities. Later it opened a second site, and plans call for a third. The establishment of county operated landfills has aided Bergen County's municipalities by providing needed disposal sites for their wastes, and through open competition with private landfill operators, has helped stabilize disposal costs in the area. Disposal at one of the sites, near Overpeck Creek, has been completed and a public golf course and recreational area was built on top of the finished site.

Municipal officials in virtually every county have sought assistance from county officials in dealing with solid waste disposal. The county appears to be a logical level of government to plan and develop regional sanitary landfills, since:

- the county has a wider choice of possible sites than a municipality;
- it would be cheaper for the county to plan and/or operate one or two large landfills than several smaller ones, if the large landfills were centrally located;
- the survey, design and planning work for one or two large county-wide landfills would also be cheaper;
- coordination of pollution monitoring and abatement activities would be easier;
- the county has a broader tax base from which to raise revenues for the purchase of land and operation of the landfill.

These reasons and municipal concern notwithstanding, to date only a few counties are actively engaged in solid waste management. Moreover, several of these counties have had their initiative rewarded by bitter arguments over site location. Monmouth County officials in cooperation with the Monmouth Shore Refuse Disposal Committee recently were rebuffed in their choice of location for an area-wide landfill operation. As soon as the location of the site was made public, strong opposition from local public officials and citizens was raised so that the proposed site had to be abandoned. Union County officials had a similar experience when it was reported that the County was thinking of developing an area-wide sanitary landfill in Linden.

In Mercer County, nine communities, including Trenton, presently haul their wastes to distant disposal sites located in Monmouth and Burlington Counties. The Mercer County Improvement Authority recently announced plans to develop a sanitary landfill and its projections indicate that most of these municipalities would achieve significant savings in their solid waste costs because of reduced hauling distances as the proposed landfill would be located within 9–10 miles of every Mercer municipality. Yet because of its concern over public opposition, the Improvement Authority has not announced the preferred location of

the site. This opposition is not without justification. Last year, the Bureau of Solid Waste Management of the Department of Environmental Protection (DEP) surveyed the State's sanitary landfills and found that fewer than half of them—45 percent—were satisfactorily meeting the provisions of the State Sanitary Code. It may be of some comfort to note that the trend of compliance is upward; a similar survey conducted in 1969 showed only 10 percent compliance. Yet as long as substandard operation of landfills continues, public resistance to them will be hard to overcome. Only a dramatic improvement in their performance will make the public more tolerant of landfills, however necessary they may be. Successful demonstrations of new solid waste technology will also have a beneficial effect on public opinion, as will conversion to acceptable reuses after landfill operations are finished.

Marginal lands such as worked-out gravel pits and surface mines could be used as regional landfill sites, and afterward transformed into parks, playgrounds, and other recreational purposes. Although the range of reuse possibilities is very limited, there are a number of examples where marginal land has been thus used:—a park and golf course have been constructed on a completed fill in Los Angeles; the Milwaukee County Stadium was built on a landfill site in 1952; Chicago has turned a landfill into a skislope and toboggan run; and in New Jersey, the Overpeck Creek landfill in Bergen County has been developed into a public golf course. Thus, with advance planning and with careful attention to sanitary regulations, it is possible to convert solid landfill sites to useful purposes with minimal environmental impact. —THEY NEVER HEARD OF METHANE!

Conclusions and Recommendations Concerning Disposal

To reiterate, New Jersey is rapidly approaching a critical stage in solid waste disposal as existing landfills are nearing maximum capacity and will be unable to handle projected waste loads much longer. While new processing technology, capable of reducing the volume of waste requiring disposal, holds much promise for the future, it has not been sufficiently developed and demonstrated to be incorporated into solid waste management systems at the present time. In the meantime, sanitary landfill disposal is the one method presently capable of assimilating the State's vast solid waste load. The Commission concludes that:

- Regional landfill sites must be planned and developed, primarily by the county, at the closest feasible location to the communities using them to minimize costs of transporting solid waste while maximizing economies of scale.
- The landfill sites should be planned in conjunction with existing or anticipated processing facilities, such as those described in the preceding chapter, to reduce both the volume of waste and transportation costs.

- Present landfills must be required to meet the standards of the New Jersey Sanitary Code, to ensure protection of public health and the environment. In addition, it is desirable that these landfills be screened from view, and that collection trucks using the fills be restricted as to their use of roads and hours of operation.
- Planning for reuse of landfills should be done for all existing sites, and well in advance of any new sites.
- In order to protect the public interest by ensuring the greatest possible return, local governments, when leasing or selling public land to private contractors for solid waste purposes should require that bids for the property be open and competitive. If the land is leased to a solid waste operator, the local government might specify in the lease that the leaser will enjoy use of the facility, either without charge or at reduced rates, for its own wastes in addition to or in lieu of monetary payments for the use of public land for privately operated solid waste facilities.
- As an inducement to municipal approval of a desirable site for regional landfill operations, the DEP, the county or counties, the municipalities to receive disposal service from the regional landfill and the municipality in which the site is located should work out equitable arrangements for establishing the site. Such arrangements could include incentive payments to the host community, tax benefits, preferential disposal rates for its own solid waste, and the like, in addition to firm guarantees that the landfill will meet health, environmental and esthetic standards, and restoration to municipal tax roles or recreational or other acceptable uses of those sites where landfill operations are terminated.

Presently, the responsibility for providing landfill disposal facilities is fragmented among many local governments and private landfill operators who simply lack the mandate and scope of operations to provide any guarantee that sufficient and environmentally acceptable landfill facilities will continue to be available for solid waste disposal throughout the entire State. Recently there has been a trend towards an increased State role in the disposal of solid waste. Legislation creating the Hackensack Meadowlands Development Commission mandates to the Commission the responsibility of providing disposal facilities for 118 of New Jersey's municipalities and the *Solid Waste Management Act* gives the Department of Environmental Protection increased powers to experiment and develop new solid waste techniques including transporting solid waste by rail to distant disposal sites.

The Commission commends the stepped up pace of State involvement in solid waste management and urges that the State be given the primary responsibility for the comprehensive, coordinated and continued planning and development of disposal facilities. The State with its extensive jurisdiction and scope of operations should be required to co-

ordinate the wide range of activities associated with proper solid waste management: the identification and selection of regional disposal sites; analysis of transportation alternatives; evaluation of environmental impact, land use considerations and social implications; cost-benefit analysis of alternate approaches; and the formulation of financing techniques for capital facilities of state-wide or regional scope.

Chapter V.

WASTE REGULATION AND CONTROL

Background

The State has assumed responsibility for the enforcement and oversight of health and environmental regulations governing solid waste disposal, and asserts this responsibility by requiring that incinerators meet emission standards, that ground and surface water supplies are not contaminated by improper disposal operations, and that disposal areas are not breeding grounds for pathogenic vectors. Chapter VIII of the *New Jersey Sanitary Code* forbids open dumping and restricts disposal to sanitary landfill, incineration or "other methods of disposal as may be approved" by the Department of Environmental Protection (DEP).^{*} The Code also requires that persons and firms engaged in solid waste disposal register with the Department; that landfills be designed by engineers and approved by the Department; that certain landfill operating requirements be met, including measures to ensure that ground and surface waters are not contaminated, and that fires, scattering paper and insects and rodents are kept under control; operating reports, submitted by all disposal operators, are also required. Chapter XI of the *Air Pollution Control Code* bans the open burning of solid wastes, and establishes standards for the construction of private and public incinerators and their allowable emissions. The Code requires a permit to construct, install or alter control apparatus and equipment from DEP.

Under N.J.S.A. 13:1E-9, the Legislature provided that the codes, rules and regulations of the DEP concerning solid waste management be enforced not only by the Department but by every local Board of Health. Some local health officials have indicated to the Commission staff some confusion regarding their role in enforcing these regulations. *The Commission believes that local health officials and the public have important roles in ensuring that proper methods of storage, collection and disposal of solid wastes are practiced, and that every effort should be made by the DEP to seek such cooperation.*

In 1966, the Bureau of Solid Waste Disposal, then in the Department of Health, began a solid waste planning and data collection program. These efforts culminated in the *New Jersey State Solid Waste Management Plan* (1970) which made the following recommendations:

1. establishment of solid waste management districts, being wherever possible contiguous with existing county boundaries;

^{*} This Department was created in April, 1970. A number of solid waste regulation and control functions were transferred to the Department and new responsibilities assigned, as well.

2. establishment of one or more solid waste collection districts within each management district;
3. adoption of a management strategy, based either on landfill disposal or incineration and landfill, for each management district;
4. further study of methods of waste collection and treatment;
5. specific study of the feasibility of hauling wastes by rail;
6. specific study of ways in which sanitary landfill can be used to prepare the land for anticipated future use; and
7. development by the State of specific performance standards for solid waste management to protect the environment and prevent nuisances.

The *Solid Waste Management Plan* has been approved by the Federal Environmental Protection Agency as the official State plan. To date, however, there has been little success in implementing this plan.

During the same year that the State's solid waste plan was published, the State Legislature broadened the State's involvement in solid waste management with the passage of the comprehensive *Solid Waste Management Act of 1970*. The Act states:

"that the current solid waste crisis should be resolved not only by the enforcement of more stringent and realistic regulations upon the solid waste industry, but also through the development and formulation of State-wide, regional, county, and intercounty plans for solid waste management and guidelines to implement the plans."

To ensure the formulation and development of these plans the legislation authorizes DEP "to supervise solid waste collection and disposal facilities or operations" and, in reviewing proposals for new collection or disposal operations, to:

"give due consideration to community development of comprehensive *regional solid waste collection and disposal* in order to be assured, insofar as is practicable, that all proposed facilities, installations, and operations shall conform to reasonably contemplated development of comprehensive community or regional solid waste collection and disposal facilities and operations and to any State-wide, regional, county and intercounty plans for solid waste management."

The Act also authorizes the Department of Environmental Protection to undertake a research and development program to determine "the most efficient, sanitary and economical way of collection, disposing and utilizing solid waste," to develop a State-wide solid waste management plan, to acquire land to demonstrate new collection and disposal methods and to construct and operate incinerators or other disposal facilities on an experimental basis. The Act provides for an Advisory Council on Solid Waste Management to study, investigate and make recommendations pertaining to solid waste management in the State. Finally, the Act empowers the

Commissioner of Environmental Protection to seek injunctive or other relief in the Superior Court from collection or disposal operations in violation of the law. The first major legal action taken by the Department under the new Act resulted in a \$12,500 fine against a landfill operator for his failure to comply with Chapter VIII of the State *Sanitary Code*.

Since the law became effective, the Bureau of Solid Waste Management has registered approximately 7,000 individuals and firms engaged in solid waste collection or disposal activities. The figure includes individual residents as well as private firms who use public disposal facilities in the State.

In October, 1969 the New Jersey State Commission on Investigation (SCI) reported that Solid Waste Contractors' Associations:¹

"often bar new members unless they first receive approval from 75% of their existing members. The effect of these provisions and practices, of course, is to greatly discourage competition in the industry. By-law provisions encourage collusive bidding and preserve allocations of customers either by territory or on some other basis. The allocation of customers is perhaps the greatest vice in the industry. At present, there is no legislation in the State of New Jersey which prohibits garbage collectors from parceling out towns, areas or customers to one another. Unless this vice is checked, more and more municipalities will be faced with the situation where they receive only one bid for their waste collection contracts. It is a take-it-or-leave-it proposition in a situation where you can't leave it."

In 1970 the State Legislature, aware of the findings of the SCI and of the need for some control over the private solid waste industry, enacted the *Solid Waste Utility Control Act*. The Act brought another State agency, the Public Utility Commission (PUC), into the Solid Waste regulation field. The Act gave the following powers and responsibilities to the PUC:

1. to establish qualifications based on experience, training, or education for all individuals engaged in solid waste collection and disposal,
2. to issue certificates of public convenience and necessity to those individuals found to be qualified to engage in solid waste activities (no person is permitted to engage in the business of solid waste collection and disposal without a certificate of public convenience and necessity),
3. to require that performance bonds be posted by every individual engaged in the solid waste business,
4. to designate specific franchise areas for collection and disposal,
5. to regulate rates and, upon a finding of excessive and unreasonable rates, to require that appropriate adjustments be made in rate structures,

6. to revoke certificate of public convenience and necessity for:
 - a. violation of P.U.C. rules and regulations,
 - b. violation of any rules and regulations relating to the protection of the environment, or
 - c. refusal to comply with any lawful order of the P.U.C., and
7. to ensure that no solid waste collection or disposal utility is permitted to limit bidding, withdraw from a specific territory, or endeavor to eliminate competition.

The *Solid Waste Management Act* and the *Solid Waste Utility Control Act* were strengthened by a New Jersey Supreme Court decision (*Ringlieb v. Township of Parsippany-Troy Hills*) decided on October 26, 1971. The Court held that the State was given exclusive jurisdiction over the solid waste industry by these two laws and that municipalities cannot enact ordinances regulating the solid waste industry. This decision contributed to uniformity in this area and resolved disputes over who has what powers.

A number of other laws have a bearing on solid waste management. The *Solid Waste Management Authorities Law of 1968* permits any two or more municipalities to create a solid waste management authority "... to construct, maintain, operate and use ... incinerators ..." and other solid waste treatment facilities. The Lower Passaic Valley Solid Waste Management Authority created by Paterson, Clifton, Passaic and Wayne (Quad City) has been the only authority established under this legislation. While the law appears to have given all the necessary power to the authority for a successful solid waste management operation, there are limitations, particularly on the authority's ability to determine a site, which render the law virtually impotent.

In 1968 the State Legislature passed the *Hackensack Meadowlands Reclamation and Development Act*, which created the Hackensack Meadowlands Development Commission (HMDC) and charged it with the responsibility of planning and developing the Hackensack Meadowlands District. The Act also gave the HMDC the responsibility of providing disposal facilities adequate to handle all the solid waste then brought in by the 118 municipalities that were disposing of their wastes in landfills in the district. The HMDC, realizing that existing landfill capacity would be exhausted by about 1976, has proposed to construct and operate a 6,000 ton per day incinerator complex in the Meadowlands, and has carried out a continuous study program of solid waste technology and environmental quality.

Another recently enacted law, known as the *County Solid Waste Disposal Financing Law of 1970*, cites rising construction costs which virtually preclude individual communities from constructing and operating modern disposal facilities. The law empowers any county in the State:

"to purchase, construct, improve, extend, enlarge, or reconstruct garbage disposal facilities within such county either alone or jointly with any municipality, joint meeting or incinerator authority located within such county . . . and to operate, manage and control all or part of such solid waste disposal facilities. . . ."

To date, only a few of New Jersey's twenty-one counties have taken advantage of this permissive legislation. The law, however, provides neither incentives nor compulsory requirements that would get the counties moving.

Are Present Controls Adequate?

The comprehensive legislation and the State solid waste plan cited above place New Jersey among the leading States in planning and legislation for the management of solid waste, although still more is necessary for effective solid waste management, as this report indicates. An increased role in the management of solid waste for both the State and the counties is clearly called for, a role involving not only the health and environmental aspects but the construction, operation, regulation, research and developmental aspects as well. Improperly handled solid wastes can menace public health and ruin the environment. Burning dumps pollute the air and irritate the eyes; toxic chemicals seep into surface and ground water supplies; vermin and insect pests breed, spread disease and damage food and property; loose trash may fall from trucks and blow away, causing blight as well as pollution. To protect the public and the natural environment from these hazards, as well as to ensure the rates charged by private enterprise are reasonable, regulations and controls are necessary. If adequate standards and regulations are adopted and implemented with concern for health, resource conservation and environmental protection; efficient and effective solid waste collection, processing and disposal operations should result.

The state of the art of solid waste management is such that within the next ten to fifteen years, new techniques should be adequately demonstrated and become available for incorporation into most solid waste systems to give them the capability of processing wastes in an environmentally acceptable manner while increasing resource recovery. This equipment will be costly and will require highly skilled operation. In anticipation of this new equipment, standards should be developed for its design, construction and operation in order to protect the public investment of millions of dollars.

Some of these new techniques are already either in use in the State, or their use is anticipated in the future. For example, transfer stations have been built or are planned in a number of New Jersey municipalities. To date there are no standards for the construction and operation of these facilities. There need to be standards which would include requirements for design, construction and operation, to ensure that wastes are not permitted to accumulate so as to cause health and environmental prob-

lems. Similarly, if transportation of solid wastes by rail becomes a reality in New Jersey, new standards and regulations must be adopted to prevent blight and health hazards that could result from spills or overloading.

While there is a need to develop standards to regulate new processes and techniques, there are several areas where existing regulations should be strengthened to ensure environmental protection and sound management. For example, the quality of ground and surface waters is adversely affected through the disposal of materials directly into streams and through seepage from disposal sites. Both infiltration and percolation of water through buried wastes have resulted in leached substances from solid wastes traveling as pollutants in ground water. Cases of water contamination by mismanaged solid waste operations have been well documented by DEP. Yet, Chapter VIII of the *Sanitary Code* does not contain provisions for the monitoring of ground water contamination and requirements for the collection and treatment of leachates from landfills, if feasible.

Within the *Code* there are provisions for the disposal of sewage sludge and hazardous wastes such as explosives and toxic chemicals. While these provisions are general in nature, they should be strengthened to ensure proper disposal. The *Code* requires that designs for new sanitary landfills be submitted to DEP for approval, yet there are no provisions for the Department to ensure that design criteria are met and for the design to assess the environmental impact of the landfill.

Enforcement Capabilities

Standards and regulations are only as good as the ability to gain compliance. Presently, DEP lacks sufficient manpower to enforce its regulations at the 331 landfills and other solid waste facilities. The effects of this lack of manpower and sufficient enforcement tools are evident in the survey by DEP which revealed that only 45 percent of existing landfills were operating in compliance with the *State Sanitary Code*.

Once a solid waste facility is found to be in violation of the *Sanitary Code*, the Department has the alternatives of opening negotiations with the violator to seek relief, or it can take the violator to court where fines can be levied against operators and injunctions issued to halt pollution. Fines can be up to \$1,000. per day, and contempt citations can be issued in cases where injunctions are ignored.

Recommendations

A. In order to insure that *all* processing and disposal facilities are operated so as to prevent health hazards and environmental pollution, Chapter VIII of the *State Sanitary Code* which regulates refuse disposal should be strengthened to include the following requirements:

1. *Before any new landfill facility is opened, a sufficient number of tests should be made by the prospective operator to determine*

the underlying soil, geology and groundwater conditions and the potential effects on neighboring properties. Sites found unsuitable on the basis of potential contamination as a result of the test results should not be allowed to be used as landfill facilities by DEP.

2. Once the landfill is operational, groundwater quality monitoring wells, one for each direction of groundwater flow, should be maintained by the operator in order to check water pollution. Periodic monitoring of water quality by chemical analysis should be required, with certified results available to DEP.
3. A statement of environmental impact, prepared by qualified sanitary engineers and paid for by the applicant, should accompany every proposal submitted to DEP for a new solid waste facility.
4. DEP should develop model ordinances to regulate on-site storage of wastes prior to collection, and should actively assist local health officers in any enforcement problems regarding improper storage of waste.
5. Disposal of sewage solids, liquids and hazardous waste in a sanitary landfill should not be permitted until the methods of disposal, suitability of the site and plan of operation have all been reviewed and approved by DEP. A permit system should be established, designed to restrict the type of waste a particular landfill can accept based on its ability to handle wastes such as sewage solids, liquids and hazardous wastes in an environmentally acceptable manner. Permits could be revoked for noncompliance with the approved plans. (Also see Section B of recommendations.)
6. Proposed landfills which have the potential of polluting ground water might be allowable if it were demonstrated on a case-by-case basis to be technically feasible to intercept the leachate at the bottom of the landfill, collect it and treat it. (If collection and treatment of leachate were feasible, many more sites would be available for sanitary landfilling.) Adequate monitoring, as recommended in No. 2 above, would be necessary.
7. Performance bonds should be posted with DEP by processing and disposal operators to ensure the proper operation and maintenance of the facility. If any facility failed to meet State sanitary standards, even after being issued administrative orders to do so, DEP should be empowered to go into the facility and upgrade the operation. The costs entailed by the Department would be borne by the governmental or private agency operating the facility. If the costs proved unfeasibly high, DEP could use existing powers to force it to close down. *doesn't mean monitoring - see #2*
8. Measures should be adopted to ~~check~~ methane gas production as decomposition takes place at landfill sites, and standards for com-

pacting refuse to prescribed densities should be developed to prevent unnecessary consumption of land, rodent infestation and fire hazards.

9. In designing new sanitary landfills, plans for erosion control, revegetation procedures, and plans for the maintenance, upkeep and ultimate reuse of the site should be filed with and approved by DEP, and the operator should be expected to adhere to these plans. Any major changes in the plan should be submitted to the Department for review and approval.
10. Assurance should be required by DEP that landfill operators have adequate cover material available and that it will be used throughout the duration of the landfill operation. Adequacy should be clearly defined in performance standards.
11. Detailed plans for adequate safety measures and rodent, insect, bird, dust, fire, and odor control programs should be included in proposals submitted to DEP for approval and adhered to throughout the duration of the operation.
12. Designs for any new solid waste processing or disposal facility, including but not limited to sanitary landfills, incinerators, compost plants, transfer stations and solid waste salvage and recovery systems, should be reviewed by all bureaus within DEP responsible for environmental quality, including the Bureau of Solid Waste Management, Bureau of Air Pollution Control, Bureau of Geology and the Bureau of Water Pollution Control, to insure that adequate environmental safeguards have been designed into the facility. This review could be concurrent with, but should be in addition to, the environmental impact review suggested in recommendation 3. Upon approval a permit should be issued to construct or prepare the facility for operation. After construction or site preparation, in the case of a landfill, but prior to operation, the Department should inspect the facility to insure that design criteria have been met. Upon a satisfactory finding the Department would then issue a permit to open the facility for solid waste operations. Operating permits could be revoked for noncompliance with environmental standards.
13. Performance standards for the operation of new processing and disposal systems should be developed. For example, transfer stations have been built or are planned in a number of New Jersey municipalities. State standards for the design, construction and operation of these facilities should be adopted, which should include requirements that qualified civil-sanitary engineers design and supervise construction of the facility, that performance bonds be required to ensure proper construction and operation of the facility, and that adequately trained personnel are hired to operate the facility. Further requirements would include the installation

of all-weather access roads, weighing facilities, and adequate unloading facilities; measures to ensure that wastes are confined to operating areas and are not permitted to accumulate so as to cause health and environmental problems; and that adequate operational and maintenance provisions are made to ensure continued operations and avoid complete shutdown of the station. Similar standards should be adopted for rail haul and other processes as they are developed and put into use.

14. In order to ensure proper operation of solid waste processing and disposal facilities, DEP should develop a training and licensing program for all solid waste facility operators.

B. The disposal of hazardous wastes, including pathogenic hospital wastes, chemicals and explosive materials, and sludge disposed of at land-fill sites, requires special consideration. There is a definite need to regulate and control the processing and disposal of these wastes. As a starting point, the following recommendations are made:

1. Based on new legislation declaring that the control and disposal of specifically enumerated hazardous wastes is in the public interest, and granting regulatory authority to DEP, the Department should develop a master list of all potentially hazardous wastes generated anywhere in the State and publish it in the New Jersey Register.
2. All enterprises which generate any of the substances on the DEP hazardous waste list should be required to file a statement with the Department disclosing the nature, composition and amounts of such wastes and should explain in sufficient detail the methods presently used to handle and dispose of these wastes.
3. With this information, DEP should develop appropriate standards and regulations for handling the wastes and to prescribe suitable methods for detoxification, recovery or disposal.

C. Standards and regulations are only as good as the ability to gain compliance with them. Therefore, an enforcement capability must be developed to ensure that all standards are met. In order to develop this enforcement capability the following recommendations are made.

1. Since DEP was established in April, 1970 the role of local health officers in inspecting solid waste operations has not been clarified. Municipal and county health officers, who are aware of local conditions and are in a position to hear citizen complaints concerning inadequate solid waste operations, should be encouraged to play an increasing role in the monitoring of solid waste operations to ensure that State standards are being met. In this regard, the State might delegate to local health officers the responsibility of systematically inspecting solid waste operations. In return for this service, the State would pay the local health

department a fixed amount per inspection. This local inspection would be supplemented by periodic inspections by DEP. The Department should provide periodic training programs for local health officers engaged in the enforcement of environmental standards.

2. Ecological groups, recycling organizations and interested citizens should be informed of State standards through a public information and education program and encouraged to report any operations which do not appear to conform to State standards for enforcement action.
3. DEP should utilize its emergency phone number to receive complaints about inadequate solid waste operations.
4. As inadequately operated solid wastes facilities are identified, DEP should utilize court enforcement powers to compel compliance. In addition, it is recommended that the courts be made available to private citizens either through new legislation or test cases in order that they might bring class action suits against solid waste operations causing environmental pollution.
5. The PUC, in cooperation with DEP, can gain compliance with State environmental standards by revoking the certificate of public convenience and necessity issued to persons engaged in solid waste collection or disposal. The Commission recommends that DEP and the PUC make use of this power in gaining compliance with the State Sanitary Code.
6. In order to increase the ability of the State to enforce its environmental standards, the staffs of DEP and the Attorney General should be increased.

D. In order to ensure the maximum degree of effectiveness and efficiency in solid waste collection and disposal operations, the PUC and DEP should work closely on developing reasonable efficiency standards and should require all contractors to adhere to them to ensure maximum service to the public at the lowest possible cost. The PUC should not only monitor the reasonableness of rate structures based on the rate of return to the contractor, but in cooperation with DEP, should establish reasonable workload standards for manpower and equipment to perform the required task. For example, if long hauls to disposal sites are involved, the PUC should be empowered to require that private contractors use transfer or a continuous vehicle schedule in order to keep manpower and equipment on the job of collection to the greatest extent. This would result in savings in operating costs which would then be passed on to the contracting municipality. Contractors could be penalized with possible loss of their certificates of public convenience for inability to meet the PUC standards.

E. Throughout this report, the Commission has recommended a greater roll for DEP and, in order to implement there recommendations, DEP will require expanded staff capabilities. Moreover, the Department's Solid Waste Management staff must acquire additional expertise to develop the statewide solid waste management process detailed in this report. The Commission recommends the provision of additional funds for this purpose.

In the coming months, the County and Municipal Government Study Commission will develop a series of models for area wide performance of the various subfunctions encompassed in solid waste management and adaptable to various situations within the State. Legislation will then be drafted based on these models and on other findings and recommendations of this report.

WASTE AVOIDANCE

It has been pointed out that per capita generation of domestic solid waste is now on the order of one ton per year, and that this rate is rapidly increasing at about 4 percent annually. Organizing public solid waste management systems to cope more effectively with this large and growing volume is a major concern which has been discussed in preceding chapters of this report. But in addition to dealing with collection, processing, disposal and regulation issues, it is essential to inquire whether there are some means available to our governmental system of arresting and rolling back the trend toward ever increasing waste. Or must we continue to incur ever increasing costs in terms of materials consumed, collection and disposal obligations and environmental damages sustained. The Commission surveyed the present efforts to reduce the generation of waste nationally and in New Jersey. The present condition and trends in this area are summarized below.

Methods and Approaches to Avoid Wastes

The generation of waste can be reduced in two ways: by decreasing the production of materials (such as packaging) that are destined to become wastes; and by designing materials so as to promote recovery, reuse, or longer useful life. Both policies would tend to prevent or defer the transformation of materials into solid waste.

Perhaps, the first requirement, in waste avoidance is developing the capability to reduce waste. Two factors are involved here: technology and attitudes. The former relates to such questions as whether solid waste generation can be reduced, by what means, at what costs, and with what degree of success. The second relates to the question of political and economic feasibility, the desire to make certain value judgments and policy choices, and "the will to act."

There is no question that the amount of waste requiring disposal can be reduced. First, by reducing the production of certain goods, such as disposable packaging—non-returnable bottles and cans and all sorts of paper and plastic packaging—which immediately enter the waste cycle after their initial use. Second, by designing products with longer useful life. Products designed to have a short useful life and to be easier to throw away and replace than to repair, create increased burdens on solid waste systems. Third, by recycling much more of the waste that is presently disposed in a landfill. Before any of the three methods for waste avoidance can have a significant effect on reducing waste loads, people must be convinced that the inconvenience of using reusable and longer lasting products rather than disposable ones and of supporting recycling efforts is worth the savings in disposal costs and the conservation of natural resources. To date a general public commitment towards waste avoidance

has not been made nor is it likely to be, unless attitudes are changed and technology is developed to effectively and economically separate and recycle large amounts of wastes.

One reason why recycling technology may not be farther advanced and more widely used than it is today is the fact that in manufacturing, environmental costs have not been considered to be costs of doing business. It has always been the taxpayer, and not the manufacturer (except inasmuch as the manufacturer also is a taxpayer), who has paid for the costs of solid waste collection, processing and disposal. Only recently has the concept of "environmental accountability" become widely discussed—a concept which suggests that such uncalculated costs as those of lost materials, altered land and pollution should also be factored into the costs of manufacturing. Some of the proposals for economic incentives that are discussed below are based on this concept. The rationale for these measures was recently quoted in the *Congressional Record*:¹

"Environmental considerations must become an important factor at each point of decision in the manufacture, sale, use, and eventual discard of commercial goods. In addition, the complete environmental and economic costs to society represented by commercial products should not be hidden or disguised, but should be accurately reflected in the commercial market price of these goods so that the consumer can exercise an informed choice."

Some additional discussion of recycling technology may be found in Chapter III. As for attitudes, it could be mentioned that during World War II, when scarce resources were needed for the war effort, 35 percent of our paper products were recycled. Today that percentage has dropped to around 20 percent. Ferrous metals, aluminum and other products were also recycled at increased rates during the war years. These patterns of recycling and reuse could again be put into effect if the public so desired.

Alternatives for Waste Avoidance

For any economic activity to take place, a market must first exist; a supply will not be salable unless there is a demand for it. This principle of economics applies to the reuse, recycling and extension of product life just as to any other aspect of goods and services production.

Strong markets already exist for certain types of products. An obvious example is precious metals such as gold and silver; these materials are never discarded. Scrap iron, copper and lead are also in strong demand and large percentages of these materials are reused. Aluminum has a lower reuse demand, although with the advent of bottle and can recycling centers across the nation the value of aluminum containers has risen enough to encourage at least voluntary recycling efforts. Waste glass and scrap paper have a miniscule market, as the cost of making glass and paper products from virgin materials is about the same as for secondary materials. For these materials, the incentive to recycle is far more an environmental than an economic one.

It is claimed by the National Association of Secondary Material Industries that discriminatory economics play a distorting role in the markets for used materials. This association (a trade association of scrap dealers) cites federal tax policies such as depletion allowances and capital-gains treatment of profits, differential railroad and shipping transportation rates and differential local licensing and taxing policies, as factors that favor the virgin materials industries over the recycled materials industries. In addition, it cites public policies such as the Wool Labeling Act that it claims prejudice consumers into thinking that products containing recycled materials are inferior to those containing 100 percent virgin materials.

Essentially three methods can be used to create markets. These are: the use of incentives, the use of constraints, and the changing of attitudes through public information and education.

Incentives for waste avoidance can include: economic rewards (such as lower taxes, cheaper prices), subsidies (such as the establishment of product specifications in purchasing so as to require a minimum content of recycled material in new products ordered), and demonstrated benefits (such as creating better garden soil with homemade compost) that could be achieved by waste avoidance.

Constraints against generation of waste can include: imposition of taxes (such as a per-unit levy against producers of disposable products, with a credit applicable if certain percentages of recycled materials are used) and regulations prohibiting certain practices outright (such as banning the use of non-returnable containers).

Changing of attitudes can involve: education and publicity campaigns (with or without governmental participation) and the demonstration of successful results in reducing the amount of waste entering the disposal cycle.

The place of rigorous and analytical study, supported by well-conceived demonstration, should not be overlooked as part of the strategy of waste avoidance. Too often we have seen adverse secondary and tertiary changes take place in our society as a result of innovations originally considered an unmitigated blessing. It would serve little purpose to "solve" the excessive packaging problem by building paper product recycling plants that pollute the water and the air. The Commission believes, despite the magnitude of the waste and environmental problems, that carefully planned and monitored demonstration projects should precede major shifts in public policy on these matters.

Legislation and Legislative Proposals

At the Federal level, the main statutes affecting solid waste management and avoidance are the *Solid Waste Disposal Act of 1965* and the *Resource Recovery Act of 1970*.

The *Solid Waste Disposal Act* contained two major objectives:

1) "to initiate and accelerate a national research and development program for new and improved methods of proper solid waste disposal . . ." including the recovery and utilization of potential resources in wastes; and 2) "to provide technical and financial assistance" to interstate, state, and local governments in the "planning, development and conduct" of solid waste programs. Grants not to exceed 50% of the total cost of state and interstate planning programs were included in the Act. This legislation contains no provision for aid to local governments towards the construction of solid waste facilities.

The *Resource Recovery Act of 1970* amended the Solid Waste Disposal Act in order "... to provide financial assistance for the construction of solid waste disposal facilities and to improve research programs" designed to provide "... new and improved methods of collection, separation, recovery, and recycling of solid wastes, and the environmentally safe disposal of nonrecoverable residues". The law authorizes grant money to any State, municipal, interstate or intermunicipal agency for the demonstration of new or improved solid waste disposal facilities and requires that the Environmental Protection Agency undertake a study "... for the creation of a system of national disposal sites for the storage and disposal of hazardous wastes, including radioactive toxic chemicals, biological, and other wastes which may endanger public health or welfare." A National Commission on Materials Policy was also created under the Act to enhance environmental quality and conserve natural resources by developing a national materials policy to utilize present resources and technology more efficiently, to anticipate future materials requirements, and to make recommendations on the supply, use, recovery and disposal of materials. However, authorizations under this Act have been followed by very meager appropriations.

Two recent proposals, introduced in the U. S. Congress, have similar goals and provisions regarding waste avoidance.² These bills would provide for imposition of disposal taxes on products to ensure that the cost of getting rid of the products is borne by the product manufacturer (who would pass it on to the product user) rather than by the general public. Products thus taxed, if they continue to be sold, would at least cover the cost of their ultimate disposal. However, they would be at a competitive disadvantage with similar non-disposable, untaxed products, which would then presumably be more attractive to consumers. The revenues generated by the tax receipts would be paid out in grants to assist local governments in constructing solid waste processing and disposal facilities, and to promote research and demonstration of new technologies. In other respects, however, the bills differ; the one is specifically aimed at products used in packaging rather than all products, in the belief that such a system of incentives and constraints should first be tried out on a limited scale; the other bill could cover any product, but the list of products to which the tax would be applicable (and the amount of the tax) would be

proposed by a commission and approved by Congress. The former bill, in addition, would provide for a system of standards and regulations on packaging (covering such things as required minimum percentages of recycled materials, maximum percentages of materials having adverse environmental effects, and certain outright prohibitions) that would be developed after two years of experience with the taxation plan and go into effect in the third year.

In addition, there are proposals to make recycled paper available for the use of the Senate and House of Representatives and to use it in printing the Congressional Record. There is another proposal to levy a penny-a-pound tax on the production of all materials that would require disposal within 10 years of origin, with revenues distributable to communities for waste treatment.

On the State level, at least one State—Vermont—has enacted legislation to tax beverage containers. After July 1, 1973, the tax would be replaced by a bottle deposit system, with bottles redeemable either at retail stores or at collection centers set up by distributors at convenient locations. As of a year ago, proposals for waste avoidance (mostly aimed at curbing one-way bottles and cans, which account for an estimated 10 percent of all solid waste) were under consideration by at least 17 State Legislatures including New Jersey. In the State of Washington, a proposal to place a deposit on soft drink and beer containers was narrowly defeated in a hard-fought referendum in 1970.* A bill (A-2212) to ban the use of non-returnable beverage containers has not been acted on by the New Jersey Legislature, as of this date.

Similar actions have been taken by municipalities, notably Bowie, Maryland, although the effectiveness of such local action in achieving the desired results is questionable, since purchasers can merely buy their products in a neighboring town.

Voluntary Efforts

Most voluntary waste avoidance efforts, other than individual composting of garbage and yard clippings, or the refusal, where possible, to buy or to accept disposable packaging, involve recycling of such materials as bottles, cans and newspapers. Such actions, since they reduce the overall volume of materials requiring public treatment or disposal, can also be considered as waste avoidance. (Recycling as a process within public solid waste management systems is discussed in Chapter III.)

Voluntary recycling programs, although they operate with varying degrees of thoroughness and efficiency, are a recent phenomenon and are gaining rapid favor. A New Jersey Department of Environmental Protection (DEP) survey this year found 114 active recycling programs in the State. All of these were voluntary, although in 30 community programs

* For an account of the referendum see William H. Rodgers, Jr., "Ecology Denied: The Unmaking of a Majority," in *Washington Monthly*, February 1971.

some municipal assistance was given mainly in providing trucks to haul the materials to scrap yards.*

Such programs have yet to make a substantially noticeable impact on the total volume of solid waste generated. A survey reported in the *New York Times* May 7, 1972, observed that only 2 to 3 per cent of the bottles and cans produced in the country were being recycled. Not only is this due to the fragmented nature of such voluntary efforts, the article stated, but also to the dormant state of the markets for recycled materials, caused in part by discriminatory taxes and transportation rates which favor the virgin materials industry. The survey revealed for example that virgin copper is transported at a rate 50 to 60 per cent cheaper than scrap copper and that the cost of transporting waste paper is twice that of shipping newly manufactured paper.

Recommendations

Many of the regulatory and legislative proposals for waste avoidance and recycling discussed above involve policy decisions at the federal level and therefore are beyond the purview of this Commission. However, where applicable it is essential that the federal, state and local governments address themselves to these legislative and administrative strategies for waste avoidance.

The Commission urges that the appropriate State agencies study the possible use of incentives, constraints and the changing of public attitudes to promote waste avoidance and that the Public Utilities Commission should evaluate the impact of discriminatory transportation rates which favor virgin materials over recycled materials as they pertain to waste avoidance. Study findings should be reported to the appropriate agencies, including the U. S. Interstate Commerce Commission, for remedy. *The State and local governments in New Jersey should encourage and assist voluntary recycling efforts by providing technical and financial assistance, information and the donation of manpower, equipment and facilities.*

* The N.J. Department of Environmental Protection has recently awarded a total of \$12,000 in grants to local governments to experiment with recycling programs. The recipients are Hunterdon County, Hightstown-East Windsor, Trenton, Avon-by-the-Sea and Cherry Hill.

FOOTNOTES

THE SOLID WASTE SYSTEM

CHAPTER I

1. Generation data in this report comes from a number of sources including: *New Jersey State Solid Waste Management Plan*, N. J. Department of Environmental Protection, Bureau of Solid Waste Management, (Trenton, 1970); *Restoring the Quality of Our Environment*, Report of the Environmental Pollution Panel, President's Science Advisory Committee (Washington, D. C., 1965); and *Technical-Economic Study of Solid Waste Disposal Needs and Practices*, U. S. Department of Health, Education and Welfare, Bureau of Solid Waste Management (Washington, D. C., 1969). Computations by Commission staff.
2. Data from Division of Local Finance Reports with computations by the Commission staff.
3. *Report on Solid Waste Management in Union County* (Elizabeth, N. J., 1971). Report prepared by M. Disko Associates for the Union County Planning Board.
4. *Sanitary Landfill Facts*, U. S. Department of Health, Education and Welfare, Bureau of Solid Waste Management (Washington, D. C., 1970). Computations by Commission staff.

CHAPTER II

1. Data from Commission survey of municipal solid waste management systems.
2. Data from Division of Local Finance Reports with computations by the Commission Staff.
3. Data from *Mercer County, New Jersey Comprehensive Plan: Solid Waste Disposal Study and Plan*, Day and Zimmerman, Inc. (Trenton, 1971) and *Solid Waste: A Problem in Hunterdon County* (1971) prepared by the Hunterdon County Planning Board. Computations by Commission staff.
4. Equipment costs furnished by manufacturers, computations by Commission staff.
5. Data from *A Study on Refuse Collection in Bergen County 1970* (Hackensack, 1970) prepared by the Bergen County Department of Public Works. Computations and analysis by Commission staff.
6. Interview with Municipal Manager, October, 1970.
7. *Report on Refuse Collection and Disposal for Monmouth Shore Refuse Disposal Committee*, Havens and Emerson Ltd., (March 1970) p. IV-12.
8. The reader is referred to a recent study prepared by Seton Hall University—*A Cost Study of Solid Waste Systems in Selected Communities in New Jersey*, Spring 1972.

CHAPTER III

1. Projections by Commission staff based on average value of \$20.00 per ton.
2. Data from general literature on solid waste management.
3. Data from Commission Questionnaires received from over 450 New Jersey municipalities.

CHAPTER IV

1. Data from a Commission survey.
2. Unpublished data from the N. J. Department of Environmental Protection, Bureau of Solid Waste Management. Computations by Commission staff.
3. *Ibid.*
4. *Ibid.*
5. *Ibid.*
6. *Report on Solid Waste Management in Union County.* Computations by Commission Staff.

CHAPTER V

1. *A Report Relating to the Garbage Industry of New Jersey*, New Jersey State Commission of Investigation (October, 1969), pp. 4-5.

WASTE AVOIDANCE

1. Statement of Senator Gaylord Nelson before the Subcommittee on the Environment, Senate Commerce Committee, on Solid Waste Packaging Legislation March 13, 1972. Reprinted in the *Congressional Record*, March 15, 1972, p. S4044.
2. The two proposals are: Amendment 861 to S. 1377 and H. R. 8151.

