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# A SURVEY of SOLID WASTE MANAGEMENT in DADE COUNTY, Florida

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A SURVEY OF  
SOLID WASTE MANAGEMENT  
IN DADE COUNTY, FLORIDA

Edited by  
JOSE T. VILLATE, PH.D.

DIVISION OF ENVIRONMENTAL TECHNOLOGY AND URBAN SYSTEMS  
SCHOOL OF TECHNOLOGY  
FLORIDA INTERNATIONAL UNIVERSITY

PROJECT COORDINATOR  
KITTY S. ROEDEL

June 1974

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December 10, 1973

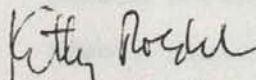
Dr. Jose T. Villate  
Division of Environmental  
Technology and Urban Systems  
School of Technology  
Florida International University  
Miami, Florida 33144

Dear Dr. Villate:

In response to your request of September, 1973,  
for a survey of solid waste management in Dade County,  
Florida, we submit herewith our report.

In addition to the survey of geographical, political  
factors, and existing disposal methods, we have  
included general recommendations for what we consider  
to be the first step in developing an optimum system of  
solid waste disposal.

Sincerely,



Solid Waste Management Class

(by Kitty S. Roedel, Coordinator)

KSR/pe

Encl: "A Survey of Solid Waste Management  
in Dade County, Florida"





A SURVEY OF SOLID WASTE MANAGEMENT  
IN DADE COUNTY, FLORIDA

An Environmental Technology Study

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PREFACE

We addressed ourselves to the solid waste problem as students and as citizens. As students, we realize that the management of the large amount of unwanted items is technically complex and, therefore, our report is more of a survey than an in-depth study of the problem. We gathered information from many sources and placed emphasis on Dade County because this is where we live, work and study, and because of the environmental importance of this county. We used the word MANAGEMENT in the title of our report to emphasize the fact that solid wastes are natural resources which require management and not disposal.

In the process of addressing ourselves to the solid waste problem as citizens, we developed an awareness that each of us is a waste contributor. Therefore, we felt that it was our duty to explore some of the methods of solid waste management, to study some of the alternatives, and to participate in the decision-making process which will lead to the most desirable method of solid waste management.

Our report shows that we have: (1) Determined the need for a solution to the solid waste problem; (2) collected some data; (3) analyzed some of the existing methods of disposal and some of the possible and more desirable management methods; considered the effect of solid waste mismanagement on our air, water, and land; and (4) established the need for a comprehensive approach to the solid waste problem to obtain maximum benefits and to protect our environment and public health.

A STUDY OF SOLID WASTE MANAGEMENT  
IN BADE COUNTY, IOWA

An Environmental Technology Study

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	Robert Taylor

Dr. Joe V. Villain

Although we did not have time to obtain enough data to present a definite proposal, we are submitting some recommendations. It is our hope that our efforts will be useful to other students, and to citizens and public officials, when considering the management of solid wastes in Dade County.

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## I. INTRODUCTION

### A. SOLID WASTE: A NATIONAL PROBLEM

Each year Americans produce greater quantities of solid wastes. Affluence, multiple packaging, built-in obsolescence, and the convenience of disposable consumer items are factors in this production of solid wastes. It has been estimated that the United States generates approximately 3.5 billion tons of total solid wastes every year; these total wastes include domestic, commercial, industrial, agricultural, animal, and mining wastes.

Besides creating solid wastes, the discarding of unwanted items help reduce available natural resources. For example, of the 190 million tons of major metals, paper, glass, rubber, and textiles used in the United States annually, 143 million tons are obtained from virgin resources; the remaining 47 million tons are obtained from recovery operations. These recovered materials are the discards of industrial processing and manufacturing activities, rather than from products discarded into the municipal solid waste stream.

In addition to depleting natural resources, the present methods of handling and disposing of solid wastes often contribute to environmental degradation. According to a national survey of community solid waste practices published in 1968, only six percent of the nation's land disposal sites met accepted minimum



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requirements for a sanitary landfill. Some 14,000 communities relied on open dumps--a majority of which were, by design or by accident, frequently on fire. Some 70 percent of the country's municipal incinerators were judged to have inadequate air or water pollution controls--even in 1968, when standards were substantially more lenient than they are today.

No more than a handful of the municipal incinerators currently in place meet the existing Air Quality New Source Performance Standards of the U.S. Environmental Protection Agency (EPA). In coastal communities, problems center not so much around open dumps or air polluting incinerators as around ocean dumping. The evidence indicates that such communities barge annually close to 50 million tons of solid wastes and sludges out to sea, seldom in treated form.

Active enforcement of water pollution laws is beginning to play a role in improving the environmental aspects of solid waste disposal, but in a more limited way than air pollution actions. For example, only seven large open dumps have been closed under EPA's Harbors and Refuse Act. Hopefully, the trend will increase in areas where dumps are located adjacent to rivers and waterways.

With support from EPA in the form of grants for planning purposes, some states are beginning to give attention to the environmental aspects of solid waste management. Many states have passed, and are in the process of implementing, programs to license land disposal sites and to ensure that applicable air

## 1. INTRODUCTION

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Each year Americans produce greater quantities of solid waste. Appliances, weight packings, built-in appliances, and the convenience of disposable consumer items are factors in this production of solid waste. It has been estimated that the United States generated approximately 3.2 billion tons of total solid waste every year; these total wastes include domestic, commercial, industrial, agricultural, animal, and mining wastes. Besides creating solid waste, the discarding of unwanted items help reduce available natural resources. For example, of the 100 billion tons of major wastes, paper, glass, rubber, and textiles each in the United States annually, 143 million tons are obtained from virgin resources; the remainder 47 million tons are obtained from recovery operations. These recovered materials are the discards of industrial processing and manufacturing activities, rather than from products discarded into the municipal solid waste stream.

In addition to existing natural resources, the present methods of handling and disposing of solid waste often contribute to environmental degradation. According to a national survey of community solid waste practices published in 1955, only six per cent of the nation's land disposal sites met accepted minimum

and water pollution standards and zoning restrictions are met. New incinerators cannot be constructed unless they comply with EPA's new and very tight national air emission standards.

EPA's Office of Solid Waste Management Programs (OSWMP) is developing--and soon will be issuing--guidelines which establish standards that must be adhered to by all federal agencies in the operation of their own land disposal sites and incinerators.

In spite of all this recent progress--much of which has been the by-product of actions aimed, not at solid waste but, at air and water pollution--the principal method of disposing of the nation's solid wastes remains the open dump. Thus, the United States, a world leader in technology, still relies on a primitive system for the disposal of its solid wastes.

Solid waste management is, then, a fundamental issue. It illustrates, perhaps more clearly than any other environmental problem, the need to change many traditional attitudes and habits. It shows very clearly and concretely the need to adjust public and private institutions to solve the problems created by an undesirable and inefficient policy of solid waste disposal which includes environmental damage and the misuse of non-renewable natural resources.

In the past, the low population and the vastness of a country with a seemingly endless supply of natural resources encouraged the easiest method of disposal. The energies of the people were absorbed in converting the natural wealth into an abundance of consumer goods. The best technology and the finest

... for a variety of reasons, based on the...  
... on open lands - a majority of which were... by...  
... accident, frequency of fire... 50 percent of the country's...  
... municipal laboratories were required to have...  
... water collection systems - even in 1958, when standards were...  
... standards were higher than they are today.

... to go to a hospital at the municipal...  
... twenty in place near the existing...  
... standards of the U.S. Environmental Protection Agency...  
... (EPA). In general, municipal...  
... around open areas of air...  
... hanging. The...  
... annually...  
... out to sea...  
... active...  
... play a role in...  
... disposal, and in a...  
... for example, only...  
... EPA's...  
... these in areas...  
... wastewater.

... With support from...  
... proposed...  
... environmental...  
... have passed, and...  
... various land disposal...



management skills were applied at every step in the production, marketing, and distribution of consumer products. Yet, the final step in the process was overlooked, and neither technology nor management was widely applied to the ultimate disposal of the products. Thus, the "closing of the circle" in the chain of production and use was neglected and this carelessness was inherited by subsequent generations.

Public concern for the environment has indicated the need for a new approach to the solid waste problem and a new concept of solid waste management is emerging. It assumes that a workable system for managing the nation's wastes can be devised by making some changes in the social, political, and economic spheres.

Implicit in the changes is the need for:

1. Controlling the quantity and characteristics of the solid wastes.
2. Collecting and processing efficiently these wastes.
3. Recovering and recycling those wastes that can be reused.
4. Disposing properly of those wastes for which there is no further use.

The Environmental Protection Agency, under the Solid Waste Disposal Act of 1965 and its amendment, the Resources Recovery Act of 1970, has been engaged in research, demonstrations, planning, training, and in various technical and financial activities to help achieve changes in the management of solid wastes.

Accordingly, Congress allocated \$260 million to the Environmental Protection Agency's Office of Solid Waste Management Pro-

and water pollution standards and zoning restrictions are met.  
The Department cannot be concerned unless they comply with  
EPA's new and very strict national air emission standards.  
EPA's Office of Solid Waste Management Programs (OSWMP) is  
developing and now will be issuing guidelines which establish  
standards that must be adhered to by all federal agencies in the  
operation of their own land disposal sites and landfills.  
In spite of all this recent progress, much of which has  
been the by-product of action aimed not at solid waste but  
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Solid waste management is, then, a fundamental issue. It  
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It shows very clearly and concretely the need to adjust public  
and private institutions to solve the problems created by an un-  
sustainable and inefficient policy of solid waste disposal which  
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In the past, the low population and the richness of a  
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encouraged the easiest method of disposal. The wastes of the  
people were abundant in converting the natural world into an  
abundance of consumer goods. The best technology and the finest



grams (OSWMP). The present administration, however, indicated that only \$6 million would be spent and the Office of Management and Budget opposed the legislative proposals advanced by the EPA in its report to congress on resource recovery. It should be noted that the present solid waste law expires on July 1974 and that the Senate Commerce Committee will meet to decide what legislative support can be given to solid waste management. (1)

Of great interest to those concerned with the environmental aspects of solid waste management is the issue of, and the need for, resource recovery and recycling. The establishment of thousands of neighborhood recycling centers and redemption depots throughout the country gives ample testimony that citizens and industry alike are beginning to realize that resource recovery is a basic and desirable course of action.

The principal obstacles to resource recovery are economic and institutional--not technological. It is imperative that the Federal Government support solid waste management by giving assistance to the recycling industry; i.e., the secondary materials industry. The Federal Government must give the secondary materials industry the same treatment on such matters as tax law, transportation rates, procurement policies, zoning regulations, and licensing policies, as are given to the virgin and primary industries.

However, success in improving solid waste management is dependent ultimately upon actions that must be taken by all seg-

management skills were applied to every step in the production

process, and distribution of consumer products. For the

first step in the process was overlooked and rather technology

for management was widely applied to the business disposal of the

products. Thus, the "closing of the circle" in the chain of pro-

duction and use was neglected and this wastefulness was inherited

by subsequent generations.

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system for managing the nation's wastes can be devised by taking

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Specific in the manner is the next part

1. Controlled the quantity and characteristics of the

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2. Collecting and processing efficiently these wastes.

3. Researching and testing these wastes that can be recycled.

4. Disposing properly of those wastes for which there is

no further use.

The Environmental Protection Agency, under the Solid Waste

Disposal Act of 1967 and its amendments, the Resource Recovery

Act of 1970, has been engaged in research, demonstration, plan-

ning, training, and in various technical and financial activities

to help achieve changes in the management of solid wastes.

Necessarily, Congress allocated \$170 million to the Environ-

mental Protection Agency's Office of Solid Waste Management for



ments of society and by state and local governments. The general public must recognize the complex nature of the solid waste problem and support the reforms that are necessary. Cities and local units of government must give solid waste management greater attention and place this function on a sound financial basis through application of user charges or some other means to raise equitably the revenues needed. At the same time, rational land use policies must be developed and implemented. Industry must also assume greater responsibility for reducing the impact of its solid waste stream by not "over-packaging" consumer products, by substituting processes with low-waste yields for present intensive-waste processes, by abandoning the principle of "planned obsolescence" and creating more durable products, and by increasing the reuse of secondary materials. (2)





## B. THE SOLID WASTE PROBLEM IN FLORIDA

A solid waste survey conducted in 1968-69 by the State Bureau of Sanitary Engineering, <sup>(3)</sup> with cooperation from the Bureau of Entomology and the Sanitation Section of the State Division of Health, showed that Floridians were generating 5 million tons of solid waste per year. This large quantity of waste was increasing at an annual rate of 4 percent annually; half of the increase (2 percent) is due to increasing population and the other 2 percent to an increase in the generation of solid wastes. Should this growth continue, "a staggering amount" of 22 million tons of refuse would be generated each year. This quantity would cover a road 25 feet wide from Jacksonville to Miami, to a height of 50 feet.

This situation has important consequences for the State of Florida because urban living represented 75 percent of the 1960 population and approximately 85 percent of the population in 1970. Thus, the solid wastes are not generated proportionately over the state's 54,250 square miles, since 180 Florida cities with populations of 2,500 or more, representing 58 percent of the state's population, occupy less than 2 percent of the land area. With the average population density of 2,725 persons per square mile in these cities, the need for collecting and disposing efficiently of the solid wastes generated is obvious.

The survey showed also that there was a lack of interest, planning, organization, reliable data, equipment, personnel, and moneys for the proper collection and disposal of the solid wastes



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lence" and creating more durable products, and by increasing  
the reuse of necessary materials. (2)

in a large percentage of the counties. The 23 largest counties were surveyed in detail by the survey staff while information about the smaller counties was obtained from the county sanitarians.

The State of Florida Department of Pollution Control has full responsibility for the regulation of solid waste practices. The only other agencies which might be involved in specific instances are the Department of Health relating to environmental health problems, and the Bureau of Entomology awarding funds for mosquito control in sanitary landfills.

Responsibilities of the Department of Pollution Control (DPC) were delegated by the 1973 Legislative session. Prior to that time, the Department of Health and Rehabilitative Services had the duties of enforcing Chapter 10D-12 Florida Administrative Code (F.A.C.) "Garbage and Rubbish". Chapter 10D-12 was also transferred by the Legislature to the DPC and is in the process of being revised and renumbered as Chapter 17-7 F.A.C. "Solid Waste Control". Under this chapter, the DPC has authority for surveillance and for approval of local solid waste management plans, including composting and mechanical disposal methods. Enforcement is also initiated by the Department when a disposal method is violating the law. Incineration is regulated under 17-2 F.A.C. "Air Pollution", and the DPC issues construction and operation permits on incinerators in compliance with that law.

At the present time, the total department's solid waste field staff (6 people) is compiling an inventory of all landfill sites in the state. After completion of this inventory, sur-

## II. THE SOLID WASTE PROBLEM IN FLORIDA

A solid waste survey conducted in 1947-48 by the State Bureau of Sanitary Engineering, with cooperation from the Bureau of Entomology and the Sanitation Section of the State Division of Health, showed that Florida's waste problem is a million tons of solid waste per year. This large quantity of waste was increasing at an annual rate of 4 percent annually and the increase is percent in the so-called population and the other 4 percent to 5 percent in the population of solid wastes. Should this trend continue, it is estimated that of 33 million tons of waste would be generated each year. This quantity would cover a solid 20 feet wide from Jacksonville in Miami, to a height of 50 feet.

This situation has important consequences for the State of Florida because urban living represented 55 percent of the 1950 population and approximately 85 percent of the population in 1970. Thus, the solid wastes are not generated proportionately over the state's 54,320 square miles, since 180 Florida cities with populations of 1,000 or more, representing 55 percent of the state's population, generate less than 2 percent of the total waste. With the average population density of 1,325 persons per square mile in these cities, the need for collecting and disposing efficiently of the solid wastes becomes a major problem.

The survey showed also that there was a lack of interest, planning, organization, reliable data, equipment, personnel, and money for the proper collection and disposal of the solid wastes.



veillance and enforcement of those operations will take place to bring these landfills into compliance with Chapter 17-7 F.A.C. Every incinerator in the state either is in compliance with state law or has a compliance schedule which will bring it into compliance prior to the July 1, 1975 deadline set in Chapter 17-2 F.A.C. (3)

The county is formed by 27 municipalities and by the unincorporated area within the county. The governmental structure differs somewhat among the municipalities and the unincorporated area. The collection and disposal of solid wastes in the municipalities and in the unincorporated area is accomplished by municipal agencies, or private contractors, or is the responsibility of each resident. Their sanitation budgets are approved by their governments as part of the total yearly operating budget.

Figure 1 shows the 27 municipalities in Deade County as well as the unincorporated area, and Table 1 presents the forms of government, the total operating budget, the sanitation budget, and the agency responsible for regulation.

in a large percentage of the counties. The 15 largest counties  
were surveyed in detail by the survey staff while information  
about the smaller counties was obtained from the county health  
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only other agencies which might be involved in special matters  
are the Department of Health relating to environmental health  
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control in sanitary landfills.

Responsibilities of the Department of Pollution Control  
(DPC) were delineated by the 1973 legislative session. Prior to  
that time, the Department of Health and Sanitation, Florida  
and the Office of Economic Development 1973-74 Florida Administrative  
Code (F.A.C.) "Garbage and Rubbish", Chapter 100-13 was also  
administered by the Legislature in the DPC and in the process  
of being revised and renumbered as Chapter 17-7 F.A.C. "Solid  
Waste Control". Under this chapter, the DPC has authority for  
enforcement and for approval of local solid waste management  
plans, including composting and mechanical disposal methods.  
Enforcement is also initiated by the Department when a disposal  
method is violating the law. Enforcement is required under  
17-7 F.A.C. "All violations", and the DPC issues citations and  
operation permits or suspensions in compliance with that law.  
At the present time, the local department's solid waste  
plans are being compiled in compliance with a landfill  
study in the state. After completion of this inventory, the

## II. GEOGRAPHICAL AND POLITICAL DATA ON DADE COUNTY

### A. POLITICAL BOUNDARIES AND GOVERNMENT STRUCTURE

Dade County is formed by 27 municipalities and by the unincorporated area within the county. The governmental structure differs somewhat among the municipalities and the unincorporated area. The collection and disposal of solid wastes in the municipalities and in the unincorporated area is accomplished by municipal agencies, or private contractors, or is the responsibility of each resident. Their sanitation budgets are approved by their governments as part of the total yearly operating budget.

Figure 1 shows the 27 municipalities in Dade County as well as the unincorporated area, and Table I presents the forms of government, the total operating budget, the sanitation budget, and the agency responsible for sanitation.



FIGURE 1. INCORPORATED AREAS IN DADE COUNTY, FLORIDA



...and enforcement of these regulations will take place  
...bring these matters into compliance with Chapter 17-7 S.A.C.  
...in the state of Texas is in compliance with  
...will bring it into com-  
...July 1, 1975 deadline set in Chapter 17-7

(1) S.A.C.

BROWARD COUNTY  
DADE COUNTY

GOLDEN BEACH

NORTH MIAMI BEACH

NORTH MIAMI

BAL HARBOUR

SURFSIDE

PENNSUCO

OPA LOCKA

HIALEAH GARDENS

BISCAYNE PARK

BAY HARBOR ISLANDS

INDIAN CREEK VILLAGE

MEDLEY

HIALEAH

MIAMI SHORES

EL PORTAL

NORTH BAY VILLAGE

MIAMI SPRINGS

VIRGINIA GARDENS

MIAMI

MIAMI BEACH

SWEETWATER

WEST MIAMI

CORAL GABLES

SOUTH MIAMI

ISLANDIA

HOMESTEAD

FLORIDA CITY

1. Bay Harbour Village
2. Bay Harbour Islands
3. Biscayne Park
4. Coral Gables
5. El Portal Village
6. Florida City
7. Golden Beach
8. Hialeah
9. Hialeah Gardens
10. Homestead
11. Indian Creek Village
12. Islandia
13. Medley
14. Miami
15. Miami Beach
16. Miami Shores
17. Miami Springs
18. North Bay Village
19. North Miami
20. North Miami Beach
21. Pennsuco
22. Opa Locka
23. Sweetwater
24. South Miami
25. Surfside
26. Virginia Gardens
27. West Miami
28. Dade County

Public Works Dept.  
Sanitation  
Public Works Dept.  
Sanitation Div.  
Refuse Div.  
Sanitation Dept.  
Public Works Dept.  
Sanitation Div.  
Sanitation Dept.  
Public Works Dept.  
Sanitation Div.  
Dade County  
Public Works Dept.  
Sanitation Div.  
Sanitation Dept.  
Private Water  
Water Dept.

FIGURE 1. INCORPORATED AREAS IN DADE COUNTY, FLORIDA

11. ORGANIZATIONAL AND POLITICAL DATA ON GAGE COUNTY

A. POLITICAL BOUNDARIES AND GOVERNMENT STRUCTURE

Gage County is formed by 37 municipalities and by the unincorporated area within the county. The governmental structure differs somewhat among the municipalities and the unincorporated area. The collection and disposal of solid waste in the municipalities and in the unincorporated area is accomplished by municipal agencies, or private contractors, or is the responsibility of each resident. Their sanitation budgets are approved by their governments as part of the total yearly operating budget. Figure 1 shows the 37 municipalities in Gage County as well as the unincorporated area, and Table 1 presents the form of government, the total operating budget, the sanitation budget, and the agency responsible for sanitation.



TABLE I

## FORM OF GOVERNMENT FOR MUNICIPALITIES

IN DADE COUNTY: 1973-1974 (4)

<u>DADE COUNTY GOVERNMENT AND MUNICIPALITIES</u>	<u>FORM OF GOVERNMENT</u>	<u>SANITATION RESPONSIBILITIES</u>
1. Bay Harbour Village	3	Sanitation Dept.
2. Bay Harbour Islands	3	" "
3. Biscayne Park	3	Public Works Dept.
4. Coral Gables	3	Sanitation Dept.
5. El Portal Village	3	Private Contractor
6. Florida City	4	Sanitation Dept.
7. Golden Beach	1	" "
8. Hialeah	3	" "
9. Hialeah Gardens	3	Councilman
10. Homestead	3	Sanitation Dept.
11. Indian Creek Village	3	" "
12. Islandia	4	Private Contractor
13. Medley	4	Residents
14. Miami	1	Sanitation Dept.
15. Miami Beach	1	Public Works Dept., Refuse Div.
16. Miami Shores	3	Sanitation Dept.
17. Miami Springs	3	Public Works Dept., Sanitation Div.
18. North Bay Village	3	Sanitation Dept.
19. North Miami	3	" "
20. North Miami Beach	3	Public Works Dept.
21. Pennsuo	4	Residents
22. Opa Locka	3	Public Works Dept., Sanitation Div.
23. Sweetwater	4	Dade County
24. South Miami	3	Public Works Dept., Sanitation Div.
25. Surfside	3	Sanitation Dept.
26. Virginia Gardens	4	Private Contractor
27. West Miami	3	Waste Dept.
28. Dade County	1	Waste Dept.

Form of Government

1. Mayor, Commission, Manager
2. Mayor, Commission
3. Mayor, Council, Manager
4. Mayor, Council





## B. POPULATION AND GROWTH RATES

Very few metropolitan areas have experienced a population increase as did Dade County during the last decade. Many reasons have been presented to explain this population increase and the growth rates. This presentation, however, will attempt only to give a concise summary of the demographical phenomenon.

According to the 1960 census, the population of the United States increased by 13 percent bringing the total to 203 million. The 1970 census showed a further increase of 24 million. This growth was not evenly distributed--the metropolitan areas showed a greater growth rate than the nation as a whole. And some urban areas increased their populations at a much greater rate than others. Dade County was one of them; from 1960 to 1970 it almost tripled the national average by increasing its population by 35.6 percent. In fact, Dade County "absorbed over 18 percent of the total growth of the state of Florida, which showed a 37 percent increase during this decade."<sup>(5)</sup> Dade County is considered one of the fastest growing urban areas in the country.

Table II shows the population change inside and outside the central city; both natural increase and net migration were higher outside the central city.

Table III presents the annual changes in population from March 1950 to March 1972. It should be noted that the population increase between 1950 and 1960 was 439,000; that between 1960 and 1970 was 332,800 persons. The total for the 20-year



TABLE 4

FORM OF COMPENSATION FOR MUNICIPALITIES  
IN DALLAS COUNTY, 1971-1974 (4)

FORM OF COMPENSATION	NUMBER OF MUNICIPALITIES	PERCENTAGE OF MUNICIPALITIES
1. Mayor, Commission, Mayor	1	3.3
2. Mayor, Commission	2	6.7
3. Mayor, Council, Mayor	3	10.0
4. Mayor, Council	4	13.3
5. Mayor, Council, Mayor	5	16.7
6. Mayor, Council	6	20.0
7. Mayor, Council, Mayor	7	23.3
8. Mayor, Council	8	26.7
9. Mayor, Council, Mayor	9	30.0
10. Mayor, Council	10	33.3
11. Mayor, Council, Mayor	11	36.7
12. Mayor, Council	12	40.0
13. Mayor, Council, Mayor	13	43.3
14. Mayor, Council	14	46.7
15. Mayor, Council, Mayor	15	50.0
16. Mayor, Council	16	53.3
17. Mayor, Council, Mayor	17	56.7
18. Mayor, Council	18	60.0
19. Mayor, Council, Mayor	19	63.3
20. Mayor, Council	20	66.7
21. Mayor, Council, Mayor	21	70.0
22. Mayor, Council	22	73.3
23. Mayor, Council, Mayor	23	76.7
24. Mayor, Council	24	80.0
25. Mayor, Council, Mayor	25	83.3
26. Mayor, Council	26	86.7
27. Mayor, Council, Mayor	27	90.0
28. Mayor, Council	28	93.3
29. Mayor, Council, Mayor	29	96.7
30. Mayor, Council	30	100.0

Form of Government

1. Mayor, Commission, Mayor
2. Mayor, Commission
3. Mayor, Council, Mayor
4. Mayor, Council

period, 772,700 persons, represents more than half of the present population, estimated at approximately 1,300,000. It is estimated that about 70 percent of the net migrants in the period 1960-1970 were Cuban refugees who now comprise a total of roughly 500,000.

TABLE III

POPULATION CHANGE TABLE CENTRAL CITY AND OUTSIDE CENTRAL CITY  
(Source: 1970 and 1960 Census, Hispanic Department)

	1970 Population	Change From 1960	Components of		
			Natural Increase	Net Migration	Net Loss
DeDe County	1,267,792	322,745	75,437	252,308	2
Inside Central City	334,359	43,171	19,465	23,706	0
Outside Central City	932,933	279,574	56,072	230,506	2

### 3. POPULATION AND GROWTH RATE

Very few metropolitan areas have experienced a population increase as did Bada County during the last decade. Many reasons have been presented to explain this population increase and the growth rate. This presentation, however, will attempt only to give a concise survey of the demographic conditions.

According to the 1950 census, the population of the United States increased by 17 percent during the total of 20 million. The 1950 census showed a further increase of 24 million. This growth was not evenly distributed--the metropolitan areas showed a greater growth rate than the nation as a whole. And some

of these areas increased their population at a much greater rate than others. Bada County was one of them: from 1940 to 1950 it increased the national average by increasing its population by 15.6 percent. In fact, Bada County "exceeded over 12 percent of the total growth of the state of Florida, which showed a 17

percent increase during this decade." Bada County is considered one of the fastest growing urban areas in the country. Table II shows the population change inside and outside the central city; both natural increase and net migration were higher outside the central city.

Table III presents the annual change in population from March 1950 to March 1952. It should be noted that the population increase between 1950 and 1952 was 139,000; that between 1950 and 1952 was 212,500 persons. The total for the 10-year



TABLE II

POPULATION CHANGE INSIDE CENTRAL CITY AND OUTSIDE CENTRAL CITY  
 (Source: Metro Dade County Planning Department) (6)

	1970 Population	Change From 1960	Components of Change			
			Natural Increase	Net Migration	Percent Natural Increase	Percent Net Migration
Dade County	1,267,792	332,745	78,437	254,308	8.4	27.2
Inside Central City	334,859	43,171	19,459	23,712	6.7	8.1
Outside Central City	932,933	289,574	58,978	230,596	9.2	35.8

period, 772,500 persons, is about one-half of the present  
 population, estimated at approximately 1,100,000. It is esti-  
 mated that about 75 percent of the net increase in the period  
 1950-1970 were those persons who now comprise a total of roughly  
 500,000.

TABLE III

## COMPONENTS OF POPULATION CHANGE IN DADE COUNTY: 1960-1972

(Source: Metro Dade County Planning Department) (6)

Year Ending March 31	Natural Increase		Net Migration	Total Increase
	Amount	Per 1,000		
1950				
1951	6,700	13.0	37,000	43,700
1952	7,200	12.9	28,600	35,800
1953	7,700	12.9	39,200	46,900
1954	8,300	13.0	35,500	43,800
1955	9,000	13.0	35,500	44,500
1956	10,000	13.6	41,500	51,500
1957	11,000	13.9	48,100	59,100
1958	11,400	13.6	36,800	48,200
1959	11,300	12.7	22,600	33,900
1960	11,200	12.2	21,400	32,500
Totals	93,800		346,200	439,900
1961	11,200	11.8	29,600	40,800
1962	10,700	10.6	45,700	56,400
1963	9,941	9.5	22,900	32,800
1964	9,070	8.5	5,900	15,000
1965	8,139	7.5	9,100	17,200
1966	6,826	6.1	19,700	26,500
1967	6,141	5.4	26,000	32,100
1968	5,168	4.4	28,600	33,800
1969	5,447	4.5	30,500	35,900
1970	5,197	4.2	37,100	42,300
Totals	77,829		255,100	332,800
1971	6,700	5.2	40,900	47,600
1972	5,481	4.1	46,700	52,200



Description	Quantity	Unit	Value	Material	Quantity	Unit	Value	Classification of Work	
								Material	Quantity
Excavation	1000	cubic yds	1000	Excavation	1000	cubic yds	1000	Excavation	1000
Foundation	500	sq ft	500	Foundation	500	sq ft	500	Foundation	500
Roof	200	sq ft	200	Roof	200	sq ft	200	Roof	200
Interior	100	sq ft	100	Interior	100	sq ft	100	Interior	100
Exterior	50	sq ft	50	Exterior	50	sq ft	50	Exterior	50

Notes: All work to be done in accordance with the specifications and drawings.

### C. PHYSICAL GEOGRAPHY

"South Florida" is a strip of land 140 miles long in a north-south direction and with an east-west width of 120 miles. It includes the area south of Palm Beach County and that of Dade County, but not the Florida Keys.

The present Florida mainland is the top of a vast submarine plateau; its southeastern and southern edges are near the present shoreline but its western edge is many miles to the west. South Florida has large flat areas and an average elevation of less than 20 feet; the elevations of the East Coast average 10 feet higher than those along the West Coast. The mainland flora is divided mainly into pineland and swamp. The pineland includes the hammocks, isolated patches of hardwood trees of several genera, and the grassy tracts or prairies; the swampland includes the coastal swamps with their characteristic mangroves. (7)

Topographically, South Florida consists of dunes, rolling sand plains, rock ridges, and flat lands. The dunes, found most often near the coast, are composed of medium-fine quartz sand, varying in tint from pale yellow to orange or light reddish brown. The rolling sand plains are sandy stretches which undulate in broad swales and low ridges. In the swales are shallow lakes or lagoons, wet prairies, or cypress swamps. Along the East Coast, the sand plains form a belt which extends southward from the north side of Palm Beach County to the Miami

Projections indicate that within the next decade municipal utility services must be made available to almost 1.8 million potential residents. And by the year 1970, the population of Lake County is expected to be 2.7 million people.

Another factor which merits consideration because of its impact on total water in the regional increase in population, it is estimated that at the peak of the tourist season, there are 750,000 tourists and seasonal residents who require and use municipal services.

Economy. The largest employers in the county are tourism-based organizations, including hotels and restaurants since Lake County is a major vacation resort. Yearly equivalent tourist population, that is, the number of tourists produced over a year, is considered to be about 10 percent of the permanent residents. The county has only a light manufacturing industry. There is a highly productive agricultural area south of Miami which produces a variety of crops during the entire year.

Industry has a further important economic asset as a recreational area, as well as a recreation area.



River. Rock ridges are not abundant in South Florida and those present may not rise more than two feet above the level of the surrounding land; it is probable that nowhere do the rock ridges exceed 25 feet above sea level. On the East Coast, rock ridges of oolite limestone extend from five miles north of Miami to Homestead and separate the sawgrass swamp of the Everglades from the fringe of mangrove swamps and salt prairie on the western shores of Biscayne Bay. The name flat lands is applied to the pinelands which lie between the rolling sand plains and the Everglades. The flat lands form a discontinuous strip which extends from Palm Beach County to the New River, in Dade County. The swamp land of South Florida includes the sawgrass glades of the Everglades, the cypress swamps, the salt meadows, and the mangrove swamps. (7)

Area. Dade County is the largest county in Florida, with an area of 2,054 square miles of which 1,023 square miles is under federal-state control and 1,031 square miles is privately owned. (8) Less than 200 square miles of land is under development and another 650 square miles is readily developable. (5) The majority of development is on the Atlantic Coast Ridge. A great portion of the remainder of the county, south and west of the Atlantic Coast Ridge, consists of the Everglades. Most of the Everglades National Park is located in Dade County.

Geology of Dade County. The name "Miami oolite" is applied to all the oolite limestone of South Florida. The typical Miami oolite is soft white and contains as much as 95 percent calcium

## PHYSICAL GEOGRAPHY

"South Florida" is a strip of land 140 miles long in a north-south direction and with an east-west width of 125 miles. It includes the area south of Palm Beach County and that of Dade County, but not the Florida Keys.

The present Florida peninsula is the top of a vast submarine platform, its configuration and contour being the result of the present erosion but its western edge is very high to the west. South Florida has large flat areas and an average elevation of less than 20 feet; the elevations of the East Coast average 10 feet higher than those along the West Coast. The peninsula is divided mainly into pinelands and swamps. The pinelands include the hammocks, scattered patches of hardwood forest of several genera, and the grassy tracts or prairies; the swamps land includes the coastal swamps with their characteristic mangroves.

Topographically, South Florida consists of broad, rolling sand plains, rock ridges, and flat lands. The dunes, found near the coast, are composed of medium-sized quartz sand, varying in color from pale yellow to orange or light reddish brown. The rolling sand plains are sandy stretches which are dotted in broad swales and low ridges. In the swales are shallow lakes or lagoons, wet meadows, or cypress swamps.

Along the East Coast, the sand plains form a belt which extends southward from the north end of Palm Beach County to the Miami



carbonate; it contains marine shells indicating its marine origin. Miami oolite underlies all of Dade County except a part of the Everglades. At many places, percolating waters have dissolved the calcium carbonate and redeposited it elsewhere, thus destroying the oolitic appearance of the rock and/or making it vesicular. (9)

Soils of Dade County. The soils of Dade County were derived from marine deposits formed when the sea covered this region, and from recent deposits of organic materials and marl. The soils exhibit many shades of color, from whitish through gray, yellow, and brown, to nearly black. The texture ranges from fine sands to silt loams and clay loams. (10)

Climate. The climate of Dade County is characterized by warm temperatures, ample rainfall and light winds. Mean annual temperature is about 75°F with a daily average of about 82°F for summer and 67°F for winter. (11)

The average annual rainfall for Dade County is about 59 inches. (12) However, during hurricanes rainfall rates may be as high as 10 inches or more in 24 hours resulting in above-average yearly rainfall and short-term flooding. On the other hand, deficiencies of up to 30.6 inches per year below average have also occurred. (11)

On a yearly basis, wind speed averages about 9.3 mph. However, hurricanes offer an extreme condition where winds may exceed 100 mph. Special studies in the Miami area have shown the evapotranspiration rate to be about 35 inches per year. (11)





## D. HYDROGEOLOGY

Miami and surrounding municipalities is one of the few large cities in the world that is located on land only a few feet above sea level.<sup>(13)</sup> Dade County sits at the downstream end of a vast watershed covering the South Florida area. Lake Okeechobee, which receives fresh water from the Kissimmee River to its north, overflows in a vast sheet of water that flows southward through the Big Cypress Swamp and the Everglades. The water that reaches the Everglades plus the high yearly rainfall of almost 60 inches in Dade County recharges our large underground reservoir known as the Biscayne Aquifer.<sup>(14)</sup> (See Figure 2)

This aquifer is less than ten feet thick along the western edge of the county and expands to 80 and to 150 feet thick along Biscayne Bay. Large quantities of water can easily be drawn from it by pumping because it is a highly permeable limestone and sandstone aquifer. Lateral inflow from canals and the recharge by rainwater infiltration are generally unrestricted.<sup>(15)</sup> The levels of ground and surface waters of the county tend to be closely related because of their interconnection due to the high permeability of the aquifer. Surface water outflow, evapotranspiration, seepage to the ocean and pumping from the aquifer lower the water table while local rainfall and surface-water inflow raise it.<sup>(14)</sup> (See Figure 3)





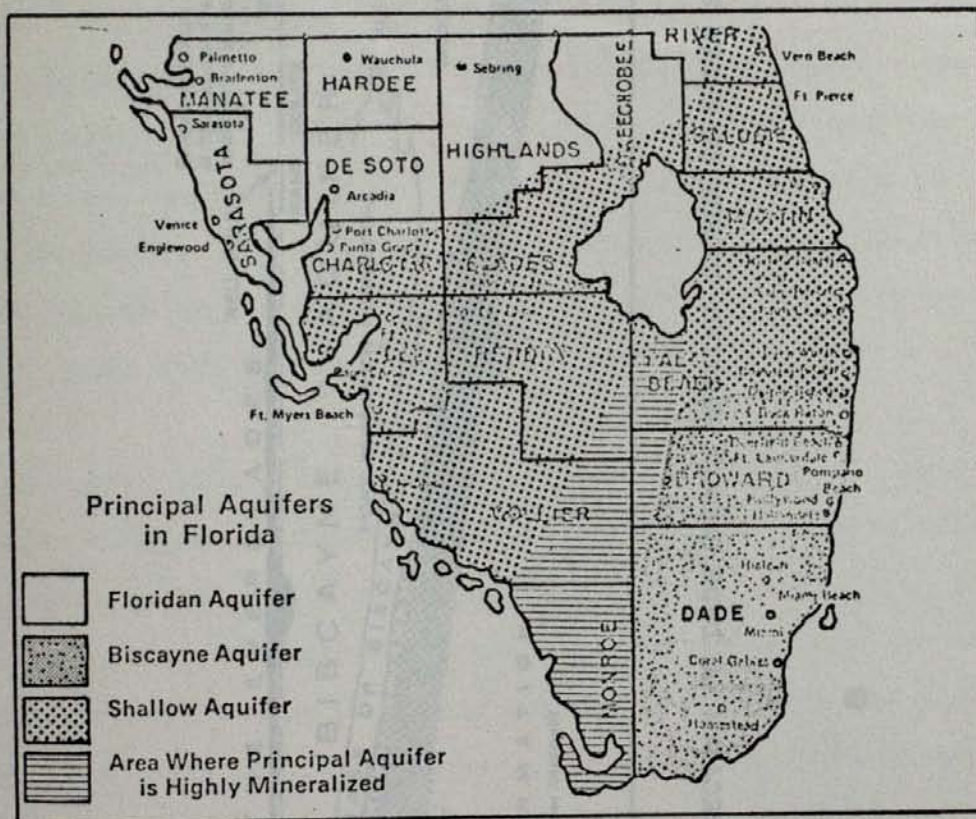


FIGURE 2. LOCATION OF AQUIFERS IN SOUTHERN FLORIDA (15)

HYDROGEOLOGY

Miami and surrounding municipalities is one of the largest  
 cities in the world that is located on land only a few feet above  
 sea level. (1) The Dade County area at the downtown end of a vast  
 marshland covering the South Florida coast, with unobstructed  
 which receives fresh water from the Kissimmee River to the north.  
 In addition to a vast sheet of water that flows southward through  
 the Big Cypress Swamp and the Everglades. The water that reaches  
 the Everglades has the high yearly rainfall of almost 60 inches  
 in Dade County recharged our large underground reservoir known  
 as the Biscayne Aquifer. (2) (See Figure 1)  
 This aquifer is less than ten feet thick along the western  
 edge of the county and expands to 20 and 150 feet thick along  
 Biscayne Bay. Large quantities of water can easily be drawn  
 from it by pumping because it is a highly permeable limestone and  
 sandstone aquifer. Lateral flow occurs and the resulting  
 by seawater infiltration are generally unobstructed. (3) The  
 levels of ground and surface waters of the county tend to be  
 closely related because of their interconnection due to the high  
 permeability of the aquifer. Surface water drains, evapo-  
 transpiration, seeps to the ocean and percolates from the aquifer  
 lower the water table while local rainfall and surface-water  
 inflow raise it. (4) (See Figure 2)

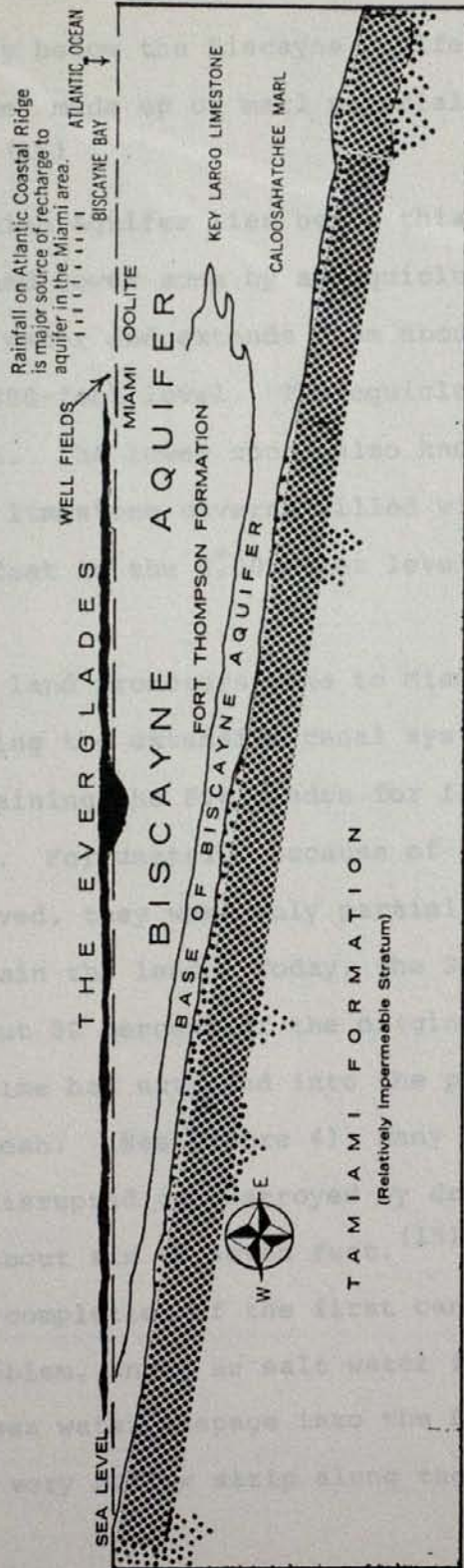


FIGURE 3. GEOLOGIC CROSS SECTION OF DADE COUNTY SHOWING SOURCE OF WATER SUPPLY (13)



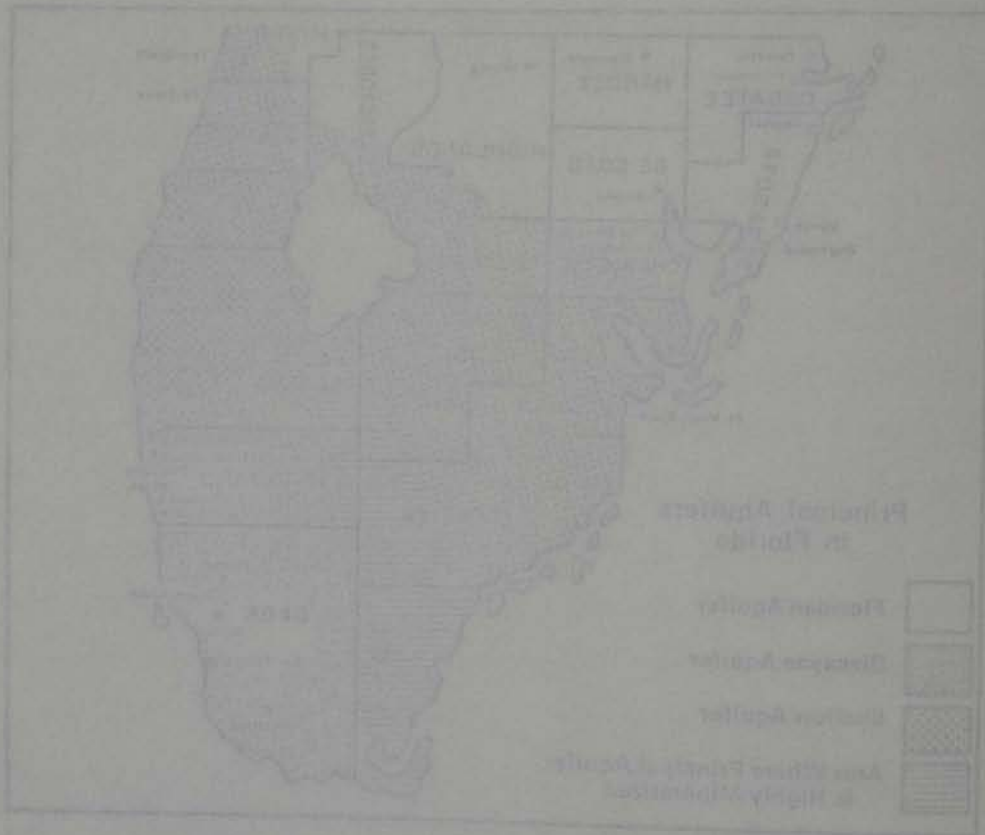


FIGURE 2. LOCATION OF SOCIETIES IN SOUTHERN FLORIDA (17)

Immediately below the Biscayne Aquifer is an impermeable layer (aquiclude) made up of marl material and approximately 800 feet thick. <sup>(16)</sup>

The Floridian Aquifer lies below this layer and is divided into an upper and lower zone by an aquiclude. The upper zone contains fresh water and extends from about the 900-foot level to about the 1800-foot level. The aquiclude then extends to the 2550-foot level. The lower zone, also known as the Boulder Zone, contains large limestone caverns filled with salt water extending from 2550 feet to the 4,000-foot level. <sup>(16)</sup>

The early land promoters came to Miami in the early 1900s and began digging the extensive canal system that we have today in hopes of draining the Everglades for farming in the rich muck and peat soils. Fortunately, because of the tremendous amount of water involved, they were only partially successful in their attempts to drain the land. Today, the South Florida wetlands cover only about 50 percent of the original Everglades Basin which at one time had extended into the present cities of West Miami and Hialeah. (See Figure 4) Many natural ecological systems were disrupted or destroyed by drastically lowering the water levels about six to seven feet. <sup>(15)</sup> (See Figure 5)

With the completion of the first canals in Dade County an unforeseen problem, known as salt water intrusion, began. Prior to this, the sea water seepage into the Biscayne Aquifer had been confined to a very narrow strip along the coast and along the





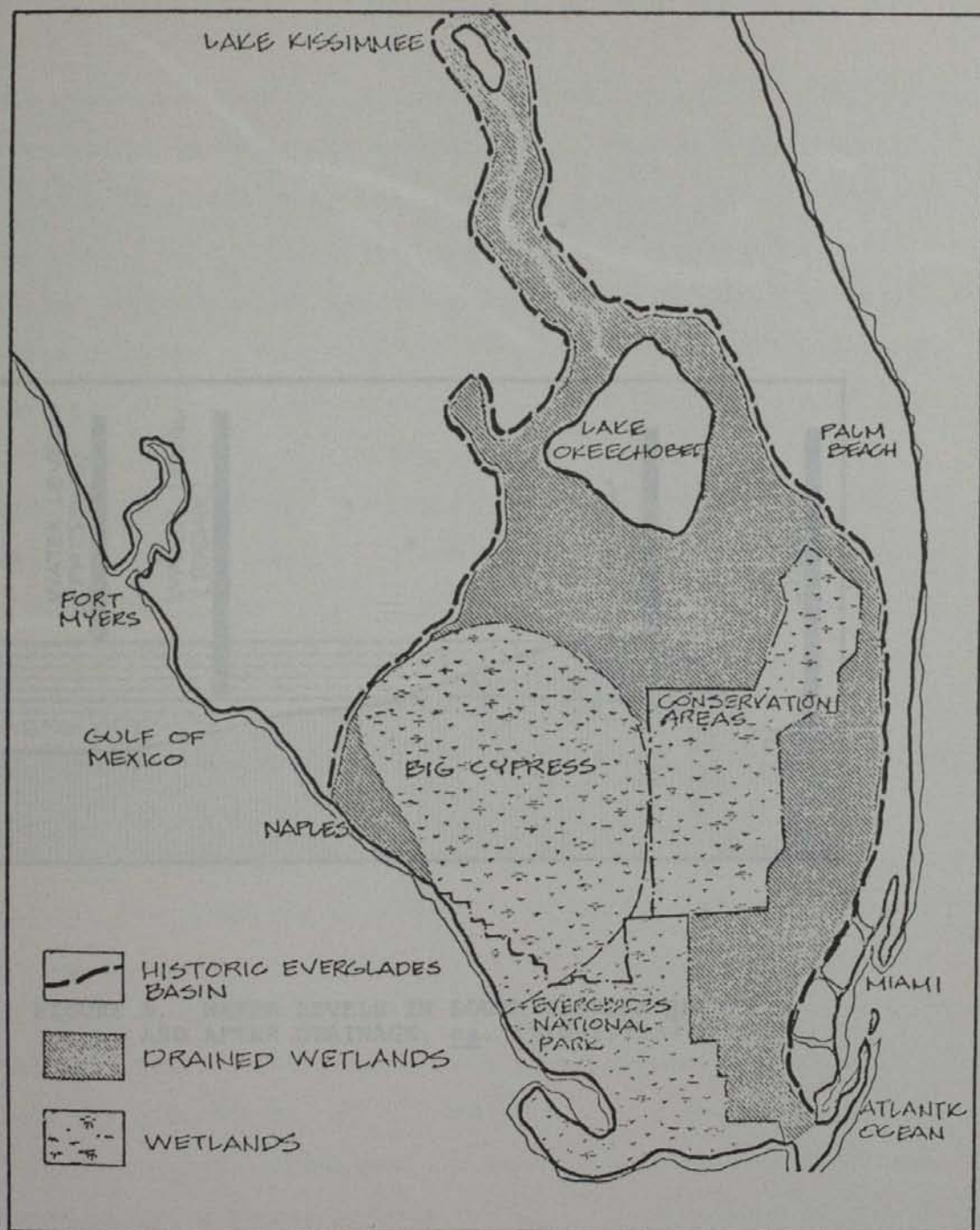


FIGURE 4. PAST AND PRESENT WETLANDS IN SOUTHERN FLORIDA SHOWING THAT THE EVERGLADES TODAY ENCOMPASS AN AREA ABOUT ONE-HALF ITS ORIGINAL SIZE (15)

Immediately below the ... is an ... layer (approximately) made up of ... and approximately 800 feet thick. (16)

The ... is divided into an upper and lower ... The upper zone contains fresh water and extends ... (800-foot level) to above the 1000-foot level. The ... also extends to the 1500-foot level. The lower zone, ... contains large ... with ... from 1500 feet to the 1000-foot level. (17)

The early lead ... and began digging the ... in hopes of draining the ... and best soils. ... of water involved, they were only partially successful in their attempts to drain the land. ... cover only about 25 percent of the ... which at one time had ... (18) (See Figure 2)

With the completion of the ... unless practical, ... to this, the ... equipped in a way ...



natural river banks for a short distance inland.<sup>(13)</sup> The general lowering of water levels throughout the region significantly reduced the fresh water head pressure pushing against the sea. The canals also allowed salt water to move greater distances inland, especially during dry periods when little or no fresh water flow was occurring. The salt water then readily seeped through the porous limestone to the fresh water aquifer.<sup>(15)</sup>

Upon completion of the Miami Canal in 1913 the early settlers found their fresh water wells turning salty as the intrusion pushed inland. The city was forced to abandon their downtown wells and move their water treatment facility all the way out to the Hialeah-Miami Springs area for good well water. Even these well fields were threatened in the late 1930s and 1940s until a permanent salinity dam was built across the river at NW 36 Street.

Salt water intrusion in the county continued to move further inland until the construction of permanent salinity dams on all major canals in the 1950s by the Central and Southern Florida Flood Control Project. After these barriers were built the salt front slowly retreated a short distance and remains relatively stationary at the present time. (See Figure 6)

Salt water intrusion still remains a major threat to our fresh water resources in Dade County.<sup>(14)</sup> A minimum of a two and one-half foot ground water surface (fresh water head) above sea level is necessary to prevent sea water movement inland in Dade County.<sup>(15)</sup> During some drought periods and in years



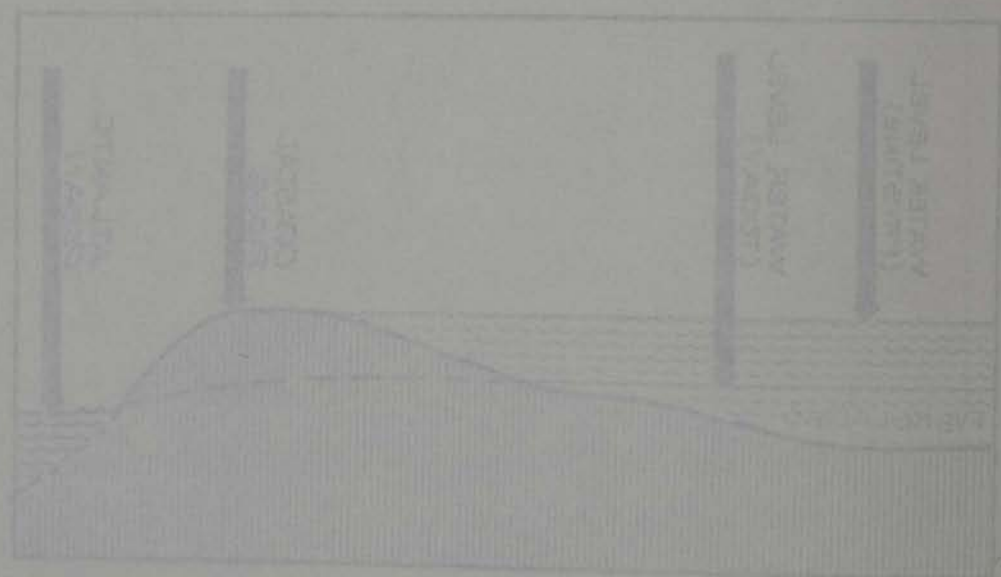


FIGURE 2. WATER LEVELS IN SOUTH PASSAGE, FEB. 1910-1911/12

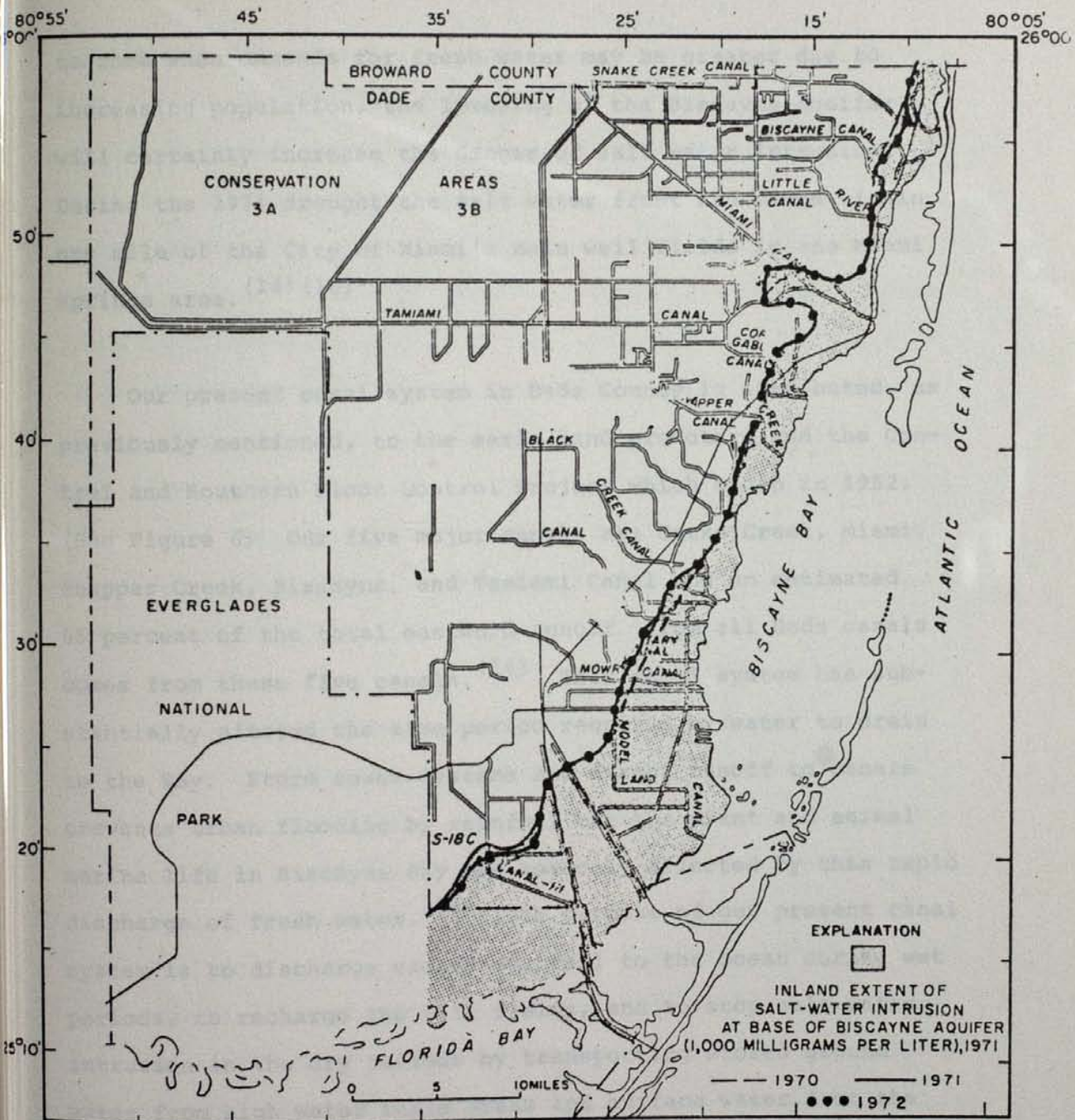


FIGURE 6. INLAND EXTENT OF SALT WATER INTRUSION, 1970, 1971, AND 1972 CALENDAR YEARS (14)

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to come when demands for fresh water may be greater due to increasing population, the lowering of the Biscayne Aquifer will certainly increase the danger of salt water intrusion. During the 1971 drought the salt water front had moved within one mile of the City of Miami's main well fields in the Miami Springs area. (14) (16)

Our present canal system in Dade County is attributed, as previously mentioned, to the early land promoters and the Central and Southern Flood Control Project which began in 1952. (See Figure 6) Our five major canals are Snake Creek, Miami, Snapper Creek, Biscayne, and Tamiami Canal and an estimated 65 percent of the total eastward runoff from all Dade canals comes from these five canals. (14) This canal system has substantially altered the time period required by water to drain to the Bay. Storm sewer systems and direct runoff to canals prevents urban flooding by rainfall but the plant and animal marine life in Biscayne Bay are severely affected by this rapid discharge of fresh water. (15) The purpose of our present canal system is to discharge excess rainfall to the ocean during wet periods, to recharge the well fields, and to stop salt water intrusion in the dry periods by transporting stored ground water from high water table areas and surface water from the conservation areas to the coastal ridge. (14)

Unfortunately, the rapid draining of our urban areas by canals prevents valuable percolation of clean rainwater into





the ground for aquifer recharge. Canal water thus becomes a prime source of well field recharge.<sup>(15)</sup> However, all sorts of contamination from a variety of sources degrade the quality of our canal water; these include pesticides and fertilizer runoff from agricultural and residential areas, occasional sub-standard sewage treatment plant effluents, raw sewage discharge from boats and a variety of illegal discharges to our waterways. A recent study funded by the Environmental Protection Agency shows that street and road runoff to waterways by way of storm sewers can pollute as much as municipal sewage. Oil, asbestos from brake linings, nitrogen and phosphorus compounds, rubber from tires, lead from gasoline and zinc from oil, all run into the waterways.

The hydrologic cycle fluctuates in Dade County with the distinct wet and dry seasons that occur here. Most rainfall occurs in the summer month period from May to October and the dry season accounts for the rest of the year. Of the sixty inches of average rainfall per year about eighty percent is lost by transpiration from plants and evaporation.<sup>(15)</sup>

The Biscayne Aquifer is our chief source of ground water and the water table levels change with the wet and dry seasons. Underground, the water is constantly moving horizontally because it is not at the same levels everywhere. It flows a few feet a day here in its attempt to seek its own level. Ground water levels are commonly shown by contour lines on a map in-



of some when demands for fresh water may be greater due to  
increased population. The lowering of the nitrogen level  
will certainly increase the amount of salt water intrusion.  
During the 1971 drought the salt water level had moved within  
one mile of the City of Miami's main well fields in the Miami  
Springs area. (14) (15)

The present canal system in Dade County is attributed, as  
previously mentioned, to the early land grantors and the Gov-  
ernment and Southern Flood Control Project which began in 1937.  
(See Figure 4) Our five major canals are Snake Creek, Miami,  
Sawyer Creek, Biscayne, and Tamiami Canal and an estimated  
85 percent of the total saltwater runoff from all Dade canals  
comes from these five canals. (16) This canal system has not  
essentially altered the time period required by water to drain  
to the Bay. Storm sewer systems and direct runoff to canals  
prevents urban flooding by canals but the drain and animal  
waste life in Biscayne Bay are severely affected by this rapid  
discharge of trash water. (17) The purpose of the present canal  
system is to discharge excess rainfall as the ocean during wet  
periods, to recharge the well fields, and to stop salt water  
intrusion in the Bay period by temporarily stored ground-  
water from high water table areas and surface water from the  
conservation areas in the coastal ridge. (18)

Unfortunately, the rapid draining of our urban areas by  
canals prevents valuable preservation of our urban areas into

dicating feet above sea level. (See Figure 7) Direction of flow is perpendicular to the contour lines and the closer the lines the more rapid the water movement. Differences between the average yearly high and low ground water levels are significant. (See Figure 8) Contours tend to be distorted from their natural pattern in areas where well fields are located.<sup>(15)</sup> The Miami well fields in the Hialeah area and the southwest section clearly demonstrate this. (See Figures 7 and 9)

Contamination of the Biscayne Aquifer from the leaching of our present dump sites in Dade County is one of the problems we face with our present solid waste system. These disposal sites fall far short of the criteria of a sanitary landfill and are simply dumps. The Main County Dump at 8831 NW 58 Street is due west of the main well fields in the Hialeah-Miami Springs area (see Figure 9) and groundwater flow from the dump is east toward the well fields.

The U.S. Geological Survey is currently conducting a study of groundwater contamination by leachates at the Main County Dump. Six test wells have been dug in the following locations at the site:

1. Middle of the existing dump.
2. Five hundred feet west of existing dump.
3. One mile west of the existing dump.
4. Middle of the old fill site (east of existing dump).
5. Five hundred feet east of the old dump.
6. One-half mile east of the dump.

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 being source of soil water (15) However, and water  
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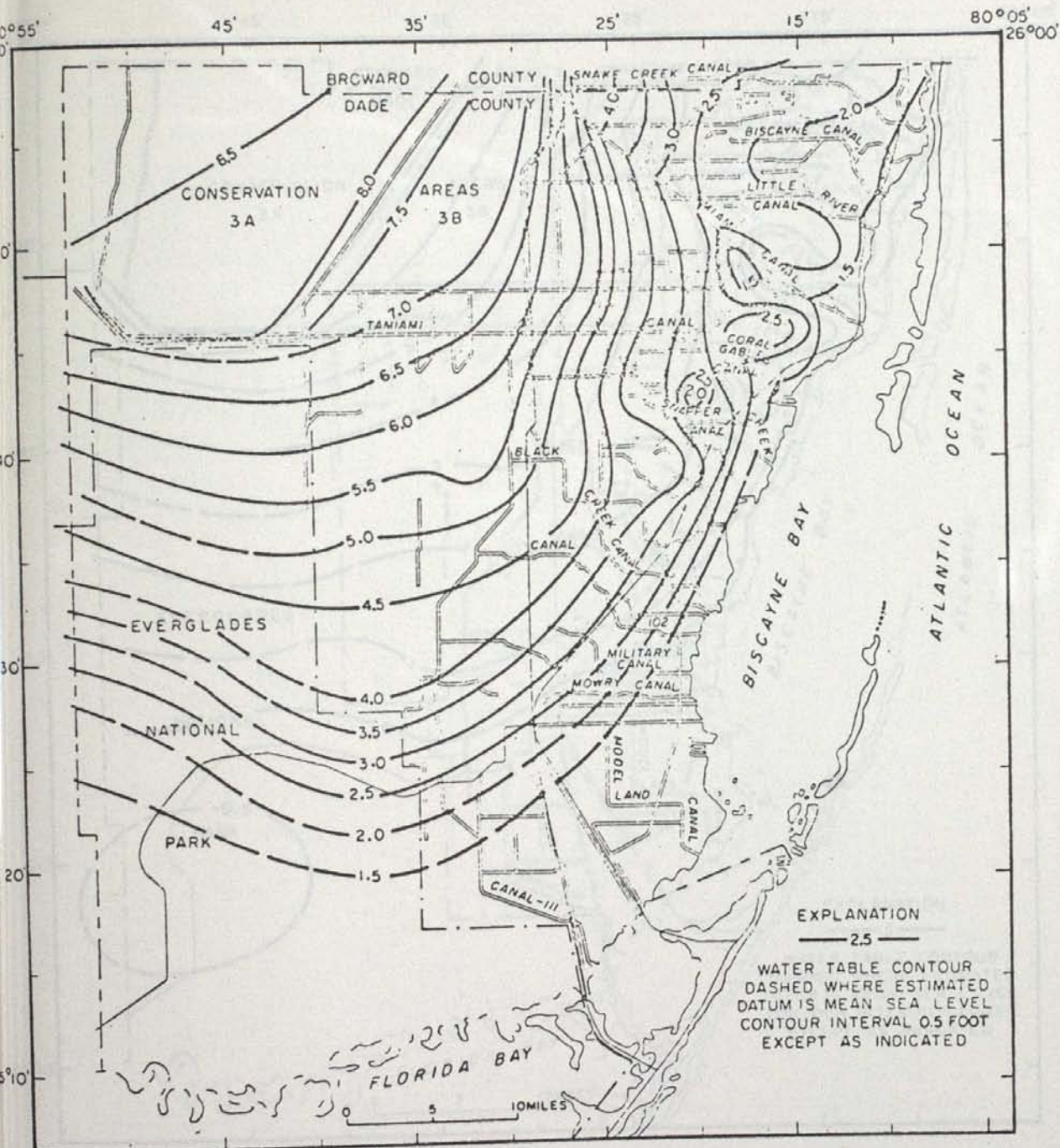


FIGURE 7. CONTOURS OF AVERAGE GROUND WATER LEVEL, 1960-1972 CALENDAR YEARS (16)





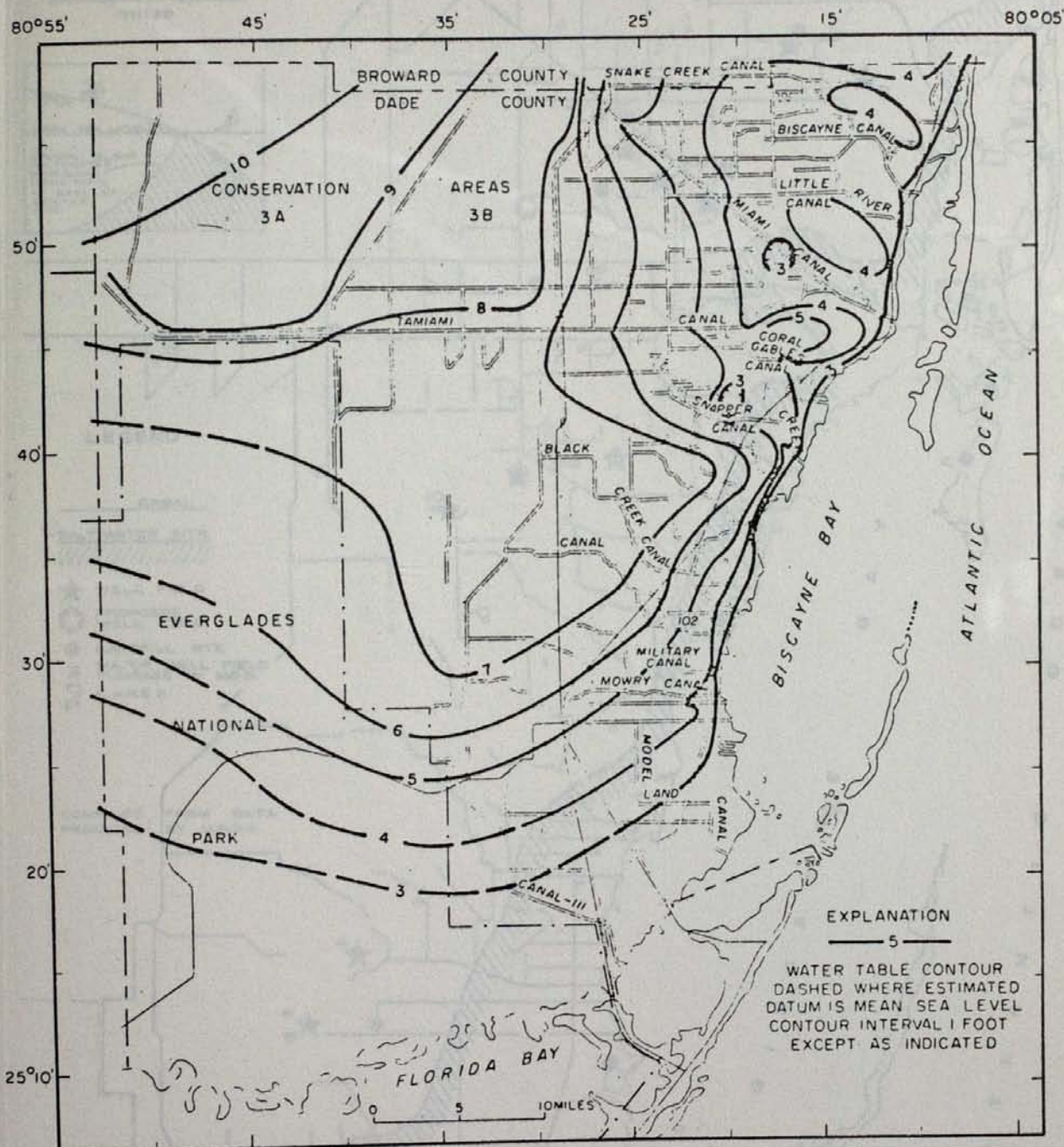
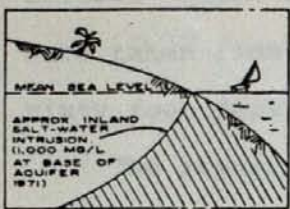
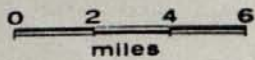


FIGURE 9. CONTOURS OF AVERAGE YEARLY HIGHEST GROUND WATER LEVEL, 1960-1972 CALENDAR YEARS (16)







**LEGEND**

- CANAL
- SALT-WATER INTR
- WELL FIELD
- PROPOSED WELL FIELD
- LANDFILL SITE
- MAJOR WELL FIELD PUMPAGE IN M.G.D. LAKES

COMPILED FROM DATA PROVIDED BY U.S.G.S.

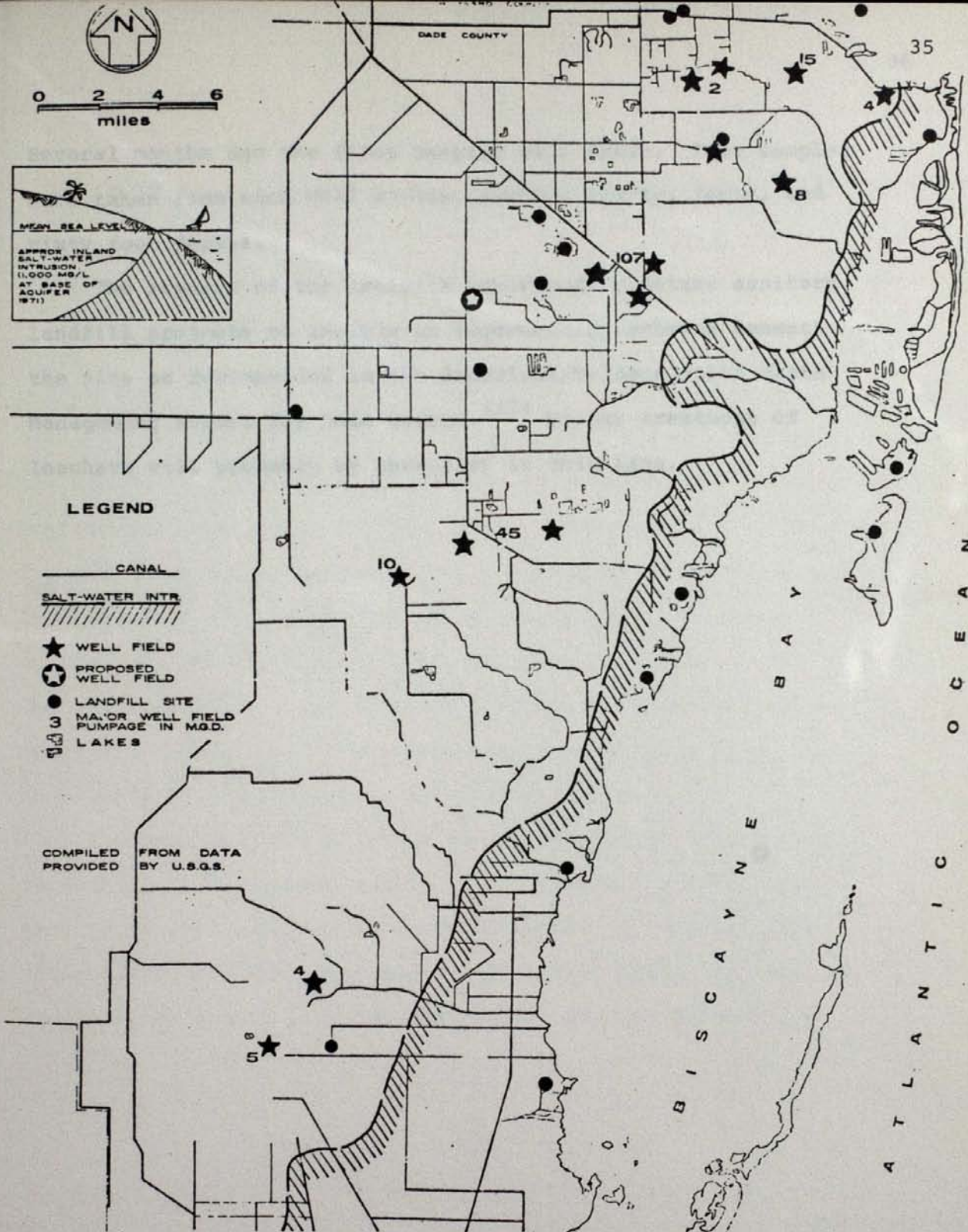


FIGURE 10. LOCATION OF WELL FIELDS (17)





Several months ago the first samples were taken. Five samples were taken from each well at ten, twenty, thirty, forty, and sixty foot depths.

The results of the analysis could modify future sanitary landfill projects to include an impermeable membrane beneath the site as recommended in the Greenleaf/Telesca Solid Waste Management Report for Dade County.<sup>(17)</sup> Proper treatment of leachate will probably be necessary in this area.

The data for that report was compiled from a number of sources for the 1971 Yearbook of Science and the Future, of the Encyclopedia Britannica, and is representative of the years 1953 to 1969. The following Tables IV, V and VI appeared in that report and offer a national view of the magnitude of the solid waste load upon the land environment of the United States.

The data in Table IV shows that paper, glass, and metals predominate in municipal solid waste. Tables V and VI, representing typical analysis of domestic wastes as compiled from several sources, show that paper and organic matter are the predominant components of the municipal solid waste stream.

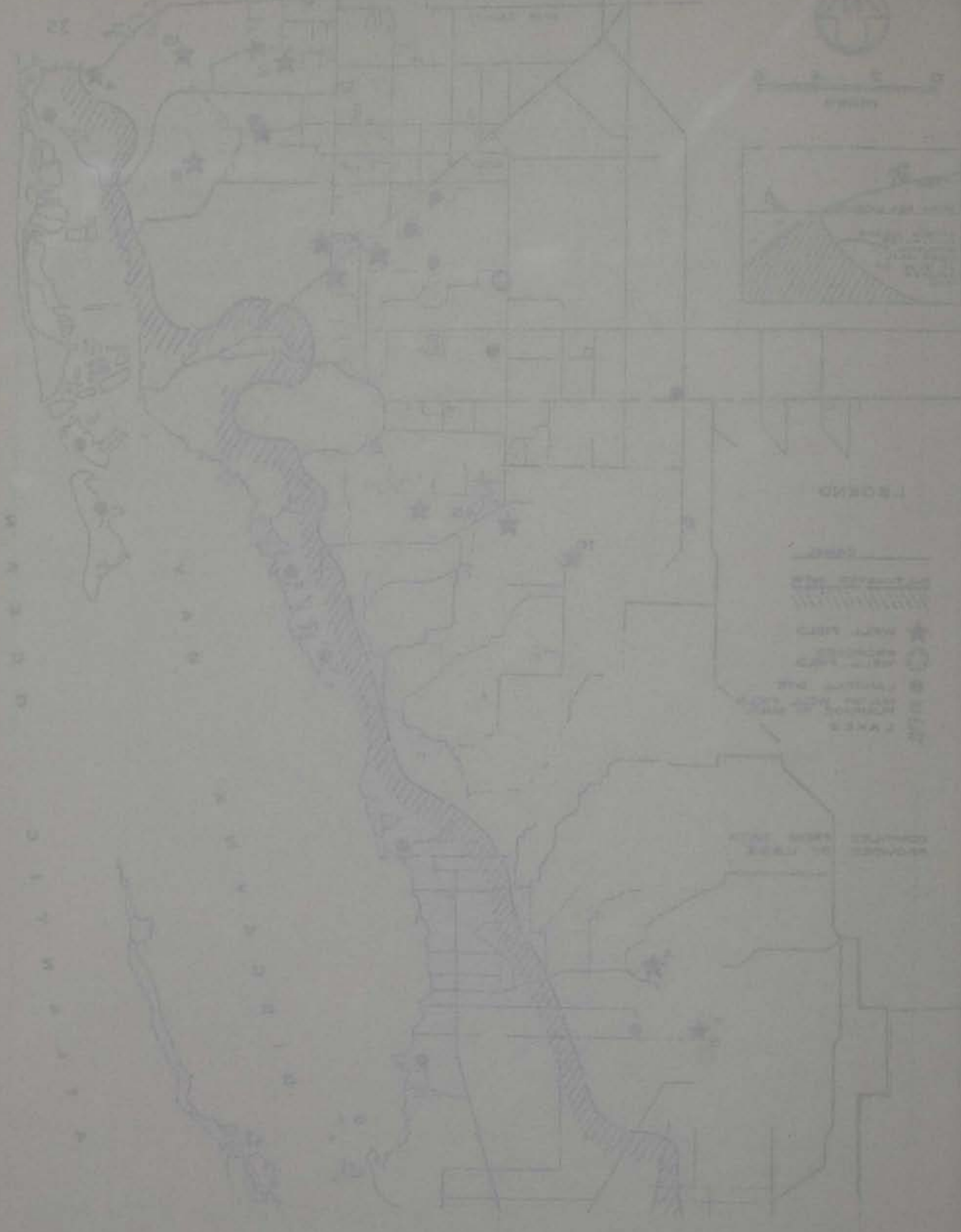


FIGURE 10. LOCATION OF OIL FIELDS (1911)



### III. SOLID WASTE MANAGEMENT IN DADE COUNTY

#### A. QUANTITIES AND KINDS OF SOLID WASTE: U.S.A.

The latest information on the sources, amounts and composition of solid wastes generated in the U.S.A. may be obtained from the report on solid waste reclamation prepared by a board of engineering consultants for the State of Wisconsin.<sup>(18)</sup> The data for that report was "compiled from a number of sources for the 1972 Yearbook of Science and the Future, of the Encyclopedia Brittanica, and is representative of the years 1965 to 1969." The following tables (IV, V and VI) appeared in that report and offer a national view of the magnitude of the solid waste load upon the land environment of the United States.

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Several samples and the first sample were taken. Two samples were taken from each well at ten, twenty, thirty, forty, and sixty foot depths.

The results of the analysis could verify the existing landfill practice to include an appropriate number of samples as recommended in the Environmental Solid Waste Management Report for the County. (1) Further treatment of features will probably be necessary in this area.

TABLE IV

## SOURCE AND AMOUNT OF SOLID WASTES GENERATED IN THE U.S.A. (18)

A. Total Solid Waste: all types (not including mining and agriculture).

30 pounds per capita per day (national average)  
1,100 million tons per year

B. Municipal Solid Waste

3-4.5 pounds per capita per day (national average, 1965)  
6-8 pounds per capita per day (some localities, 1968)  
900 million pounds per day = 165 million tons per year

C. Industrial Wastes

13-14 pounds per capita per day (national average)  
510 million tons per year

D. Agricultural Wastes

2280 million tons per year

E. Mining Wastes

1700 million tons per year

SOLID WASTE MANAGEMENT IN WASH COUNTY

A. QUANTITIES AND KINDS OF SOLID WASTE, U.S.A.

The latest information on the sources, amounts and composition of solid wastes generated in the U.S.A. may be obtained from the report on solid waste collection prepared by a board of engineering consultants for the State of Massachusetts. (10) The data for that report was "compiled from a number of sources for the 1977 yearbook of science and the Bureau of the Sanitary Administration, and is representative of the year 1965 to 1967." The following tables (IV, V and VI) appear in that report and offer a national view of the magnitude of the solid waste load upon the land environment of the United States.

The data in Table IV shows that paper, glass, and metals predominate in municipal solid waste. Tables V and VI, representing typical analyses of domestic wastes as compiled from several sources, show that paper and organic wastes are the predominant components of the municipal solid waste stream.



TABLE V

SOME COMPONENTS OF THE MUNICIPAL SOLID WASTE  
LOAD FROM VARIOUS SOURCES (18)

<u>Material</u>	<u>Units per Year</u>	<u>Annual Tonnage</u>
Paper and paper products	-	50 million (1967)
Glass	-	14 million
Metal, mostly junked autos	6 million	10 million
Rubber (primarily auto tires)	-	2.2 million
Packaging wastes	-	83 million (1969)
a) glass containers	29 billion (1967)	9 million (1969)
b) metal containers	54 billion (1967)	6.2 million (1969)
c) plastic containers	600 million (1967)	-
d) paper containers	-	-









## B. QUANTITIES AND KINDS OF SOLID WASTE: DADE COUNTY

One method used in calculating the composition of solid wastes is the output analysis "which involves hand-sorting the garbage and weighing each individual component." (19)

Wastes collected from homes, institutions and commercial concerns can be divided into two fractions: combustible and non-combustible. These two fractions combined are sometimes referred to as RUBBISH. The combustible fraction is composed of paper, cardboard, cartons, wood, boxes, excelsior, plastics, rags, clothing, bedding, leather, rubber, grass clippings, leaves, yard trimmings, and food wastes. The non-combustible fraction comprises metals, tin cans, foils, dirt, stones, bricks, ceramics, crockery, glass, and bottles.

TRASH is a general name sometimes given to the wastes collected from streets, sidewalks, alleys, and vacant lots. TRASH is divided into two fractions: parkways and street refuse and bulky wastes. The parkways and street refuse consists of street sweepings, dirt, leaves, dirt collected in catch basins, the contents of litter receptacles, trees, plants, stumps, and floating debris from rivers and canals.

Bulky wastes is that fraction of TRASH which includes large auto parts, tires, stoves, refrigerators, and other appliances, discarded furniture, and crating materials.





Table VII<sup>(20)</sup> presents the amounts of RUBBISH and TRASH in Dade County for the Year 1970 and the projected amounts for the years 1975 and 1980, for the 27 municipalities in the county but excluding the amounts collected by the latter in the unincorporated areas.

MUNICIPALITY	1970		1975		1980	
	RUBBISH	TRASH	RUBBISH	TRASH	RUBBISH	TRASH
Del Rio	1,000	250	2,000	500	3,000	1,000
Del Rio Harbor Inc.	2,500	1,700	4,000	3,000	5,500	4,000
Glendale Park	500	1,000	1,000	1,500	1,500	2,000
Coral Gables	15,000	10,000	20,000	17,000	25,000	20,000
St. Forest	500	100	750	300	1,000	500
Florida City	1,500	2,000	2,000	2,500	2,500	3,000
Golden Beach	1,000	500	1,500	750	2,000	1,000
Hialeah	20,000	15,000	25,000	20,000	30,000	25,000
Hialeah Gardens	100	100	200	100	300	200
Homestead	10,000	8,000	12,000	10,000	15,000	12,000
Int. Dev. District	50	50	75	50	100	75
Jacksonville	2	2	3	2	5	3
Mellon	200	100	300	150	400	200
Miami	100,000	100,000	120,000	120,000	140,000	140,000
Miami Beach	40,000	30,000	50,000	40,000	60,000	50,000
Miami Shores	1,000	1,000	1,500	1,500	2,000	2,000
Miami Springs	1,000	1,000	1,500	1,500	2,000	2,000
North Bay Village	1,000	1,000	1,500	1,500	2,000	2,000
North Miami	10,000	10,000	12,000	12,000	15,000	15,000
N. Miami Beach	10,000	11,000	12,000	12,000	15,000	16,000
Opa Locka	5,000	4,000	7,000	6,000	9,000	8,000
Palmetto	50	50	75	50	100	75
South Miami	2,000	2,000	2,500	2,500	3,000	3,000
Sunnyvale	1,000	1,000	1,500	1,500	2,000	2,000
Sweetwater	1,000	1,000	1,500	1,500	2,000	2,000
Virginia Gardens	500	500	750	750	1,000	1,000
West Miami	1,000	1,000	1,500	1,500	2,000	2,000

B. QUANTITIES AND KINDS OF SOLID WASTE, DANE COUNTY

One method used to determine the composition of solid waste is the output analysis which involves separating the various and weighing each individual component.

Wastes collected from homes, institutions and commercial concerns can be divided into two fractions: combustible and non-combustible. These two fractions comprise the waste collected in the WASTE. The combustible fraction is composed of paper, cardboard, refuse, wood, bones, excelsior, plastic, glass, clothing, bedding, rubber, tires, oil, grease, yard trimmings, and food wastes. The non-combustible fraction comprises metals, tin cans, coils, dirt, stones, bricks, ceramics, crockery, glass, and tires.

TRASH is a general term sometimes given to the waste collected from houses, schools, stores, and vacant lots. TRASH is divided into two fractions: highway and street refuse and bulky waste. The highway and street refuse consists of street sweepings, dirt, leaves, dirt collected in catch basins, the contents of litter receptacles, trees, plants, stumps, and floating debris from rivers and canals.

Bulky waste is that fraction of TRASH which includes large auto parts, tires, stoves, refrigerators and other appliances, discarded furniture, and various materials.

TABLE VII  
 AMOUNTS OF RUBBISH AND TRASH IN DADE COUNTY IN 1970  
 AND PROJECTED AMOUNTS IN 1975 AND 1980 <sup>(20)</sup>

AREA	1970		1975		1980	
	RUBBISH	TRASH	RUBBISH	TRASH	RUBBISH	TRASH
Bal Harbor	1,068	760	1,243	897	1,439	1,052
Bal Harbor Is.	2,407	1,722	2,826	2,046	3,300	2,411
Biscayne Park	975	1,013	1,158	1,197	1,365	1,402
Coral Gables	14,747	15,850	16,581	17,854	18,624	20,078
El Portal	757	771	793	804	824	832
Florida City	1,762	1,914	2,050	2,232	2,372	2,586
Golden Beach	1,041	317	1,465	679	1,952	1,096
Hialeah	35,037	37,944	41,244	44,831	48,266	52,608
Hialeah Gardens	164	183	272	303	393	438
Homestead	4,714	5,100	5,689	6,163	6,793	7,365
Ind. Crk. Village	62	30	76	40	92	52
Islandia	2	2	18	20	39	43
Medley	160	130	233	194	313	263
Miami	120,753	124,902	141,570	147,213	165,089	172,378
Miami Beach	46,589	32,477	54,078	38,049	62,511	44,322
Miami Shores	3,335	3,515	3,487	3,684	3,645	3,857
Miami Springs	4,869	4,953	5,535	5,657	6,279	6,444
North Bay Village	1,708	1,801	2,015	2,100	2,360	2,455
North Miami	12,315	12,968	14,280	15,076	16,498	17,448
N. Miami Beach	10,641	11,500	13,595	14,687	16,972	18,325
Opa Locka	4,254	4,664	5,123	5,600	6,113	6,663
Pennsuco	24	27	39	44	59	65
South Miami	4,058	4,393	4,697	5,071	5,416	5,830
Surfside	1,889	1,348	2,227	1,601	2,606	1,885
Sweetwater	1,124	1,252	2,279	2,539	3,620	4,033
Virginia Gardens	910	941	982	1,015	1,060	1,096
West Miami	1,952	2,049	2,141	2,264	2,348	2,498



Table VII (197) presents the amount of REVENUE and TAXES in  
 Lake County for the Year 1970 and the projected amounts for the  
 years 1975 and 1980, for the 17 municipalities in the county but  
 excluding the amounts collected by the latter in the unincorpor-  
 ated areas.

C. COLLECTION, TRANSPORTATION, AND METHODS  
OF DISPOSAL

1. Collection. The Metropolitan Government of Dade County operates a system of garbage and trash collection which serves approximately 140,000 homes in the unincorporated areas of the county. (21)

The system in operation during Fiscal Year 1970-71 included 92 garbage collection trucks, 137 trash collection vehicles, and 768 employees, including those working at the disposal sites. At that time, the annual cost reported by the County Manager was \$9,140,000, not including a required reserve for October, November, and December 1971. (22)

At present, Dade County offers three types of services in its collection system to meet the needs of the residents in the unincorporated areas. Each homeowner pays \$52 yearly for this three-pronged waste collection system.

(a) The primary service is collection of residential garbage and trash by collection crews. Residents are required to place this refuse in 20 or 30-gallon garbage containers or in plastic bags. Weight of these containers is restricted to 50 lbs. or less. Branches or small trash are to be placed in bundles which are limited in length to 3 ft. and to 50 lbs. in weight. (23) These containers or bundles are placed at curbside by the residents and are picked up twice a week by collection

TABLE 1  
 SHOWING THE NUMBER OF VOTES RECEIVED BY EACH PARTY IN 1912  
 AND THE PERCENTAGE OF THE TOTAL VOTES RECEIVED BY EACH PARTY

NAME	1912		1916		1920	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Dem.	1,822	31.2	2,870	48.1	1,822	31.2
Rep.	3,978	68.8	3,030	51.9	3,978	68.8
Prohibition	1,000	17.5	1,000	17.5	1,000	17.5
Progressive	1,000	17.5	1,000	17.5	1,000	17.5
Independent	1,000	17.5	1,000	17.5	1,000	17.5
Other	1,000	17.5	1,000	17.5	1,000	17.5
Total	5,800	100.0	5,900	100.0	5,800	100.0



crews. Crews work four ten-hour days per week: Monday, Tuesday, Thursday and Friday. They work on an incentive plan and are released from work upon completion of the task assignment for the day.

This service in the waste collection program is designed to reduce manpower requirements for collection crews as well as to improve the appearance of residential areas by eliminating random dispersion of waste containers. To enforce compliance, the county has ordinances prohibiting residents from leaving trash cans at curbside on noncollection days. There are also special provisions for backyard pickup of residential refuse in cases where the resident is ill or infirm and unable to carry the containers to curbside himself or has no one who can do this for him or her.

- (b) The second type of collection service is the "Neighborhood Garden Trash Transfer Station," where the residents themselves haul any trash except construction materials, loose paper, or automotive parts, to specified stations. There are no charges associated with this service, which is required in this part of the country because of the year-round growth of vegetation in private gardens. Prior to this service, garden trash piles along the roadsides in residential areas were common. Collection crews, using hydrocranes equipped with clamshell type

OF BIODIESEL

Collection. The Metropolitan Government of Baltimore operates a system of garbage and trash collection which serves approximately 144,000 people in the incorporated areas of the county. (2)

The system in operation during fiscal year 1970-71 included 35 garbage collection trucks, 177 trash collection vehicles, and 763 employees, including those working at the disposal sites. At that time, the annual cost reported by the County Manager was \$7,146,806, and including a reported reserve for October, November, and December 1971. (3)

At present, Bakersfield County offers three types of services in its collection system to meet the needs of the residents in the unincorporated areas. Each household pays \$21 yearly for this three-pronged waste collection system.

(a) The primary service is collection of residential garbage and trash by collection crew. Residents are required to place this refuse in 30 or 36-gallon garbage containers or in plastic bags. Weight of these containers is restricted to 50 lbs. or less. Branches or small trash are to be placed in bundles which are limited in length to 1 1/2 ft. and to 20 lbs. in weight. These containers or bundles are placed at curbside by the residents and are picked up twice a week by collection



buckets, patrolled county roads and removed the piles of garden trash. In doing so, they removed also small amounts of the underlying soil. The eventual result was a small pit into which careless people deposited cans and bottles. In addition, the pits were a hazard to the unwary person walking along the roads after dark. The "Neighborhood Garden Trash Transfer Station" service has eliminated these spots thereby improving the appearance of residential areas. This service has helped to reduce collection costs by reducing the collection system to 28 sites instead of stops at every home.

- (c) The third type of public waste collection is the "Customized Collection" designed to handle bulky wastes. This service is provided twice a year upon request of the residents for collection of bulky items which cannot be containerized or taken to trash stations. Examples of bulky items are discarded furniture, appliances, and major tree cutbacks. Each collection is limited to 25 cubic yards (one truck load). There is a charge of \$1.60 per cubic yard for trash in excess of the authorized limit per collection. Only two such collections per year are allowed without an extra charge. The minimum charge for any additional collections is \$8.00 for each 5 cubic yards collected. <sup>(23)</sup> Commercial establishments are not served and must engage private contractors for collecting





their wastes; the unincorporated areas of the county provide their own services.

2. Transportation. Waste collected in the Dade County area is taken to three main locations: the Northeast Incinerator located at 18701 N.E. 6th Avenue; the 20th Street Incinerator, owned by the City of Miami and located just north of the Civic Center; and a large dump, euphemistically called "the N.W. 58th Street sanitary landfill."<sup>(24)</sup> In addition to the above locations, several other land disposal sites are being used but these are scheduled for deactivation soon. Vehicles used include 20-yard packer trucks, 25-yard packer trucks, 32-yard trash trucks, 40-yard roll offs, and 65-yard transfer trailers.<sup>(25)</sup> Route mileage varies from 63 to 112 miles per day's collections and is related directly to the distance from "landfill" sites and increased trips on Monday and Tuesday because of the greater number of loads to be transported.<sup>(21)</sup>
3. Disposal. At the time that the Greenleaf/Telesca report was prepared, there were four incinerators and twenty land disposal sites in Dade County.<sup>(20)</sup> Two of the incinerators have been shut down through court action. One of these, the Coral Gables Incinerator, might be modified and used to dispose of waste sometime in the future, but the other, the Coconut Grove Incinerator, is not expected to be reopened due to public





pressure. A third incinerator located at N.W. 20th Street and 12th Avenue is presently owned by the City of Miami, but is due to be turned over to Dade County soon. It is scheduled to be deactivated by April 1975.<sup>(26)</sup> The fourth incinerator, the Northeast Incinerator, is a new facility which was used by the Environmental Protection Agency in drawing up their requirements for particulate emission because of its clean operating characteristics. Curiously, it does not meet less stringent state and Dade County requirements due to the use of a different test procedure.<sup>(20)</sup>

The main receiver of solid waste is the N.W. 58th Street land disposal site. Trucks from Dade County, incorporated municipalities and private hauling firms bring waste to this site. While aware of the necessary requirements for compaction and daily cover in a landfill, county administrators point to the lack of suitable cover materials, personnel shortages, equipment breakdowns and a pitfire which lasted approximately three months, as reasons for the failure to maintain the landfill program on schedule.<sup>(24)</sup> Greenleaf/Telesca points out that all of the land disposal sites in the county are in violation of state and federal regulations concerning the disposal of refuse. At the time their report was written, the major concern with county officials was control of fires as indicated by the fact that the operation of dumps and landfills were under the administration of the fire department.

their wastes, the unincorporated areas of the county  
provide their own services.

5. Transportation. Waste collected in the Lake County area is  
taken to three main locations: the Northeast Incinerator  
located at 18701 W.E. 6th Avenue, the South Street Incinerator,  
owned by the City of Miami and located just north of the  
Civic Center, and a large truck, "intermittently" called "the  
N.W. 35th Street sanitary landfill." (28) In addition to the  
above locations, several other land disposal sites are being  
used but these are scheduled for deactivation soon. Vehicles  
used include 30-yard garbage trucks, 15-yard packer trucks,  
35-yard crane trucks, 40-yard roll offs, and 60-yard transfer  
trailers. (29) Waste transfer varies from 50 to 112 miles per  
day's collection and is related directly to the distance  
from "landfill" sites and increased trips on Monday and  
Tuesday because of the greater number of loads to be trans-  
ported. (30)

6. Disposal. At the time that the Greenleaf/Pollock report was  
prepared, there were four incinerators and twenty land dis-  
posal sites in Lake County. (31) Two of the incinerators have  
been shut down through court action. One of these, the Green  
Cable Incinerator, might be rebuilt and used to dispose of  
waste remaining in the future, but the other, the County Waste  
Incinerator, is not expected to be reopened due to public



At least partially as a result of the Greenleaf/Telesca report, several steps have been taken to deal with the solid waste disposal problem. The United States Geological Society has been asked to install water-quality monitoring wells around the N.W. 58th Street site. A \$50 million bond issue has been approved for waste disposal, the City of Miami has agreed to turn over the N.W. 20th Street site to the county, and requests for proposal have been sent to 60 different firms in hopes of obtaining a system suitable for dealing with the disposal of solid waste.

4. Wastewater Sludge. Sludge is a mixture of water and solids. The solids are those originally present in the wastewater and/or those generated during the treatment of the wastewater. Sludge may contain from 95 to 99 percent, by weight, of water but it may be dewatered to reduce the water content to 60-80 percent by weight. Further processing and heating may yield a "cake" with varying degrees of moisture.

Dewatered or dry sludge requires final disposal and the following methods are the most commonly used for this purpose:

- Disposal in the ocean
- Application to land surface
- Landfilling
- Subsurface disposal
- Incineration





Many of the environmental problems which can arise from sludge disposal are similar to those caused by the discharge of untreated wastewater to the environment. (27)

At present, the wastewater treatment plants in Dade County use sludge drying beds to dry the sludge produced. The continuous buildup of sludge on the drying beds eventually requires its removal and develops into a solid waste problem. (28)

In Dade County, the final disposal of wastewater sludge is accomplished by spreading it on the land. (27) This requires collecting and transporting the sludge from the various treatment plants and septic tanks in the county to Virginia Key. Future plans, however, include the development of three wastewater management districts which will consolidate smaller plants into three large facilities by 1975 as indicated in Figure 11. By the year 2000, a fourth district will be developed in the county, and wastewater treatment will be carried in four large plants as indicated in Figure 12. (29)

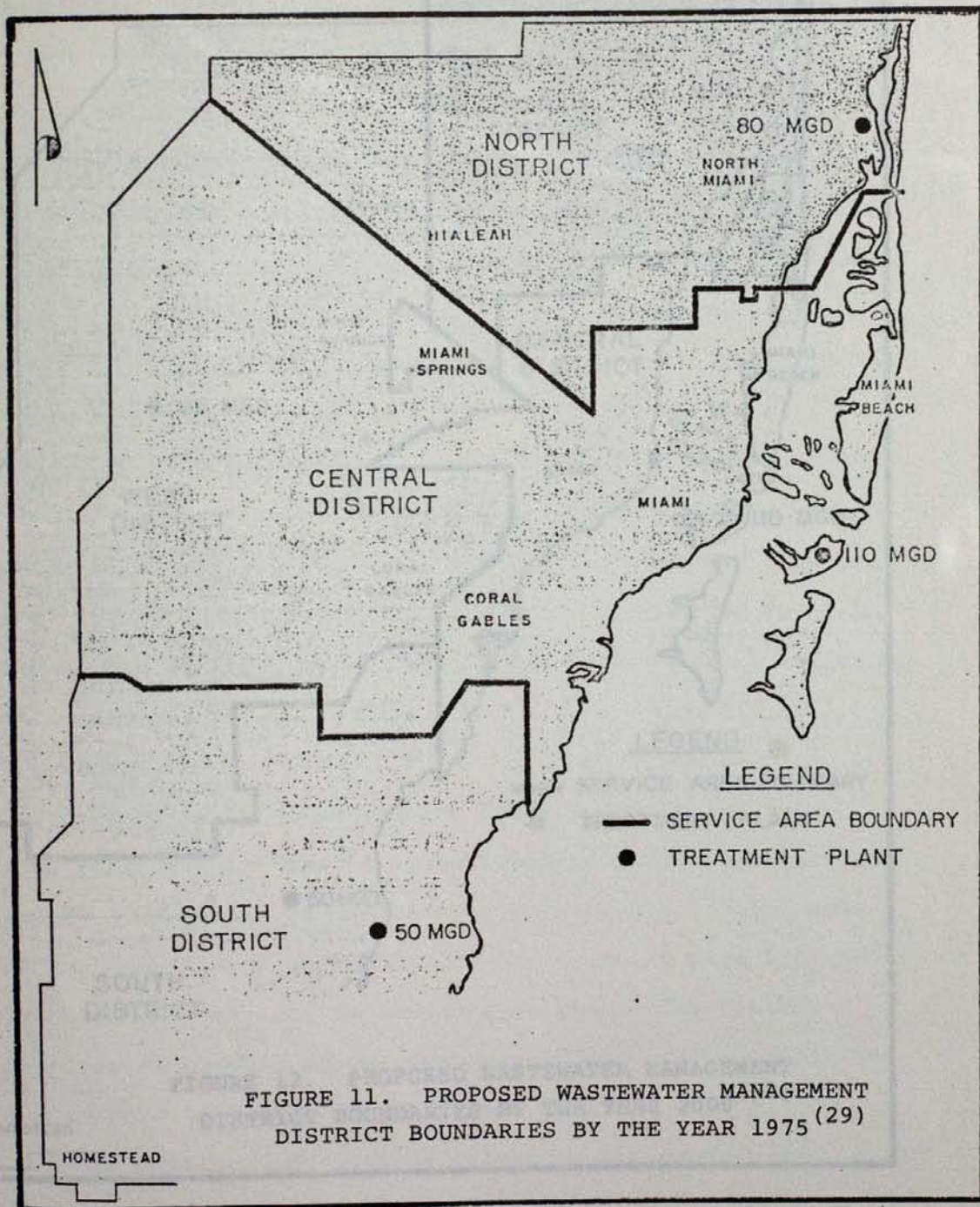
The 1975 plan includes transporting, via a pipeline, the sludge from the North District to the Central District where it will be used for landfilling in Virginia Key.

At least partially as a result of the General...  
reports, several groups have been asked to deal with the solid  
waste disposal problem. The United States Geological Survey  
has been asked to conduct a study of the solid waste disposal  
problem in the...  
around the...  
has been approved for...  
agreed to...  
and requests for...  
line in hopes of obtaining a...  
with the disposal of solid waste.

Wastewater Sludge Sludge is a mixture of water and solids.  
The solids are those materials present in the wastewater  
and/or those generated during the treatment of the wastewater.  
Sludge may contain from 5% to 15 percent, by weight, of water,  
but it may be dehydrated to reduce the water content to 50-60  
percent by weight. Further processing and handling may yield  
a "cake" with varying degrees of moisture.

Wastewater or any sludge requires final treatment and the  
following methods are the most commonly used for this purpose:  
Disposal to the ocean  
Application to land  
Landfills  
Landwater disposal  
Incineration





Many of the environmental problems which exist in the  
 disposal are related to those caused by the drainage of un-

treated wastewater to the environment. (17)

At present, the wastewater treatment plant in Lake County use  
 sludge drying beds to dry the sludge produced. The contin-  
 uous pouring of sludge on the drying beds eventually requires  
 its removal and disposal into a solid waste problem. (18)

In Lake County, the final disposal of wastewater sludge is  
 accomplished by spreading it on the land. (19) This requires

collecting and transporting the sludge from the various treat-  
 ment plants and applying it to the land in Virginia Key.

Future plans, however, include the development of three waste-  
 water management districts which will necessitate similar

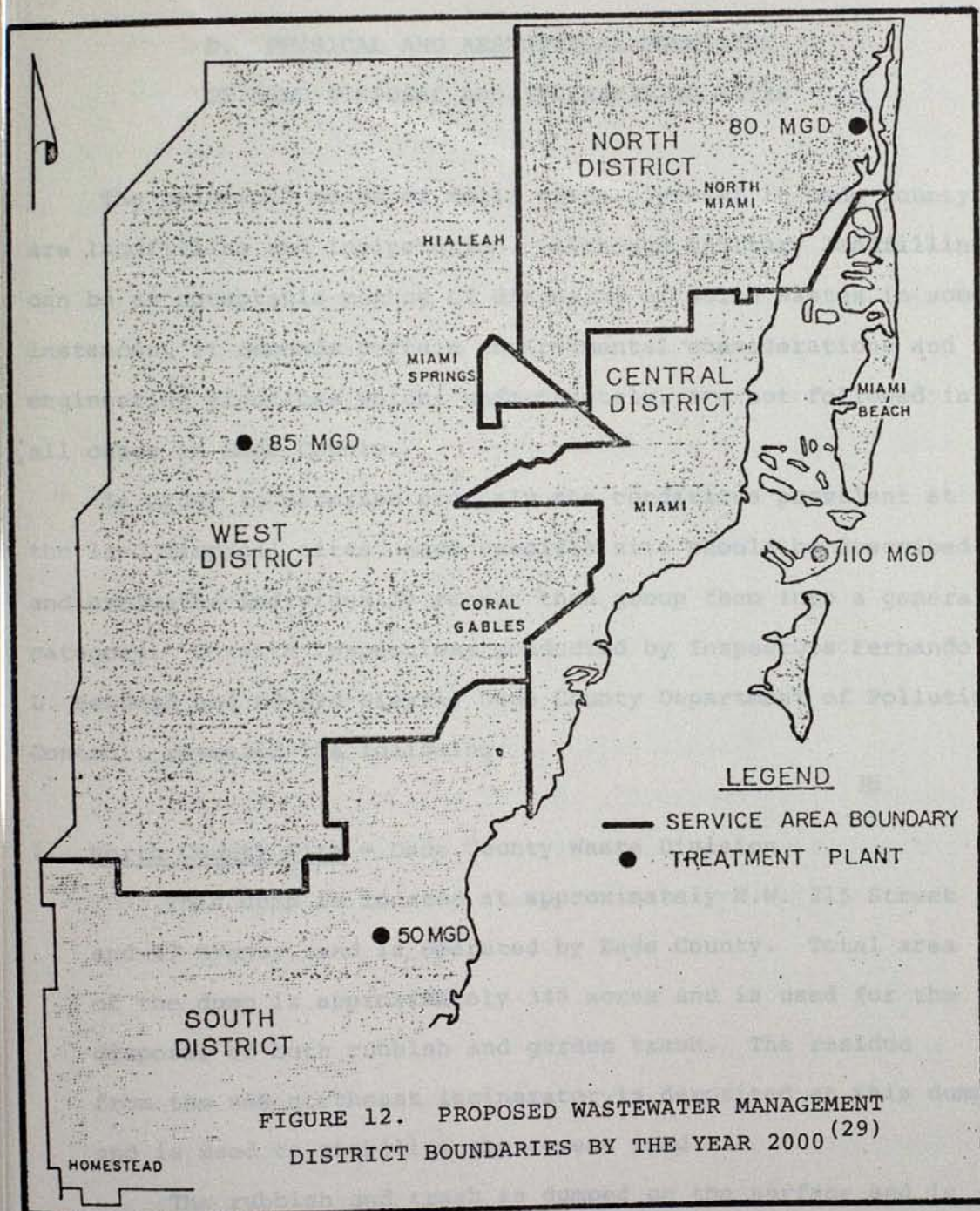
plans into three future facilities by 1975 as indicated in  
 Figure 11. By the year 2000, a fourth district will be de-

veloped in the county, and wastewater treatment will be  
 carried in four large plants as indicated in Figure 12. (20)

The 1975 plan includes transportation, via a pipeline, the  
 sludge from the north district to the Central District where

it will be used for landfills in Virginia Key.









D. PHYSICAL AND AESTHETICAL CONDITION  
OF LAND DISPOSAL AND INCINERATION SITES

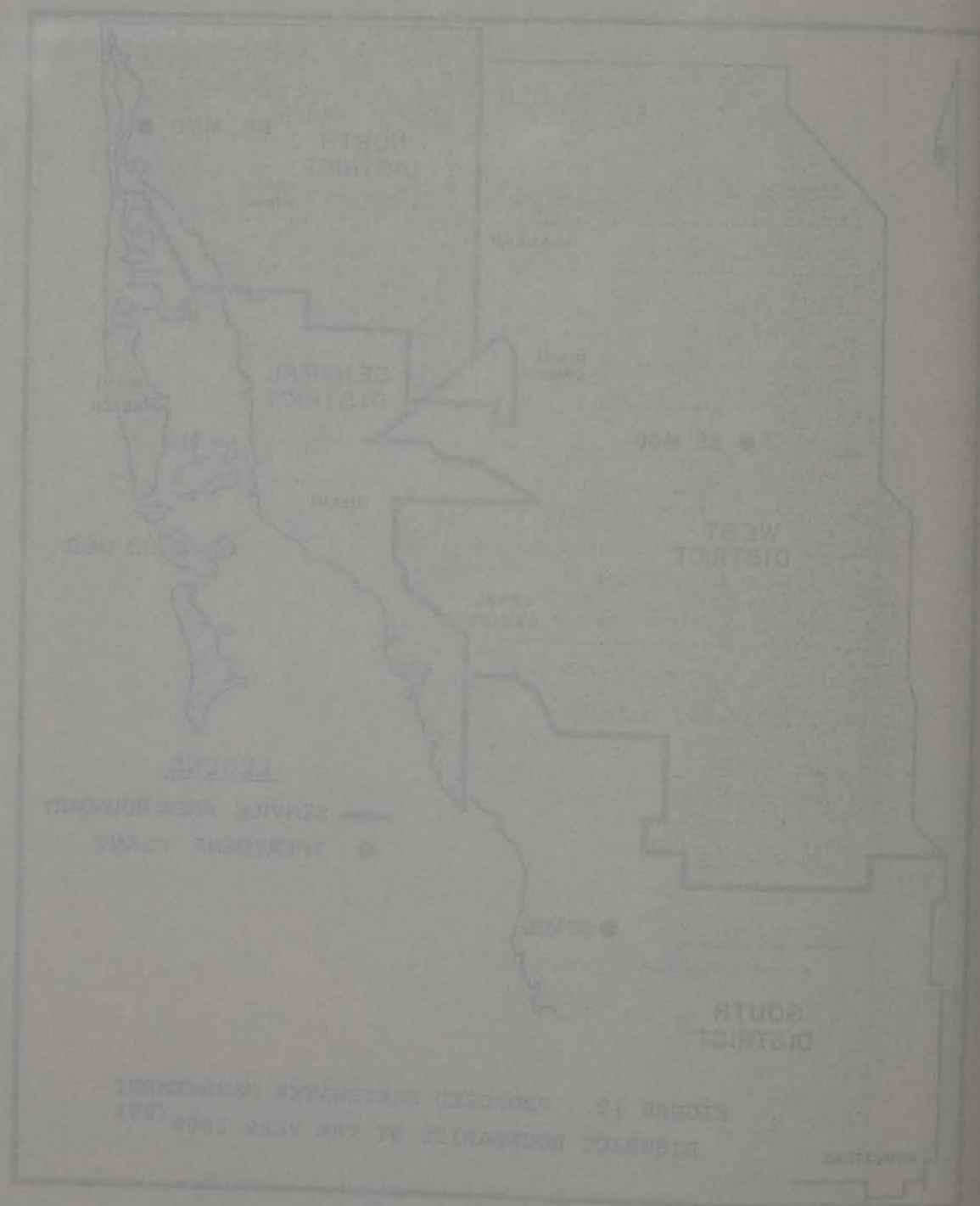
The principal means of solid waste disposal in Dade County are landfilling and incineration. Although sanitary landfilling can be an acceptable method of disposing of solid wastes in some instances, it demands certain environmental considerations and engineering practices which, unfortunately, are not followed in all cases in Dade County.

In order to describe properly the conditions prevalent at the land disposal sites, each specific site should be described and evaluated individually rather than group them into a general category. On-site inspections conducted by Inspectors Fernando L. Bestard and Edward Sierra, Dade County Department of Pollution Control, revealed the following:

1. North County Site - Dade County Waste Division

This dump is located at approximately N.W. 215 Street and 47 Avenue, and is operated by Dade County. Total area of the dump is approximately 340 acres and is used for the disposal of both rubbish and garden trash. The residue from the new northeast incinerator is deposited at this dump and is used to stabilize the access road.

The rubbish and trash is dumped on the surface and is pushed and compacted by a tractor. At this site there is





little earth cover available; thus rodents and odor are a continuous nuisance. This dump is also notorious for fires due to the lack of cover material.

2. Main County Site - Dade County Waste Division

This dump is located at N.W. 58 Street and 87 Avenue, and is operated by Dade County. The dump comprises some 640 acres, and is thus the largest county disposal site.

The dump handles rubbish and trash which is pushed and compacted by a tractor. Although this is supposed to be a sanitary landfill, the operation is very unsatisfactory due to poor compaction, little use of the available cover material and no control of the leachates. Rodents and odor are a severe problem along with fires which have been known to burn for months at a time.

3. South County Site - Dade County Waste Division

This dump is located at S.W. 240 Street and 87 Avenue, and is less than one mile from Biscayne Bay. Operated by Dade County, the dump comprises 140 acres and accepts both rubbish and trash as well as oversized waste.

Cover material is hauled in by trucks and the existing three or five feet of muck covering the dump is excavated and stockpiled. This places the excavation bottom below the water table which can lead to water pollution. Here, too, fires have been known to burn for weeks at a time.

2. PHYSICAL AND AESTHETIC LOCATION  
OF LAND DISPOSAL AND INCINERATION SITES

The principal means of solid waste disposal in Lake County are landfilling and incineration. Although sanitary landfilling can be an acceptable method of disposal of solid wastes in some instances, it demands certain environmental considerations and engineering practices which, unfortunately, are not followed in all cases in Lake County.

In order to describe properly the conditions prevalent at the land disposal sites, each specific site should be described and evaluated individually rather than group them into a general category. On-site inspections conducted by Inspector Kestner, District and District Director, Lake County Department of Pollution Control, revealed the following:

1. North County Site - Lake County Waste Division

This dump is located at approximately 500 S. 1st Street and 4th Avenue, and is operated by Lake County. Total area of the dump is approximately 340 acres and is used for the disposal of both liquid and solid waste. The residue from the wet weather technology is disposed at this dump and is used to maintain the access road.

The residue and trash is dumped on the surface and is pushed and compacted by a tractor. At this site there is



4. North Miami Beach (Interama Dump)

This dump is now completely closed down and is being covered and leveled.

5. Miami Beach Site - City of Miami Beach

Located at N.E. 207 Street and 16 Avenue, this is probably the best operated land disposal operation in Dade County. The site accepts garden trash and oversized waste. The wastes are placed and compacted by bulldozer in excavated trenches which are approximately 15 feet wide by 6 feet deep. Cover material is plowed and compacted on the surface daily. Needless to say, there is no odor nor fire situation at this site.

6. Surfside Dump - Town of Surfside

Located at N.W. 215 Street and 47 Avenue, it occupies approximately 46 acres and handles rubbish and garden trash. Refuse is dumped into open trenches and compacted as dumping progresses to an elevation of twenty feet. The refuse is then covered with earth. This dump is set to be phased out soon due to lack of space; however, a date has not been set. This dump also suffers from odors and rodents.

7. City of Miami at Virginia Key - City of Miami

This site is located on Virginia Key and accommodates incinerator residue and garden trash. The refuse is pushed and compacted by bulldozer. Because the material disposed of includes incinerator residue, this dump has a tendency to ignite and fires are frequent. At this dump, due to the



little earth cover material... continuous movement... due to the lack of cover material.

Little County Site - Little County Waste Division

This dump is located at N.W. 25 Street and 17 Avenue... and is operated by Little County. The dump comprises some 800 acres, and is the largest facility of its kind.

The dump facility... composed by a... early landfill... to poor composition... and no control of the... severe problem... for months at a time.

Little County Site - Little County Waste Division

This dump is located at N.W. 150 Street and 17 Avenue... and is less than one mile from... Little County. The dump comprises 140 acres and... rubbish and trash as well as... material.

Cover material is... three or five feet of... and... water table... lines have been... for weeks at a time.

frequency of fires, smoke and odors are the major offenders.

8. Homestead and Florida City Dump

Located at approximately S.W. 344 Street and 162 Avenue, this is one of the worst, if not the worst, dump in Dade County. The dump is completely overused, handles all types of wastes and is continually on fire. This dump is susceptible to fires, smoke, rodents and odors.

9. Hialeah Dump - City of Hialeah (Private)

This dump, located at approximately N.W. 107 Avenue and 138 Street, while owned by the City of Hialeah in an old rock quarry, is operated by a private contractor for a fee. The dump disposes of garden trash and oversized wastes. The waste is pushed and compacted by tractor into trenches, with the bottom below the water level, and refilled by excavation with little or no cover. Odors and rodents are common.

10. United Sanitation Services, Inc.

Located at N.W. 95 Avenue and 103 Street, Medley, and operated by one of the largest commercial sanitation firms in the country. Wastes are stockpiled and placed into open trenches. Although the trenches are covered twice daily, there is no control of leachates which, most likely, contaminate the Biscayne Aquifer due to the high water table.

11. Marks Brothers (Private)

Located at N.W. 110 Avenue and N.W. 17 Street, this site accepts only garden trash and demolition material. The site is an active limerock quarry with rock being mined from





one end of the site and refuse being used for backfill at the other. The resultant lake from the rock excavation is 30-40 feet deep and, therefore, the wastes are deposited into the aquifer.

12. Haulover Beach - Department of Parks and Recreation

This small site on Haulover Beach is used to dispose of cuttings and clippings from park maintenance operations. Land cover is scarce and rodent and odor problems are existent.

13. Minton's Site

Located in Opa Locka on N.W. 37 Avenue and N.W. 122 Street, this private site accepts non-putrescible and over-size wastes. The wastes are dumped into a lake of a depth of approximately 40-45 feet. The main pollutant problem with this lake is its direct connection to the Opa Locka canal system and possible water pollution problems.

14. Trash Transfer Stations - Dade County Waste Division

To make this summary complete it should include the trash transfer stations which are now at 29 locations in Dade County. Trash and oversized wastes are deposited here by citizens and then picked up by Dade County Waste Department and taken either to the incinerator or to one of the dumps. It was impossible to visit each transfer station; however, an inspection of 12 of these sites revealed conditions to be typical. The stations are unsightly, heavily inhabited by rodents and insects, create offensive odors and are very





prone to fires.

In general, we can come to the following conclusions pertaining to the land disposal sites in Dade County:

1. Sites do not meet the acceptable standards of a sanitary landfill.
  2. Wastes are in direct contact with the ground waters of Dade County.
  3. Rodents, insects and odors are a persistent menace in many of the sites.
  4. Fires are predominant at most sites, thereby creating another problem: air pollution.
5. Approval is granted by the Dade County Health Department.
15. Northeast Incinerator  
This is the only modern incinerator in Dade County; it was placed in operation in 1970 and complies fully with present particulate emission standards. Due to test procedures, the incinerator does not meet state or local codes.
  16. N.W. 20th Street Incinerator  
Closed due to unsatisfactory exhaust emissions.
  17. Coconut Grove Incinerator  
Now under court injunction not to operate. Due to its location, all attempts to upgrade and operate this plant have brought litigation and strife.
  18. Coral Gables Incinerator  
Closed due to unsatisfactory exhaust emissions and local public reaction.



the end of the line and water being used for washing at  
the other. The treatment tank from the first operation in  
10-15 feet deep and, therefore, the water was deposited  
into the gutter.

Hullway Beach - Department of Parks and Recreation

This small area on Seaside Beach is used for disposal of  
cans and glass, from both amusement operations.  
Land water is scarce and hence the water problems are  
existent.

King's Site

located in the block on N.W. 11 Street and S.W. 131  
Street, some private site owners have been notified and over-  
size water. The water was dumped into a hole of a depth  
of approximately 10-15 feet. The main problem problem with  
this site is the direct connection to the San Juan canal  
system and possible water pollution problems.

Trash Transfer Station - Bada County Water District

To have this transfer station it should include the trash  
transfer station which are now at its location in Bada County.  
Trash and compacted wastes are deposited here by district and  
then picked up by Bada County Waste Department and taken  
either to the incinerator or to one of the dumps. It was  
impossible to visit with transfer station, however, an in-  
spection of it of their other transfer stations decided to be  
typical. The stations are usually, heavily landscaped by  
shrubs and flowers, trees, etc. and are very

## E. AGENCIES INVOLVED IN SOLID WASTE DISPOSAL

The following is a summary of the agencies involved in the disposal of solid wastes according to the methods used in such disposal. (30)

### 1. GARBAGE FEEDING TO HOGS

- A. Permit from the DADE COUNTY ZONING DEPARTMENT where the feeding is going to be done.
- B. A feeding permit shall be obtained from the FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMERS SERVICE.
- C. Approval is granted by the DADE COUNTY HEALTH DEPARTMENT.
- D. Surveillance and Inspection is done by DADE COUNTY DEPARTMENT OF POLLUTION CONTROL.

### 2. SANITARY LANDFILLS

- A. Permit from the DADE COUNTY PLANNING AND ZONING DEPARTMENT where the landfill operations are going to take place.
- B. Counties and mosquito control districts participating in the State anthropod control program shall comply with CHAPTER 388, FLORIDA STATUTES, and all applicable provisions of this chapter.





- C. Counties, municipalities, individuals, corporations and organizations not subject to CHAPTER 388, FLORIDA STATUTES, shall submit to the local health department an operational work plan including a map showing the location of the proposed site.
- D. Following receipt of the proposed operational work plan from the local health department, the DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES, DIVISION OF HEALTH, will review the plans and make necessary field investigations before approval or disapproval of the proposal. Approval from the DIVISION OF HEALTH must be received before operations are initiated.
- E. DADE COUNTY DEPARTMENT OF POLLUTION CONTROL makes the necessary surveillance and inspections.
- F. DADE COUNTY DEPARTMENT OF PUBLIC WORKS is responsible for the maintenance of county operated landfills.
3. INCINERATORS
- A. Permit from the DADE COUNTY PLANNING AND ZONING DEPARTMENT for the site location.
- B. Application should be obtained from the DADE COUNTY



DEPARTMENT OF AIR AND WATER POLLUTION CONTROL and submitted to them.

- C. Statement that engineering drawings have been approved by the governing body (city commissioners).
- D. Surveillance and inspection is done by DADE COUNTY DEPARTMENT OF AIR AND WATER POLLUTION CONTROL.

#### 4. COMPOSTING

- A. Permit from the DADE COUNTY PLANNING AND ZONING DEPARTMENT for site location.
- B. Plans and accompanying documents shall be submitted to the DIVISION OF HEALTH through the DADE COUNTY HEALTH DEPARTMENT for review and consideration of approval.
- C. COUNTY COMMISSIONERS have to give approval prior to submittal to the local HEALTH DEPARTMENT.
- D. Inspection and surveillance should be done by DADE COUNTY DEPARTMENT OF POLLUTION CONTROL.





5. PATHOLOGICAL WASTES

A. Disposal shall be by incineration or other method approved by the DADE COUNTY DEPARTMENT OF POLLUTION CONTROL.

Of the 27 municipalities, 22 do not have public services. Economic considerations indicate that it is not economically feasible for small communities to provide independent solid waste disposal services. However, of the 27 communities, 22 do presently provide independent solid waste collection service and 5 provide and operate their own disposal facilities within their corporate boundaries. The Dade County Waste Division presently provides collection and disposal services for only one of the incorporated areas and the total unincorporated community, as well as either partial or complete disposal services for 15 of the remaining municipalities. Two communities contract with private contractors for collection and disposal and two remote communities do not have public services.

The budget history for fiscal year 1960-61 thru fiscal year 1970-71 was obtained from the county's finance office and refuse tonnage from the Waste Division records to develop collection and disposal costs. A summary of these annual costs is shown in Table VIII. The budget figures do not include fringe benefit costs in their personnel service extensions.





## F. COSTS OF DISPOSAL AND METHODS OF FINANCING

Within Dade County, 27 incorporated communities comprise about 32% of its area. These 27 communities also account for 58% of the resident population and 84% of the tourist population. Of the 27 municipalities, 21 have fewer than 15,000 population. Economic considerations indicate that it is not economically feasible for small communities to provide independent solid waste disposal services. However, of the 27 communities, 22 do presently provide independent solid waste collection service and 5 provide and operate their own disposal facilities within their corporate boundaries. The Dade County Waste Division presently provides collection and disposal services for only one of the incorporated areas and the total unincorporated community, as well as either partial or complete disposal services for 15 of the remaining municipalities. Two communities contract with private contractors for collection and disposal and two remote communities do not have public services.

The budget history for fiscal year 1960-61 thru fiscal year 1970-71 was obtained from the county's finance office, and refuse tonnages from the Waste Division records to develop collection and disposal costs. A summary of these annual costs is shown in Table VIII. The budget figures do not include fringe benefit costs in their personnel service extensions.





TABLE VIII

## BUDGET HISTORY FOR SOLID WASTE DISPOSAL IN DADE COUNTY, 1960-1971

	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71
<b>REVENUE</b>											
Waste Collection Fees	\$2,452,432	\$2,736,842	\$3,089,000	\$2,964,169	\$3,271,000	\$3,499,000	\$3,411,115	\$4,380,500	\$4,479,000	\$5,846,200	\$7,422,076
Other Income				131,690	102,000		127,000	420,000	489,500	715,156	824,012
<b>TOTAL Revenue</b>	<b>\$2,452,432</b>	<b>\$2,736,842</b>	<b>\$3,089,000</b>	<b>\$3,095,859</b>	<b>\$3,373,000</b>	<b>\$3,499,000</b>	<b>\$3,738,115</b>	<b>\$4,800,500</b>	<b>\$4,968,500</b>	<b>\$6,561,356</b>	<b>\$8,246,088</b>
<b>EXPENDITURES</b>											
<b>A) Administration</b>											
1) Personal Services	\$ 63,523	\$ 78,995	\$ 89,882	\$ 105,924	\$ 95,373	\$ 104,447	\$ 131,250	\$ 128,000	\$ 146,500	\$ 159,124	\$ 171,464
2) Contractual Services	66,360	30,997	37,903	41,221	21,252	21,210	28,827	34,527	57,815	57,748	53,815
3) Commodities	1,034	966	1,562	1,475	1,057	2,067	1,700	2,800	2,511	2,030	3,300
4) Fixed and Sundry	5,184	40,553	54,995	48,824	47,054	51,332	51,650	51,772	80,074	67,040	106,329
5) Capital Outlay	1,158	1,741	179	480	870	2,003	2,777		608	4,369	
<b>Total</b>	<b>\$ 137,259</b>	<b>\$ 152,252</b>	<b>\$ 184,521</b>	<b>\$ 197,926</b>	<b>\$ 166,106</b>	<b>\$ 181,029</b>	<b>\$ 216,204</b>	<b>\$ 217,099</b>	<b>\$ 287,508</b>	<b>\$ 290,311</b>	<b>\$ 334,908</b>
<b>B) Disposal (Landfill)</b>											
1) Personal Services	\$ 37,569	\$ 36,808	\$ 40,888	\$ 40,784	\$ 42,998	\$ 43,460	\$ 46,500	\$ 55,500	\$ 92,220	\$ 131,957	\$ 170,690
2) Contractual Services	29,152	43,828	46,637	45,000	52,849	72,923	58,800	69,080	122,619	189,036	126,058
3) Commodities	4,246	9,151	9,001	10,000	6,327	2,509	8,000	2,000	5,261	4,061	12,360
4) Fixed and Sundry	2,028		1,648	3,533	2,372	2,576	3,440	3,999	5,755	7,381	7,356
5) Capital Outlay	112		3,530	28,000	126,105	27,589	39,100		25,141	14,558	84,116
<b>Total</b>	<b>\$ 83,107</b>	<b>\$ 89,787</b>	<b>\$ 101,704</b>	<b>\$ 127,317</b>	<b>\$ 230,681</b>	<b>\$ 149,057</b>	<b>\$ 155,840</b>	<b>\$ 130,579</b>	<b>\$ 250,996</b>	<b>\$ 346,943</b>	<b>\$ 400,530</b>
Tons Collected & Disposed			209,507	273,365	274,299	300,501	293,452	336,698	377,685	386,478	404,000
Private Haulers' Disposed			49,593	46,151	48,645	47,631	78,484	90,424	132,198	181,211	224,540
<b>Total Tons Disposed</b>			<b>259,100</b>	<b>319,516</b>	<b>321,944</b>	<b>348,132</b>	<b>371,936</b>	<b>427,322</b>	<b>508,083</b>	<b>567,689</b>	<b>628,040</b>
<b>Cost Per Ton</b>			<b>\$0.29</b>	<b>\$0.40</b>	<b>\$0.67</b>	<b>\$0.43</b>	<b>\$0.42</b>	<b>\$0.31</b>	<b>\$0.50</b>	<b>\$0.61</b>	<b>\$0.66</b>
<b>Garbage Collection</b>											
1) Personal Services	\$1,561,433	\$1,562,748	\$1,398,671	\$1,549,779	\$1,554,044	\$1,720,582	\$1,728,594	\$2,120,265	\$2,849,438	\$3,666,323	\$4,319,822
2) Contractual Services	262,087	262,386	247,447	294,610	278,873	329,727	295,560	326,060	540,650	624,166	398,977
3) Commodities	23,873	22,293	22,354	24,300	18,690	17,340	19,520	16,020	18,803	25,493	29,024
4) Fixed and Sundry	135,287	116,540	122,004	130,021	143,550	148,571	201,898	170,292	224,215	286,299	327,251
5) Capital Outlay	14,342	74,566	59,577	130,525	180,428	169,773	158,200	251,720	411,419	250,161	266,311
6) Debt Service	139,049	29,217	72,774								
<b>Total</b>	<b>\$2,136,071</b>	<b>\$2,066,750</b>	<b>\$1,922,827</b>	<b>\$2,129,235</b>	<b>\$2,175,585</b>	<b>\$2,385,963</b>	<b>\$2,403,772</b>	<b>\$2,861,222</b>	<b>\$4,044,525</b>	<b>\$4,852,432</b>	<b>\$5,341,385</b>
Tons Collected			122,816	132,002	142,241	156,551	155,643	165,967	189,600	185,693	192,000
<b>Collection Cost Per Ton</b>			<b>\$15.66</b>	<b>\$16.13</b>	<b>\$15.30</b>	<b>\$15.24</b>	<b>\$15.44</b>	<b>\$17.38</b>	<b>\$21.33</b>	<b>\$26.13</b>	<b>\$27.82</b>
<b>D) Trash Collection</b>											
1) Personal Services	\$ 88,682	\$ 136,108	\$ 333,135	\$ 350,416	\$ 327,375	\$ 362,600	\$ 520,102	\$ 717,144	\$ 825,942	\$1,067,354	\$1,328,426
2) Contractual Services	81,690	156,422	158,003	214,000	137,469	199,856	237,000	303,000	394,592	441,642	390,249
3) Commodities	224	1,037	558	2,000	1,133	642	1,500	1,550	1,365	3,213	7,000
4) Fixed and Sundry	2,669		11,897	28,200	25,320	27,949	27,949	58,254	70,441	88,472	100,351
5) Capital Outlay	57,670	70,740	105,888	206,495	269,427	271,453	230,783	361,050	76,003	161,815	227,230
<b>Total</b>	<b>\$ 230,955</b>	<b>\$ 314,207</b>	<b>\$ 609,481</b>	<b>\$ 801,111</b>	<b>\$ 780,724</b>	<b>\$ 862,500</b>	<b>\$1,036,235</b>	<b>\$1,440,998</b>	<b>\$1,368,343</b>	<b>\$1,762,496</b>	<b>\$2,058,056</b>
Tons Collected			86,691	141,363	151,058	143,950	137,809	170,731	183,285	200,785	212,307
<b>Collection Cost Per Ton</b>			<b>\$7.03</b>	<b>\$5.67</b>	<b>\$5.04</b>	<b>\$5.99</b>	<b>\$7.52</b>	<b>\$8.44</b>	<b>\$7.47</b>	<b>\$8.78</b>	<b>\$9.71</b>
<b>E) Incineration</b>											
1) Personal Services									\$ 7,527	\$ 50,342	\$ 164,268
2) Contractual Services										1,930	43,860
3) Commodities									360	4,840	21,847
4) Fixed and Sundry							\$ 377,983		84	3,730	12,891
5) Capital Outlay							200,000	\$ 137,500	279,078	5,378	49,200
6) Debt Service										273,965	284,528
<b>Total</b>							<b>\$ 577,983</b>	<b>\$ 137,500</b>	<b>\$ 287,049</b>	<b>\$ 340,185</b>	<b>\$ 576,574</b>
Tons Incinerated										49,990	111,53
<b>Cost Per Ton</b>											
<b>F) Model Cities</b>											
1) Personal Services											\$ 55,478
2) Contractual Services											21,036
3) Commodities											15,307
4) Fixed and Sundry											10,165
<b>Total</b>											<b>\$ 102,186</b>
<b>WASTE DIVISION TOTAL</b>	<b>\$2,587,392</b>	<b>\$2,623,096</b>	<b>\$2,818,533</b>	<b>\$3,255,599</b>	<b>\$3,333,066</b>	<b>\$3,578,549</b>	<b>\$4,390,034</b>	<b>\$4,810,533</b>	<b>\$6,238,421</b>	<b>\$7,592,367</b>	<b>\$8,813,619</b>
<b>TOTAL TONS (Unincorporated)</b>			<b>209,507</b>	<b>273,365</b>	<b>293,299</b>	<b>300,501</b>	<b>293,452</b>	<b>336,698</b>	<b>372,685</b>	<b>386,478</b>	<b>404,000</b>
<b>TOTAL COST PER TON</b>			<b>\$13.45</b>	<b>\$11.91</b>	<b>\$11.34</b>	<b>\$11.91</b>	<b>\$14.94</b>	<b>\$14.29</b>	<b>\$16.73</b>	<b>\$19.65</b>	<b>\$21.82</b>





- Residential Units: For garbage and trash collection and disposal, \$52 annually.
- Commercial Establishments: \$40 annually for 2 garbage cans. All additional waste collection and disposal services paid at the rate of \$1.60 per loose cu. yd. plus \$0.20 for each additional garbage can.

The following range for county disposal fees are charged for the disposal of waste matter listed below brought to the county-operated disposal sites and incinerators:

1. Equine or bovine carcasses, each \$8.00 to nonflammable liquids, per 100 gallons \$1.00.
2. Offal waste \$4.00/ton to minimum charge for disposal at \$2.50/ton.

Operating costs per ton for the various types of facilities used in the disposal of solid wastes are as follows:

Rubbish -

Incinerator or Processing	\$5.00
Milled Sanitary Landfill	3.10
Sanitary Landfill	3.30
Milling and Modified Landfill	2.50





## Trash

Milled Landfill	\$2.00
Landfill	1.00

A study conducted by Greenleaf/Telesca shows that on a countywide program, the annual cost of solid waste processing would increase as follows:

	<u>Rubbish</u>	<u>Trash</u>
1972	\$3.68/ton	\$1.00/ton
1990	9.08/ton	2.93/ton

The 1973-74 sanitation budget for each of the municipalities in Dade County is shown on Table IX.

There are several ways of obtaining the necessary financial assistance to aid in implementing a countywide solid waste program. It has been estimated that no major municipality within Dade County is capable of providing for its solid waste disposal within its own boundaries except for a limited period of time. It has also been suggested that a carefully coordinated countywide plan is needed to provide for the long range solid waste disposal on a countywide basis to prevent further environmental degradation. An overall county agency can avail itself of general county credit in financing at a substantial savings in interest rates over those required by revenue as other special financing procedures.





TABLE IX

## TOTAL AND SANITATION BUDGET FOR DADE COUNTY

GOVERNMENT AND MUNICIPALITIES, 1973-1974 (4)

<u>DADE COUNTY GOVERNMENT AND MUNICIPALITIES</u>	<u>TOTAL OPERATING BUDGET FOR 1973-1974</u>	<u>SANITATION BUDGET FOR 1973-1974</u>
1. Bay Harbour Village	655,196.87	118,220
2. Bay Harbor Islands	Not Available	Not Avail.
3. Biscayne Park	297,537	137,923
4. Coral Gables	16,846,721	2,117,408
5. El Portal Village	2,083,525	112,100
6. Florida City	625,788	45,000
7. Golden Beach	227,795	28,000
8. Hialeah	19,022,336	1,972,440
9. Hialeah Gardens	283,314	130,410
10. Homestead	295,219	313,379
11. Indian Creek Village	210,841	27,000
12. Islandia	12,000	0
13. Medley	484,000	0
14. Miami	68,714,516	8,385,498
15. Miami Beach	38,790,192	3,162,097
16. Miami Shores	1,496,000	249,496
17. Miami Springs	2,236,218	288,951
18. North Bay Village	1,095,106	94,000
19. North Miami	14,000,000	877,404
20. North Miami Beach	6,549,419	585,600
21. Pennsuco	Not Available	Not Avail.
22. Opa Locka	3,728,260	280,511
23. Sweetwater	802,690	0
24. South Miami	1,987,481	344,138
25. Surfside	2,083,525	112,100
26. Virginia Gardens	220,337	22,680
27. West Miami	832,385	95,707
28. Dade County	173,000,000	9,885,499





The Federal Solid Waste Disposal Act under Title II of Public Law 89-272, signed by the President on October 20, 1965, assumed new major responsibilities for the control and management of solid wastes and directed the Secretary of Health, Education and Welfare to initiate, encourage, and support a national program aimed at discovering and evaluating other methods of coping with solid waste problems. One of the major responsibilities granted to the Secretary was "to provide training, financial and technical assistance to local and state agencies so that they can survey their needs in the solid waste area and plan for the development and staffing of programs capable of meeting those needs now and in the years to come." Also, "encourage and support projects that may demonstrate new and improved methods of solid waste collection, handling and disposal."

In order to carry out these responsibilities, the Environmental Protection Agency was created. This agency has made grants and given other assistance to reduce the financial burden which must eventually be borne by the taxpayer. Some of the assistance programs are as follows:

Resource Recovery Grants: For the purpose of attracting the interests in the recovery of potentially valuable materials and energy.





Municipal Assistance in Financing: To minimize the capital expenditures by the county in absorbing the outstanding bond financing by the municipalities.

Private Sources of Financing: For the purpose of promoting specialized types of refuse disposal.

constraints, prohibitive, limited, and unfavorable purchasing policies, higher salvage. Moreover, since the costs of collection and transportation of municipal solid wastes are high the trend in urban areas has been towards the "one-man system" -- where all wastes are mixed in one can. Salvaging demands the separation of the wastes and this is a complicated and expensive operation.

1. Salvaging and recycling in DeWitt County. Paper and paper products are some of the wastes that are salvaged in DeWitt County. Their market value, however, fluctuates very much. For any other salvaged material and large amounts of waste paper are either incinerated or buried with other refuse.

Florida Processing Company recycles some books, office and stationery to produce a certain grade of paper. The by-products are sold to other companies. The waste paper is recycled at a plant in DeWitt County. Some waste paper is recycled through the waste management system at the DeWitt County Health Department. The waste management system at the DeWitt County Health Department is a recycling system which supplies the waste management system at the DeWitt County Health Department.



## G. SECONDARY MATERIALS INDUSTRIES (RECYCLING)

1. General. Salvaging and recycling wasted materials are methods of reducing solid wastes and of conserving natural resources. Although it is possible to examine and sort the wastes of a community, most cities hesitate to venture into salvaging. Many factors, such as economic and institutional constraints, prejudices, limited demand, and unfavorable purchasing policies, hamper salvaging. Moreover, since the costs of collection and transportation of municipal solid wastes are high the trend in urban areas has been towards the "one-can system"---where all wastes are mixed in one can. Salvaging demands the separation of the wastes and this is a complicated and expensive operation.

2. Salvaging and recycling in Dade County. Paper and paper products are some of the wastes that are salvaged in Dade County. Their market value, however, fluctuates more than for any other salvaged material and large amounts of waste paper are either incinerated or buried with other refuse.

Florida Processing Company reclaims some bones, offal, and other animal matter. A portion of scrap metals, including those in discarded automobiles, are recovered by scrap processors. Some reclamation of energy is realized through steam and heat generation at the 20th Street incinerator which supplies steam to Jackson Memorial Hospital.





3. Recycling Centers in Dade County. Table X presents some of the active recycling centers and collection stations in Dade County.

<u>Recycling Center</u>	<u>Materials Processed or Accepted</u>
ABC Scrap Metals Co. 2111 N.W. N. River Dr., Miami	ferrous & non-ferrous metals
ABC Iron & Metal Co. 2111 N.W. N. River Dr., Miami	ferrous & non-ferrous metals
Continental Can Company 1420 N.W. 110th St., Miami	aluminum, copper, brass
Everolds Aluminum Co. 4213 Bruce de Leon Blvd., Miami	aluminum cans
Walter Russell Metal 3741 N.W. 17th Avenue, Miami	aluminum cans
Scrap Metal Processing Co. 19120 Calvo Lane, Miami	ferrous and non-ferrous metals
Miscayne Paper Co. 2645 N.W. 33rd St., Miami	paper
Carbin Paper Stock Co. 1420 N.W. 37th Avenue, Miami	paper
Miami Waste Paper Co. 1170 N.W. 14th Avenue, Miami	paper
Waste Waste Paper Corkins Road, Miami	paper

#### 4. Collection Stations

Central Shopping Center	newspaper, glass, aluminum
Northside Shopping Center	" " "
Red Bird Shopping Center	" " "
Stephens Market	" " "
Westchester Shopping Center	" " "
University of Miami (Coville Avenue)	" " "
Florida International University-newspaper (107th St. Entrance)	newspaper only





TABLE X  
 RECYCLING CENTERS AND COLLECTION STATIONS  
 IN DADE COUNTY

<u>1. Recycling Centers</u>	<u>Materials Processed or Accepted</u>
ABC Scrap Metals Co. 3511 N.W. N. River Dr., Miami	ferrous & non-ferrous metals
AIMCO Iron & Metal Co. 3338 N.W. N. River Dr., Miami	ferrous & non-ferrous metals
Continental Can Company 3400 N.W. 110th St., Miami	aluminum, copper, brass
Reynolds Aluminum Co. 4450 Ponce de Leon Blvd., Miami	aluminum cans
Robert Russell Metal 5761 N.W. 37th Avenue, Miami	aluminum cans
Scrap Metal Processing Co. 13100 Cairo Lane, Miami	ferrous and non-ferrous metals
Biscayne Paper Co. 5646 N.W. 35th Ct., Miami	paper
Durbin Paper Stock Co. 5420 N.W. 37th Avenue, Miami	paper
Miami Waste Paper Co. 2120 N.W. 14th Avenue, Miami	paper
Simco Waste Paper Simkins Road, Miami	paper
 <u>2. Collection Stations</u>	
Central Shopping Center	newspaper, glass, aluminum
Northside Shopping Center	" " "
Red Bird Shopping Center	" " "
Stephens Market	" " "
Westchester Shopping Center	" " "
University of Miami (Levante Avenue)	" " "
Florida International University-newspaper (107th St. Entrances)	newspaper only





#### IV. DEVELOPMENT OF A SOLID WASTE POLICY FOR DADE COUNTY

##### A. THE GREENLEAF/TELESCA REPORT

The firm of Greenleaf/Telesca was retained in 1963 as a consultant to report on solid waste disposal in Dade County. In 1971, at the request of the Board of County Commissioners, this consulting firm was authorized to update their 1963 report as an element of the Metropolitan Dade County General Land Use Master Plan. In approaching the problem, the firm began with an in-depth study of present conditions and practices and considered the projected growth and development of the metropolitan area.

The "Engineering and Economic Report on Solid Waste Collection and Disposal for Metropolitan Dade County," commonly referred to as "The Greenleaf/Telesca Report,"<sup>(20) (17)</sup> was submitted to the County in May 1972. The thrust of the report is on an immediate program using proven processes and equipment with the suggestion that an evaluation of a number of new concepts and items for demonstration projects could be realized. In the immediate program, the report recommended the establishment of a county-wide agency to manage solid wastes. The Board of County Commissioners approved the report in its meeting of April 6, 1973.

The Greenleaf/Telesca report noted that none of the munic-





ipalities within the County had undeveloped areas that could be used for land disposal of solid wastes for an extended period of time. Since land is available in the unincorporated areas of the county, a metropolitan agency could provide the needed disposal areas. In addition, certain economic advantages to the taxpayers could be realized and these were estimated to be about \$1.05 per ton of wastes. The proposed system could be supported by user fees and taxes. This consolidation of effort was approved by the Planning Advisory Board and the County Commissioners.

As mentioned previously, the Greenleaf/Telesca Report made "no firm recommendations beyond those required for the immediate future...in order to allow time to evaluate the suggested demonstration projects as well as many innovative processes for converting, reclaiming, and recycling material which at present seem promising." The report concluded that incineration and sanitary landfilling of shredded wastes are the only proven methods capable of handling the large quantities of refuse generated within the county.

In regards to the landfilling operations, special consideration was given to the area's geographical condition including the prevalent high water table, the porosity of the limestone prevalent in the region, the low elevation of the land, and the scarcity of satisfactory material to be used as cover. The report outlines also the requirements for the sanitary landfills since the existing land disposal sites in Dade County violate





Federal and State regulations and are more appropriately described as dumps.

Incineration was also considered as an alternative solution for Dade County wastes and included the modernization of the 20th and 58th Street incinerators to increase their capacity while complying with Federal, State and local air quality standards.

In the implementation of both plans, incineration and land-filling, a county-wide application of milling (shredding) of the solid wastes is proposed. One justification for this additional processing step is that shredding is the first step in many of the recycling plans being developed. Shredding reduces also the volume of the wastes, thereby increasing the life-span of the sanitary landfills, and promotes faster biochemical decomposition of the wastes.

The Greenleaf/Telesca report noted that by the year 1990, land disposal of unshredded wastes would require approximately 190 acres of land per year; if the wastes were shredded, only 90 acres would be required. The report mentioned the full-scale projects carried out in Madison, Wisconsin, and in Pompano Beach, Florida, which have shown that shredding of wastes extends the life of a sanitary landfill by 30 to 40 percent. The scarcity of soil for cover material is also a problem in Dade County and the shredding of wastes would substantially reduce the amount of cover required.





## B. BOND ISSUE FOR SOLID WASTES

On election day, November 7, 1972, the voters of Dade County approved eight out of ten proposed county bond issues, for a total of \$533.1 million, to be spent for capital improvements. Included in this total was a \$50 million bond for improving the disposal of solid wastes. On this same date, the Metro Board of County Commissioners passed Ordinance No. 72-80 requiring public hearings to be held before any bond issue projects are authorized or implemented. It also gives the citizens a voice in determining which projects should have priority. Six public hearings were held to determine priorities for the bond issue projects.

Public response to the initial offering of \$66 million in bonds was excellent, with all of them purchased within two days. Several solid waste disposal projects were scheduled to be implemented with money from this first bond sale.

On September 4, 1973, the County Commission authorized the administration to advertise for proposals leading to solid waste disposal services throughout the County. Thirty-nine prospective bidders requested copies of the Request for Proposal. On November, 1973, 17 proposals were received and five of them were rejected because they failed to comply with the requirements. An Evaluation Committee was appointed by the County Commission to examine the 12 remaining proposals and informal public hearings and presentations were scheduled for December 1973. Mem-





bers of the Evaluation Committee visited also several sites throughout the country to observe some of the latest processes used in solid waste disposal. The proposals received included conventional incineration, shredding and landfilling, composting, and resource (material and energy) recovery.

On January 23, 1974, Mr. R. Ray Goode, Dade County Manager, reported to the Mayor and County Commissioners that he concurred with the recommendations of the Evaluation Committee "that we reject all bids and go into a second round of bidding." (31)

Individual municipalities have addressed themselves to the problem in one form or another, there is an evident lack of general coordination. Studies have shown that the most desirable and efficient method of solid waste management in urban areas involves a defined geographical area, usually comprising several municipalities and sometimes even the county.

As indicated in the report (Solid Waste Management) prepared by the National Association of Counties Research Foundation, (32) the advantages of areawide cooperative programs include: greater flexibility in locating disposal sites; reduction in costs of collection and processing; avoidance of siting and better coordination of air and water pollution control activities. An additional advantage, not mentioned in this early report, is that successful regulation and recycling of hazardous wastes depends on large volumes of wastes. Consequently, the solid waste management plan should consider the recommendation of areawide/countywide or statewide





### C. NEW APPROACHES TO SOLID WASTE MANAGEMENT

It would be unfair to expect the Greenleaf/Telesca report to cover in detail every aspect of the solid waste problem in Dade County. The difficulties in solid waste management range from the technological to the political and social.

The Solid Waste Management Class found, in analyzing the problem, that some areas could benefit from more governmental attention, especially at the state level. Although the individual municipalities have addressed themselves to the problem in one form or another, there is an evident lack of general coordination. Studies have shown that the most desirable and efficient method of solid waste management in urban areas involves a definite geographical area, usually comprising several municipalities and sometimes more than one county.

As indicated in the report (Solid Waste Management) prepared by the National Association of Counties Research Foundation,<sup>(32)</sup> the advantages of areawide cooperative programs include: greater flexibility in locating disposal sites; reduction in costs of collection and processing; economies of scale; and better coordination of air and water pollution control activities. An additional advantage, not mentioned in this early report, is that successful reclamation and recycling of discarded wastes depends on large volumes of wastes. Consequently, the Solid Waste Management class considers the recommendation of Greenleaf/Telesca to establish a county-wide





disposal agency as the first step in the proper management of solid wastes. It is the opinion of the class that efforts must be made to encourage the development of secondary materials industries which would reclaim and reuse discarded materials. Such industries will diversify the industrial sector, create employment opportunities, improve the disposal of solid wastes, and contribute to the conservation of several forms of energy.

To this effect, the advantages of creating a Regional or even a State Authority on solid waste management should be thoroughly explored and evaluated. Such Authority could determine the optimal program or programs, the optimal extent of the geographical areas, and the best location of the processing plants. It should be noted that at least two states, Wisconsin and Connecticut, have established state-wide authorities to manage the solid waste problem.

The regional approach has been used in land use, transportation, flood control, and other activities. The same approach should be effective in the management of solid wastes without impinging in the rights of the municipalities. Delay will not solve the problem but, on the contrary, will aggravate it. Since by the year 2,000 about 85 percent of the population of this country is expected to reside in metropolitan areas.

A regional agency may offer other important benefits such as encouraging accountability to the public. The multiplicity of agencies dealing with municipal problems leads to multiplicity of efforts and directions and discourages or dilutes ac-





countability to the public. On the other hand, it is essential to have a mechanism of checks and balances to avoid the concentration of power in one particular agency. Because solid wastes is a public problem, public awareness, cooperation and participation is imperative for the reclamation and recycling of discarded resources. Therefore, it is highly desirable to develop educational and informational programs for the average citizens.

planning programs at the municipal, county, and state levels.

**Solution.** Develop a desirable, comprehensive, economically self-supporting plan which will include economic and environmental advantages of a regional approach. The plan need not depend exclusively on a traditional method of disposal such as incineration or landfilling. Serious consideration should be given to other disposal methods and to reclamation of materials, or to a combination of methods.

**Problem 2.** Several agencies have a direct but fragmentary responsibility for solid wastes which often hampers progress towards an overall objective.

**Solution.** Consolidate in one agency all solid waste activities but subject to environmental and fiscal supervision by the public, local, and county governments.





#### D. SOME PROBLEMS AND POSSIBLE SOLUTIONS

In the opinion of the Solid Waste Management class, the following represent some of the factors hindering the proper management of wastes; in a constructive effort, the Class also presents a possible solution to each problem:

**Problem 1.** Lack of long-range, comprehensive solid waste planning programs at the municipal, county, and state levels.

**Solution.** Develop a desirable, comprehensive, economically self-supporting plan which will include economic and environmental advantages of a regional approach. The plan need not depend exclusively on a traditional method of disposal such as incineration or landfilling. Serious consideration should be given to other disposal methods and to reclamation of materials, or to a combination of methods.

**Problem 2.** Several agencies have a direct but fragmentary responsibility for solid wastes which often hampers progress towards an overall objective.

**Solution.** Consolidate in one agency all solid waste activities but subject to environmental and fiscal supervision by the public, local, and county governments.



Problem 3. Lack of legislation at State level covering all phases of solid waste management.

Solution. Enact solid waste legislation at the state level to provide regions, counties, and municipalities with a uniform set of rules and regulations. The creation of Regional or State Solid Waste Authority should be considered. The State Legislature could consider the "Suggested State Solid Waste and Resource Recovery Incentives Act,"<sup>(33)</sup> as approved by the Council on State Governments, as a starting point.

Problem 4. Need for public information and education.

Solution. Develop a program of public information and education to help citizens understand the solid waste problem and to respond to the challenge. The help of the State University System, environmental organizations, and private industry and business groups would be valuable.

Problem 5. Need to develop markets for products made with recycled materials.

Solution. State, County and Municipal Governments should not, when planning solid waste programs, circumvent the Secondary Material Industries (recycling industries). Through encouragement and incentives for private





industry, these governments can expand the markets for the utilization of solid waste materials.

Although solid waste management is a complex problem, a comprehensive management plan is feasible and within legislative reach. Indeed, the State of Wisconsin conducted an engineering study<sup>(34)</sup> which recommended the creation of a state-wide municipal solid waste reclamation authority. This authority, "divided into regions, will permit the regions to operate independently, but as interrelated and cooperating entities."

To support the conclusion and recommendation that the best interests of the State require that municipal solid waste reclamation be administered on a regional basis, the Wisconsin report noted that such an Authority can:

- a. Make long-term financial and contractual commitments.
- b. Consolidate municipal solid waste operations by providing a means of crossing lines of local political jurisdiction.
- c. Operate on a scale large enough to be efficient and economical.
- d. Make maximum use of private enterprise in municipal solid waste reclamation.





- e. Provide flexibility in operations to accommodate local conditions.
- f. Assure environmentally acceptable municipal solid waste disposal to all citizens of the State.
- g. Provide materials to markets in sufficient quantity and reliability to be attractive to purchasers.
- h. Permit the step-wise development of municipal solid waste reclamation facilities in pace with market development."

Considering not only the large amounts of wastes discarded annually--30 million tons of paper, 4 million tons of plastics, 48 billion metal cans, and 26 billion glass containers, for example--and the fact that some of the raw materials represent nonrenewable resources and that large amounts of energy are required to manufacture these products, reclamation and recycling is a logical and desirable policy.

The Returnable/Reusable Beverage Containers. There is evidence that a deposit on beverage containers encourages their return for reuse rather than being thrown away. The "Oregon Bottle Bill" has demonstrated the wisdom of legislation establishing a





## E. RECOMMENDATIONS

Introduction. Solid wastes may be considered mismanaged or wasted resources and any solid waste management program should consider the recovery and reuse of these resources. The recovery, however, should not be limited to the energy liberated through combustion; the approach should be from the point of view of the total environment including soil conservation and reclamation, the protection of both the freshwater and the marine environment, integration with land use plans, and even source reduction of solid waste by minimizing unnecessary consumption and/or increasing the reusability of certain products. It is acknowledged that although the recovery and reuse of certain wasted materials may not be economically viable at a particular time, this should not be an a priori decision applicable to all wastes. The recycling and reclamation of wastes have at least three benefits:

1. They reduce the quantity of solid wastes to be disposed.
2. They reduce the quantity of virgin resources used (35)
3. They reduce the amount of fuel (energy) needed to manufacture products since it is usually more efficient to recycle or reclaim than to manufacture from virgin products.

The Returnable/Reusable Deposit Containers. There is evidence that a deposit on beverage containers encourages their return for reuse rather than being thrown away. The "Oregon Bottle Bill" has demonstrated the wisdom of legislation establishing a



