

Broward County,
Florida



NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.

**Solid Waste Energy Recovery Facility -
Application for Power Plant Site Certification**

**MALCOLM
PIRNIE**

Volume I -
Hilton Road Site
Technical Submittal

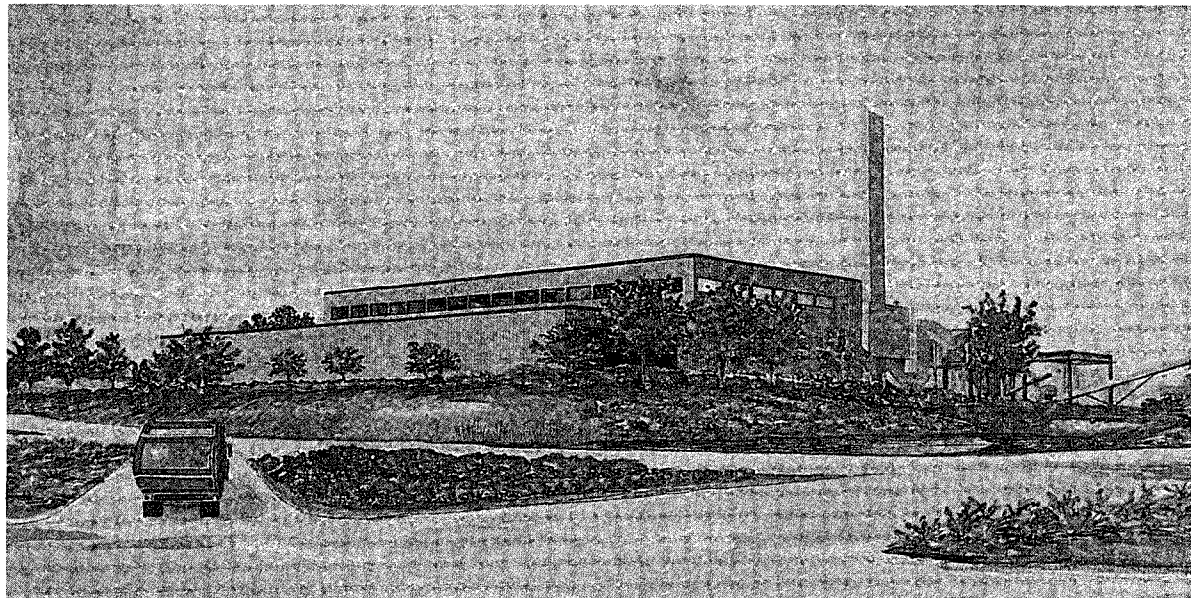
North Broward County Resource Recovery Project, Inc.

Solid Waste Energy Recovery Facility Application for Power Plant Site Certification

Volume I - Hilton Road Site - Technical Submittal

Submitted By
The Broward County
Board of County Commissioners

Gerald Thompson, Chairman
Howard Forman, Vice Chairman
Scott I. Cowan Howard Craft
Ed Kennedy Sylvia Poltler
Nickl Englander Grossman



Floyd T. Johnson, County Administrator
Thomas M. Henderson, Director, Resource Recovery Office

February 1986

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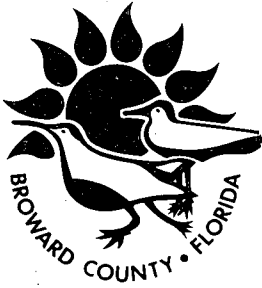
**NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT, INC.
SOLID WASTE ENERGY
RECOVERY FACILITY**

**APPLICATION FOR
POWER PLANT SITE CERTIFICATION -
HILTON ROAD SITE**

**Submitted By
The Broward County Board of
County Commissioners**



February 1986



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 24, 1986

State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Attention: Mr. Hamilton Oven, P.E.
Power Plant Siting Section

Re: Power Plant Site Certification Application
North Broward County Resource Recovery Project, Inc.

Gentlemen:

On behalf of the Broward County Board of County Commissioners and North Broward County Resource Recovery Project, Inc., this application for certification under Chapter 17-7, FAC for construction and operation of the referenced project is herewith submitted for Departmental review. Also herewith transmitted, in conjunction with the application itself, is the requisite \$25,000 fee per FAC Rule 17-7. This application has been prepared in accordance with the intent of the Power Plant Siting Act as set forth in Chapter 403, Florida Statutes, the requirements of the Electrical Power Plant Siting Regulations as set forth in Rule 17-7 FAC and the format and informational requirements of Electrical Power Plant Site Certification Applications as set forth in Florida Department of Environmental Regulation Form 17-1.211(72).

Please note that the co-applicant for this certification, North Broward County Resource Recovery Project, Inc., as owner and operator of the referenced project, constitutes a legal corporation incorporated in the State of Florida for the purpose of providing solid waste disposal and resource recovery services. The parent of this corporation during the construction and operation of the proposed facility will be a partnership established by Waste Management, Inc. and Morrison-Knudson Company, Inc., the vendor selected by the County to develop this project.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

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Mr. Hamilton Oven, P.E.
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Broward County has, since 1981, been engaged in planning and engineering studies designed to implement a sound program of solid waste management. The resource recovery program identified through these efforts, of which the referenced project is an integral part, will provide Broward County a proven and reliable means of solid waste disposal which is necessary to resolve the capacity limitations of its existing landfills. Expeditious implementation of the identified program is critical to the continued ability of Broward County to dispose of such waste in an environmentally and economically acceptable manner and thereby help preserve the public health and environment and maintain the standard-of-living and well-being of the County citizenry.

Several significant accomplishments have marked efforts to implement the proposed resource recovery program and realize the above stated objective. Firstly, Broward County has secured financing for the program through the issuance of Industrial Development Bonds which, with a total bond issue in excess of 521 million dollars, represents the largest bond issue undertaken to date in the United States for a single resource recovery program. These funds must, however, be committed to construction by February 26, 1987.

Secondly, the County selected two full-service vendors in July 1985 to enter into construction and service agreements with the County. An affiliate of Waste Management, Inc. and Morrison-Knudson Company, Inc. will be the vendor for the North Broward County Project.

Thirdly, significant progress has been made in obtaining permits for the Southern Resource Recovery Project including proceeding under Chapter 17-17, FAC.

Fourthly, the Florida Public Service Commission on January 7, 1986, approved the Northern Broward County Resource Recovery Project petition required by Chapter 403,FS, for all applicants under the Power Plant Siting Act.

Finally, the County has made significant progress toward reaching an interlocal agreement for waste flow control with the 28 municipalities in the County.

As discussed above, it is imperative that the proposed resource recovery program be implemented at the earliest possible time in order for Broward County to provide solid waste disposal services for its citizenry in the near future. Failure to do so will jeopardize not only the future social vitality of Broward County, but may, in the absence of available disposal alternatives, compromise the existing quality of environmental resources in the

Mr. Hamilton Oven, P.E.
Page Three

area by continuing sole reliance on landfill practices for disposal of the County's solid waste stream. Therefore, Broward County is prepared to commit, consistent with applicable regulatory requirements and provisions, those resources necessary for expeditious implementation of the referenced project. Our current schedule, which is based on having the referenced project facilities on-line and available to serve Broward County needs by early 1989 dictates that construction commence on the proposed site by the end of 1986.

We sincerely believe that the issues to be determined in review of this application for certification are very limited in contrast to the recent applications covering the Southern Broward County and Palm Beach County Projects. Further, the major issues associated with this Project, air emissions and storm water management, are already well known to both the applicant and reviewing agencies. We would, therefore, hope that the review of this application and issuance of certification can be expedited to a significant degree.

We would hope the required hearings on the application can be held in late this Spring or early Summer. This will require coordination of all of the agencies involved, but should be possible because of the limited number of issues, familiarity of agencies with the proposed project and issues and the urgent need to complete the certification process by mid-October. This deadline is a significant one since maintaining financing of the project is dependent upon completing all required permitting activities by that time. Failure to secure financing and beginning construction this Fall would at best cost many additional millions of dollars and at worst could make the project unfinancable due to restrictions already imposed by Congress which limits bonding capacity of state and local government.

You continued cooperation and assistance will be sincerely appreciated.

Very truly yours,



Thomas M. Henderson
Project Director
Broward County Resource Recovery Office
and
Attorney-in-Fact
North Broward County Resource Recovery Project, Inc.

NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.
SOLID WASTE ENERGY RECOVERY FACILITY

POWER PLANT SITE CERTIFICATION APPLICATION
HILTON ROAD SITE

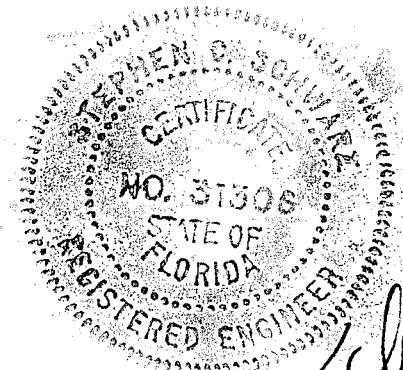
SUBMITTED BY

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS
Broward County Governmental Center
115 S. Andrews Avenue
Fort Lauderdale, Florida 33313

FEBRUARY 1986

MALCOLM PIRNIE, INC.
2 Corporate Park Drive
P.O. Box 751
White Plains, New York 10602

MALCOLM
PIRNIE



Stephen C Schwarz

SUN BANK/SOUTH FLORIDA N.A.
P.O. BOX 5100
FORT LAUDERDALE, FLORIDA 33310

BOARD OF COUNTY COMMISSIONERS

BROWARD COUNTY

FORT LAUDERDALE, FLORIDA

63-607
670

NO. 0093019

PAY

REVENUE \$25,000.00

DATE 02/20/86 CHECK NO. 93019

AMOUNT
*****25,000.00



WCDS REVENUE/CENTRAL OPERATING ACCOUNT

TO
THE
ORDER
OF

FLORIDA DEPT. OF ENVIRONMENTAL REGULATION
2600 BLAIR STONE RD TWIN TOWERS BLDG.
TALLAHASSEE, FLORIDA 32301

VOID AFTER 90 NINETY DAYS
Beard & Chanf
CHAIRMAN BOARD OF COUNTY COMMISSIONERS
F. J. Johnson
AUTHORIZED SIGNATURE

[REDACTED]

NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.
SOLID WASTE ENERGY RECOVERY FACILITY
APPLICATION FOR POWER PLANT SITE CERTIFICATION
BROWARD COUNTY, FLORIDA

APPLICANT INFORMATION

Applicant's Official Name: Broward County Board of County
Commissioners and
North Broward County Resource Recovery
Project, Inc.

Address: c/o CT Corporation System
8751 West Broward Boulevard
Plantation, Florida 33324

Business Entity: A Florida Corporation

Name and Title of Business Head: Andrea K. Feirstein
Member, Board of Directors

Name, Title and Address of
Representative Responsible
for Obtaining Certification Thomas M. Henderson
Attorney-in-Fact
Room 521
115 South Andrews Avenue
Ft. Lauderdale, Florida 33301

Site Location: County: Broward
Address: 2700 Hilton Road (N.W. 48th St.)
Pompano Beach, Florida 33060
(Unincorporated Area)

Latitude: 26° 17' 13" N

Longitude: 87° 09' 35" W

UTM Zone: 17

UTM x coordinate: 583.8 km

UTM y coordinate: 2907.6 km

Township and Range:

T48S, R42E, Section 16

Location of Any Directly
Associated Transmission
Facilities: Florida Power and Light Company Substation

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SOLID WASTE ENERGY RECOVERY FACILITY
APPLICATION FOR POWER PLANT SITE CERTIFICATION
BROWARD COUNTY, FLORIDA

APPLICANT INFORMATION (continued)

Nameplate Generating Capacity
of Proposed Facility:

55.5 megawatts

Ultimate Generating Capacity
for Certification

83.25 megawatts

Purpose of Project:

The purpose of the proposed solid waste-fired electrical power plant is to dispose of solid waste and recover energy and possibly materials. This proposed facility will afford Broward County a method of solid waste disposal as a substitute for the present sanitary landfilling operations and in doing so generate enough electricity to service over 40,000 homes annually.

BROWARD COUNTY
RESOURCE RECOVERY PROJECT

o Consulting Engineering Team

Malcolm Pirnie, Inc.
2 Corporate Park Drive
White Plains, NY 10602

Hazen & Sawyer, P.C.
5950 Washington Street
Hollywood, FL 33023

William F. Cosulich Associates, P.C.
1 Crossways Park West
Woodbury, NY 11797

Keith & Schnars, P.A.
1115 N.E. 4th Ave.
Ft. Lauderdale, FL 33304

Environmental Science and Engineering, Inc.
P.O. Box ESE
Gainesville, FL 32602

Cal Recovery Systems, Inc.
160 Broadway
Suite 200
Richmond, CA 94804

KBN Engineering and Applied Sciences, Inc.
P.O. Box 14280
Gainesville, FL 32604

o Special Counsel

Greenberg, Traurig, Askew, Hoffman,
Rosen & Quentel, P.A.
1401 Brickell Avenue
Miami, FL 33131

o Bond Counsel

Brown, Wood, Ivey, Mitchell and Petty
One World Trade Center
New York, NY 10048

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BROWARD COUNTY
RESOURCE RECOVERY PROJECT

o Financing Advisor

Lazard Freres and Company
1 Rockefeller Plaza
New York, NY 10020

o Senior Co-Managing Underwriters

Kidder Peabody and Company
10 Hanover Square
Public Finance Department
New York, NY 10005

Smith Barney, Harris Upham and Company
1345 Avenue of the Americas
New York, NY 10105

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NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.
SOLID WASTE ENERGY RECOVERY FACILITY
APPLICATION FOR POWER PLANT SITE CERTIFICATION

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ABBREVIATIONS AND ACRONYMS

AADT	-	Average annual daily traffic
AAQS	-	Ambient air quality standard
ADT	-	Average daily traffic
AMSL	-	Above mean sea level
AGL	-	Above grade level
AQCR	-	Air Quality Control Region
AQS	-	Air quality standards
ASHRAE	-	American Society of Heating, Refrigerating and Air Conditioning Engineers
BACT	-	Best available control technology
BCEQCB	-	Broward County Environmental Quality Control Board
BCLUP	-	Broward County Land Use Plan
BCNRWTP	-	Broward County North Regional Wastewater Treatment Plant
BCUD	-	Broward County Utilities Division
CDSL	-	Central Disposal Sanitary Landfill
CEC	-	Cation exchange capacity
CM/SEC	-	Centimeters per second
CO	-	Carbon Monoxide
COD	-	Chemical Oxygen Demand
CY	-	Cubic yards
DAHRM	-	Division of Archives History and Records Management (Florida Department of State)
dBA	-	Decibel (A-weighted scale)
DER	-	Florida Department of Environmental Regulation
DRC	-	Broward County Development Review Committee
DO	-	Dissolved Oxygen
DRI	-	Development of Regional Impact
ESP	-	Electrostatic precipitator
FAA	-	Federal Aviation Administration
FAAQs	-	Florida Ambient Air Quality Standards
FAC	-	Florida Administrative Code
FDER	-	Florida Department of Environmental Regulation
FEMA	-	Florida Emergency Management Agency
FGD	-	Flue Gas Desulfurization
FLUCCS	-	Florida Land Use and Cover Classification System
FML	-	Flexible membrane liners
FP&L	-	Florida Power and Light Company

ABBREVIATIONS AND ACRONYMS (continued)

GEP	-	Good Engineering Practice
gpd	-	Gallons per day
gpm	-	Gallons per minute
gr/dscf	-	Grains per dry standard cubic foot
HDPE	-	High Density Polyethylene
HSR	-	Highest Second Highest Concentration
Hz	-	Hertz
ILA	-	Interlocal Agreement for Solid Waste Disposal Service
ISCST	-	Industrial Source Complex Short-Term Model
kips	-	Kilopounds (1000 pounds)
km	-	Kilometers
kV	-	Kilovolt
kw	-	Kilowatt
LAER	-	Lowest Available Emission Rate
m ³	-	Cubic meter
MCL	-	Maximum Contaminant Level
mgd	-	Million gallons per day
mg/l	-	milligrams per liter
mps	-	Meters per second
MSL	-	Mean Sea Level
mw	-	Megawatts
NAAQS	-	National Ambient Air Quality Standards
NGVD	-	National Geodetic Vertical Datum
NHPA	-	National Historic Preservation Act
NOAA	-	National Oceanographic and Atmospheric Administration
NPDES	-	National Pollutant Discharge Elimination System
NSSFC	-	National Severe Storms Forecast Center
NSPS	-	New Source Performance Standards
NWS	-	National Weather Service
NO ₂	-	Nitrogen Dioxide
ppm	-	Parts per million
PSC	-	Public Service Commission
PSD	-	Prevention of Significant Deterioration
psi	-	Pounds per square inch
psf	-	Pounds per square foot
P.U.D.	-	Planned Unit Development
PURPA	-	Public Utility Regulatory Policies Act
PVC	-	Polyvinyl Chloride

ABBREVIATIONS AND ACRONYMS (continued)

RCRA	-	Resource Conservation & Recovery Act
RFP	-	Requests for Proposals
SCA	-	Specific Collection Areas
SCS	-	Soil Conservation Service
SELS	-	Severe Local Storms
SES	-	Signal Environmental Systems
SHPO	-	State Historic Preservation Officer
SIA	-	Significant Impact Area
SIL	-	Significant Impact Level
SIP	-	State Implementation Plan
SO ₂	-	Sulfur Dioxide
SR	-	State Road
SW	-	Solid Waste
SFWMD	-	South Florida Water Management District
tpd	-	tons per day
tpy	-	tons per yard
TSP	-	Total Suspended Particulates
USCOE	-	U.S. Army Corps of Engineers
USEPA	-	United States Environmental Protection Agency
USFWS	-	United States Fish and Wildlife Service
USGS	-	United States Geological Survey
vpd	-	vehicles per day
vph	-	vehicles per hour
WMI	-	Waste Management, Inc.

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Introduction

Broward County can no longer rely on conventional land-filling as its only method of solid waste disposal for practical, environmental, economic and social reasons. As in many other urban Florida counties, the expansion of existing, or siting and development of new, landfills has become increasingly difficult. The decreasing availability of land, stricter regulation of both the development and operation of landfills and neighborhood opposition have all contributed to this situation. At the same time, State policies have encouraged local governments to look more and more to the recovery of the material and energy resources found in solid waste.

Broward County's decision to build a solid waste energy recovery facility is the result of nearly seven years of research, analysis and planning. Since 1978, the Broward County Board of County Commissioners has been working to find a viable long-term alternative to sanitary landfilling. The County started this effort soon after the State of Florida enacted Section 403.706, Florida Statutes, requiring urbanized counties like Broward to submit resource recovery and solid waste management plans. Numerous studies, commissioned by the County since 1978, have demonstrated the need for resource recovery as a long-term solution to the County's solid waste disposal needs. The filing of this application for the North Broward County Resource Recovery Project, Inc. represents the County's continuous efforts to reach its solid waste disposal objectives.

Purpose of Proposed Facility

The purpose of the facility is to dispose of solid waste generated predominantly within Northern Broward County. Non-combustibles and inert ash residue resulting from the plant's

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combustion process will be landfilled at a landfill owned by Waste Management, Inc. of Florida and located adjacent to the Project site. The permits required for construction and operation of this landfill have already been issued.

The electrical power derived from the combustion of the refuse is an additional benefit of the Project. Electrical energy sales to Florida Power and Light Company (FP&L) will help offset the overall cost of the Project. The County will contract with a full-service vendor controlled by Waste Management, Inc. to design, construct, and operate the Project for 20 years with four, five year renewal option periods totaling twenty years.

The Project is designed to meet the State's goal of enhancing environmental quality and preserving natural resources. Broward County is committed to protecting its groundwater and surface water resources by among other things, reducing its reliance on sanitary landfilling of solid wastes. The only viable means for Broward County in achieving these goals is through a solid waste-fired electrical power plant.

Site Location

Pursuant to Section 403.506, Florida Statutes, Broward County is applying for certification for a solid waste-fired electrical power plant on a 25 acre tract in unincorporated Broward County at Powerline and Hilton Roads in Section 16, Township 48 and Range 42. The Project site is well located to serve Northern Broward County. Access is available for on site interconnection to Florida Power and Light Company transmission lines.

Section 403.506 Florida Statutes states that any power plant or steam generating plant with a rated capacity of 50 megawatts or larger must be certified as a power plant site. The North Broward Resource Recovery Facility is proposed to

have an initial capacity of 55.5 megawatts and, therefore, falls under the site certification process.

Facility Description

The Project will be a mass-burn resource recovery facility with an initial continuous design rated capacity of 2,200 tons per day of solid waste and a gross electrical generating capacity of approximately 55.5 megawatts. In anticipation of future disposal needs, Broward County is seeking certification for an initial site electrical generating capacity of approximately 55.5 megawatts with consideration of an ultimate generating capacity of approximately 83.25 megawatts (gross), using 3300 tons per day of solid waste.

Application Overview

This application has been prepared in accordance with the State of Florida Department of Environmental Regulation (DER) Chapter 17-17 Rules and follows the format prescribed in DER Form 17-1.211(1), FAC (Instruction Guide for Certification Applications: Electrical Power Plant Site, Associated Facilities, and Associated Transmission Lines).

This application consists of two (2) volumes:

Volume I (Application) - contains the Applicant Information Sheet, Sections 1-9 as presented in the DER Instruction Guide, and a listing of references.

Volume II (Appendices) - contains Section 10, Appendices 10.1 through 10.17 of the application.

As required by Rule 17-17.121 (3) (a), FAC three (3) separately bound copies of materials which show the procedures being taken to accomplish compliance of the site with existing land use plans and zoning ordinances are included as well. This compilation of information is referred to as the "Compliance Document" and is entitled "Compilation of Information - Hilton Road Zoning and Land Use."

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Principal Findings

The Project will be designed and operated to meet all applicable Federal, State, Regional and County standards. As planned, the Project will have minimal impact on the surrounding environment. The analysis presented in this application supports these findings and is summarized as follows:

- o Determination of Need - On January 7, 1986 the Florida Public Service Commission (PSC) approved a resolution ordering issuance of a preliminary order of approval of Broward County's petition which determined a need for a solid waste fired electrical generating facility exists in northern Broward County pursuant to 404.519, F.S. and Section 25-22.80, FAC.
- o Air Quality - As discussed in Sections 3.4, Air Quality, the combustion process for the facility will be environmentally sound. The results of the Prevention of Significant Deterioration (PSD) analysis indicate:
 - Best Available Control Technology/Lowest Achievable Emission Rate (BACT/LAER) for the proposed source is the use of emission controls inherent to the system design with Electrostatic Precipitators (ESP) designed to meet an outlet grain loading well within Federal and State regulations;
 - The facility will operate in compliance with the Prevention of Significant Deterioration (PSD) increments, National Ambient Air Quality Standards (NAAQS), and Florida Ambient Air Quality Standards (FAAQS) for all criteria pollutants;
 - Fugitive dust created during construction of the facility is addressed in Section 4.5. With suggested standard mitigative measures, there will be no adverse effects due to fugitive emissions;
 - Total suspended particulates (TSP) are examined in Section 5.6.1 and Appendix 10.1.5. The proposed resource recovery facility emissions will result in an ambient impact well within Florida Ambient Air Quality Standards for TSP;
 - As discussed in Section 3, the tipping area and refuse bunker will be enclosed and under nega-

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tive air pressure. Thus, odors will be contained within the resource recovery building. Odors within the building will be drawn into the furnace and destroyed through the combustion process; and

- The emissions from the facility will not have any adverse effect on surrounding soils, vegetation or visibility.
- o Land Use and Zoning - The Project site is designated industrial in the Broward County Land Use Plan (BCLUP) and the Unincorporated Area Land Use Element (UALUE). Resource recovery is a utility (for solid waste disposal) and, as such, is an allowable use under the industrial designation.

Resource recovery is consistent with and meets the goals and objectives of the Land Use Plans, the Traffic Circulation and Mass Transit, Drainage, Aviation, Utility, Economic Development, Solid Waste and Intergovernmental Coordination Elements of the Broward County Comprehensive Plan.

The rezoning request for Planned Unit Development for Planned Special Complexes is in conformance with the permitted nonresidential uses listed under "Planned Special Complexes" (Section 39-883(b)(3)) of the Broward County Zoning Code.

- o Noise - As discussed in Section 5.7, during operation of the resource recovery facility noise levels at the closest residence would not increase by a level perceptible to the human ear.
- o Traffic - As discussed in Section 5.9, the solid waste energy recovery facility will not increase daily traffic on Powerline and Hilton Roads. The analysis shows that there will be no capacity problems on these existing streets.
- o Surface Water and Groundwater - As discussed in Section 4.2 and 4.3, all plant process water will be drawn from county supply facilities and all wastewater will go to the North Regional Wastewater Treatment Plant. Potable water will be used in small quantities in the personnel areas of the plant and for boiler make-up. Cooling water will be secondary effluent supplied from the North Regional Wastewater Treatment Plant. All plant water will be recycled whenever possible. Runoff from vegetated

areas, paved areas, and rooftops will be collected in onsite stormwater retention/detention basins. Refuse storage and ash/residue handling unit operations within the proposed facility will be covered and therefore, will not come into physical contact with precipitation or associated runoff. There will be no influence on groundwater quality as a result of the planned construction or facility operation.

- o Soil and Foundation Conditions - As discussed in Section 2.3.1, preliminary subsurface data indicate that certain surface conditions at the Project will require specific site preparation and subsurface foundation design. These subsurface conditions are considered typical of those normally encountered in the immediate area and will be addressed by appropriate site preparation and foundation design.
- o Plant and Animal Communities - No special plants, terrestrial/palustrine natural communities or aquatic natural communities are known or expected to occur within five miles of the Project site.
- o Archaeological Sites and Historic Preservation Areas - As discussed in Section 5.10, there are no historic or prehistoric resources known to be present within the Project site boundaries as confirmed by field investigations. Projected use of the Project site will therefore not impact any historic or prehistoric cultural resources.

Project Status

The Broward County Board of County Commissioners selected, after an extensive evaluation process, Waste Management, Inc. (WMI) as the vendor for the North Broward County Resource Recovery Project on July 2, 1985. WMI will be required to guarantee compliance with all terms and conditions of the Site Certification and County Development Order conditions through a binding contract with the County. Negotiations on the construction and service agreements are underway and are expected to be concluded by the first quarter of 1986.

Construction is scheduled to begin in December, 1986. The projected in-service date for the facility is April 1, 1989. The projected capital cost for the initial project

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development is approximately \$167 million. The County has issued \$521 million in adjustable rate industrial revenue bonds to cover the cost of developing the Project and other associated solid waste disposal projects.

The County, Waste Management and FP&L are presently discussing the details and means of providing an interconnection with FP&L's system and the rates to be paid for electrical energy sales. Based on FP&L's preliminary investigation of electrical interconnection requirements, there does not appear to be a need for new transmission line corridors or any other long narrow siting corridors (e.g., rail lines, or influent or effluent pipelines) that would leave the area near the proposed facility or adjacent landfill (see Section 6 - Transmission Lines and Other Linear Facilities).

The County has also made significant progress toward achieving an Interlocal Agreement for solid waste disposal services with the 28 municipalities in the County. This Agreement is expected to be finalized in early 1986.

NEED FOR POWER AND THE PROPOSED FACILITIES

NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.
SOLID WASTE ENERGY RECOVERY FACILITY
APPLICATION FOR POWER PLANT SITE CERTIFICATION

SECTION 1

NEED FOR POWER AND THE PROPOSED FACILITY

1.1 Overview

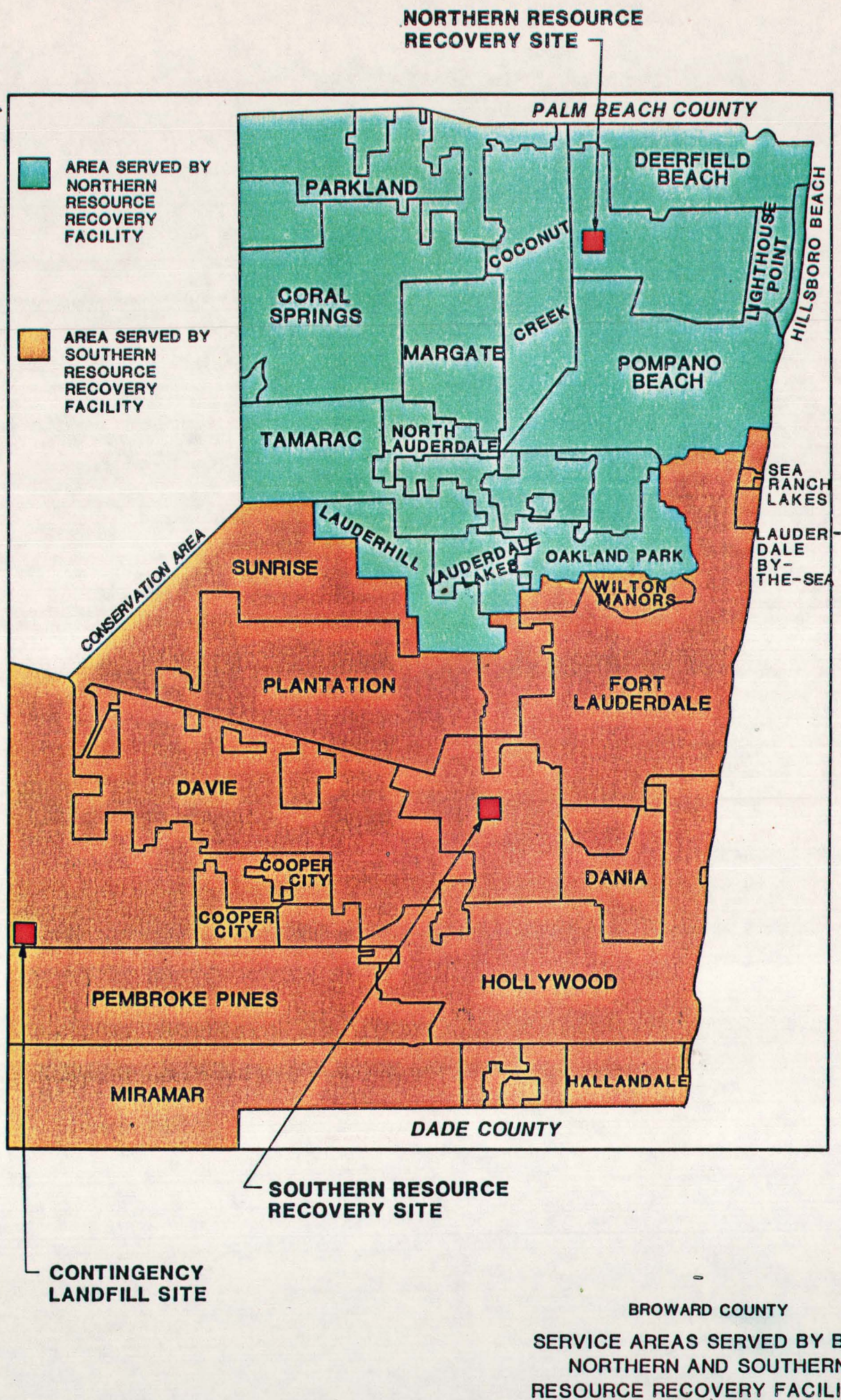
The Broward County Resource Recovery System has been selected as the best alternative for meeting Broward County's long-term solid waste disposal needs. This system will:

- o dispose of garbage and trash in an environmentally sound manner;
- o reduce the need for siting and developing a raw garbage landfill;
- o recover energy by using solid waste as a fuel to produce electricity and;

Broward County is proposing to develop as initial parts of the system two mass-burning resource recovery facilities, an ash residue landfill, and a contingency landfill site (see Figure 1.1.1). The proposed North Broward County facility, which is the subject of this Application, will be located on a 25 acre tract in unincorporated Broward County on Hilton Road (N.W. 48th Street) between Powerline Road and the Florida Turnpike.

1.2 Introduction

Broward County occupies an area of approximately 1,200 square miles and is located in the southeastern portion of the State of Florida. Broward County is bounded on the north by Palm Beach County, on the east by the Atlantic Ocean, on the south by Dade County and on the west by Hendry and Collier



Counties. The estimated 1985 population of the County was 1.1 million persons.

Over 1.3 million tons of solid waste are generated in Broward County each year. This amount is expected to increase to over 2 million tons by the year 2010. The County, at the present time, depends solely on landfills for disposing of solid waste. Given the present generation rate of solid waste (approximately 3,300 tons per day) the County's two landfills will reach the end of their useful lives within a few years. The County owned and operated landfill in Davie has been recently expanded to its maximum capacity, but will be completely filled in 1987. The Waste Management, Inc., Central Disposal Site located near Pompano Beach will be expanded in the next few years, but will reach its maximum capacity in the mid-1990's.

As in many other urban Florida counties, the expansion of existing or siting and development of new landfills has become increasingly difficult. The decreasing availability of land, stricter regulation of both the development and operation of landfills and neighborhood opposition have all contributed to this situation. At the same time, State policies have encouraged local governments to look more and more to the recovery of the material and energy resources found in solid waste.

In 1981, the Broward County Board of County Commissioners authorized an investigation of solid waste management alternatives. The following year, the Commission approved a plan which called for de-emphasizing landfilling as a primary means of solid waste disposal. Further studies led in 1983 to a decision to proceed with development of two resource recovery facilities utilizing mass burning technology. Mass burning is a mature technology which requires no pre-processing or sorting of wastes. Several hundred plants around the world utilize this technology.

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1.3 North Broward County Resource Recovery Project

The proposed North Broward County Resource Recovery Facility will be designed to initially generate approximately 55.5 megawatts of electrical power using solid waste generated predominantly in the northern region of the County (see Figure 1.1.1 for the approximate boundaries of the facility's service area). In anticipation of future needs, certification is being sought for an ultimate electric generating capacity of 83.25 megawatts.

A petition was filed with the Florida Public Service Commission on November 21, 1985, under Section 403.519, F.S. and Section 25-22.80 of the Florida Administrative Code requesting a Determination of Need for the proposed facility. A copy of the petition is included in Appendix 10.6 of this Application. On January 7, 1986, the PSC unanimously granted Broward County's petition for the Project.

1.4 Consistency of Project with State Energy Policy

As early as 1974, the Florida Legislature recognized the need to look for new solutions to an ever growing solid waste problem. The Legislature found in the Florida Resource Recovery and Management Act (Section 403.702 (i)(e) F.S.) that "The failure or inability to economically recover material and energy resources from solid waste results in the unnecessary waste and depletion of our natural resources, and, therefore, maximum recycling and reuse of such resources must be considered goals of the State." Fla. Stat. §403.702(1)(e) (1985) (emphasis added).

The Florida Legislature acted by "protect the health, prosperity, and general welfare... of its citizens" declaring in chapter 84-198 of the Laws of Florida that the "combustion of solid waste by small power production facilities for the production of electricity not only represents conservation efforts well directed towards that goal, but also represents an environmentally preferred alternative to conventional solid waste disposal" for the State of Florida. Fla. Stat. §377.709(1) (1985) (emphasis added).

In a letter inviting local officials to attend a workshop on "Resource Recovery in Florida" in November 1985, Florida Governor Bob Graham wrote,

"Programs which result in the substitution of resource recovery alternatives to direct landfilling are vital to the protection of Florida's fragile development. The utilization of municipal solid waste as a safe and abundant renewable energy resource represents a positive economic opportunity for many Florida communities... Recent technological advances have made resource recovery a viable option for small, growing populations as well as large urban areas. Experience in Florida indicates that resource recovery can reduce landfill area requirement by up to 90 percent, and at the same time produce valuable electricity and thermal energy for use or sale."

Broward County's proposed solid waste disposal system is consistent with the State's policy to pursue resource recovery as a long-term solution for waste disposal. The use of proven mass burn technology will provide a technically and economical feasible solution to the County's long-term disposal needs.

1.5 Consistency of Project with the State Plan Goals and Policies

The North Broward County Resource Recovery Project is consistent with the following goals and policies of the Florida State Comprehensive Plan adapted by the 1985 Florida Legislature:

GOAL: Water Resources

Florida shall assure the availability of an adequate supply of water for all competing uses deemed reasonable and beneficial and shall maintain the functions of natural systems and the overall present level of surface and groundwater quality.

POLICIES:

#5 Ensure that new development is compatible with existing local and regional water supplies.

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Promote water conservation an integral part of water management programs as well as the reuse

of water of the lowest acceptable quality for the purpose intended.

- #13 Identify and develop alternative methods of wastewater treatment, disposal and reuse of wastewater to reduce degradation of water resources.

GOAL: Energy

Florida shall reduce its energy requirements through enhanced conservation and efficiency measures in all end-use sectors, while at the same time prompting and increased use of renewable energy resources.

POLICIES:

- #5 Reduce the need for new power plants by encouraging end-use efficiency, reducing peak demand, and using cost-effective alternatives.
- #9 Promote the use and development of renewable energy resources.

GOAL: Hazardous and Nonhazardous Material and Waste

All solid waste, including hazardous waste, wastewater and all hazardous materials, shall be properly managed, and the use of landfills shall be eventually eliminated.

POLICIES:

- #1 By 1995, reduce the volume of nonhazardous solid waste disposed of in landfills to 55 percent of the 1985 volume.
- #7 Encourage the research, development, and implementation of recycling, resource recovery, energy recovery, and other methods of using garbage, trash, sewage, slime, sludge, hazardous waste, and other waste.

GOAL: Land Use

In recognition of the importance of preserving the natural resources and enhancing the quality of life of the state, development shall be direct to those areas which have in place, or have agreements to provide, the land and water

resources, fiscal abilities, and the service capacity to accommodate growth in an environmentally acceptable manner.

POLICIES:

- #3 Enhance the liveability and character of urban areas through the encouragement of an attractive and functional mix of living, working, shopping, and recreational activities.
- #6 Consider, in land use planning and regulation, the impact of land use on water quality and quantity, the availability of land, water, and other natural resources to meet demands, and the potential for flooding.

GOAL: Public Facilities

Florida shall protect the substantial investments in public facilities that already exist, and shall plan for and finance new facilities to serve residents in a timely, orderly, and efficient manner.

POLICIES:

- #1 Provide incentives for developing land in a way that maximizes the use of existing public facilities.

GOAL: Cultural and Historical Resources

By 1995, Florida shall increase access to its historical and cultural resources and programs and encourage the development of cultural programs of national excellence.

POLICIES:

- #3 Ensure the identification, evaluation, and protection of archaeological folk heritage and historic properties of the state's diverse ethnic population.
- #6 Ensure that historic resources are taken into consideration in the planning of all capital programs and projects at all levels of government, and that such programs and projects are carried out in a manner which recognizes the preservation of historic resources.

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SITE AND VICINITY CHARACTERIZATION

SECTION 2
SITE AND VICINITY CHARACTERIZATION

2.1 Site and Associated Facilities Delineation

2.1.1 Site Location

Drawing No. D-C-1, Plate 1 - Site Location with Easements and Property Lines of the Hilton Road Site, provides the current dimensions of the Project site. The 25 acre site is owned by Waste Management, Inc. and is located east of the Sunshine State Parkway (Florida Turnpike) and west of Powerline Road (N.W. 21st Avenue) on the south side of Hilton Road (N.W. 48th Street) in unincorporated Broward County between Deerfield Beach and Pompano Beach (Section 16, Township 48, Range 42).

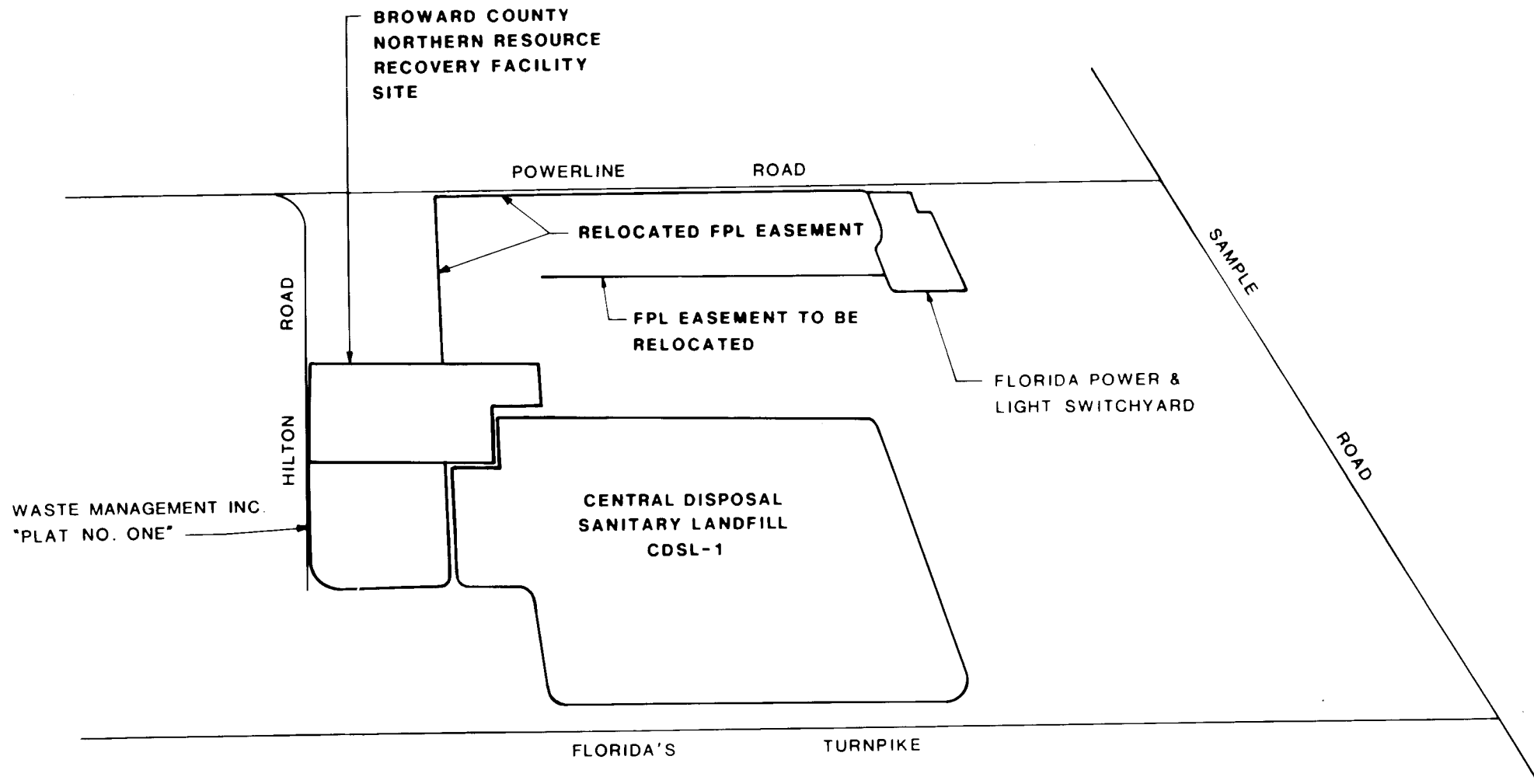
2.1.2 Existing Uses

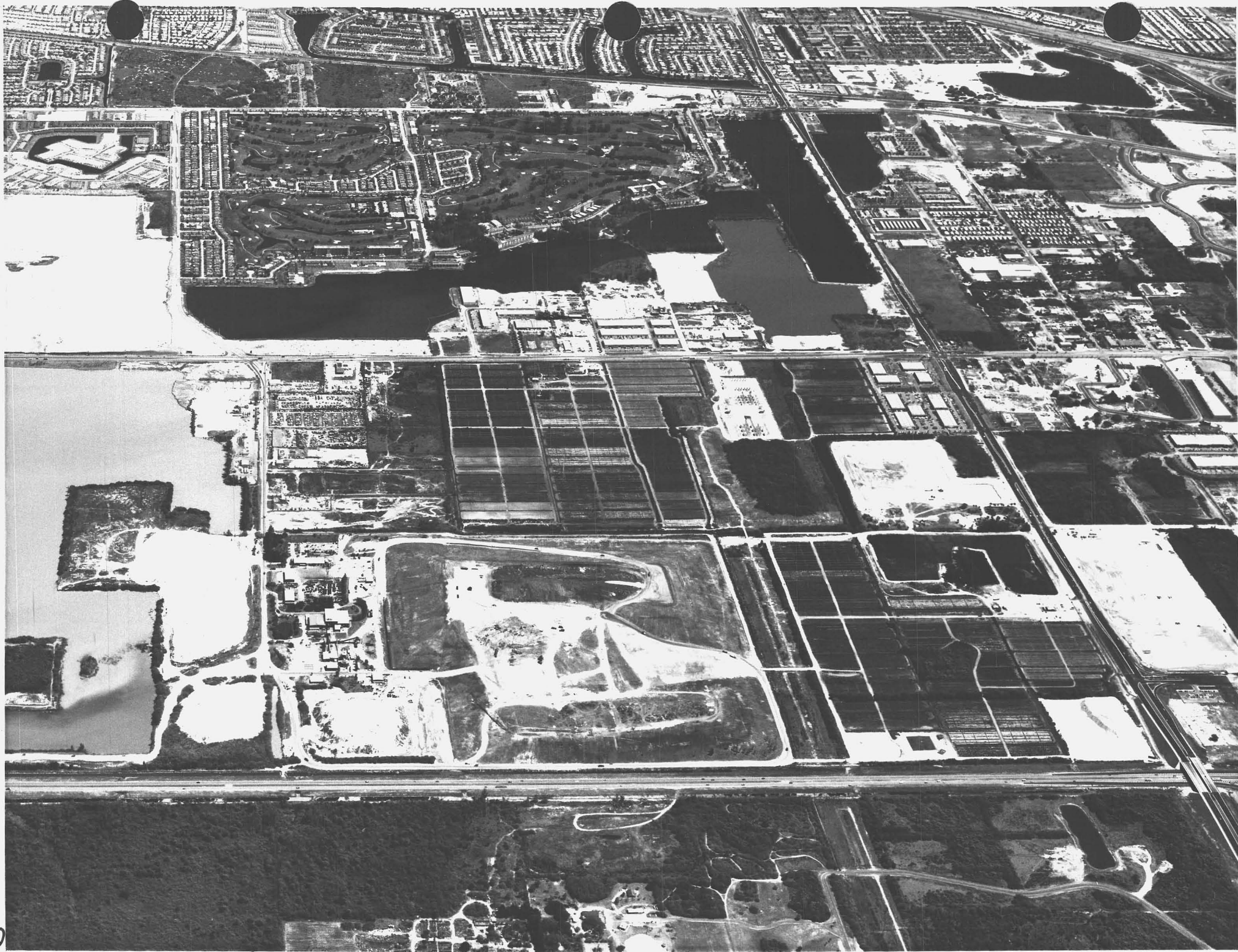
The Project site is vacant industrial property. It is bounded by a sanitary landfill to the west and the south and vacant industrial land to the east. Other uses between the Project site and Powerline Road on the south side of Hilton Road include auto salvage and repair buildings and welding and small engine repair shops. Paving and excavation operations are located on the north side of Hilton Road between the Turnpike and Powerline Road. A Florida Power and Light substation is located less than one-half mile south of the Project site. A more detailed description of transmission facilities is discussed in Section 6. An aerial photograph of the site is provided on the following page.

2.1.3 Site Modifications

The proposed site plan for the Project is shown in Figure 2.1.3.1. The Project site consists of a resource recovery facility, stormwater retention areas, an internal roadway system, a visitor/employee parking area and appropriate perimeter landscaping. The resource recovery facility will include a gatehouse/weigh station, receiving and handling

OVERSIZE
DOCUMENT WAS
REMOVED AND
INSERTED INTO
OCULUS
SEPARATELY.





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(305) 523-1215 Miami 945-1242
Photo # Date

BR53125C 3-18-85

building, furnace boilers, turbine generators, ash disposal area, cooling system, and electrical substation.

As shown in Figure 2.1.3.1, the furnace, kiln and boiler areas extend rearward from the back wall of the crane building, which encloses the refuse pit and hopper floor. The electrostatic precipitators are located behind the boilers. These in turn are followed by the induced draft fans and the stacks. The turbine-generator structure is located in a peninsular arrangement to one side of the boilers. The transformer area is adjacent to the turbine-generator structure, with the take-off tower located on the side nearest the FP&L high voltage transmission lines. The cooling systems are located on the same side of the boilers as the turbine-generator structure and transformers, in order to minimize piping and electrical interconnections. The ash transfer conveyors and loadout facilities are located on the opposite side of the Plant from the turbine-generator structure, so located to minimize ash haul distances to the landfill.

Facility access will be via Hilton Road. Roadways supporting internal traffic will be designed to provide congestion-free circulation. The basic traffic flow will be east and west, to and from the receiving area. A more detailed description of the plant and its directly associated facilities is found in Section 3 of this application.

2.1.4 100-Year Flood Zone

As indicated in Figure 2.1.4.1, the proposed site is located within a 100-Year Flood Zone. Project site design criteria for this zone is elevation 14.0 MSL.

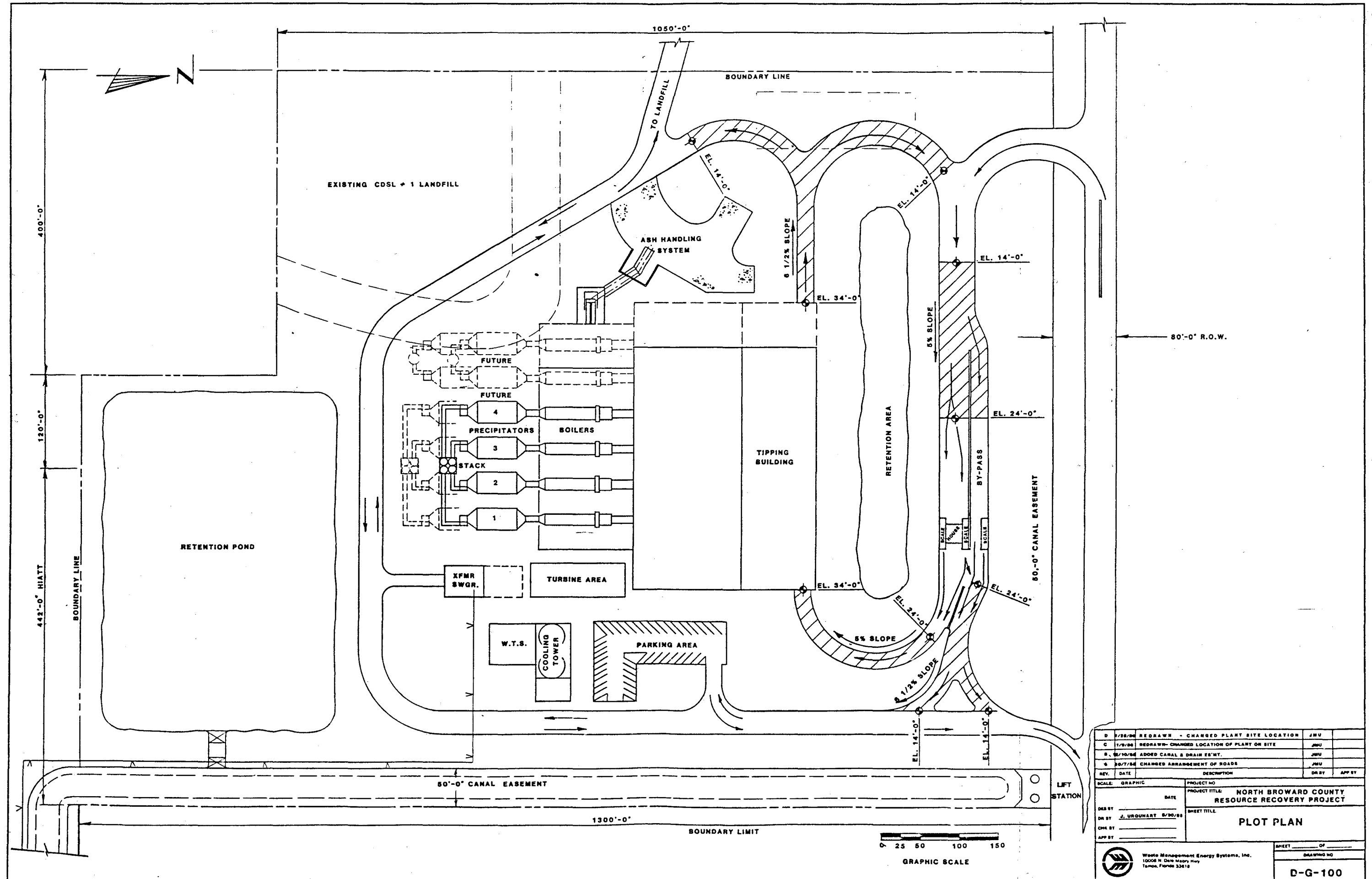
2.2 Socio-Political Environment

2.2.1 Governmental Jurisdictions

The area contained within a five-mile radius of the proposed facility is part of the metropolitan development area of Broward County and Palm Beach County.

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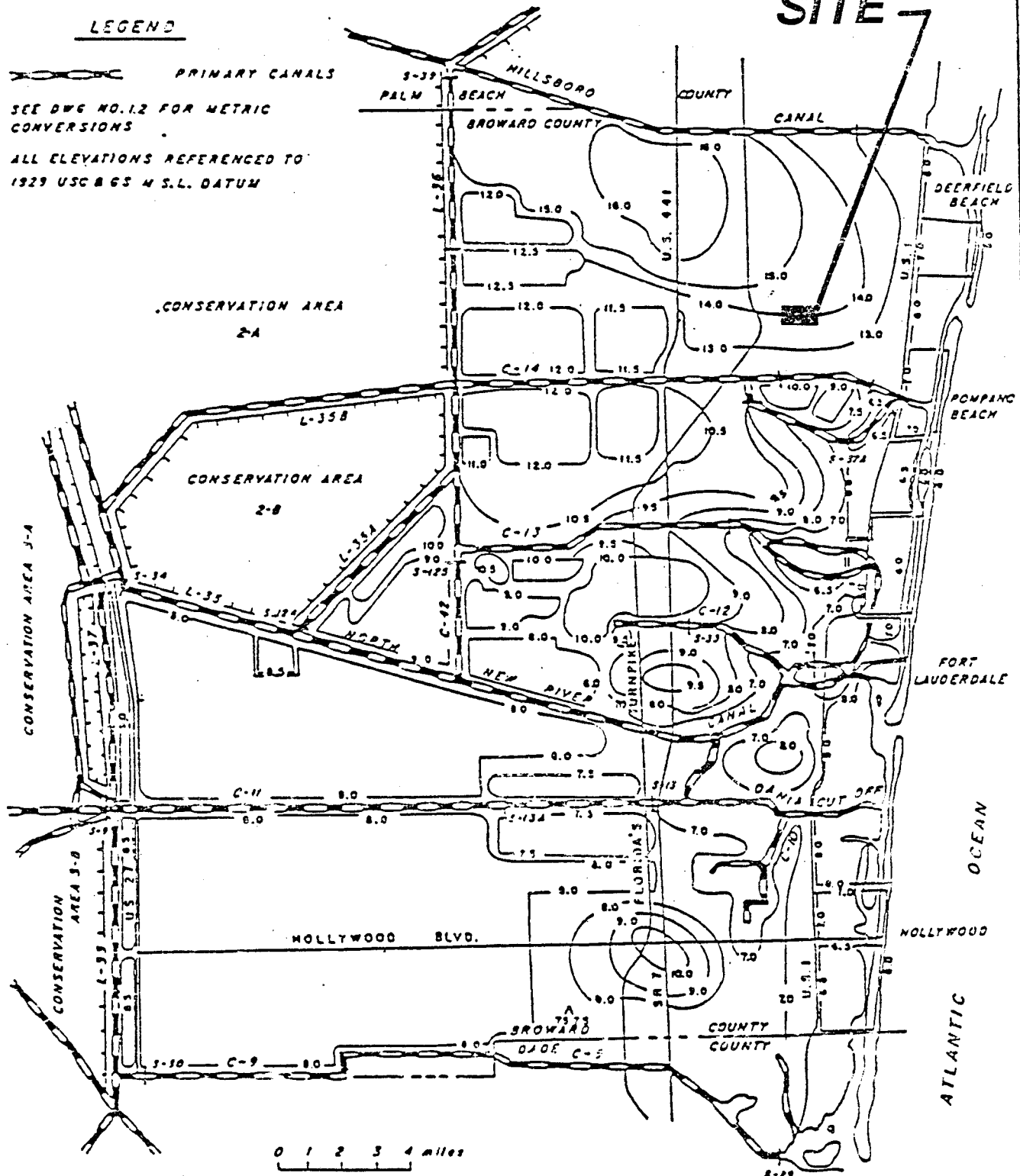
FIGURE 2.1.3.1



SITE

LEGEND

PRIMARY CANALS

SEE DWG NO. 12 FOR METRIC
CONVERSIONSALL ELEVATIONS REFERENCED TO
1929 USC & GS M.S.L. DATUM

BROWARD COUNTY
TRANSPORTATION DEPARTMENT
WATER MANAGEMENT
DIVISION

APPROVED
7-19-77
REVISED

100 YEAR
FLOOD ELEVATION MAP

W. M.
13.1
1 OF 1
SHEETS

Note: Project Site Design Criteria for
100 Year Flood is Elevation
14.0 (M.S.L.)

The approximate boundaries of this area are:

- o North Boundary - 1/4 mile south of Glades Road (Palm Beach County)
- o East Boundary - Hillsboro Beach
- o South Boundary - McNab Road
- o West Boundary - 1/3 mile east of University Road

As shown on Figure 2.2.1.1, portions of the following cities in Broward County are within five miles of the site:

- o Coconut Creek
- o Pompano Beach
- o Lighthouse Point
- o Deerfield Beach
- o Parkland
- o Coral Springs
- o Margate
- o Hillsboro Beach

Also, a portion of the City of Boca Raton in Palm Beach County is within five miles of the site.

Local, regional, state and federal areas located within a five mile radius of the site were identified by contacting appropriate agencies and reviewing current maps and related literature. A list of all agency contacts appears in Section 9.

The following local, regional facilities have been identified on the five mile region map (Figure 2.2.1.1) and the one-mile map (Figure 2.2.1.1A):

Memorials and Monuments

Broward County

Forest Lawn Memorial Gardens

Palm Beach County

None

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FIGURE 2.2.2.1(A)

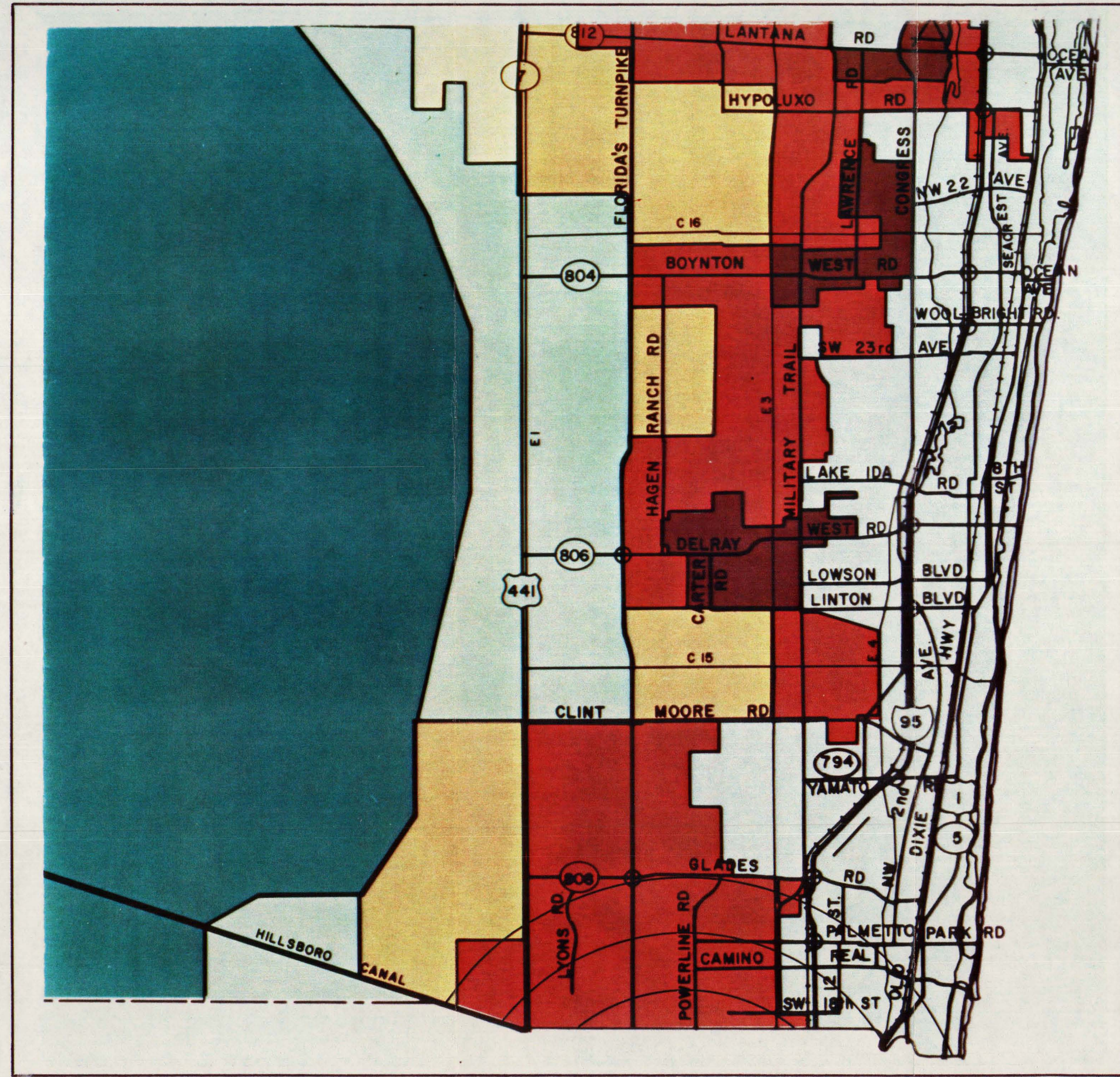
LEGEND

- MEDIUM HIGH - HIGH RESIDENTIAL
- MEDIUM - MEDIUM HIGH RESIDENTIAL
- LOW - MEDIUM RESIDENTIAL
- VERY LOW - LOW RESIDENTIAL
- VERY LOW RESIDENTIAL
- RESERVE
- AGRICULTURAL PRESERVATION
- CONSERVATION
- INDUSTRIAL
- MUNICIPALITIES

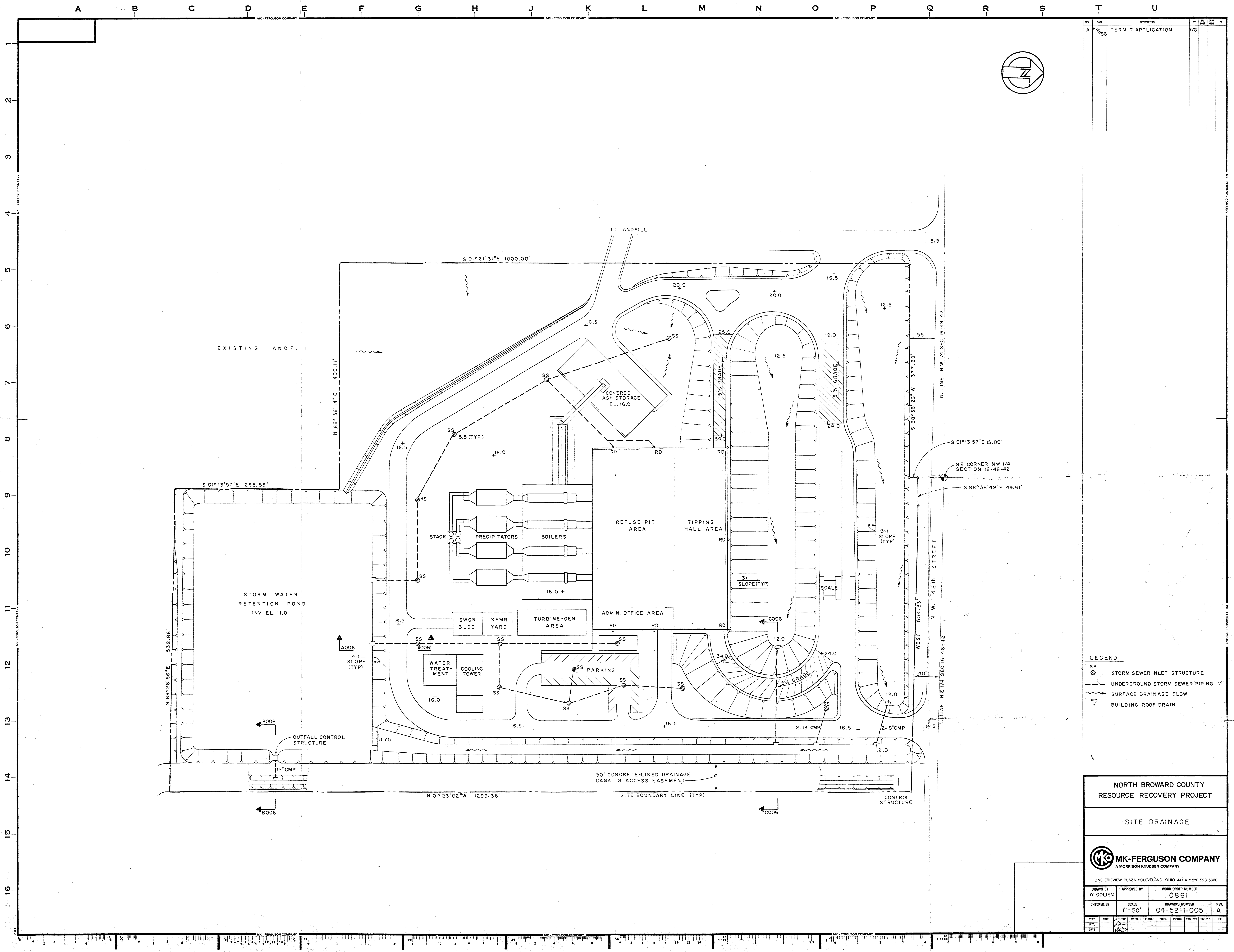
SCALE:
0 1 2
MILES

Source: Palm Beach County Planning Council

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**PALM BEACH COUNTY
LAND USE MAP
UPPER LIMIT OF
FIVE MILE RADIUS
1983**



REV.	DATE	DESCRIPTION	BY	IN	CHK	APP
A	6/16/86	PERMIT APPLICATION	WVG			

LEGEND	
SS	STORM SEWER INLET STRUCTURE
---	UNDERGROUND STORM SEWER PIPING
~	SURFACE DRAINAGE FLOW
RD	BUILDING ROOF DRAIN

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT

SITE DRAINAGE

ONE ERIEVIEW PLAZA • CLEVELAND, OHIO 44114 • 216-523-5800	
DRAWN BY V. GOLLEN	APPROVED BY [Signature]
CHECKED BY [Signature]	WORK ORDER NUMBER 0861
SCALE 1" = 50'	DRAWING NUMBER 04-52-1-005
DATE 6/16/86	REV. A

N.W.48TH. STREET (HILTON ROAD)

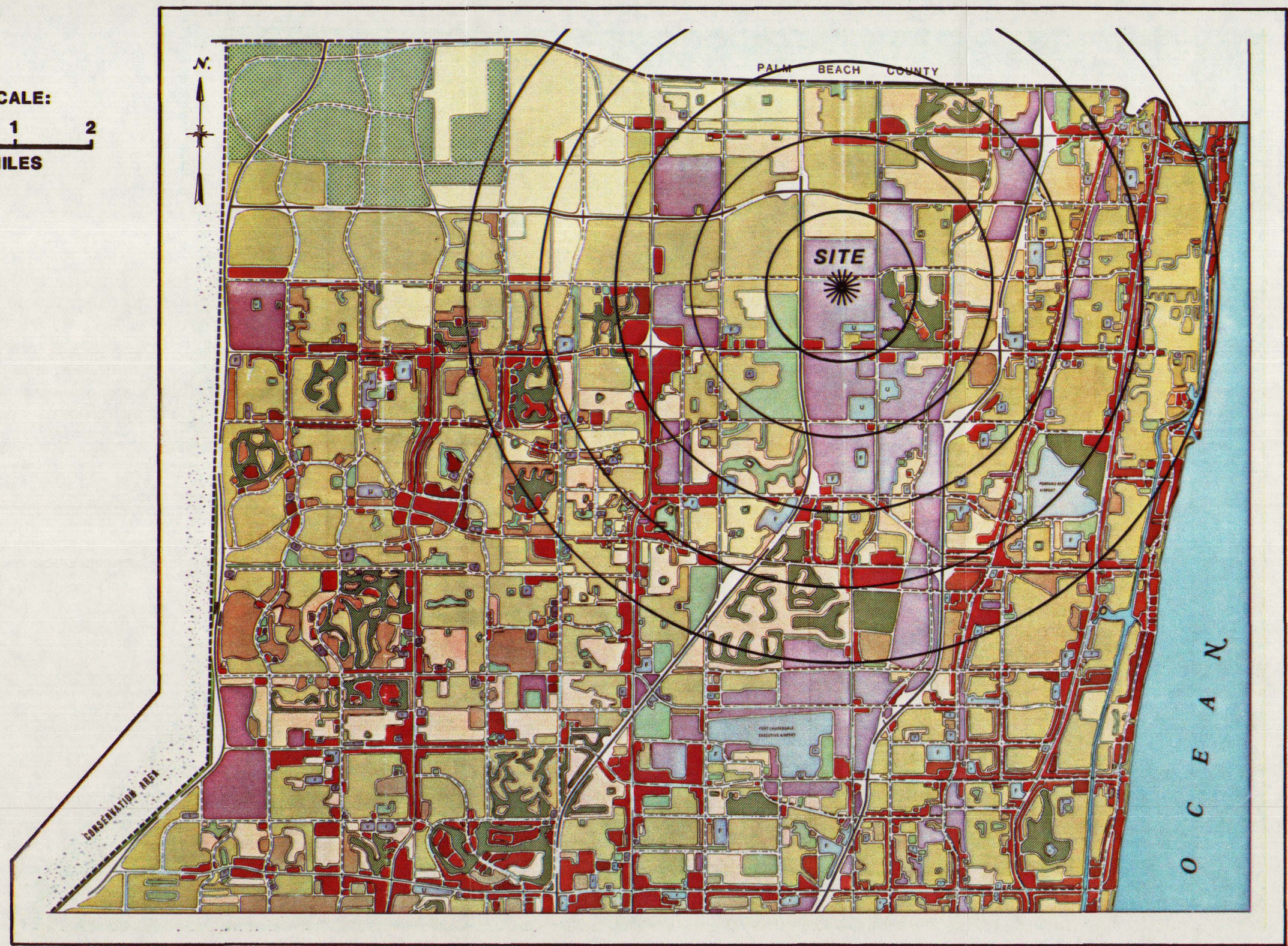
**NORTH BROWARD COUNTY
RESOURCE RECOVERY FACILITY**

**B EASEMENT TO BE RELOCATED
EAST WITH EXPANSION OF LANDFILL**

C	1/29/86	REDRAWN	RELOCATED PLANT SITE	JMU	
B	8/28/85	ISSUED TO FPL FOR COMMENT		JMU	PJW
A	5/20/85	ISSUED FOR COMMENT		JMU	PJW
REV.	DATE	DESCRIPTION		DR BY	APP BY
SCALE: 1" = 200'			PROJECT NO.		
DATE			PROJECT TITLE:		
			BROWARD COUNTY PROJECT		
DES BY _____			SHEET TITLE:		
DR BY <u>JUROLHART</u> 8/14/85			SITE LOCATION		
CHK BY _____			WITH EASEMENT AND PROPERTY LINES		
APP BY _____			SHEET _____ OF _____		
 Waste Management, Inc. - Resource Recovery 10009 N. Dale Mabry Hwy Tampa, Florida 33618			DRAWING NO.		
			D-C-1		

- LEGEND:**
- ESTATE
(Approximate 1 unit/acre)
 - LOW (3)
(Approximate 1-3 du/acre)
 - LOW (5)
(Approximate 3-5 du/acre)
 - LOW MEDIUM
(Approximate 5-10 du/acre)
 - MEDIUM
(Approximate 10-16 du/acre)
 - MEDIUM HIGH
(Approximate 16-25 du/acre)
 - HIGH
(Approximate 25-50 du/acre)
 - COMMERCIAL
 - OFFICE
 - INDUSTRIAL
 - PARKS AND RECREATION
 - COMMERCIAL RECREATION
 - AGRICULTURE
(du's subject to local Plans)
 - CONSERVATION AREA
 - F COMMUNITY FACILITIES
 - U UTILITIES
 - TRANSPORTATION-PORT & AIRPORTS
(see also Trafficways/Transportation)

SCALE:
0 1 2
MILES



Source: Broward County Planning Council

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**BROWARD COUNTY
LAND USE MAP
FIVE MILE RADIUS
1983**

Parks and Golf Courses & Type of Ownership

Broward County

Fern Forest	County
Tradewinds N.	County
Tradewinds S.	County
Quiet Waters	County
Hillsboro	County
Deerfield Island	County
N. Broward Community Center	County
Pompano Beach Highlands	County
Sandspur	County
W. Pompano Beach Highland	County
Jaycee Park	City
Kester Park	City
Lyons Park	City
Municipal Baseball Complex (Pompano Beach)	City
Pioneer Park	City
Pompano Beach Public Park	City
Westside Community Center (Pompano Beach)	City
Westside Park (Deerfield Beach)	City

Palm Beach County

Hillsboro-El Rio Park Site	City
Sandalfoot Cove Park	County
Dulan/Davidson/Archdiocese	County

Private and Public

Broward County

Deer Creek Golf Course	Public
Deerfield County Club	Private
Century Village Golf Club	Private
Crystal Lake County Club	Private
Tam O'Shanter Golf Course	Private
Whispering Lakes Golf Club	Private
Leisureville Fairway	Private
Pompano Beach Country Club	Private
Palmaire Country Club	Private
Pompano Park Golf Course	Public
Martinique Village Golf Club	Private

Palm Beach County

Camino Del Mar Country Club	Semi-Private
Boca Del Mar Golf & Tennis Club	Semi-Private

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Palm Beach County (cont'd)

Boca Pointe Golf & Racquet Club	Private
Boca Grove Golf & Tennis Club, Inc.	Private
Holiday Inn Lakeside	Public
Boca Lago Golf & Racquet Club	Private
Boca Rio Golf Club	Private
Sandalfoot Cove Country Club	Semi-Private
Hillsboro Country Club	Semi-Private

Unique Natural Areas and Areas of Critical State Concern

Broward County

Deerfield Expressway Site
Deerfield Isl. Park
Holmberg Road Site
Coconut Creek - Palm Aire Site
Express Creek Road Site
Deerfield Sand Pine Site
Holmberg Pond Apple Slough
Swamp 22 Site
Leitner Site
Ramors Site

Palm Beach County

None

Hospitals

Broward County

Cypress Community
Margate General
North Broward

Palm Beach County

None

Research has indicated that the presence of wildlife refuges, conservation lands, marine sanctuaries, or critical habitats of endangered species do not exist within five miles of the site.

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2.2.2 Zoning and Land Use Plans

A zoning and land use chronology for the North Broward County Resource Recovery Project appears in Table 2.2.2.1.

Land Use

Between 1977 and 1984 the Broward County Board of County Commissioners adopted fifteen elements and subelements for the unincorporated area in conformance with the Local Government Comprehensive Planning Act of 1975 (Chapter 163, Florida Statutes).

The Broward County Land Use Plan (BCLUP), was adopted on November 9, 1977 (BC Ordinance #77-66, Appendix 10.3.2). Under the Broward County Charter, effective January 1, 1975, the County Land Use Plan became the official land use plan within the County and is effective within all local jurisdictions, including the unincorporated area, upon its adoption. Local jurisdictions submit their own land use plans to the County to be reviewed for certification with the County Land Use Plan. The Charter further states that within one year after the adoption of the BCLUP, local zoning, as to permitted uses and densities, must be in compliance with the Plan and/or certified local land use plan for the area concerned.

The primary goal of the BCLUP is to:

"encourage the private and public sectors to adhere to patterns of planned development in Broward County which will promote environmental protection, recognize the finite nature of certain natural resources, strive to meet the County's social and economic needs, and reflect the goals and aspirations of the people in Broward County"

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TABLE 2.2.2.1

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ZONING AND LAND USE CHRONOLOGY

June 10, 1966	Broward County Board of County Commissioners holds a public hearing on rezoning request No. 21-2-66 for the North One-Half (N 1/2) of the Northeast Quarter (NE 1/4) of Section 16. Township 48 South. Range 42 East less the East 880 feet of the North 755 feet thereof from A1: Limited Agricultural to M-4: Limited Heavy Industrial (Hilton Road Site).
June 28, 1966	Broward County Board of County Commissioners unanimously approves rezoning request No. 21-Z-66 from A1: Limited Agricultural to M-4: Limited Heavy Industrial (Hilton Road Site).
November 9, 1977	Broward County Board of County Commissioners adopts a Comprehensive Land Use Plan for the unincorporated area.
January 25, 1983	Broward County Board of County Commissioners authorizes staff to obtain appraisals, title information, owners' authority to proceed to rezone and to proceed with rezoning and begin negotiations toward the acquisition of two resource recovery/ash residue disposal sites.
April 12, 1983	Broward County Board of County Commissioners adopt the recommendations of the March 1983 Site Evaluation Report prepared by Malcolm Pirnie, Inc. and authorizes staff to secure all necessary information and to conduct negotiations for acquisition of the Route 441 and the Copans Road site for resource recovery/disposal facilities.
July 6, 1983	Broward County Zoning Board approves at a public hearing the rezoning of the Copans Road Resource Recovery Project Site from A-1, Limited Agricultural: A-3, Agricultural Utility; and M-3, General Industrial to Planned Unit Development for Special Complexes (PUD) by a vote of 8-2 (Rezoning Petition No. 28-2-83).
August 12, 1983	Broward County Board of Commissioners approves the rezoning of the Copans Road Resource Recovery Project Site from A-1, Limited Agricultural: A-3, Agricultural Utility; and M-3 General Industrial to Planned Unit Development for Special Complexes (PUD) at a public hearing (Ordinance No. 48-2) as recommended by the Broward County Zoning Board on July 6, 1983.
September 1, 1983	City of Pompano Beach annexes an area between Sample Road and Coconut Creek Parkway which includes the site of the Copans Road Resource Recovery Project.

TABLE 2.2.2.1 (continued)

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ZONING AND LAND USE CHRONOLOGY

October 18, 1983	Pompano Beach City Commission directs city attorney to begin rezoning of Copans Road Resource Recovery Project.
November 1, 1983	County and Deputy County Administrators and County Engineering consultants participants in Workshop with City Commissioners in Pompano Beach on the Resource Recovery Program to persuade the Commission to retain County zoning on Copans Road project site.
December 28, 1983	City of Pompano Beach Planning and Zoning Board holds a Public Hearing on the Copans Road Resource Recovery Project site. The hearing is continued until January 25, 1984 at request of the County to allow the County time to review the City Planning Department's report on the rezoning request.
January 25, 1984	City of Pompano Beach Planning and Zoning Board votes to recommend to the City Commission that the Copans Road Resource Recovery Project site zoning be changed from the existing County designation of Planned Unit Development for Special Complexes to the City's Highway Light Industrial or 1-1 zoning which does not allow resource recovery uses.
February 21, 1984	Pompano Beach City Commission and Broward County Commission hold a "Summit of Sorts" in Pompano Beach to attempt to discuss and negotiate the development of the Copans Road Resource Recovery Project. Differences of opinion on the use of the site were not resolved at this meeting. However, both Commissions indicated a willingness to continue discussion and negotiations.
February 28, 1984	First reading of City of Pompano Beach rezoning application for the area involving the County's Copans Road Resource Recovery Project site.
March 6, 1984	Second reading of the City of Pompano Beach rezoning application for the area involving the County's Copans Road Resource Recovery Project site. The City Commission approves the rezoning of the site from the County's for Special Complexes to the City's zoning of Highway Light Industrial (1-1).
April 3, 1984	Broward County Board of Commissioners authorizes the General Counsel's Office to initiate the appropriate legal action against the City of Pompano Beach relating to the rezoning of the Copans Road Resource Recovery Project site.

TABLE 2.2.2.1 (continued)

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ZONING AND LAND USE CHRONOLOGY

June 8, 1984	Seventeenth Judicial Circuit Court denies County's petition to void City of Pompano Beach Highway Light Industrial (I-1) zoning at the Copans Road Resource Recovery site and instructs County to seek a special variance from the City.
June 19, 1984	Broward County Board of County Commissioners authorizes the Broward Broward County General Counsel's Office to appeal to the Fourth District Court of Appeal the case of Broward County v. City of Pompano Beach, Case No. 84-7687 CU (Agenda Item No. 50) regarding the zoning of the Resource Recovery Project site.
July 9, 1984	Broward County Office of General Counsel files 1.) a petition for a Writ for Certiorari; 2.) a petition requesting an abbreviated response time for the Writ and 3.) a petition requesting a hearing for an oral argument with the Fourth District Court of Appeals concerning the rezoning of the Copans Road Resource Recovery Project site by Pompano Beach.
September 5, 1984	Meeting between Broward County Board of County Commissioners and City of Pompano Beach administrative officials in Pompano Beach to discuss siting of Resource Recovery Project on Copans Road.
October 1, 1984	County Administrator and staff meet with City of Pompano Beach Planning Director and economic development consultants at the County Governmental Center to review the City's Master Plan for Industrial Development and its impact on the Copans Road Resource Recovery Project.
November 21, 1984	Fourth District Court of Appeals issues an order denying Broward County's petition for Writ of Certiorari affecting Copans Road Resource Recovery Project.
December 6, 1984	Broward County petitions the Fourth District Court of Appeals for a rehearing on the Copans Road Resource Recovery Project Site rezoning issue.
December 10, 1984	County Administrator and Director of County's Office of Planning Plan Implementation Division meet with Pompano Beach City Manager and Planning Director in Pompano Beach to discuss Copans Road Resource Recovery Project.
December 13, 14, 17, 19 & 21, 1984; January 2, 3, & 8, 1985	County Office of Planning Plan Implementation Division Director and Pompano Beach Planning Director meet in Pompano Beach concerning Copans Road Resource Recovery Project.

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TABLE 2.2.2.1 (continued)

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ZONING AND LAND USE CHRONOLOGY

January 15, 1985	County Administrator and Office of Planning, Plans Implementation Division Director meet with Pompano Beach City Commission.
January 31 & 5, 19 & 26, March 12, 1985	County Administrator and staff meet with City of Pompano Beach February Fact-Finding Committee in Pompano Beach concerning Copans Road Resource Recovery Project.
March 21, 1985	Fourth District Court of Appeal denies Broward County's Motion for Rehearing in the case of Broward County vs. City of Pompano Beach, Case No. 84-1470, filed by the County against the City challenging the City's denial of the use of the County's Copans Road property in Pompano Beach for a resource recovery site.
April 18, 1985	Broward County Board of County Commissioners directs staff to proceed with necessary steps for 1.) rezoning; 2.) filing a Power Plant Siting Certification Application with the State of Florida Department of Environmental Regulation for the same site and 3.) possible deannexation of the North Broward County Resource Recovery Project site on Copans Road in the City of Pompano Beach.
May 31, 1985	The prequalified full service vendors, Signal RESCO, Inc. and Waste Management, Inc., submit "final and best offer" proposals for the Resource Recovery Project. In addition to its base proposals, Waste Management also proposes a site adjacent to its Central Disposal Sanitary Landfill site on N.W. 48th Street (Hilton Road) as an alternate location for the North Resource Recovery Project.
June 27, 1985	Broward County Planning Council approves a letter prepared by Council's Counsel to be sent in reply to a question from County Commission Vice Chairman G. Thompson stating: 1. A utility is a permitted use under the Industrial Land Use designation of the Broward County Unincorporated Area Land Use Plan. A resource recovery facility would be interpreted as a utility by the Council and, as such, would be a permitted use; and 2. The Community Facilities (C.F.-1) Zoning District of the City of Pompano Beach included and permits, among other things, utility structures, and by special exception, solid waste disposal and transfer sites (Resource Recovery Facilities) is consistent with the Industrial Land Use designation under the Broward County Unincorporated Land Use Plan.

TABLE 2.2.2.1 (continued)

NORTH BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ZONING AND LAND USE CHRONOLOGY

July 2, 1985	Broward County Board of County Commissioners select Waste Management as the full-service vendor for the North Broward County Resource Recovery Project.
July 1, 1985	Broward County Office of Planning staff files rezoning and use variance applications with the City of Pompano Beach Planning Department to permit the use of a resource recovery facility on Copans Road.
July 24, 1985	City of Pompano Beach Planning and Zoning Board unanimously denies Broward County's request to rezone the Copans Road Resource Recovery Project site from Highway Light Industrial (I-1) to Community Facilities (CF-1).
August 13, 1985	Broward County Board of County Commissioners authorize staff to negotiate with Waste Management, Inc. for the siting of the Northern Resource Recovery Facility adjacent to its Central Disposal Sanitary Landfill site on Hilton Road (N.W. 48th Street).
September 3, 1985	Broward County withdraws its applications for rezoning and variance for the Copans Road (North) Resource Recovery Project.
February 5, 1986	Waste Management files a rezoning application with the Broward County Office of Planning to change the Zoning of the Hilton Road Resource Recovery Project site from M-4: Limited Heavy Industrial and A-6: Agricultural - Disposal to Planned Unit Development for Special Complexes (PUD).

The Unincorporated Area Land Use Element (UALUE) was adopted on September 4, 1979 to determine future land use patterns in the unincorporated areas of the County.

The Project site is designated industrial on the BLCUP and the Unincorporated Area Land Use Element. Resource Recovery is a utility (for solid waste disposal) and as such, is an allowable use under an industrial land use designation. Therefore, the Project is consistent with and meets the goals and objectives of the BCLUP and UALUE. The Project is also consistent with the Traffic Circulation and Mass Transit, Drainage, Coastal Zone, Conservation, Aviation, Utility, Economic Development, Solid Waste and Intergovernmental Coordination Elements of the Comprehensive Plan (see Table 2.2.2.2).

Figures 2.2.2.1 and 2.2.2.1(A) illustrates the major surrounding land use categories for a 5 mile radius around the site. The major land use categories are:

- o Low Residential
- o Medium Residential
- o High Residential
- o Commercial
- o Industrial
- o Agricultural

Using Level II categories of the Florida Land Use and Cover Classification System, additional land uses are provided for the 5 mile area around the site on Figures 2.2.2.2 and 2.2.2.2(A).

Zoning

All requests for changes in zoning classification must be consistent with the Comprehensive Plan in addition to meeting

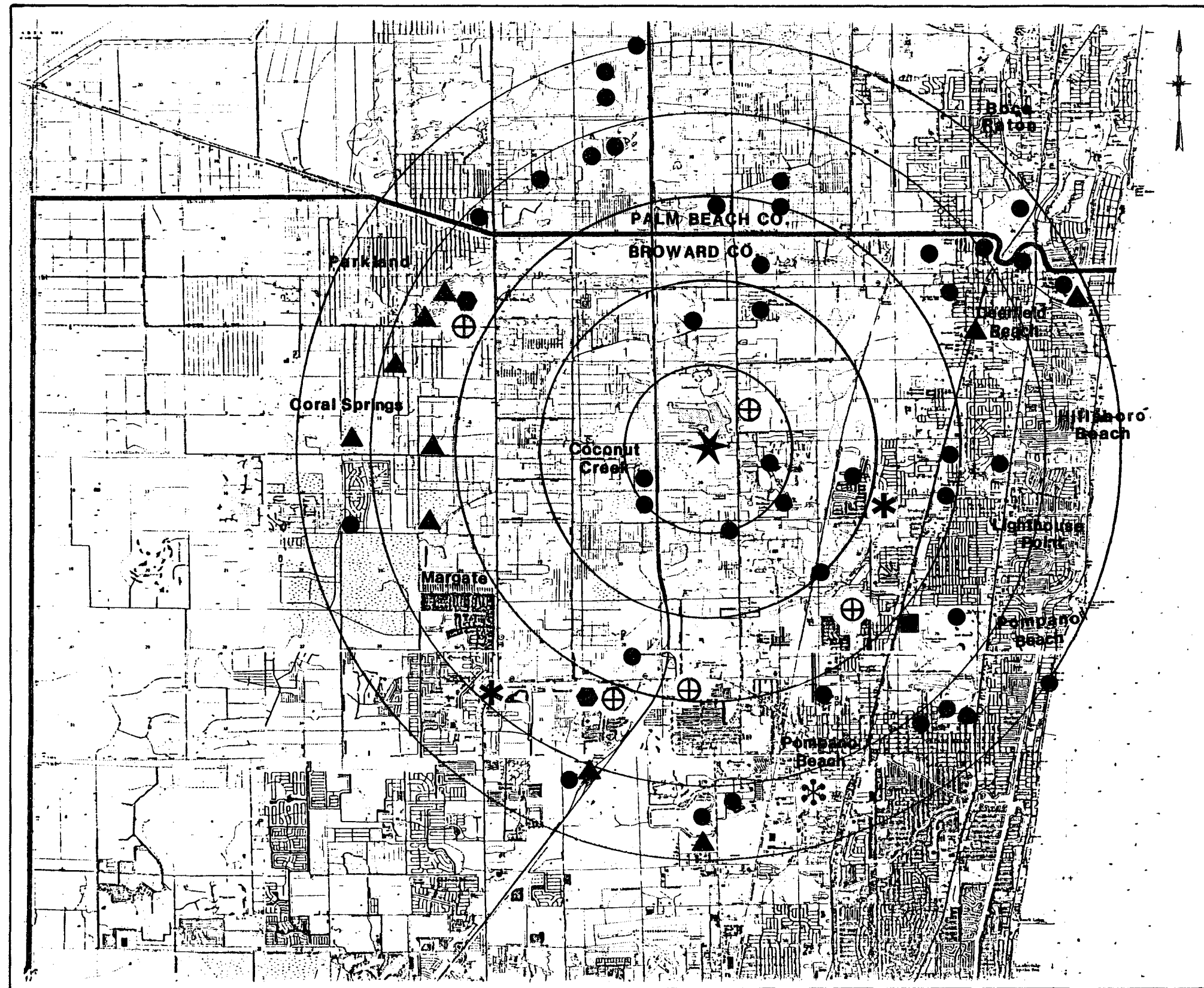
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FIGURE 2.2.1.1

- LEGEND**
- Parks and Golf Courses
 - * Hospitals
 - ▲ Unique Natural Areas
 - Memorials
 - ⊕ Fire Station
 - ⬢ Police Station

SCALE:
0 1 2
MILES

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**BROWARD COUNTY
GOVERNMENTAL JURISDICTIONS
AND
REGIONAL SCENIC, CULTURAL
AND
NATURAL LANDMARKS**

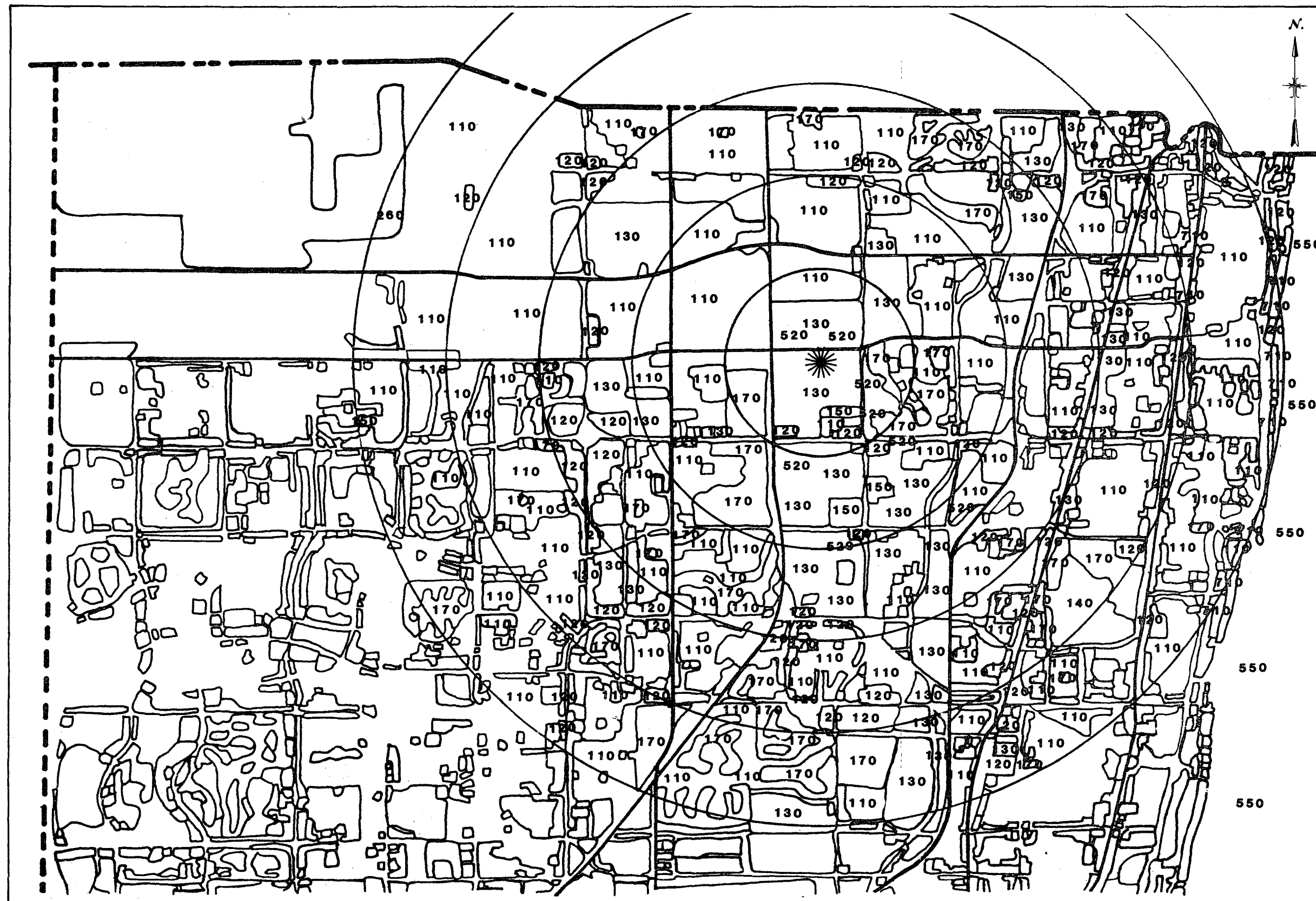
**BROWARD COUNTY
GOVERNMENTAL JURISDICTIONS
AND
REGIONAL SCENIC, CULTURAL
AND
NATURAL LANDMARKS**



FLORIDA LAND USE AND COVER CLASSIFICATION SYSTEM (LEVEL II)

- 110 RESIDENTIAL
- 120 COMMERICAL & SERVICES
- 130 INDUSTRIAL
- 140 TRANSPORTATION
- 150 COMMUNICATIONS & UTILITIES
- 160 INSTITUTIONAL
- 170 RECREATIONAL
- 180 MIXED
- 190 OPEN LAND & OTHER
- 210 CROPLAND & PASTURELAND
- 220 ORCHARDS, GROVES (EXCEPT CITRUS)
- 230 CITRUS GROVES
- 240 CONFINED FEEDING OPERATIONS
- 250 SPECIALITY FARMS
- 260 OTHER AGRICULTURE
- 310 GRASSLAND
- 320 SHRUB AND BRUSHLAND
- 330 MIXED RANGELAND
- 410 CONIFEROUS FOREST
- 420 HARDWOOD FOREST
- 430 MIXED FOREST
- 440 PLANTED FREST FOREST
- 450 CLEARCUT AREAS
- 510 STREAMS & CANALS
- 520 LAKES
- 530 RESERVOIRS
- 540 BAYS & ESTUARIES
- 550 OPEN MARINE WATERS
- 560 OTHER WATER AREAS
- 610 WETLAND-CONIFEROUS FOREST
- 620 WETLAND-HARDWOOD FOREST
- 630 WETLAND-MIXED FOREST
- 640 WETLAND-VEGETATED, NON-FORESTED
- 650 NON-VEGETATED WETLANDS
- 710 BEACHES
- 720 SAND OTHER THAN BEACHES
- 730 EXPOSED ROCK
- 740 ALTERED LANDS
- 750 EXTRACTIVE
- 760 OTHER BARREN LANDS

SCALE:



**BROWARD COUNTY
RESOURCE RECOVERY PROJECT
EXISTING LAND USE
5-MILE AREA**

1983

**FLORIDA LAND USE AND COVER
CLASSIFICATION SYSTEM (LEVEL II)**

- 110 RESIDENTIAL
- 120 COMMERCIAL & SERVICES
- 130 INDUSTRIAL
- 140 TRANSPORTATION
- 150 COMMUNICATIONS & UTILITIES
- 160 INSTITUTIONAL
- 170 RECREATIONAL
- 180 MIXED
- 190 OPEN LAND & OTHER
- 210 CROPLAND & PASTURELAND
- 220 ORCHARDS, GROVES (EXCEPT CITRUS)
- 230 CITRUS GROVES
- 240 CONFINED FEEDING OPERATIONS
- 250 SPECIALITY FARMS
- 260 OTHER AGRICULTURE
- 310 GRASSLAND
- 320 SHRUB AND BRUSHLAND
- 330 MIXED RANGELAND
- 410 CONIFEROUS FOREST
- 420 HARDWOOD FOREST
- 430 MIXED FOREST
- 440 PLANTED FREST FOREST
- 450 CLEARCUT AREAS
- 510 STREAMS & CANALS
- 520 LAKES
- 530 RESERVOIRS
- 540 BAYS & ESTUARIES
- 550 OPEN MARINE WATERS
- 560 OTHER WATER AREAS
- 610 WETLAND-CONIFEROUS FOREST
- 620 WETLAND-HARDWOOD FOREST
- 630 WETLAND-MIXED FOREST
- 640 WETLAND-VEGETATED, NON-FORESTED
- 650 NON-VEGETATED WETLANDS
- 710 BEACHES
- 720 SAND OTHER THAN BEACHES
- 730 EXPOSED ROCK
- 740 ALTERED LANDS
- 750 EXTRACTIVE
- 760 OTHER BARREN LANDS

SCALE:
0 1 2
MILES



PALM BEACH COUNTY
RESOURCE RECOVERY PROJECT
EXISTING LAND USE
5-MILE AREA

TABLE 2.2.2.2

CONSISTENCY WITH THE COMPREHENSIVE PLAN¹

<u>Element of Comprehensive Plan</u>	<u>Project Consistency Summary</u>
Solid Waste	o The energy recovery facility is the culmination of years of solid waste management planning.
Economic	- o There will be no externalized impacts from the facility, the system will employ proven technology, and the program is more economically sound than landfilling. - o The energy recovery facility is a new industry for Broward County. - o Resource recovery has long-term beneficial economic, environmental and societal impact to the County.
Land Use	- o The energy recovery facility is interrelated with other light industrial activities in the area. - o The energy recovery facility incorporate modern design techniques. The facility will not have adverse external impacts and is compatible with the surrounding area.
Traffic Circulation and Mass Transit	o The site location minimizes truck route distances for solid waste collection and disposal.
Aviation	o The project will be in compliance with the Federal Aviation Administration regulations.
Port Everglades	o This element is not directly applicable to the proposed project.
Housing	o The energy recovery facility will not impact the creation or maintenance of healthy and viable living environment.
Water and Sewer	o The North Regional Wastewater Treatment Plant will treat discharges from the energy recovery facility. Plant effluent will be reused as cooling make-up.
Drainage	o The proposed stormwater drainage system meets the requirements of the South Florida Water Management District and DER.

**MALCOLM
PIRNIE**

TABLE 2.2.2.2 (continued)

CONSISTENCY WITH THE COMPREHENSIVE PLAN¹

<u>Element of Comprehensive Plan</u>	<u>Project Consistency Summary</u>
Utility	o The energy recovery facility helps Florida Power and Light meet its goals and objectives in the Electric Utility Subelement.
Conservation	o The energy recovery facility was sited to avoid impacts to conservation/reservation areas.
Coastal Zone Protection	o The energy recovery facility was sited in an area advantageous for this type of development with the least undesirable impact on both the natural and the built environment.
Intergovernmental Coordination	o Power Plant Siting Act process includes coordination of the Project with comprehensive planning.

1. This table does not present all of the policy statements of the Comprehensive Plan. It shows the general thrust of the policies in each element and the general consistency of the Project.

all requirements of the Broward County Zoning Ordinance and other applicable county, state and federal laws. The site is currently zoned M-4 - Limited Heavy Industrial and A-6 - Agricultural-Disposal. A rezoning application was filed February 1986 requesting this zoning classification be changed to Planned Unit Development for Planned Special Complexes (PUD). The rezoning request for PUD is in conformance with the permitted nonresidential uses listed under Section 39-883(b) (3) of the Broward County Zoning Code. This is the same zoning classification used for the South Broward County Resource Recovery Facility at State Roads 84 and 7.

The rezoning is scheduled to be reviewed by the Broward County Development Review Committee, the Zoning Board, and the Broward County of County Commissioners by April 1986.

2.2.3 Demography and Ongoing Land Use

Figure 2.2.3.1 is a 1980 census tract map of Broward County and Figure 2.2.3.1(A) is a 1980 census tract map of Palm Beach County. Existing resident population data corresponding to each census tract for each County is presented in Table 2.2.3.1 and Table 2.2.3.1(A). Resident population by municipality is provided for Broward County in Table 2.2.3.2 and for the City of Boca Raton in Table 2.2.3.2(A).

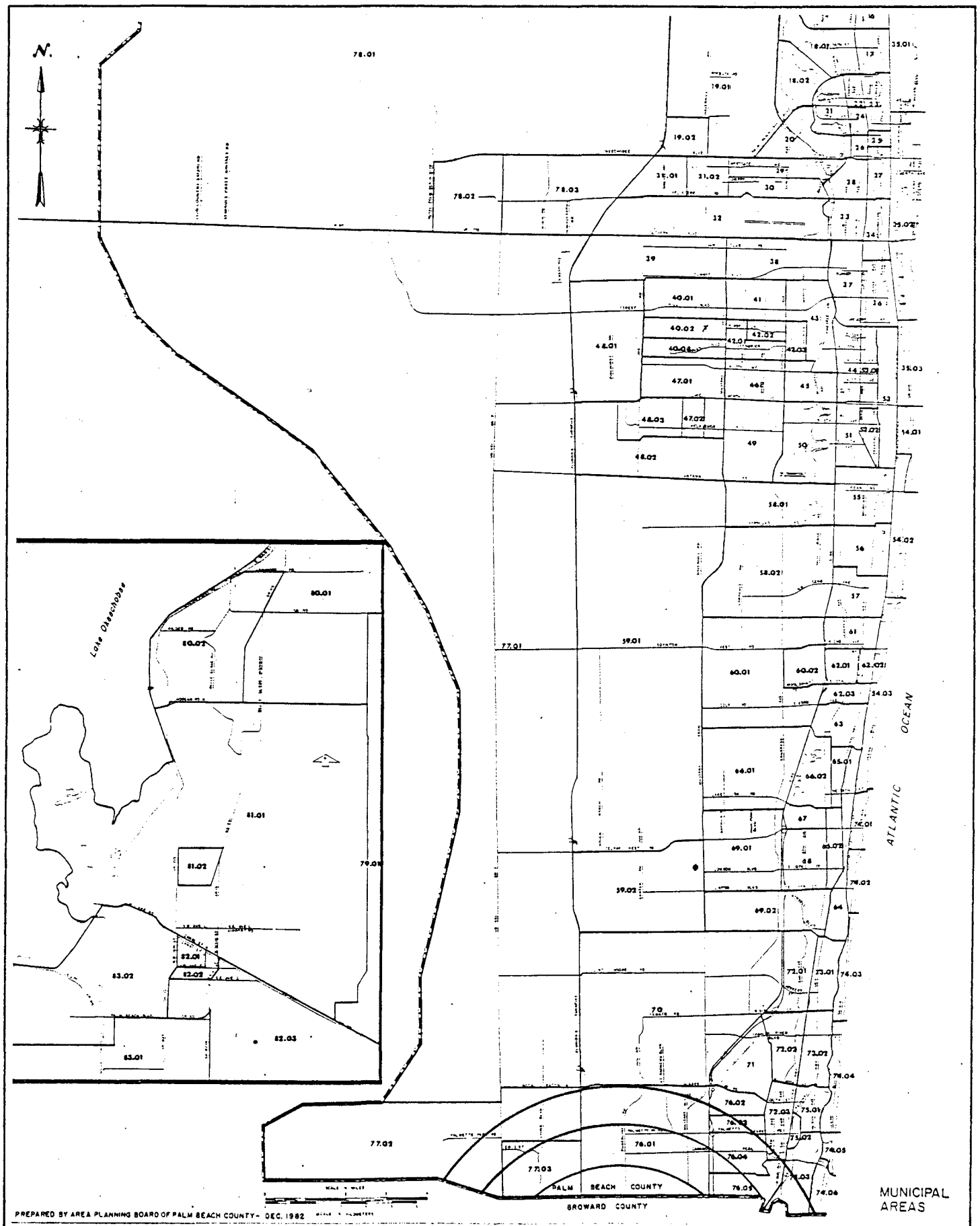
As illustrated in the previous section on Figures 2.2.2.1, 2.2.2.1(A), 2.2.2.2 and 2.2.2.2(A), the ongoing land use for the five mile area surrounding the site is primarily low residential and light industrial. Details for both the five mile and one mile radii are provided on these drawings. Detailed information on vegetation and land use is provided in Section 2.3.5.

2.2.4 Easements, Title, Agency Works

The Project site consists of one 25 acre parcel under the ownership of Waste Management, Inc. of Florida (Plate 1).

This map illustrates the Palm Beach County Conservation Area, detailing land parcels, roads, and geographical features. The map is bounded by the Atlantic Ocean to the east and the county line with Dade County to the south. Key roads include Holmberg Rd, Wiles Rd, Pompano, McNab Rd, Oakland Park Blvd, Broward, Griffin Rd, Sheridan St, Hollywood Blvd, and Hallandale Blvd. The map is divided into several sections, each labeled with a unique identifier (e.g., 105, 106, 203.03, 203.04, 203.07, 204.03, 601.01, 601.02, 601.03, 601.04, 602.01, 602.02, 602.03, 605.02, 606.01, 607, 610.02, 609, 610.01, 611, 430, 431, 432, 426, 427, 428, 429, 433, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163,

BROWARD COUNTY
1980 CENSUS TRACTS
FIVE MILE RADIUS AROUND SITE



PREPARED BY AREA PLANNING BOARD OF PALM BEACH COUNTY - DEC. 1982

**PALM BEACH COUNTY
1980 CENSUS TRACTS
FIVE MILE RADIUS AROUND SITE**

TABLE 2.2.3.1

Census Tract	April 1 1970	April 1 1980	Census Tract	April 1 1970	April 1 1980
101	7,749	8,945	503	12,639	27,994
102	3,370	6,239	503.01		6,249
103	6,963	10,735	503.02		9,105
103.01		4,219	503.03		6,396
103.02		6,566	503.04		6,244
104	923	17,390	504	4,719	4,375
105	289	1,057	505	6,650	7,970
106	391	2,489	506	7,238	7,385
107	5,524	10,132	507	5,645	7,318
108	5,014	6,031	508	3,695	5,731
109	5,222	6,033	509	6,591	6,738
110	713	1,554	510	4,405	6,035
201	56	2,517	601	3,290	41,737
202	7,071	23,912	601.01		9,684
202.01		6,025	601.02		8,194
202.02		7,585	601.03		14,774
202.03		10,302	601.04		8,585
203	1,626	38,231	602	7,395	29,878
203.01		4,362	602.01		15,329
203.02		3,665	602.02		9,229
203.03		7,663	602.03		4,820
203.04		6,771	603	2,077	14,345
203.05		4,655	604	6,591	14,126
203.06		8,084	605	1,642	9,485
203.07		3,011	605.01		5,737
204	4,502	30,236	605.02		3,748
204.01		9,031	606	2,951	8,491
204.02		17,133	606.01		6,380
204.03		4,022	606.02		2,111
205	1,740	10,576	607	3,440	3,305
301	4,507	4,413	608	8,249	7,623
302	8,373	8,430	609	5,655	5,226
303	5,031	8,948	610	1,212	10,227
304	7,902	8,206	610.01		6,524
305	2,693	3,512	610.02		3,403
306	3,910	5,358	611	6,132	6,212
307	1,363	5,690	701	5,272	9,068
307.01		3,149	702	2,562	13,680
307.02		2,541	703	1,729	12,724
308	2,416	6,923	704	2,535	10,973
308.01		3,745	705	622	4,511
308.02		3,238	706	1,909	4,455
309	11,122	11,593	801	4,677	7,225
310	5,624	6,942	802	2,150	1,712
311	5,466	5,703	803	1,301	2,583
312	6,324	11,651	804	6,094	11,499
312.01		6,087	804.01		8,992
312.02		5,564	804.02		2,507
401	3,539	3,876	805	6,503	6,104
402	10,535	11,883	901	4,054	8,877
402.01		3,618	902	2,366	2,405
402.02		8,265	903	6,956	6,851
403	4,518	4,755	904	9,625	10,459
404	4,169	5,918	905	2,710	10,584
405	6,109	3,323	906	7,691	9,280
405.01		5,445	907	3,712	3,981
405.02		2,883	908	6,966	8,175
406	7,182	6,690	909	6,245	5,659
407	5,870	6,403	910	4,906	4,227
408	7,027	8,433	911	4,549	5,033
409	7,159	8,267	912	10,473	10,007
410	3,672	3,442	913	3,979	3,991
411	4,360	4,845	914	5,946	5,290
412	3,885	5,299	915	4,365	4,458
413	9,080	9,452	916	2,192	4,917
414	4,112	4,860	917	6,042	5,705
415	6,102	4,638	918	7,180	7,183
416	6,562	7,173	919	6,317	6,290
417	3,639	4,479	920	3,229	2,233
418	5,983	6,730	921	---	366
419	3,967	3,853	1001	6,214	17,764
420	3,675	3,903	1001.01		4,745
421	1,725	2,607	1001.02		8,418
422	3,388	3,701	1001.03		4,601
423	5,421	6,148	1002	4,207	6,296
424	2,926	2,434	1003	4,509	5,523
425	229	85	1004	7,158	4,590
426	4,559	5,563	1005	4,436	5,449
427	5,024	5,713	1006	5,566	5,037
428	7,162	7,164	1007	5,128	5,618
429	6,256	5,729	1008	4,843	7,272
430	9,022	8,502	1101	7,198	6,640
431	4,459	4,856	1102	1,611	1,001
432	3,401	3,557	1103	7,052	35,358
433	7,284	7,403	1104	12,586	13,245
501	6,009	4,223	1104.01		9,053
502	3,748	8,738	1104.02		4,192
502.01		4,840	1105	6,488	6,464
502.02		3,898	Total	620,100	1,018,200

SOURCE: U.S. Department of Commerce,
Bureau of the Census

BROWARD COUNTY, 1970 AND 1980

RESIDENT POPULATION BY CENSUS TRACT

TABLE 2.2.3.1(A)

Census Tract	Total Population	White	Black	Other	Spanish Origin*	Dwelling Units
74.06	3,169	3,160	1	8	12	2,309
75.01	3,000	2,498	468	34	68	1,425
75.02	21	20	-	1	-	17
75.03	3,086	3,031	40	15	211	1,810
76.01	5,421	5,347	11	63	88	3,796
76.02	3,109	2,952	75	82	98	1,731
76.03	2,675	2,604	14	57	54	896
76.04	6,535	6,471	16	48	142	2,612
76.05	3,455	3,387	19	49	65	1,147
77.01	11,396	10,368	503	525	1,142	6,110
77.02	6,571	6,464	43	64	155	3,917
77.03	5,299	5,255	11	33	118	2,996
78.01	7,773	7,616	59	98	218	2,950
78.02	3,727	3,574	86	67	186	1,823
78.03	2,636	2,538	93	5	30	1,611
79.01	394	181	198	15	19	126
79.02	2,121	60	9	2,052	457	21
80.01	3,845	1,672	2,061	112	277	1,322
80.02	6,057	2,673	3,187	197	783	1,907
81.01	4,870	3,803	615	452	1,378	1,714
81.02	803	258	506	39	74	-
82.01	5,958	811	4,772	375	752	2,410
82.02	3,602	409	3,073	120	273	1,228
82.03	3,044	2,019	807	218	679	928
83.01	2,688	374	2,280	34	54	836
83.02	4,704	1,540	2,921	243	632	1,493
TOTALS	576,813	487,448	77,584	11,781	27,677	286,455

*Included in total population

SOURCE: U.S. Census Bureau, April 1, 1980 (as revised April 1983)
Area Planning Board of Palm Beach County

PALM BEACH COUNTY, 1980
POPULATION, BY RACE AND SPANISH ORIGIN AND
DWELLING UNITS BY CENSUS TRACTS

TABLE 2.2.3.2

RESIDENT POPULATION BY MUNICIPALITY ----- 1920 -- 1983										
CITY / YEAR (April 1)	1920	1930	1940	1950	1960	1970	1980	1981	1982	1983***
Coconut Creek	----	----	----	----	----	1,359	6,288	8,527	9,816	12,319
Cooper City	----	----	----	----	550	2,535	10,140	11,053	11,526	11,753
Coral Springs	----	----	----	----	----	1,489	37,349	40,849	44,272	46,830
Dania	----	1,674	2,902	4,540	7,065	9,013	11,796	12,151	12,222	12,287
Davie	----	----	----	----	----	5,859	20,515	22,756	30,006	32,502
Deerfield Beach	----	1,483	1,850	2,088	9,573	16,662	39,193	40,138	41,232	41,782
Ferncrest Village*	----	----	----	----	93	1,029	----	----	----	----
Fort Lauderdale	2,065	8,666	17,996	36,328	83,648	139,590	153,279	153,814	153,167	153,185
Hacienda Village****	----	----	----	----	125	35	126	126	128	128
Hallandale	----	1,012	1,827	3,886	10,483	23,849	36,517	36,872	37,413	37,443
Hillsboro Beach	----	----	----	84	437	1,181	1,554	1,562	1,562	1,554
Hollywood	----	2,869	6,239	14,351	35,237	106,873	121,323	121,955	122,680	123,363
Hollywood Ridge Farms**	----	----	----	----	108	302	----	----	----	----
Lauderdale-by-the-Sea	----	----	----	234	1,327	2,879	2,639	2,622	2,628	2,617
Lauderdale Lakes	----	----	----	----	----	10,577	25,426	25,538	26,286	26,376
Lauderhill	----	----	----	----	132	8,465	37,271	37,893	37,997	39,287
Lazy Lake	----	----	----	----	49	48	31	32	31	32
Lighthouse Point	----	----	----	----	2,453	9,071	11,488	11,421	11,474	11,427
Margate	----	----	----	----	2,646	8,867	35,900	37,596	38,388	38,678
Miramar	----	----	----	----	5,485	23,997	32,813	33,332	34,276	34,946
North Lauderdale	----	----	----	----	----	1,213	18,653	19,320	20,006	20,057
Oakland Park	----	463	815	1,295	5,331	16,261	23,035	23,100	23,343	23,537
Parkland	----	----	----	----	----	165	545	658	735	825
Pembroke Park	----	----	----	----	569	2,949	5,326	5,361	6,014	6,036
Pembroke Pines	----	----	----	----	1,429	15,496	35,776	40,070	41,784	42,062
Plantation	----	----	----	----	4,772	23,523	48,653	50,420	51,476	51,650
Pompano Beach	----	----	4,427	5,682	15,992	38,587	52,618	55,911	56,704	57,119
Sea Ranch Lakes	----	----	----	----	170	660	584	584	584	575
Sunrise	----	----	----	----	----	7,403	39,681	42,406	44,022	44,901
Tamarac	----	----	----	----	----	5,078	29,376	30,104	31,158	31,223
Wilton Manors	----	----	----	883	8,257	10,948	12,742	12,658	12,629	12,544
Unincorporated	3,070	3,927	3,738	14,562	138,015	124,137	167,620	164,483	163,485	162,051
Total	5,135	20,094	39,794	83,933	333,946	620,100	1,018,257	1,047,313	1,067,044	1,079,089

*Disincorporated July 1, 1970

**Annexed to Pembroke Park, July 1, 1970

*** Preliminary

SOURCE: U.S. Department of Commerce, Bureau of the Census, 1920-1980

Bureau of Economic and Business Research, University of Florida, 1981-1983

****Annexed to Town of Davie, September 4, 1984

TABLE 2.2.3.2(A)
POPULATION OF BOCA RATON

<u>Year</u>	<u>Population</u> ¹	<u>Change</u> <u>%</u>
1940	723	-
1950	992	37.2%
1960	6,961	1001.0
1970	28,506	310.0
1976	46,079	38.1
1977	47,633	3.4
1978	49,481	3.9
1979	51,622	4.3
1980	53,343	3.3
1981	54,874	2.9
1982	57,001	3.9
1983	58,144	1.0
1984	59,534	2.0

1. Population estimates provided by Community Development Department as of December 31 of each year.

Source: City of Boca Raton Statistical Abstract (Revised April 1985)

Dedication of rights-of-way associated with the Project site will be determined in coordination with the Broward County Office of Planning during the development review process for platting and site planning.

2.2.5 Regional Scenic, Cultural and Natural Landmarks

In addition to the information provided in Section 2.2.1, Governmental Jurisdictions, the following regional scenic, cultural and natural landmarks were identified to exist within 5 miles of the site:

- o Educational Facilities
- o Tourist Attractions
- o Shopping Centers and Malls
- o Airports

The following educational facilities, tourist attractions, shopping malls and airports were identified to exist outside of the one mile radius of the facility but within the five mile radius. No like educational, tourist attractions, shopping malls or airports are located within one mile of the site.

Elementary and Middle Schools

Broward County

Atlantic West Elementary
Bright Horizons School
Coconut Creeks Elementary
Coral Springs Middle School
Cresthaven Elementary
Crystal Lake Middle School
Cypress Elmenetary
Deerfield Beach Elementary
Deerfield Beach Middle School
Deerfield Park Elementary
Drew, Charles Elementary
Forest Hills Elementary
Hunt, James S. Elementary
Margate Elementary
Margate Middle School

Elementary and Middle Schools (cont'd)

Markham, C. Robert Elementary
Norcrest Elementary
Palmview Elementary
Park Ridge Elementary
Pompano Beach Elementary
Pompano Beach Middle School
Sanders Park Elementary
Tedder Elementary

Palm Beach County

Addison Mizner Elementary School
Verde Elementary School

High Schools

Broward County

Coconut Creek High School
Coral Springs High School
Deerfield Beach High School
Ely High

Palm Beach County

None

Other Educational Facilities

Broward County

Atlantic Vocational Center
Broward County Youth Center
Broward Community College - North Campus

Principal County Tourist Attractions or Shopping Centrs and
Malls (within 5 miles)

Broward County

Brown's Miniature Horse Farm
Pompano Park Harness Racing
Goodyear Blimp Base
USA Waterboggan
Pompano Beach Stadium
Hidden Harbor Restaurant and Showboat
Pompano Fishing Fleet
Pompano Fashion Square
Depot Shopping Center

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Principal County Tourist Attractions or Shopping Centers and
Malls (within 5 miles) (cont'd)

Palm Beach County

Sandalfoot Plaza
Sandalfoot Square
Village Pointe Shopping Center
Wharfside at Boca Pointe
Gardens Shops at Boca
Del Mar Shopping Village
Shops at Boca
Palmetto Park Square

Airports

Broward County

Pompano Beach Airport

Palm Beach County

None

None of these areas of cultural interest will be affected by the proposed plant or its emissions.

2.2.6 Archaeological and Historic Sites

The State of Florida, Division of Archives, History and Records Management, reviewed a map of the area for evaluation of known or potential historic or archaeological resources at the site. The results of this review indicate that the probability of any significant occurrence of historic or archaeological resources is very low. Therefore, no further investigation is required prior to construction. Appendix 10.16 provides further details on this issue.

2.2.7 Socioeconomics and Public Services

2.2.7.1 Social and Economic Characteristics

Current Population. In 1980, total Broward County population as recorded by the U.S. Bureau of Labor, Department of Census was 1,018,200 and for Palm Beach County it was 576,863. It is anticipated that approximately 40 percent of the total Broward County population will be serviced by the Northern

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Resource Recovery Facility. Previous Figures 2.2.3.1 and 2.2.3.1(A) detail the 1980 census population counts for those census tracts partially or wholly located within five miles of the site. The site is located in Broward County census tract 104. In 1980 the population of census tract 104 was 17,390. In aggregate, 1980 census populations for all Broward census tracts located within 5 miles of the site was 202,412 and for all Palm Beach census tracts located within 5 miles of the site was 36,151.

Labor Force. The civilian labor force in Broward County as a whole totaled 370,100 in 1983. This represents a 5 percent increase since 1980. The unadjusted unemployment rate in January of 1983 was 9.1 percent. In July of 1984 the unemployment rate had fallen to 5.4 percent. This compares to national unadjusted unemployment rate figures for the same period of 11.4 percent and 7.5 percent, respectively. Table 2.2.7.1 presents a compilation of unemployment data from January 1982 through August of 1984.

The civilian labor force in Palm Beach County as a whole totaled 324,313 in 1984 which is a 40 percent increase since 1980. The unemployment annual rate in 1984 was 6.4 percent compared to a national annual rate of 7.5 percent. Table 2.2.7.2 presents unemployment data from 1970 through 1980 and for 1984.

Employment by Occupation in the Industrial Sector. Table 2.2.7.3 presents 1983 employment statistics by occupation (except agriculture) for Broward County. Table 2.2.7.4 presents 1984 employment statistics by occupation (except agriculture) for Palm Beach County.

General Income Characteristics. Within the 5 mile radius of the proposed Hilton Road site there is a combination of high and low median household incomes. The City of Parkland contains a majority of the upper income households. The City of Deerfield Beach contains a majority of the lower income

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TABLE 2.2.7.1

UNEMPLOYMENT RATE (UNADJUSTED)
BROWARD COUNTY, STATE OF FLORIDA, UNITED STATES
JANUARY 1982-JUNE 1983

Year	Month	Broward	Florida	United States
1982	January	6.0%	7.7%	9.4%
	February	5.7	7.1	9.6
	March	7.0	8.6	9.5
	April	6.4	7.9	9.2
	May	6.0	7.3	9.1
	June	6.1	7.7	9.8
	July	5.8	7.5	9.8
	August	6.2	7.8	9.6
	September	6.7	8.2	9.7
	October	7.6	9.2	9.9
	November	8.0	9.5	10.4
	December	7.8	9.5	10.5
	Annual Average	6.6	8.2	9.7
1983	January	9.1	10.4	11.4
	February	8.3	9.5	11.3
	March	7.6	8.9	10.8
	April	7.3	8.4	10.0
	May	7.7	8.7	9.8
	June	7.6*	8.8	10.2
	July	6.7	8.2	9.4
	August	6.7	8.2	9.2
	September	6.4	8.1	8.8
	October	7.0	8.6	8.4
	November	6.6	8.1	8.1
	December	6.1	7.5	8.0
1984	January	6.1	7.4	8.8
	February	4.9	6.1	8.4
	March	4.3	5.4	8.1
	April	4.6	5.7	7.6
	May	5.0	6.1	7.2
	June	5.3	6.6	7.4
	July	5.4	6.8	7.5
	August	4.7*	6.2*	7.3
	September	N/A	N/A	7.1

*Preliminary

Source: State of Florida, Department of Labor and Employment
Security, Bureau of Labor Statistics

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TABLE 2.2.7.2

LABOR FORCES ESTIMATES
PALM BEACH COUNTY, FLORIDA, AND UNITED STATES

Year	Palm Beach County				Florida Unemployment Rate	United States Unemployment Rate
	Civilian Labor Force	Employed	Unemployed	Unemployment Rate		
1970	141,693	138,141	3,552	2.5	4.3	4.9
1971	146,325	139,736	6,589	4.5	4.9	5.9
1972	155,215	145,382	9,633	6.2	5.1	5.6
1973	167,284	161,617	5,667	3.4	4.3	4.9
1974	181,480	171,710	9,770	5.4	6.2	5.6
1975	187,523	167,338	20,185	10.8	10.7	8.5
1976	192,453	172,335	20,118	10.5	9.0	7.7
1977	195,320	174,849	20,471	10.5	8.2	7.0
1978	206,288	193,345	12,943	6.3	6.3	6.2
1979	222,500	207,200	14,600	6.6	6.1	5.8
1980	232,500	218,800	13,700	5.9	5.9	7.2
1984	324,313	303,512	20,801	6.4	-	7.5

Source: Florida Department of Labor and Employment Security, Division of
Employment Security.

TABLE 2.2.7.3

AVERAGE ANNUAL NON-AGRICULTURAL EMPLOYMENT
BY INDUSTRY DIVISION
BROWARD COUNTY, 1983

<u>Industry</u>	<u>Employment</u>	
	<u>Number</u>	<u>Percent</u>
Construction	25,900	7.0
Manufacturing	41,600	11.2
Durables	31,300	8.4
Non-Durables	10,300	2.8
Transportation, Public Utilities	18,100	4.9
Trade	107,800	29.1
Retail	88,900	24.0
Wholesale	18,900	5.1
Finance, Insurance, Real Estate	33,200	9.0
Services and Miscellaneous	94,200	25.5
Government	<u>49,300</u>	<u>13.3</u>
Total	370,100	100.0%

Source: Florida Department of Labor and Employment Security

TABLE 2.2.7.4

EMPLOYMENT DISTRIBUTION BY INDUSTRY
PALM BEACH COUNTY

<u>Industry</u>	<u>1984</u>
Manufacturing	34,500
Contract Construction	24,900
Transportation	10,500
Trade	69,800
Finance	20,900
Services	72,500
Government	<u>33,200</u>
TOTAL	266,300

Source: Florida Department of Commerce.

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households. Median household income for residences within a one mile radius of the proposed site falls within the lower fifty percentile of Broward County averages.

Source of Income. Throughout the nine cities in the area, the primary source of income is wages and salary. Approximately 50 percent of the land in the area is used for light to medium residential housing (see Figures 2.2.2.1 and 2.2.2.1(A)).

Average Wage and Salary Income. For those census tracts either partially or wholly within five miles of the site, private services account for the primary source of income. Private services provided more jobs in 1983 for this area than any other industrial sector in Broward County or Palm Beach County.

Existing Housing Stock. Housing statistics are shown in Table 2.2.7.5. Parkland has the greatest proportion of owner-occupied housing units (87%), while the Pompano Beach has the lowest (51%).

Building Activity. Multi-family housing units represented the largest proportion of building activity in Broward County between 1970 and 1982. Single family housing units represented the largest proportion of building activity in Palm Beach County between 1975-1984. Table 2.2.7.6 presents municipality building activities based on building permits issued to build within five miles of the proposed site. Table 2.2.7.7 and Figure 2.2.7.1 presents information pertaining to residential building permits issued for Broward County and Palm Beach County, respectively.

Housing Costs. Of those census tracts partially or wholly within the 5 mile radius of the site, average median housing value is highest in Parkland. Median housing values and condominium values for the same area are shown in Table 2.2.7.8.

TABLE 2.2.7.5

EXISTING HOUSING INFORMATION, 1980

<u>Municipality</u>	<u>Total Housing</u>	<u>Occupied Year Round Housing Units</u>			<u>Vacant Year-Round Housing Units</u>			
		<u>Total</u>	<u>Owner Occupied</u>	<u>Renter Occupied</u>	<u>Total</u>	<u>For Sale</u>	<u>For Rent</u>	<u>Other</u>
<u>Broward County</u>								
Coconut Creek	3,509	2,820	2,543	277	689	123	62	504
Pompano Beach	32,262	24,244	16,604	7,640	8,018	369	920	6,729
Lighthouse Point	5,674	5,097	4,397	700	577	61	54	462
Deerfield Beach	21,071	18,422	14,631	3,791	2,649	232	450	1,967
Park Land	176	162	153	9	14	-	1	13
Coral Springs	12,746	11,392	8,469	2,923	1,354	533	264	557
Margate	16,632	14,639	12,802	1,837	1,993	156	134	1,703
Hillsboro Beach	1,464	875	778	97	589	38	34	517
<u>Palm Beach County</u>								
Boca Raton	25,833							

TABLE 2.2.7.6

RESIDENTIAL BUILDING PERMITS ISSUED, BY MUNICIPALITY,
BROWARD COUNTY, 1983 AND 1970-1983

Municipality	1983				1970-1982			
	Single Family	Duplex	Multi- Family	Total	Single Family	Duplex	Multi- Family	Total
<u>Broward County</u>								
Coconut Creek	12	-	179	191	840	78	4,649	5,567
Pompano Beach	27	8	110	145	816	390	16,232	17,438
Lighthouse Point	-	-	-	-	-	-	-	-
Deerfield Beach	51	4	249	304	2,668	272	14,322	17,262
Parkland	13	-	-	13	153	-	-	153
Coral Springs	393	30	957	1,380	7,893	1,116	7,832	16,931
Margate	62	4	101	167	5,204	230	9,250	14,684
Hillsboro Beach	-	-	30	30	110	-	930	1,040
<u>Palm Beach County</u>								
			<u>1984</u>				<u>1975-1984</u>	
Boca Raton	466	-	251	717	4,151	-	2,685	6,836

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TABLE 2.2.7.7

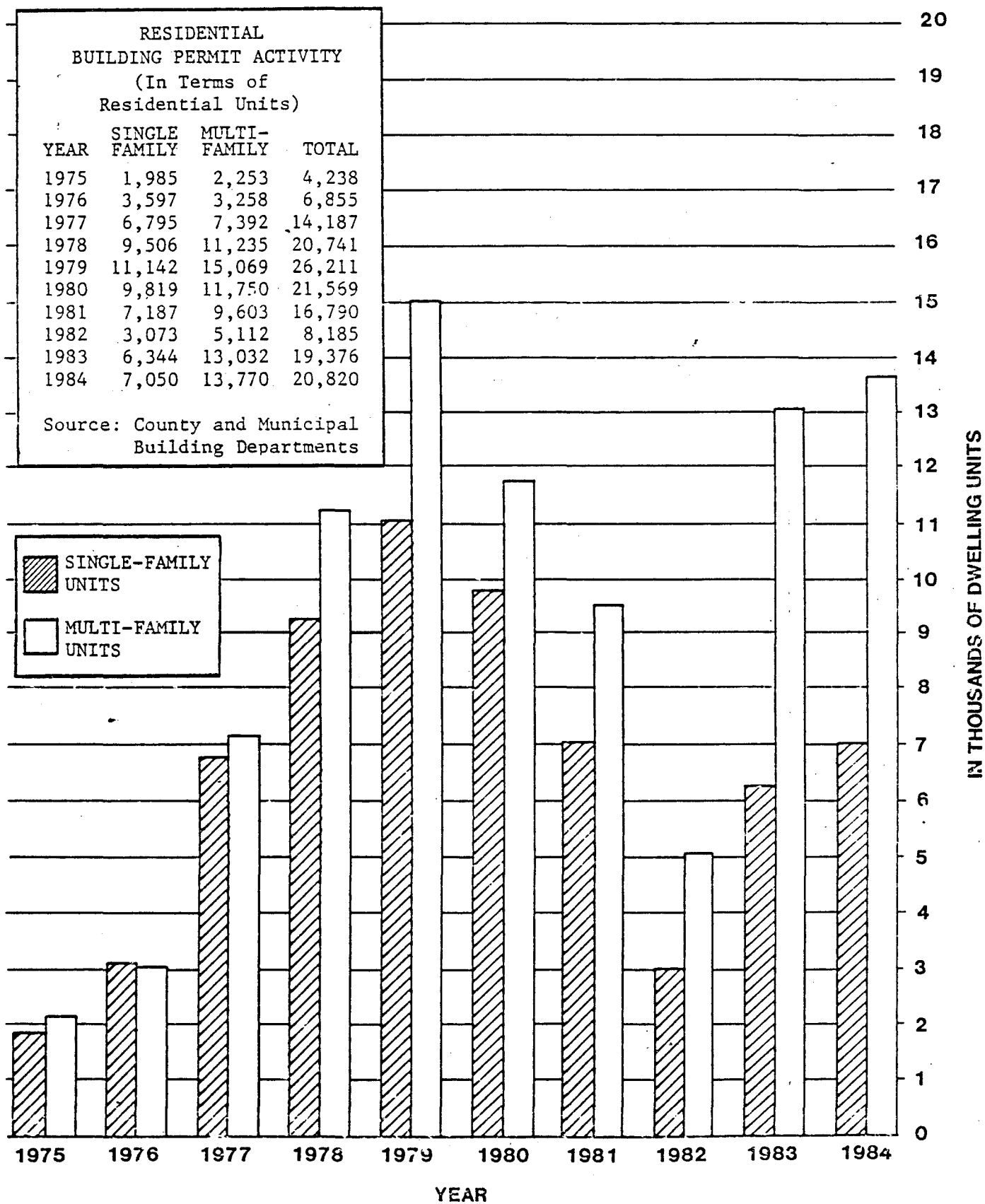
RESIDENTIAL BUILDING PERMITS ISSUED
BROWARD COUNTY, 1970 - AUGUST, 1984

<u>Year</u>	<u>Single Family</u>		<u>Duplex</u>		<u>Multi-Family</u>		<u>Total</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
1970	6,200	30.7	1,096	5.4	12,924	63.9	20,200	100.0
1971	7,999	27.3	1,274	4.4	20,014	68.3	29,287	100.0
1972	9,664	21.3	1,544	3.4	34,090	75.3	45,298	100.0
1973	11,071	16.9	1,496	2.3	52,981	80.8	65,548	100.0
1974	3,585	17.5	602	2.9	16,367	79.6	20,554	100.0
1975	3,334	63.4	396	7.5	1,532	29.1	5,262	100.0
1976	4,871	59.9	458	5.6	2,803	34.5	8,132	100.0
1977	6,951	49.8	392	2.8	6,613	47.4	13,956	100.0
1978	8,143	35.9	464	2.0	14,078	62.1	22,685	100.0
1979	6,304	39.4	444	2.8	9,247	57.8	15,995	100.0
1980	5,078	32.8	499	3.2	9,920	64.0	15,497	100.0
1981	2,987	34.3	431	5.0	5,279	60.7	8,697	100.0
1982	1,828	28.4	272	4.2	4,334	67.4	6,434	100.0
1983	4,696	33.0	476	3.4	9,042	63.6	14,214	100.0
1984*	3,647	32.9	346	3.1	7,089	64.0	11,082	100.0

*Through August

Source: Fort Lauderdale News/Sun Sentinel

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BROWARD COUNTY
RESIDENTIAL BUILDING
PERMIT ACTIVITY

TABLE 2.2.7.8

AVERAGE VALUE OF OWNER-OCCUPIED UNITS
NON-CONDOMINIUM AND CONDOMINIUM

<u>Municipality</u>	<u>Non-Condo</u>	<u>Condo</u>
<u>Broward County</u>		
Coconut Creek	\$ 78,690	\$59,591
Pompano Beach	83,045	77,308
Lighthouse Point	123,165	53,151
Deerfield Beach	69,507	46,645
Parkland	163,590	--
Coral Springs	112,162	52,606
Margate	60,095	45,466
Hillsboro Beach	178,723	95,635

2.2.7.2 Area Public Service and Utilities

Education. An extensive list of schools is provided in Section 2.2.5.

Transportation. Section 5-9 discusses the average daily traffic volumes and concludes that there would be an insignificant impact on existing traffic conditions.

Medical Facilities. A list of medical facilities within a 5 mile radius of the proposed facility is provided in Section 2.2.1.

Fire Fighting Facilities. On-site fire fighting facilities would consist of the following:

- o The fire protection system will be designed to detect, suppress and prevent fires from spreading so that a fire does not cause excessive damage to Plant equipment and structures. The fire water system will supply an adequate quantity of water for fire fighting to the yard hydrants, water spray systems and sprinkler systems.
- o Firewater to the site will be supplied from the 16-inch water line adjacent to Powerline Road. The power block portion of the Plant shall be ringed by a 10-inch main fire loop supplying the automatic fire suppression systems, yard hydrants, standpipes and hose reels. This loop shall be provided with post indicator valves as required by National Fire Protection Association (NFPA).
- o The transformer area will be protected by a dry pipe fixed spray system. The cable spreading area under the control room floor will be protected by a Halon system. Water cannons are provided at the perimeter of the refuse pit. Standpipes and hose racks are also provided for these areas as well as other plant areas in accordance with NFPA criteria.
- o Fire protection system supervisory instrumentation and annunciators will be located in the main control room. System components are designed in accordance with the established by the National Fire Protection Association.
 1. The underground fire main yard loop, fire hydrants, the distribution of fire hydrants, the distribution of fire hydrants and their installation will comply with the requirements of NFPA 24.

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2. The water spray systems will be designed and installed in accordance with the requirements of NFPA 13 and 15.
3. Portable fire extinguishers will be selected based on the specific area fire hazard and distributed in accordance with the requirements of NFPA 10.
4. The fire detection systems will be designed and installed in accordance with NFPA 72C and 72E.

The following is a list of Fire Stations located in the immediate area of the proposed resource recovery facility:

Coconut Creek Volunteer F.D., 1071 NW 45 Ave., Coconut Creek
 Collier City Volunteer F.D., 9050 SW Pl., Cooper City
 Deerfield Beach, Station No. 1, 928 E. Hillsboro Blvd.
 (City Emergency Medical Service Unit) (responding unit)
 Rockland Volunteer F.D., 7400 Holmberg Rd., Parkland
 Pompano Beach, Station No. 5, 2001 NW 3 Ave.

Police Protection. The following is a list of Police Departments in Broward County:

Broward County Sheriff's Office/201 SE 6th St.
 (responding unit)
 Coconut Creek/1071 NW 45 Ave. (located near the site)
 Cooper City/9090 SW 50 Pl/11610 Stonebridge Pky
 Coral Springs/106 W. Dania Bch Blvd.
 Davie/6591 SW 45 St.
 Deerfield Beach/300 NE 2 St.
 Fort Lauderdale/1300 W. Broward Blvd.
 Hallandale/100 SW 4 Ct.
 Hillsboro Beach/1210 A 1-A Hyw.
 Lauderdale-by-the-Sea/4501 Ocean Dr.
 Lauderdale Lakes/3461 NW 43 Ave.
 Lauderhill/1980 NW Ave.
 Lazy Lake/2154 Lazy Lane
 Lighthouse Point/3760 NE 22 Ave.
 Margate/5790 Margate Blvd.
 Miramar/6700 Miramar Pky.
 North Lauderdale/1051 SW 80 Ave.
 Oakland Park/3650 NE 12 Ave.
 Parkland/6500 Parkside Dr. (located near the site)
 Pembroke Pines/3150 SW 52 Ave.
 Pembroke Pines/9500 W. Pines Blvd.
 Plantation/7051 NW 4 St.
 Pompano Beach/101 SW 1 Ave.
 Sea Rank Lakes/1 Gatehouse Rd.
 Sunrise/1277 Sunset Strip

Tamarac/5811 NW 88 Ave.
Wilton Manors/524 NE 21 Ct.

Recreation Facilities. A list of recreation facilities is provided in Section 2.2.5.

Electricity. Will be generated on-site by a condensing turbine generating set. All electrical utility power not used by the plant will be sold to Florida Power and Light. Backup emergency power will be supplied by Florida Power and Light.

Gas. Natural gas will not be used in the RRF. Back-up emergency power will be supplied by Florida Power and Light.

Water Supply Facilities. A 16 inch diameter water transmission line will provide potable water and boiler make-up requirements for the Resource Recovery Facility. An 8-inch diameter transmission line will supply secondary treated wastewater to the Facility for cooling.

Sewage Treatment Facilities. Discharges from the Resource Recovery Facility will flow to an existing 36-inch sanitary sewer line located directly adjacent to Powerline Road. All discharges will go to the Broward County North Regional Wastewater Treatment Plant for treatment prior to ocean discharge.

Solid Waste Disposal. Refuse generated on-site will be processed at the facility. No hazardous material will be generated on-site. Any unprocessable waste (i.e. oversized or bulky waste) that cannot be incinerated will be landfilled directly at the adjacent landfill.

2.3 Biophysical Environment

2.3.1 Hydrogeology

The following subsections describe the major geologic features of the site and associated facility areas. This information includes the results of the geotechnical studies which were undertaken to determine the structural and environmental suitability of the site. The study description includes

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identification and justification of the sampling pattern, sampling method, and analytic techniques.

Because the facility will not incorporate an ash residue/unprocessable waste landfill, a detailed description of site-specific hydrogeologic characteristics will not be required. However, regional aquifer and surface water characteristics are discussed in order to assist in defining a surface water management plan which will conform with South Florida Water Management District (SFWMD) requirements.

2.3.1.1 Geologic Description of the Site Area

The most common geologic formations in Broward County to a depth of approximately 300-400 feet, are limestones overlain by sand. These units are Pleistocene to Late Miocene (from 1 million to 25 million years old).

The Biscayne Aquifer system, the major potable water source for south Florida, with the exception of certain coastal areas where salt water intrusion has occurred, underlies all of eastern Broward County. This system is comprised of highly permeable limestones and sandstones with overlying younger deposits of sand. The Biscayne Aquifer extends from land surface to a depth of more than 200 feet along the coast, thins westward to a depth of about 70 feet in central Broward County, and pinches out near the western county line. At various locations, it may be composed of: the upper part of the Tamiami formation, small erosional remnants of the Caloosahatchee marl, the Anastasia formation, the Fort Thompson formation, the Miami oolite, and the Pamlico sand. The aquifer grades into a predominantly sandy phase in the Fort Lauderdale area. Wells often must be cased to the main water horizon, and screens may be required to prevent sand from entering the well. It is underlain by a thick sequence of relatively impermeable clayey materials which in turn overlie the permeable limestone formations of the Floridan Aquifer. The confined Floridan Aquifer extends from a depth of about

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900 feet to more than 3,000 feet and is overlain by a 500 to 600-foot section of clay, silt, and marl of low permeability. Parker, et al. (1955), presents a comprehensive description of the geology of southeastern Florida.

The typical lithology in the area is shown by the log of USGS well G515 (Table 2.3.1.1), and the logs depicted in Figures 2.3.1.1, 2.3.1.2, and 2.3.1.3. The lithologic and permeability description in Table 2.3.1.1 are an interpretation of the USGS and show that low and high permeabilities are generally associated with sand and rock zones, respectively. Although the lithology is highly variable, Figure 2.3.1.1 shows that about 60 feet of low permeability sand overlies at least 140 feet of highly permeable limestone interbedded with sandstone and sand. In some areas, the deposits below a depth of 60 feet are predominantly sand or sandstone and sand. The wells depicted in Figure 2.3.1.1 are located on Figure 2.3.1.4.

There is also evidence of a low-permeability zone at the base of the Biscayne Aquifer. Many of the wells in Figures 2.3.1.1., 2.3.1.2 and 2.3.1.3 show the presence of sand or marl beds at depths below 180 feet, and the lithologic interpretation of Table 2.3.1.1 associates similar beds with low to very low permeabilities. The presence of brackish water near the base of the aquifer (Vorhis, 1948) suggests that a low-permeability zone may have entrapped connate water or relict seawater by retarding ground water movement.

In general, the geologic units underlying the Hilton Road site are comprised of up to 100 feet of unconsolidated sands which in turn are underlain by as much as 200 to 300 feet of interbedded limestone, sandstone, sand and clay/marl. Figure 2.3.1.5 provides a geologic cross section a few miles south of the site. As noted on the figure, lithologic conditions are highly variable within the Biscayne Aquifer.

2.3.1.2 Detailed Site Lithologic Description

Information contained in this section has been developed from exploratory borings taken as part of the site selection

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TABLE 2.3.1.1

TYPICAL LITHOLOGY - USGS WELL G515⁽¹⁾

Location: N.E. 1/4 S.W. 1/2 Section 12, T. 50 S., R. 41E., in center of Fort Lauderdale Golf and Country Club, near City Well 6.

Elevation of land surface: about 9.0 feet above mean sea level.

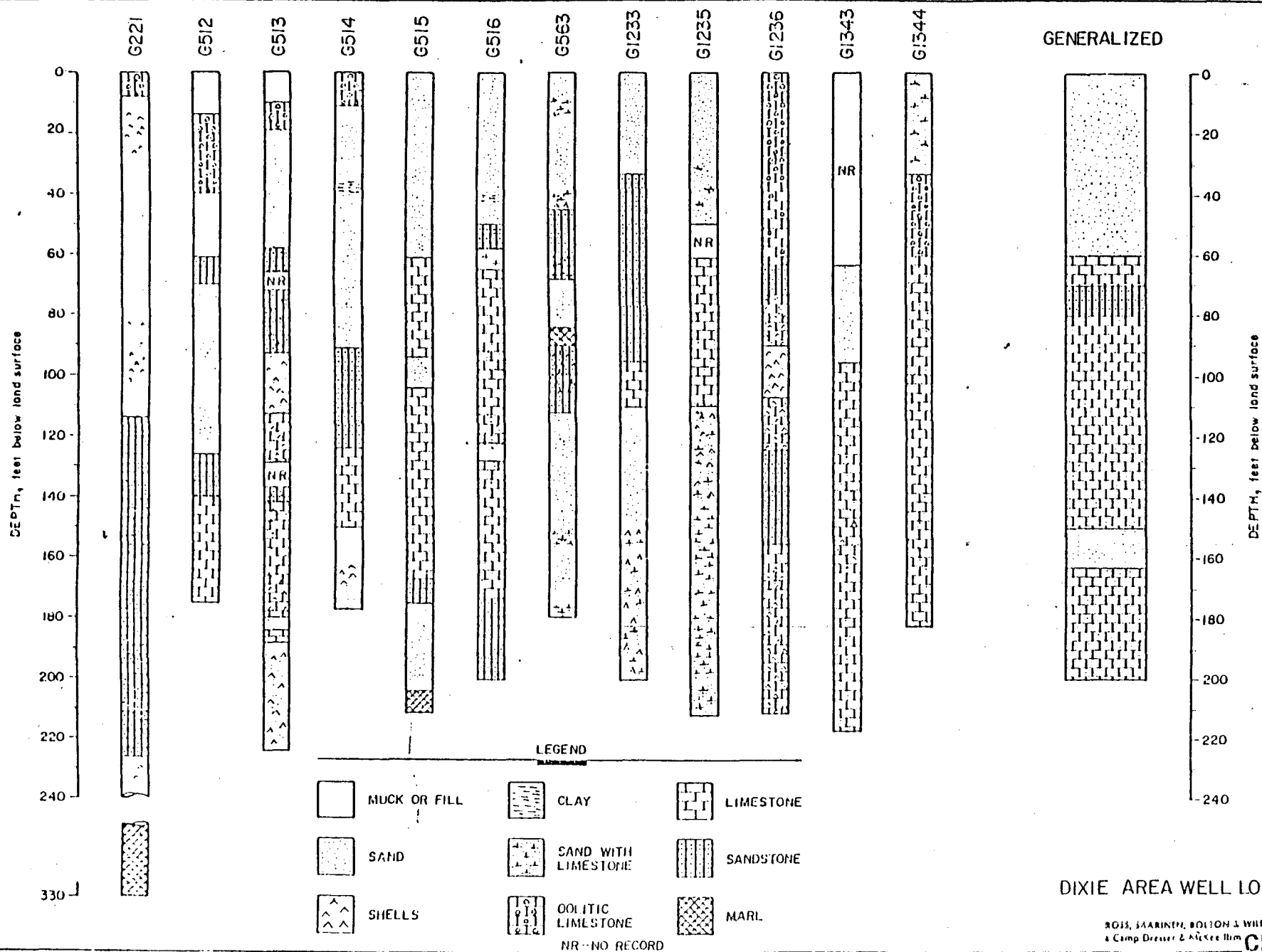
	<u>Depth in feet below land surface</u>
Sand, quartz, grayish-white.	0 - 3
Sand, quartz, dark-brown, medium-grained, containing a large amount of organic material. Moderately permeable.	3 - 31
Sand, quartz, fine-grained.	31 - 42
Sand, quartz, very fine-grained with some admixed clay. Low permeability.	42 - 61
Limestone, sandy, cavernous, with some quartz sand. Limestone has weathered appearance. Moderately permeable.	61 - 68
Limestone, sandy, and quartz sand. Each have peppered appearance due to presence of collophane. Medium to low permeability.	68 - 94
Sand, quartz, very fine-grained, peppered with collophane and ilmenite. Low permeability.	94 - 104
Limestone, sandy, and calcareous sandstone, fossiliferous. Very permeable between 107 and 123 feet; low, between 123 and 167 feet.	104 - 167
Sandstone, calcareous. Permeable.	167 - 175
Sand, quartz, interbedded with thin layers of clay. Low permeability.	175 - 204
Marl, clayey, gray-green with thin lenses of quartz sand containing some ilmenite. Very low permeability.	204 - 211

Note:

1. As interpreted by the United States Geological Survey.

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FIGURE 2.3.1.1

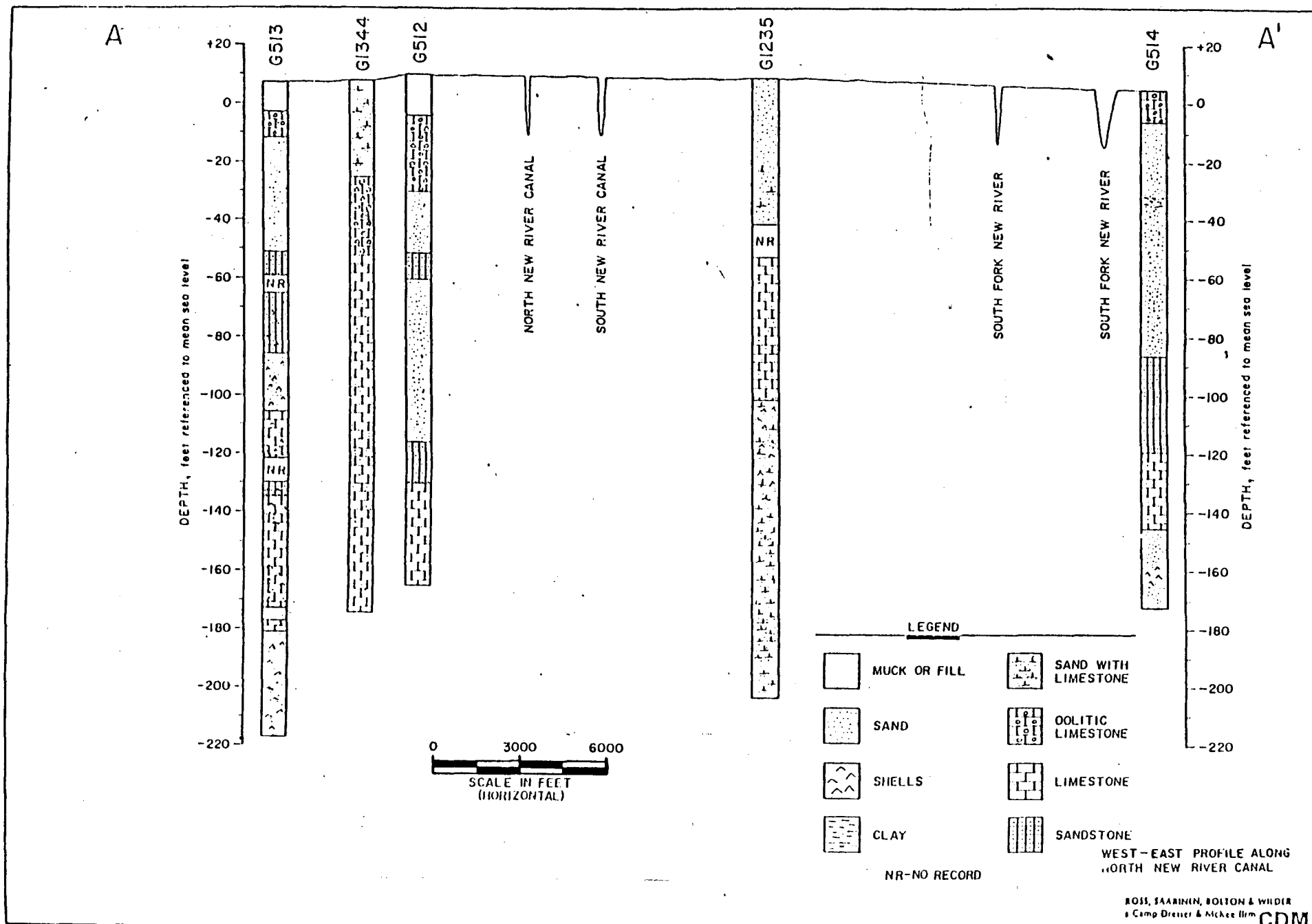


DIXIE AREA WELL LOGS

BOIS, SAARINK, BOLTON & WILDER
a Camp Dresser & McKee firm

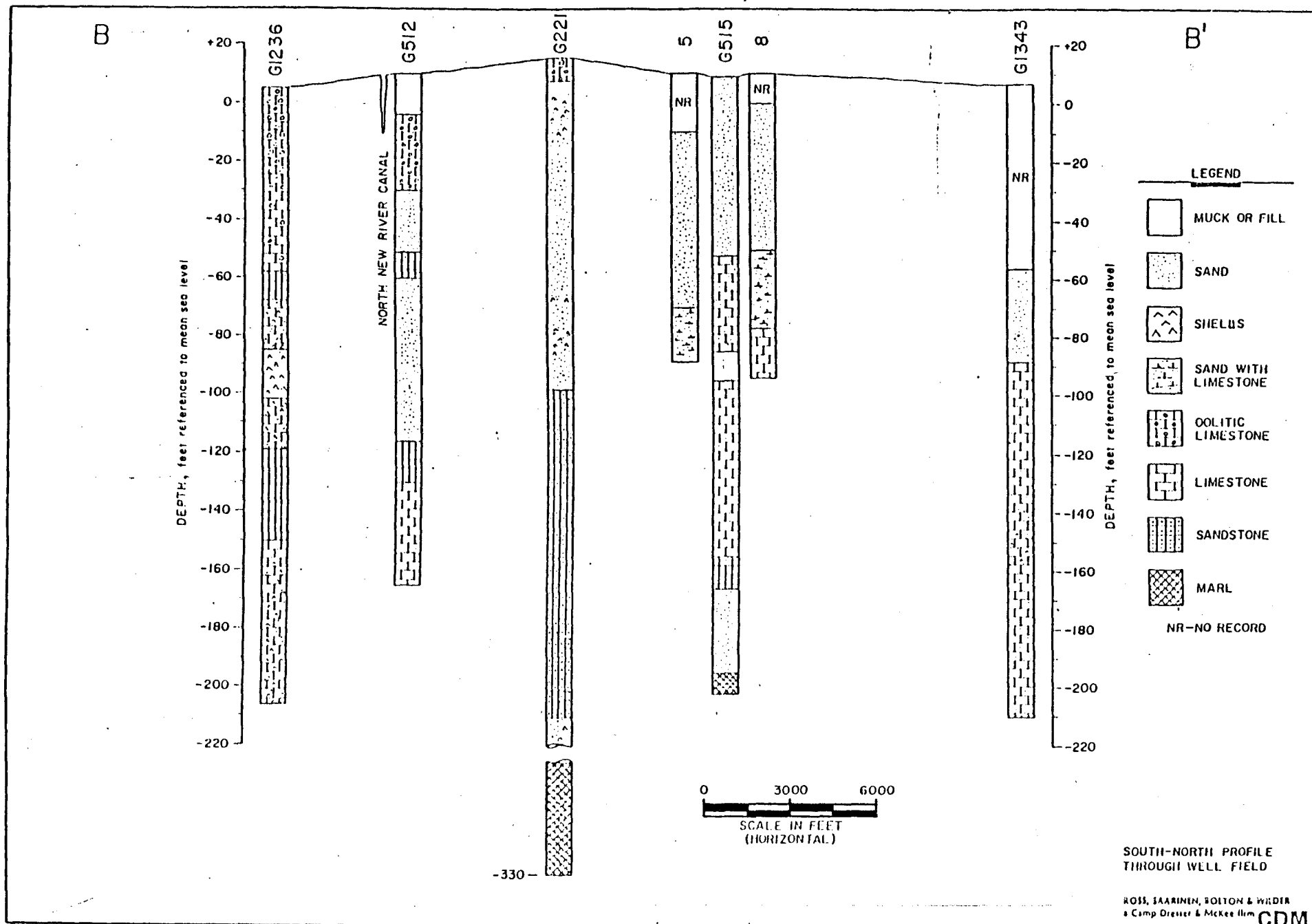
CDM

FIGURE 2.3.1.2

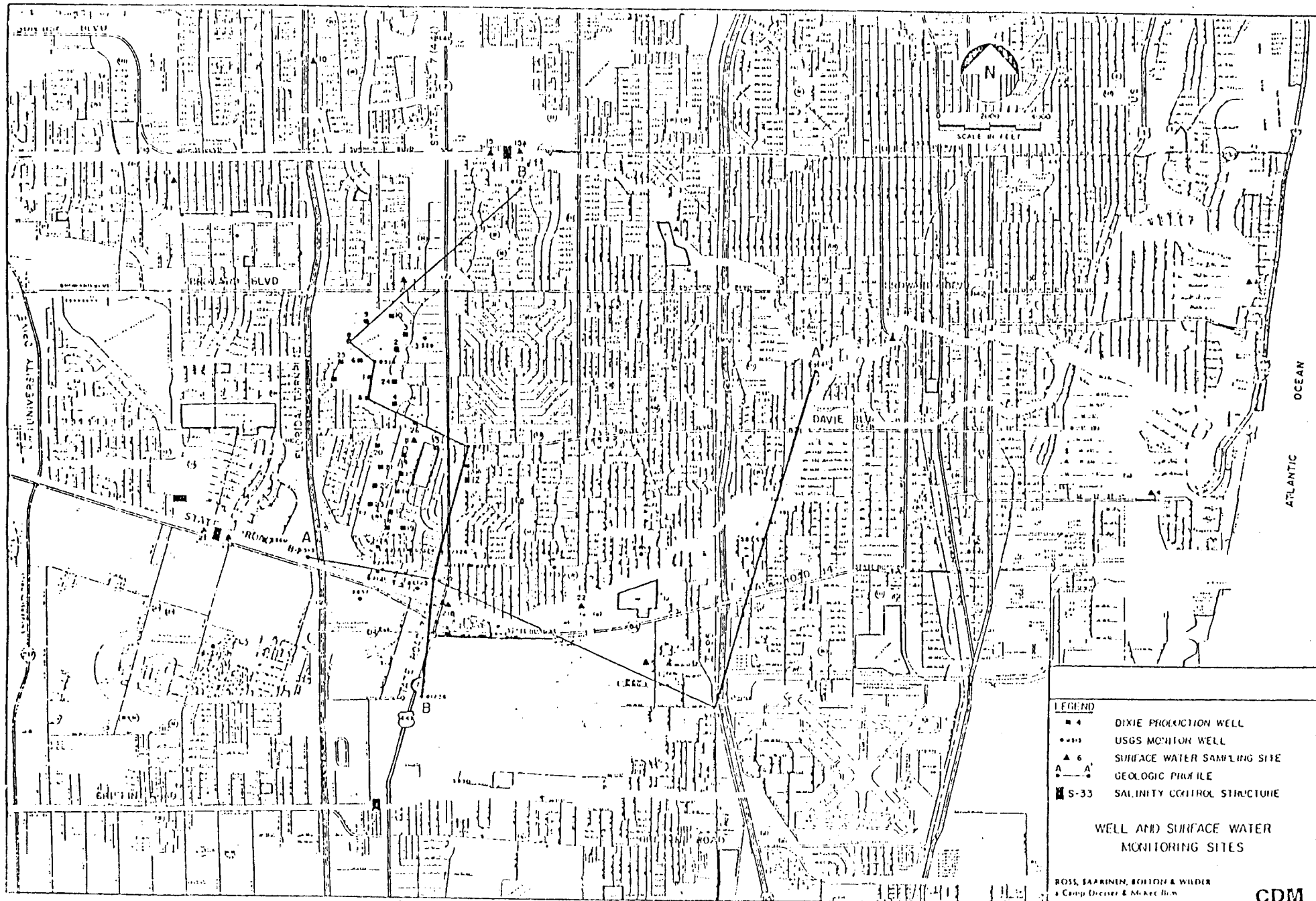


Note: See Figure 2.3.1.4 for Line of Section

FIGURE 2.3.1.3



Note: See Figure 2.3.1.4 for Line of Section



Note: Cross Sections Shown on Figures 2.3.1.2 and 2.3.1.3

FIGURE 2.3.1.4



Location of test
Broward County.



Lithologic logs along line B-B'

BROWARD COUNTY

LITHOLOGIC LOGS AND LOCATIONS OF OBSERVATION WELLS IN PROXIMITY TO HILTON ROAD SITE

and geotechnical investigation efforts of Broward County's Resource Recovery Program. Florida Testing and Engineering Company under supervision of Reynolds, Smith and Hills, conducted a geotechnical investigation, in September 1985, involving 15 borings on the site and an area 400 ft. east of the eastern property boundary. The borings range 30 to 100 feet in depth.

Site Soils

Information on existing soils at the northern site was obtained from the Broward County Soil Survey (U.S.D.A. Soil Conservation Service, 1976) and verified by geotechnical investigations to provide additional background soil and geologic data.

The site is entirely on Hallandale and Margate soils (Hm). These soils are level, poorly drained and have been graded and covered with generally 8 to 20 inches of fill material (sand, shell and limestone fragments). Other soil types and pond bottoms may occasionally underlie the fill material which may be as deep as five feet or more.

The soil borings indicate fill material (limestone, silt and debris) can be found at depths as great as 35 feet. Some silty material is tentatively identified as buried sludge. The remaining material found in borings is fine to medium sand.

Site Stratigraphy

The adjacent and on-site boring logs in Appendix 10.8 indicate fine to medium sand to a depth of at least 85 feet except for the near surface fill material described above. Boring B-5 (100 feet deep) in the center of the site is the only boring exceeding a depth of 75 feet. Some limestone is found in the geologic samples beginning at 85 feet. These findings corroborate earlier investigations conducted about

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two miles to the south (Law Engineering Testing Company, 1980; Malcolm Pirnie, 1983).

A layer of sandy marl at Boring B-6 (37 feet to 40 feet [boring bottom]) and B-9 (38 feet to 43 feet) may be locally confining, however, it is not areally extensive enough to be significant.

2.3.1.3 Geologic Maps

The site has generally uniform geologic conditions, typical of the Broward County area.

The borings indicate fine to medium sand with discontinuous fill materials near the surface and an occasional discontinuous layer of marl at depth. Limestone content appears to increase below 85 feet. The closest confining layer would be the layer below the Biscayne Aquifer, which consists of marl and lime clay. Above that ground water is unconfined.

2.3.1.4 Bearing Strength

In the Subsoil Investigation Report in Appendix 10.8, a range in soil loading values from 1,000 to 4,000 pounds per square foot have been calculated. Because of nonuniformity caused by variation in depth of debris deep piling is recommended, in the above report, for most aspects of construction.

2.3.2 Subsurface Hydrology

This section contains two subsections which describe the physical, chemical, and hydrological characteristics of subsurface waters. These have the potential to be affected by the construction or operation of the proposed plant, and associated facilities. Even though facility construction and operations may not have any effect on ground water, the environmentally sensitive nature of the Biscayne Aquifer (i.e. unconfined aquifer with high horizontal and vertical hydraulic conductivities, and it being the sole potable ground water supply in Broward County) has made the performance of a detailed aquifer analyses an important factor for proper facility design.

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2.3.2.1 Subsurface Hydrologic Data for the Site

Aquifer pumping tests have been conducted at the Pompano Beach and Deerfield Beach well fields located approximately 2 miles south and 3 miles east of the Hilton Road site, respectively. Test data from the Pompano Beach well field test indicated a transmissivity of 1.4×10^6 gallons per day per foot (gpd/ft) and a storage coefficient of 0.34. Test results from the Deerfield well field show a transmissivity of 4.0×10^5 and a storage coefficient of 0.0004. Previous studies estimated the transmissivity of the upper sand layer (± 60 feet) of the Biscayne aquifer to be 1.25×10^4 gpd/ft. Transmissivities for the limestone portion of the Biscayne Aquifer range from 4.0×10^5 gpd/ft in northern Broward County to 2.5×10^6 in southern Broward County. No storage coefficients have been reported for the Ft. Lauderdale area, however, a storage coefficient of approximately 0.015 has been estimated for the Prospect well field.

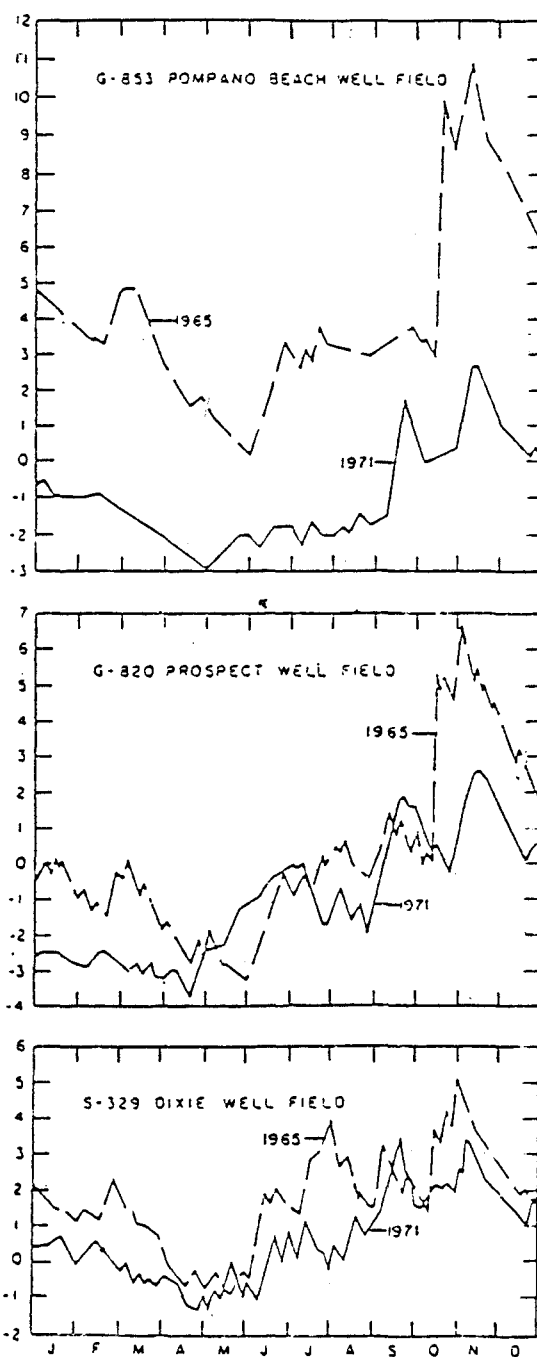
Figure 2.3.2.1 shows long-term water level fluctuations for several wells in the study area. Monitoring wells G-853 and G-820, which are closest to the Pompano well field, show a range of water level fluctuations in the order of ± 10 feet with a possible decline resulting from well field pumpage. Monitoring well S-329, located within the Dixie well field, shows declining water levels apparently resulting from Dixie well field pumpage.

Wells G-561, G-1217, G-1220, and G-1215, Figure 2.3.2.2, are somewhat remote from the major well fields with water level fluctuations in the order of ± 5 feet. Hydrographs for these wells are fairly stable for the record period.

Highest water levels tend to occur in October and lowest levels in April and May. The average difference between maximum and minimum water levels range from about 5 to 10 feet. Annual water level fluctuations at the three largest well fields (Pompano, Prospect, and Dixie) for a drought year (1971) and a non-drought year (1965) are shown on Figure

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WATER LEVEL, FEET ABOVE AND BELOW MEAN SEA LEVEL



Hydrographs of wells in the Pompano Beach well field and the Fort Lauderdale Dixie and Prospect well fields, 1965 and 1971.

BROWARD COUNTY
ANNUAL FLUCTUATIONS OF WATER LEVELS
AT THREE LARGE WELL FIELDS

2.3.2.3. Water level declines are most pronounced during the first five months of the year when recharge is minimal and discharges from the well fields are maximum. Water levels rise from June through October because of seasonal rainfall and decreased pumping. The difference in water levels between the low period of the dry year (1971) and the high period of the wet year (1965) are as much as 14 feet.

An examination of available water level contour maps indicate that ground water flow is generally south/southeast, except near the coast where it is seaward. The most recent water level contour map (Figure 2.3.2.4), compiled by the USGS, indicates that ground water flow is generally easterly in the vicinity of the northern site. (Note this map probably represents ground water flow conditions within the medium to deeper portions of the Biscayne Aquifer).

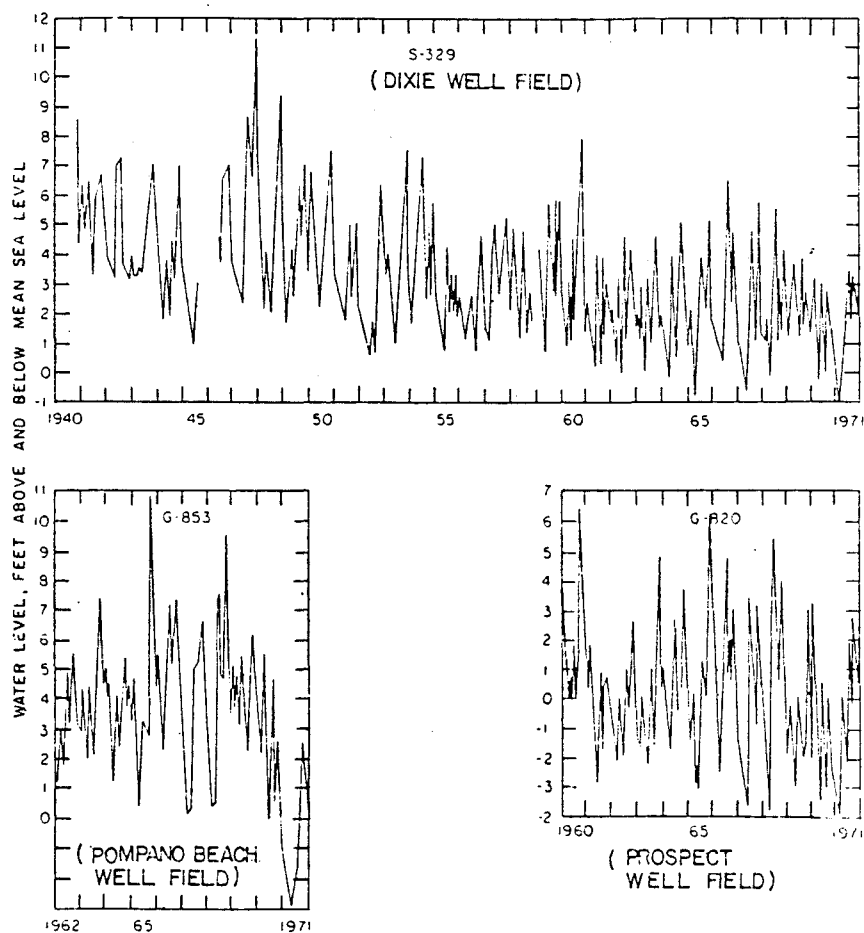
The source of all potable water in Broward County is groundwater from the Biscayne Aquifer which has been designated as sole source of drinking water for the area by USEPA.

Site Specific

The unsaturated zone varies little across the site and is generally 4 to 5 feet thick although according to the boring information in Appendix 10.8, it ranges from 0 to 8 feet. The variation may be attributed to heterogeneities in the fill material.

As shown in Figure 2.3.2.4, the site is located east of a water table high area in northern Broward County and flow direction is eastward towards coastal pumping centers.

The Biscayne Aquifer system is recharged from rainfall (during the rainy season) and infiltration from canals and other surface water bodies (during the dry seasons). Discharge from the aquifer is by evapotranspiration, ground water



HYDROGRAPHS OF WELLS IN MAJOR WELL FIELD
AREAS OF BROWARD COUNTY

BROWARD COUNTY
HYDROGRAPHS OF OBSERVATION WELLS
IN BROWARD COUNTY AND THEIR LOCATIONS



**BROWARD COUNTY
REGIONAL WATER LEVEL CONTOUR MAP
BISCAYNE AQUIFER, OCTOBER 1983
(USGS)**

flow to canals and other surface water bodies and by withdrawals from production wells. The average annual rainfall is about 60 inches with approximately 70 percent of the total recharge from rainfall occurring between June and October. About 20 inches of the average annual rainfall (50 percent) is lost by evapotranspiration. The remaining 50 percent (20 inches) is available to the aquifer.

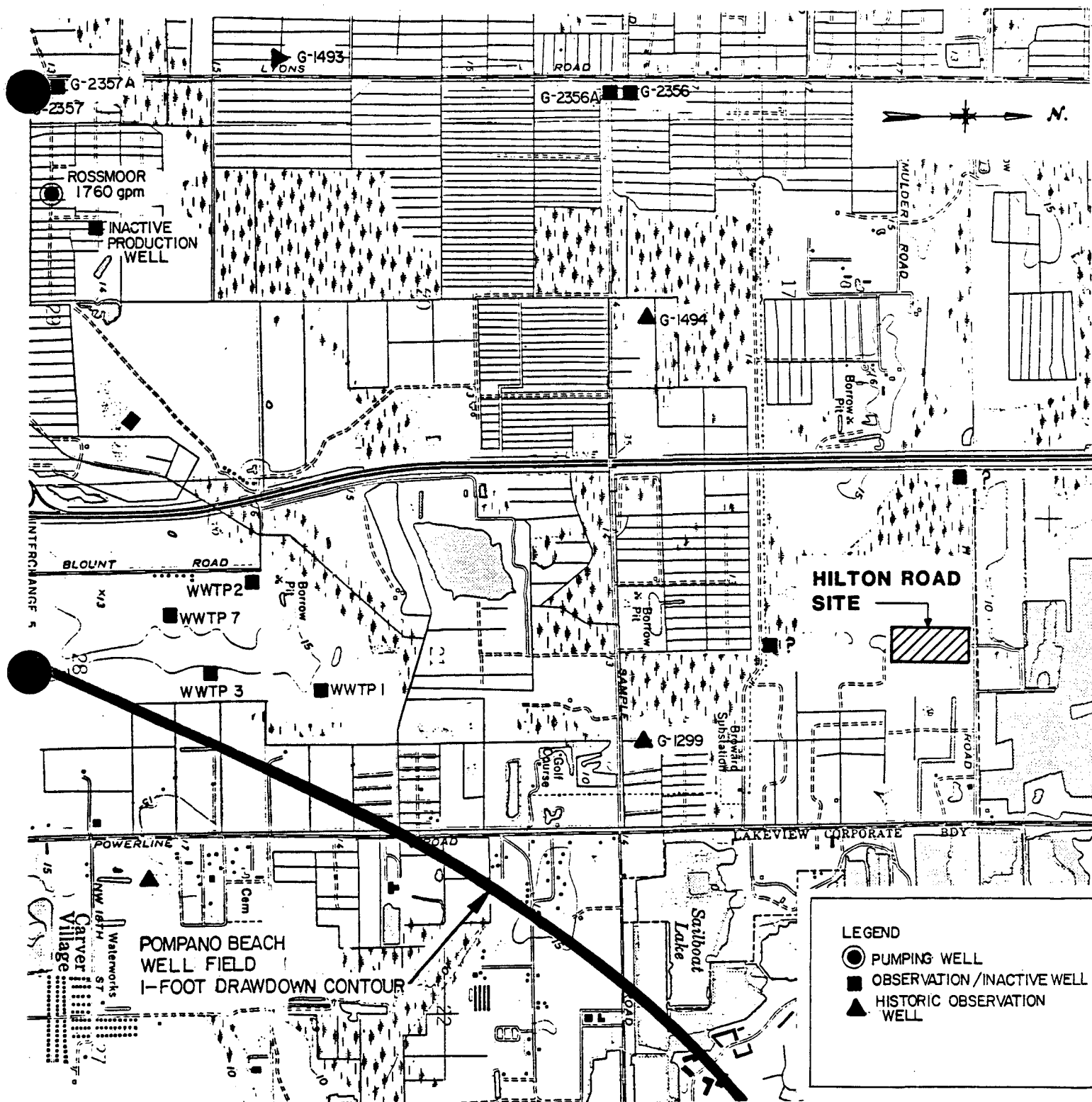
Permeabilities have been estimated from slug injection tests performed on a site 1 to 2 miles south (Malcolm Pirnie, 1984). These test indicate permeability coefficients in the range of 10^{-2} cm/sec to 10^{-3} cm/sec. This range can reasonably be extrapolated to the site, with the understanding that variations could result from occasional lenses of marl or fill material.

Water Quality

Considerable water quality data, from reports published by state agencies in the early 1960's, are available for the Biscayne Aquifer in the vicinity of the northern site. Table 2.3.2.1 contains water quality data for four wells within 1-1/2 miles of the site. These wells are all open to the middle zone of the Biscayne Aquifer (100 to 170 feet). None of these wells were accessible in early 1984, approximate locations are shown on Figure 2.3.2.5.

The water quality data which predates the Waste Management, Inc. landfill is of exceptable quality, with high bicarbonate, calcium and hardness levels characteristic of the Biscayne Aquifer.

The brackish/freshwater interface is located several miles east of the site, as mapped in May 1983, with 1,000 mg/L isochlor for the Biscayne Aquifer in the vicinity of U.S. Route 1. The Pompano Beach well field, about 3 miles south-



BROWARD COUNTY
HILTON ROAD SITE
LOCATION OF MAJOR WELL FIELDS
AND MONITORING WELLS

SCALE: 1:24,000

TABLE 2.3.2.1

WATER QUALITY WITHIN 1-1/2 MILES OF COPANS ROAD SITE
(IN MG/L EXCEPT PH, SPECIFIC CONDUCTANCE, TEMPERATURE AND COLOR)

	Well Number			
	G-1494	G-1299	S-1516	G-1493
Date of Collection	3/12/64	4/14/64	4/6/62	3/12/64
Depth of Well (ft.)	106	145	150	165
Specific Conductance (umhos at 25 C)	650	741	752	740
pH	7.5	7.6	7.8	7.6
Temperature (F)	77	75	76	74
Silica (SiO ₂)	13	15	17	11
Calcium (Ca)	123	138	126	138
Magnesium (Mg)	1.6	5.7	8.6	5.7
Sodium (Na)	17	23	30	22
Potassium (K)	1.3	1.0	1.6	1.2
Bicarbonate	384	388	412	392
Carbonate	0	0	0	0
Sulfate (SO ₄)	0	31	0	32
Chloride (Cl)	25	36	46	36
Fluoride (F)	0.3	0.2	0	0.2
Nitrate (NO ₃)	0.1	0.2	0	0.1
Iron (Fe)	0.42	1.38	0.16	0.12
Dissolved Solids:				
Residue at 180 C	386	482	444	494
Calculated	373	441	432	439
Hardness:				
Calcium, Magnesium	326	368	350	368
Noncarbonate	12	50	12	47
Color	15	15	7	25

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east of the site, currently monitors chloride levels in several seaward observation wells for the detection of possible salt water intrusion.

Water samples were collected from the newly installed monitoring wells at the formerly proposed Copans Road Site on March 9, 1984, by Malcolm Pirnie (as per protocol in Section 10). Results of the laboratory analyses are presented in Table 2.3.2.2. The constituents analyzed for are indicators of landfill and ash residue leachate. The data show elevated levels of calcium and bicarbonate indicative of natural carbonate waters, as well as high iron and manganese concentrations. Most of the heavy metal constituents were below analytical detection limits.

2.3.2.2 Karst Hydrogeology

The topography of the Broward County area is not characterized as Karst. Karst generally refers to characteristic terrain features which develop in purer limestone. The Biscayne Aquifer in this portion of Broward County is typically a carbonaceous sand indicative of an ancient offshore depositional environment where strong tidal currents had once prevailed.

2.3.3 Site Water Budget and Area Users

2.3.3.1 Site Water Budget

The important water source in the Project area which has the potential to be affected by Project implementation is the Biscayne Aquifer.

In the project area, the Biscayne Aquifer system is recharged from rainfall, infiltration from canals and other surface water bodies. Discharge from the aquifer is by evapotranspiration, ground water flow to canals, other surface water bodies and by pumping from wells. Average temperatures range from about 82° Fahrenheit in the summer to about 68°

TABLE 2.3.2.2

GROUND WATER QUALITY AT THE COPANS ROAD SITE
BROWARD COUNTY, FLORIDA (MARCH 1984 SAMPLING)

<u>Constituents</u>	<u>North Well Cluster</u>		<u>South Well Cluster</u>	
	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>
Total Organic Carbon (TOC)	9.7	9.7	13	30
Chemical Oxygen Demand (COD)	36	92	112	144
pH (standard units)	7.0	7.0	7.1	6.2
Specific Conductance (umhos)	620	360	280	134
Nitrate-N	<0.1	<0.1	<0.1	<0.1
Sulfate	48	14	20	4
Chloride	60	45	33	27
Potassium	1.3	5.2	4.6	7.6
Magnesium	6.2	4.3	4.7	4.8
Calcium	136	92	120	60
Ammonia	<0.1	<0.1	<0.1	<0.1
Bicarbonate (as HCO ₃)	402.6	347.7	341.6	73.2
Total Alkalinity	330	285	280	60
Iron	9.85	4.59	44.0	19.4
Manganese	<0.05	<0.05	0.16	<0.05
Antimony	<0.1	<0.1	<0.1	<0.1
Arsenic	0.007	0.010	0.010	0.005
Beryllium	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.01	<0.01	<0.01	<0.01
Total Chromium	<0.05	<0.05	<0.05	<0.05
Copper	<0.05	<0.01	0.13	0.08
Cyanide	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01
Mercury	<0.001	<0.001	<0.001	<0.001
Nickel	<0.05	<0.05	<0.05	<0.05
Selenium	<0.001	<0.001	<0.001	<0.001
Silver	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05
Zinc	0.005	0.008	0.042	0.016

Note: All units in milligrams per liter (mg/L) unless otherwise stated.

Fahrenheit in the winter. Mean annual temperature is 73° Fahrenheit.

2.3.3.2 Area Water Uses

All surface waters of the State have been classified according to their designated uses, as follows:

Class I - Potable Water Supply

Class II - Shellfish Propagation or Harvesting

Class III - Recreation, Propagation and Management of Fish and Wildlife

Class IV - Agricultural Water Supplies

Class V - Navigation, Utility and Industrial

Broward County is entirely within The Lower Florida River Basin (No. 28). All surface waters in this basin are classified as Class III - Recreation Propagation and Management of Fish and Wildlife with the exception of a small abandoned rockpit in North Broward which is classified as Class I - Potable Water Supply (FAC 17-3). The main functions of the canals in Broward County are to provide drainage in low-lying areas and prevent salt water intrusion. A further discussion of the canal system is provided in Section 2.3.4, Surficial Hydrology.

2.3.3.3 Well Inventory

The Pompano Beach well field is located two or three miles east of the site and has 15 water supply wells. Several new wells form the smaller New Pompano Beach well field about two miles south and southwest of the site. The combined cones of depression from the two Pompano Beach well fields are represented by the one foot drawdown contour (Figure 2.3.2.3) just southeast of the site.

Rossmoor Florida Limited Partnership operates a 350-foot deep 10-inch diameter well (1,750 gpm capacity) for golf course irrigation. This well is located about 2 to 3 miles

southwest of the site (Figure 2.3.2.5). There are a few deep observation wells within one to two miles of the site boundaries. Two pairs of USGS wells are located (Figure 2.3.2.5) about 1-1/2 miles to southwest of the site to monitor the middle of the Biscayne Aquifer. Those wells are 1 to 2-inch diameter with the following depths:

<u>Observation Well No.</u>	<u>Measured Depth in Feet</u>
G-2356	>100
G-2356A	57
G-2357	85
G-2357A	58

In addition, two inactive Rossmoor supply wells (+350 feet deep) are located about one mile southeast of site.

Four shallow water table wells were installed by Broward County to monitor possible sludge disposal impacts. They are located about 2 miles to the south of the northern site. These wells are 2-inch diameter and screened about 20 feet below grade. Numerous observation wells have reportedly been installed by Waste Management, Inc. to monitor leachate migration from their landfill. The USGS has been involved (early 1984) in the installation of two deep monitoring wells at the northwest and southeast corners of the landfill site. Geologic logs, water level, and water quality information are not available for these wells.

As part of Broward County's long range aquifer protection plan, cones of depression for major pumping centers in the County were determined from long term water level changes in observation wells. These data were used to determine travel time contours to the major pumping centers which were plotted on aerial photos as contours of equal travel time to pumping wells, i.e., 10 days, 30 days, 210 days. In certain cases

(e.g., Pompano Beach well field) a one-foot drawdown contour was also plotted (Figure 2.3.2.5).

2.3.4 Surficial Hydrology

2.3.4.1 Hydrologic Characterization

Regional

Due to Florida's high local precipitation rates, low land surface elevation, and general flat topography, much of Broward County was originally swamp or marsh lands. Upon completion of several drainage projects, Broward County was rendered developable. Drainage areas are exceptionally difficult to define due to the topographic relief and canal systems, however, dominant overland flows are to the south and southeast, and the canals flow toward the Intracoastal Waterway. The only exception is the western portion of the C-11 or South New River Canal in the south central section of Broward County, which is backpumped 3/4 of an inch of runoff per acre per day into the Conservation Area.

Site-Specific

The project site is influenced by two major canals. The Hillsboro Canal is located approximately five miles north of the site and flows southeast and east. The water level in the canal is regulated by locks to the east. The Pompano Canal (C-14) is located approximately 2-1/2 miles south of the site and flows to the east. The water levels in the Pompano Canal are regulated by a control structure at Levee 36 to the west, a control structure east of the Cypress Creek Canal intersection, and a control structure at Pompano Beach. The operation of canal control structures is managed by the SFWMD. During periods of high rainfall, the structures are opened to prevent flooding. During dry periods, the canals are used to transport water from Lake Okeechobee and the Conservation Areas to the coastal areas to recharge the aquifer.

Several small lakes, water-filled borrow pits, and canals are located in and around the site. The water levels in these surface water bodies fluctuate similarly with the groundwater levels. During dry periods, the water levels in the surface water bodies decline due to evaporation and lower water table levels. Surface water levels usually decline more rapidly than the surrounding water table resulting in groundwater flow into these water bodies. During periods of high rainfall, the surface water levels rise more rapidly than the groundwater levels, and recharge to the aquifer occurs.

Surface water flow in the drainage canal east of Central Disposal Landfill Cell No. 1 (CDSL 1) is regulated by a control structure south of Sample Road. The elevation of the structure is 10 feet above mean sea level (ams1). When the stage of the canal north of the structure is greater than the elevation of 10 feet ams1, canal water flows to the south toward the Pompano Canal. When the canal stage north of the structure is less than 10 feet ams1, surface water flows north to the Hillsboro Canal. Stage data collected from staff gages installed in the canal east of CDSL 1 (Figure 2.3.4.1) indicate that the canal stage is below 10 feet ams1 during the dry season and above this elevation during the wet season (Figures 2.3.4.2 and 2.3.4.3). Therefore, surface water flows north during the dry season and south during the wet season.

The interaction between surface water and groundwater adjacent to CDSL 1 was studied by comparing SFWMD drainage canal stage data with water table elevation data collected at WMI monitor cells 4 and 5 (Figure 2.3.4.1). Figures 2.3.4.2 and 2.3.4.3 are hydrographs showing canal stage and water table elevations for the adjacent aquifer. Generally, groundwater is at a higher elevation than the adjacent surface water. This relationship suggests that groundwater is contributing to surface water flow in the adjacent canal. The contribution of groundwater to surface water occurs during

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both the wet and dry seasons (Figures 2.3.4.2 and 2.3.4.3), since the water table elevation beneath CDSL 1 is continuously higher than the canal stage elevation. Figure 2.3.4.4 is a schematic illustrating the flow field around the SFWMD drainage canal.

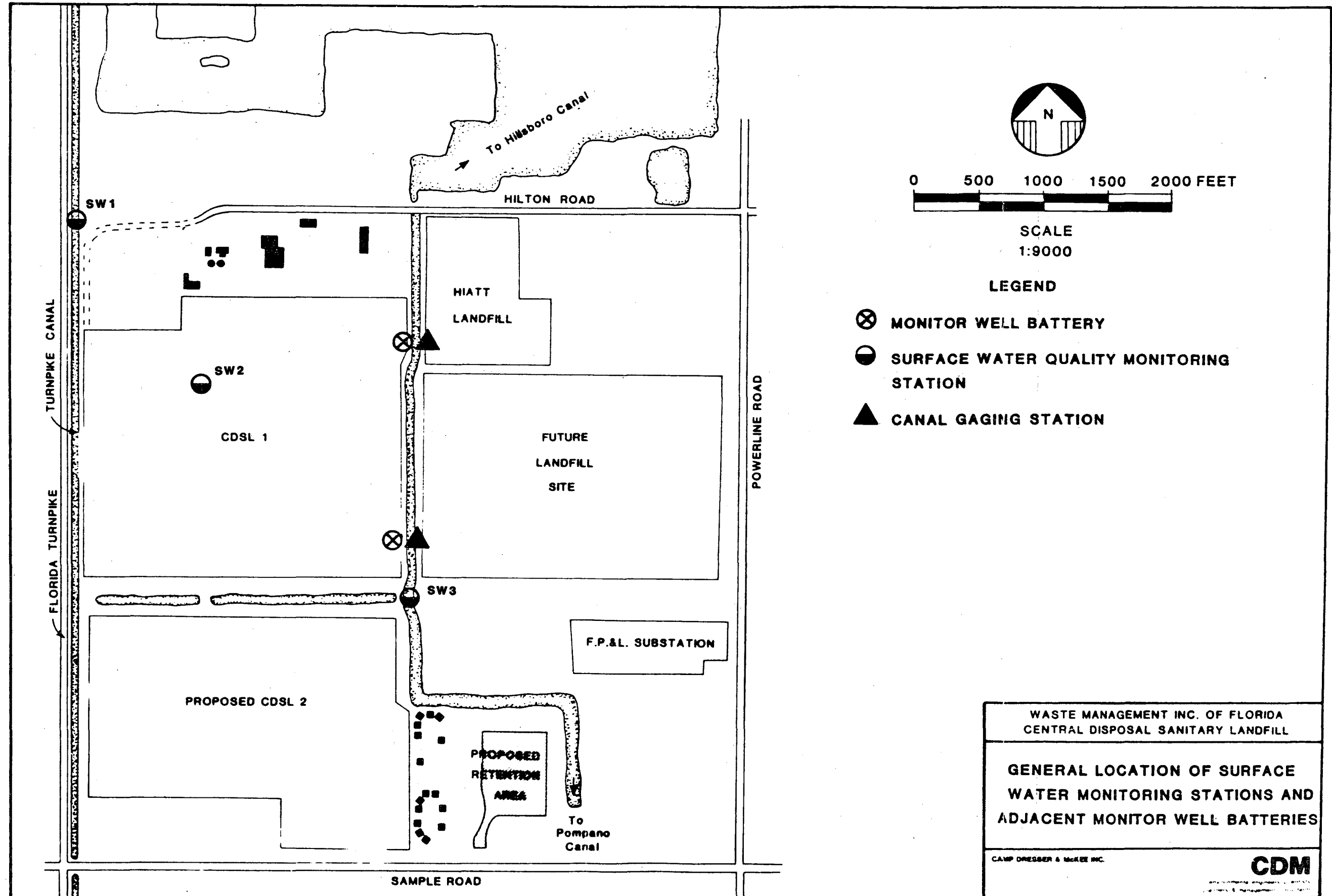
Surface water quality monitoring has been ongoing at CDSL 1 since 1975. Waste Management, Inc. monitors water quality in three canals and the location of surface water sample collection are presented in Figure 2.3.4.1.

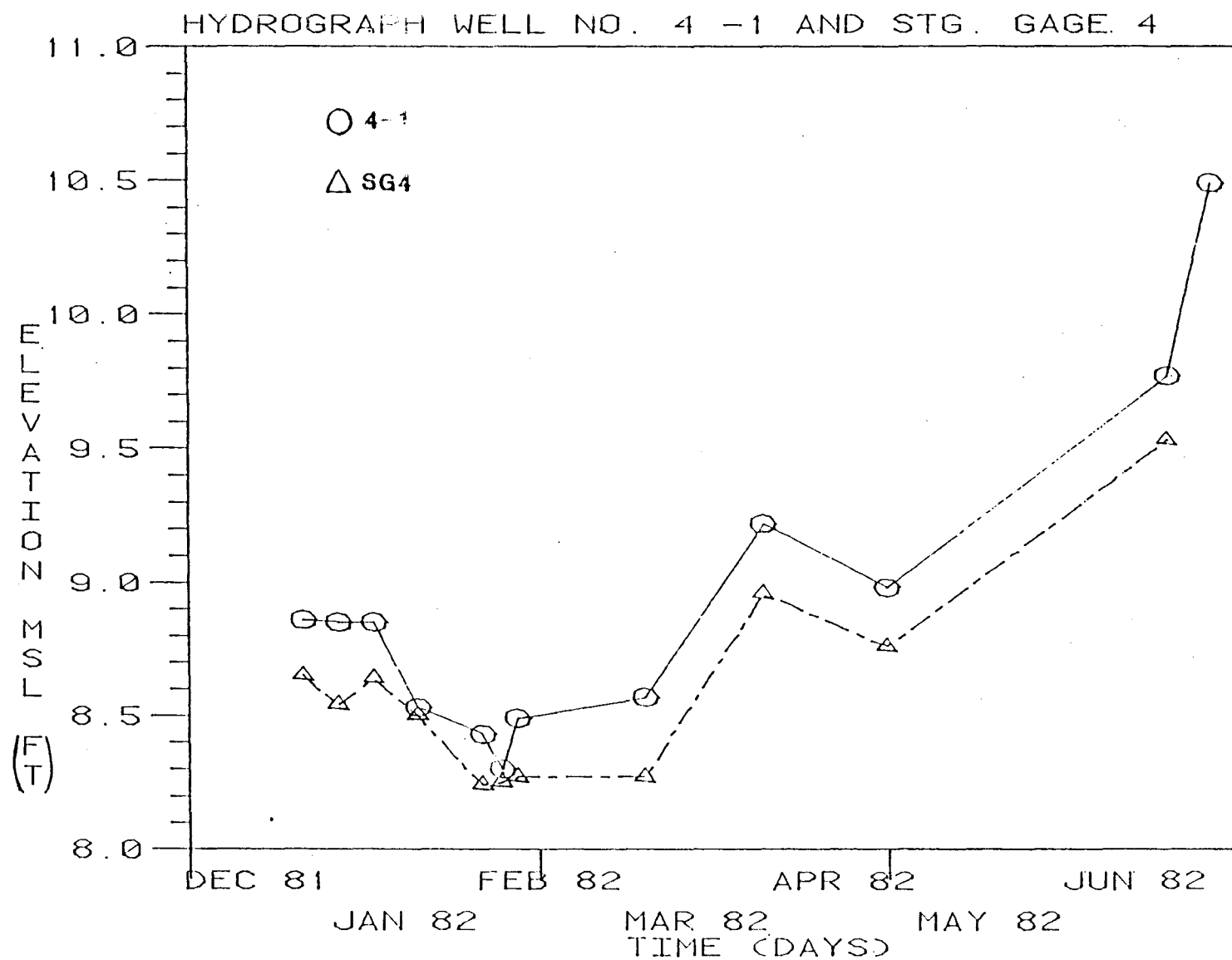
- o SW1 - Sample station located on the turnpike canal northwest of CDSL 1 since 1975. This station represents background surface water quality.
- o SW2 - Sample station located in a pre-oxidation pond west of the effluent spraying project and just north of the oxidation pond.
- o SW3 - Sample station located at the intersection of the FP&L right-of-way and the SFWMD drainage canal, southeast of CDSL 1. This station monitors water quality of surface water flowing toward the Pompano/Cypress Creek canal system.

Table 2.3.4.1 presents analytical results for the most recent set of samples analyzed for the full suite of parameters for Samples SW1, SW2, and SW3 collected on October 24, 1981 (Appendix 10.9). Quarterly results from October, 1983 to July, 1985 for selected parameters are presented in Appendix 10.9. The overall sampling schedule is also presented in Appendix 10.9. The overall quality of background and landfill surface water is poor and the overall conditions have not changed since the last set of samples were collected. Selected parameters exceed BCEQCB Standards for Surface Water (Appendix 10.9). Samples exceeding these standards are presented in Table 2.3.4.2.

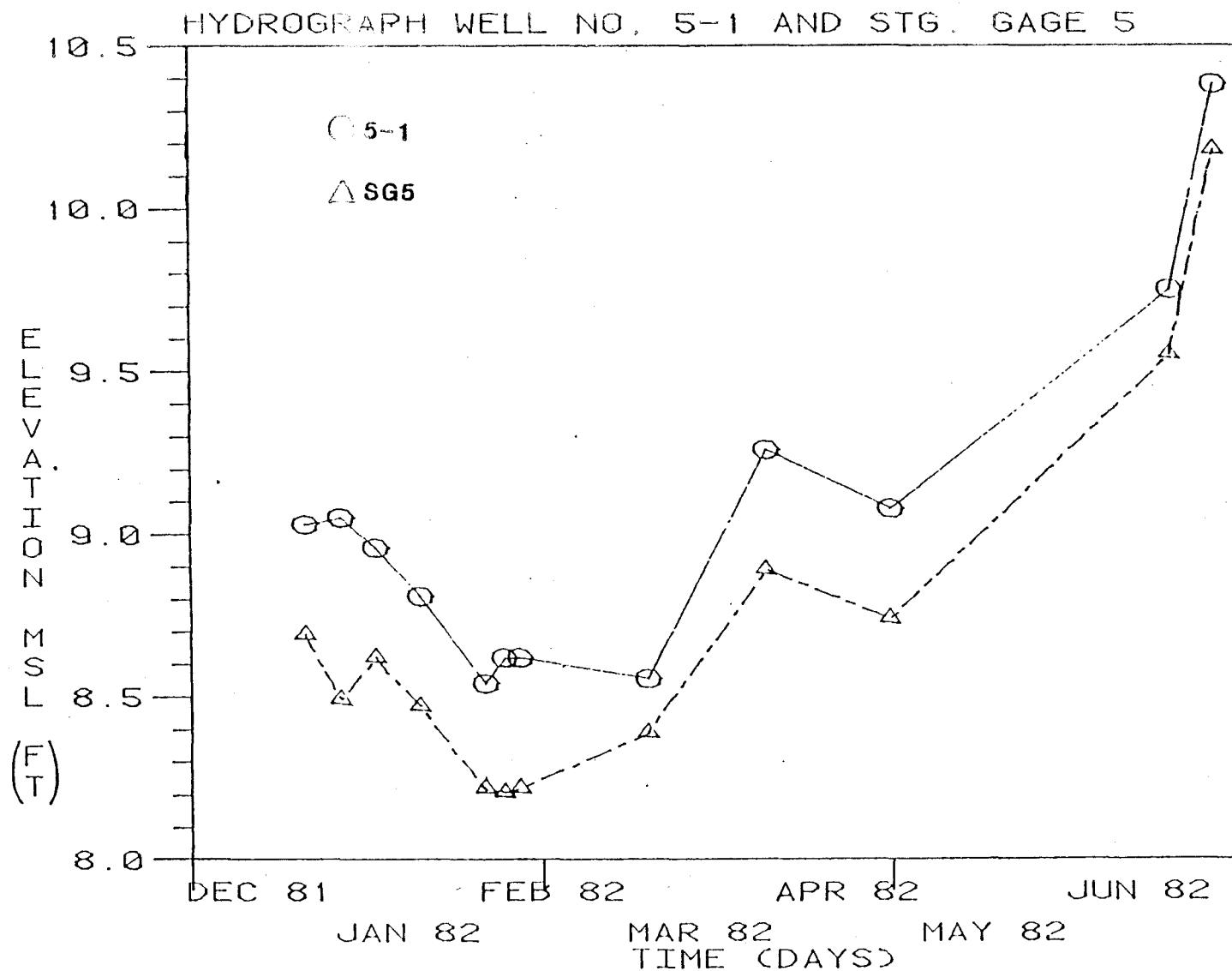
Background surface water (SW1) exceeds BCEQCB standards for turbidity, COD, total phosphorus, oil-grease, and total coliform (Table 2.3.4.2). SW2 water is poorer in quality than SW1, with concentrations exceeding standards for all the parameters presented in Table 2.3.4.2.

FIGURE 2.3.4.1

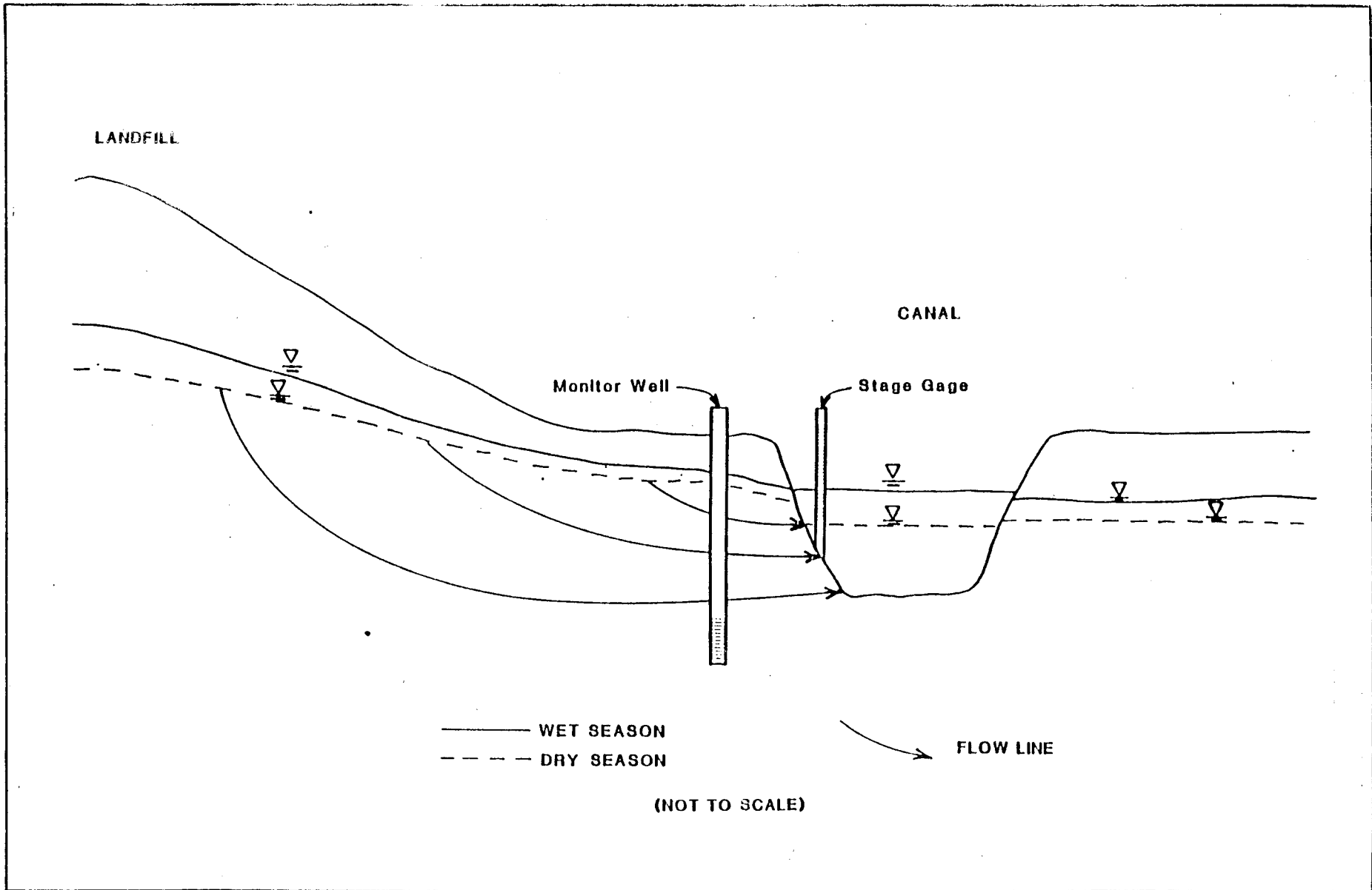




BROWARD COUNTY
HYDROGRAPH COMPARING CANAL STAGE
AND GROUNDWATER TABLE ELEVATION
AT SITE 4



BROWARD COUNTY
HYDROGRAPH COMPARING CANAL STAGE
AND GROUNDWATER TABLE ELEVATION
AT SITE 5



BROWARD COUNTY
SCHEMATIC SHOWING FLOW FIELD AROUND
SFWMD DRAINAGE CANAL

TABLE 2.3.4.1

ANALYTICAL RESULTS FOR SURFACE WATER QUALITY SAMPLES
COLLECTED OCTOBER 24, 1981

Constituent or Parameter	SW1	SW2	SW3
<u>Physical</u>			
Hardness (mg/l)	296	388	236
pH (S.U.)	7.1	7.5	7.0
Temperature (°C)	27.0	27.0	27.0
Turbidity (NTU)	45	45	21
Specific Conductance (umhos/cm)	920	980	950
<u>Inorganics (mg/l)</u>			
Alaklinity	240	360	212
Aluminum	<2	<2	<2
Arsenic	<0.001	<0.001	<0.001
Bicarbonate	146	220	129
Boron	0.24	0.64	0.17
Cadmium	<0.002	<0.002	<0.002
Calcium	114	152	90
Chloride	47	62	63
Chromium	<0.004	<0.004	<0.004
Chromium (CR ⁺⁶)	<0.005	<0.005	<0.005
Cobalt	<0.004	0.006	0.005
COD	224	264	286
Copper	0.003	<0.003	<0.003
Dissolved Solids	512	624	504
Fluoride	0.11	0.24	0.09
Iron	0.06	0.07	0.05
Lead	<0.003	0.038	0.005
Magnesium	4.8	ND	ND
Manganese	0.014	0.005	0.006
Mercury	<0.0001	<0.0001	<0.0001
Nickel	0.006	0.008	0.006
Noncarbonate Hardness	56	28	24
Silica	3.7	4.8	5.5
Sodium	48	42	50
Strontium	0.88	2.1	0.83
Sulfate	12	12	21
Total Nitrogen	1.1	14	1.4
Total Nitrate N	0.72	2.7	4.7
Total Nitrite N	0.011	0.012	0.008
Total Ortho Phosphorus	0.05	0.23	0.41
Total Phosphorus	0.08	0.39	0.66
Vanadium	<0.04	<0.04	<0.04
Zinc	0.03	0.07	0.05

TABLE 2.3.4.1 (continued)

ANALYTICAL RESULTS FOR SURFACE WATER QUALITY SAMPLES
COLLECTED OCTOBER 24, 1981 (continued)

Constituent or Parameter	SW1	SW2	SW3
<u>Organics (mg/l)</u>			
Aldrin	<0.00006	<0.00003	<0.00002
Chlorodane	<0.00009	<0.0004	<0.0001
DDD Total	<0.0006	<0.0003	<0.0002
DDE	<0.0004	<0.0002	<0.0002
DDT	<0.001	<0.0005	<0.0004
Diazinon	<0.0008	<0.0004	<0.0003
Diieldrin	<0.0005	<0.0002	<0.0002
Endrin	<0.0003	<0.0002	<0.0001
ETH, Parathion	<0.0005	<0.0003	<0.0002
ETH, Trithion	<0.001	<0.0006	<0.0004
Ethion	<0.001	<0.0006	<0.0004
Heptachlor Epoxide	<0.0004	<0.0002	<0.0002
Heptachlor	0.0002	<0.0003	<0.00009
Lindane	<0.0001	<0.00006	<0.00004
M.B.A.S.	0.01	0.09	0.05
Met. Parathion	<0.0004	<0.0002	<0.0002
Met. Trithion	<0.003	<0.002	<0.001
Oil and Grease	7	12	12
PCB	<0.0003	<0.0003	<0.0002
PCNB	<0.002	<0.0001	<0.00007
Phenols	<0.001	0.012	0.006
Silvex	<0.0003	<0.0004	<0.0003
Total Ammonia	0.42	1.7	1.7
Total Organic Carbon	6	37	36
Total Organic Nitrogen	0.83	7	1.2
Toxaphene	<0.004	<0.002	<0.002
2,4,5-T	<0.0003	<0.0004	<0.0004
2,4-D	<0.0006	<0.0007	<0.0009
2,4-DP	<0.001	<0.001	<0.002
<u>Bacteria (mg/l)</u>			
Fecal Coliform/100 ml	270	1,200	270
Total Coliform/100 ml	3,400	10,000	900
Fecal Strep/100 ml	25	60	12
5-Day BOD	5.4	5.7	4.2

ND = not determined

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TABLE 2.3.4.2

PARAMETERS EXCEEDING BCEQCB SURFACE WATER QUALITY STANDARDS
IN SURFACE WATER SAMPLES COLLECTED OCTOBER 24, 1981

Constituent or Parameter	Units	SW1	SW2	SW3	BCEQCB Standard
<u>Physical</u>					
Turbidity	NTU	45	45	21	10
<u>Inorganics</u>					
COD	mg/l	224	264	286	10
Lead	mg/l	NE	0.038	NE	0.03
Total Nitrogen	mg/l	NE	14	NE	1.5
Total Phosphorus	mg/l	0.08	0.39	0.66	0.02
Zinc	mg/l	NE	0.07	0.05	0.03
<u>Organics</u>					
Oil-Grease	mg/l	7	12	36	1
Phenols	mg/l	NE	0.012	0.006	0.001
<u>Bacteria</u>					
Fecal Coliforms	count/100 ml	NE	1,200	NE	800
Total Coliforms	count/100 ml	3,400	10,000	NE	1,000

NE = standard not exceeded

SW3 surface water represent water flowing away from CDSL 1 boundaries. SW3 analytical results exceed BCQCB standards for turbidity, COD, total phosphorus, zinc, oil-grease, and phenols. The lack of baseline surface water quality data makes it difficult to determine the amount of any contamination contributed by CDSL 1. However, zinc and phenols are two possible contaminants observed in higher concentrations in SW2 and SW3 than in SW1 (Table 2.3.4.2). The presence of high concentrations within the landfill boundary (SW2) and lesser concentrations in the adjacent SFWMD drainage canal suggest that the landfill may be a source of higher concentrations of zinc and phenols. Other possible sources of contamination include:

- o Sand and gravel mining north and northeast of CDSL 1.
- o Previous landfill operations at the abandoned county and Hiatt landfills.
- o Previous sewage sludge disposal at the abandoned county landfill.
- o Contaminants introduced in the drainage canal due to urban runoff and construction associated with Powerline, Hilton, and Sample Roads.
- o Irrigation and other agricultural activities adjacent to CDSL 1.

2.3.4.2 Measurement Programs

The programs and methods for measuring background physical and chemical parameters of surface waters which have potential of being affected during construction and/or operation of the resource recovery facility is described in Section 2.3.4.1, Hydrologic Characterization.

2.3.5 Vegetation/Land Use

The site has been cleared, scraped, and bulldozed in the past so that the surface is irregular with low areas and dirt mounds scattered throughout. A business establishment former-

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ly occupied the northeast section of the site. The northwest section of the site is a paved parking area adjacent to the CDSL landfill maintenance building.

A plant species list was developed during a field vegetative study (see Appendix 10.7) and is presented in Table 2.3.5.1.

2.3.5.1 Vegetative Survey

There is sparse vegetative cover in the eastern section and herbaceous species, primarily grasses, dominate this portion of the site. They include Bermuda grass (Cynodon dactylon), sandspur grass (Cenchrus echinatus), blue stem grasses (Andropogon spp.), white beggar-ticks (Bidens pilosus), common ragweed (Ambrosia attemisiifolia), dog fennel, camphor weed (Heterotheca subaxillaris), wild balsam apple (Momordica charantia) and many other mostly annual weedy species. The western section of the site is mostly paved parking areas.

The canal crossing the site is 4 to 5 feet below the surface in most areas and are lined by Brazilian pepper-tree and castor bean (Ricinus communis). However, there are some low spots bordering the canal on the southeast which support the following species: cattails (Typha domingensis), Carolina willow (Salix caroliniana), primrose willow (Ludwigia peruviana), camphor weed (Pluchea purpurascens) and a few Melaleuca (Melaleuca quinquenervia) saplings. This canal will be relocated due to the Central Disposal landfill expansion. The relocation will be accomplished before the construction of the proposed facility is started.

2.3.5.2 Sensitive Plant Species

No environmentally significant species (i.e. rare, unique, threatened, endangered, or indicative of significant connected wetland areas) as indicated in Table 2.3.5.2 were

TABLE 2.3.5.1

List of vascular plants identified during field reconnaissance, September 12, 1985, undeveloped portion of the Hilton Road Resource Recovery Facility site, Broward County, Florida.

<u>Scientific Name</u>	<u>Common Name</u>
<u>Ambrosia artemisiifolia</u>	ragweed
<u>Andropogon spp.</u>	blue stem grasses
<u>Bidens pilosus</u>	white beggar-ticks
<u>Cenchrus echinatus</u>	sandspur grass
<u>Cynodon dactylon</u>	Bermuda grass
<u>Heterotheca subaxillaris</u>	camphor weed
<u>Ludwigia peruviana</u>	primrose willow
<u>Melaleuca quinquenervia</u>	Melaleuca
<u>Momordica charantia</u>	wild balsam apple
<u>Pluchea purpurascens</u>	camphor weed
<u>Ricinus communis</u>	castor bean
<u>Salix caroliniana</u>	Carolina willow
<u>Typha domingensis</u>	cattails
<u>Leucaena leuedcephala</u>	lead tree
<u>Pennisetum americanum</u>	pearl millet
<u>Echinochloa crusgalli</u>	barnyard grass

TABLE 2.3.5.2

VEGETATION, REPORTED FROM BROWARD COUNTY, CONSIDERED TO BE RARE (R),
THREATENED (T), OR ENDANGERED (E)

<u>Scientific Name</u>	<u>Common Name</u>	<u>Florida State (1978)</u> ¹	<u>REBF</u> ²	<u>Florida</u> ³ <u>Statutes</u>
Acrostichum danaeae- folium	Leather Fern		T	
Asplenium dentatum	Toothed Spleenwort	T	T	
Asplenium serratum	Bird's nest Spleenwort	T	E	
Coccothrinax argentata	Silver Palm	E	T	
Cocos nucifera	Coconut Palm	T		
Commelina gigas	Giant, or Climbing Dayflower	T	T	
Drosera intermedia	Water Sundew		R	
Ernodea littoralis	Beach Creeper		T	
Gossypium hirsutum	Wild Cotton		E	
Jacquemontia reclinata	Beach Jacquemontia		E	
Mallontonia gnaphalodes	Sea-Lavender		T	
Nemastylis floridana	Fall-flowering Ixia	T	T	
Okenia hypogaea	Burrowing Four-o'clock		E	
Ophioglossum palmatum	Hand Fern	E	E	
Pleopeltis revoluta	Star-scale Fern		E	
Polygala smallii	Tiny Polygala		E	
Remirea maritima	Beach-Star		E	
Roystonea elata	Florida Royal Palm			E
Sabal palmetto	Cabbage Palm	T		
Tillandsia fasciculata	Wild Pine Bromeliad			E
Tillandsia flexuosa	Twisted Air-plant	T	T	
Zamia floridana	Florida Coontie	T	T	

1. State of Florida. 1978. Preservation of native flora of Florida. Chapter 78-72.
2. Ward, D.B. 1979. Rare and endangered biota of Florida, Vol. 5: Plants. Univ. Presses of Florida, Gainesville, 175 pp.
3. Section 581.185, Florida Statutes.

observed on the site. All species observed are typical of those found on disturbed sites in south Florida.

2.3.6 Ecology

Figure 2.3.6.1 illustrates endangered species critical habitats in the southern half of the State of Florida. Table 2.3.6.1 is a listing of vertebrates which are endangered, threatened or rare species or species of special concern found in the southern half of the State. Site survey and analysis have not identified any threatened or endangered species on the Project site and the probability of their presence is low.

Based on the vegetation survey conducted for the undeveloped portion of the proposed facility site on September 12, 1985, the vertebrates listed in Table 2.3.6.2 likely occur in the area. As the land parcel is developed for the Project, it is anticipated that these species will relocate to areas adjacent to the site. Some habitat will be lost due to development, but no significant impact on vertebrate species populations in the region is expected.

2.3.6.1 Species-Environmental Relationships

The Resource Recovery Project is not anticipated to have significant adverse effects on the area ecology. Terrestrial fauna can move to adjacent land. In addition, those species believed to inhabit the site are generally adapted to areas previously disturbed by humans and co-exist successfully.

2.3.6.2 Pre-existing Stresses

The site is located in an area that is primarily industrial and very low residential. On-site ecological conditions indicate the occurrence of stress as a result of previous alterations.

2.3.6.3 Measurement Programs

A surface water sampling program is performed near the site on a quarterly basis. Also, a field vegetative study was conducted in September, 1985. This data is presented in Section 2.3.5.1. No other vegetative measurement programs will be required for this Project.

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FIGURE 2.3.6.1

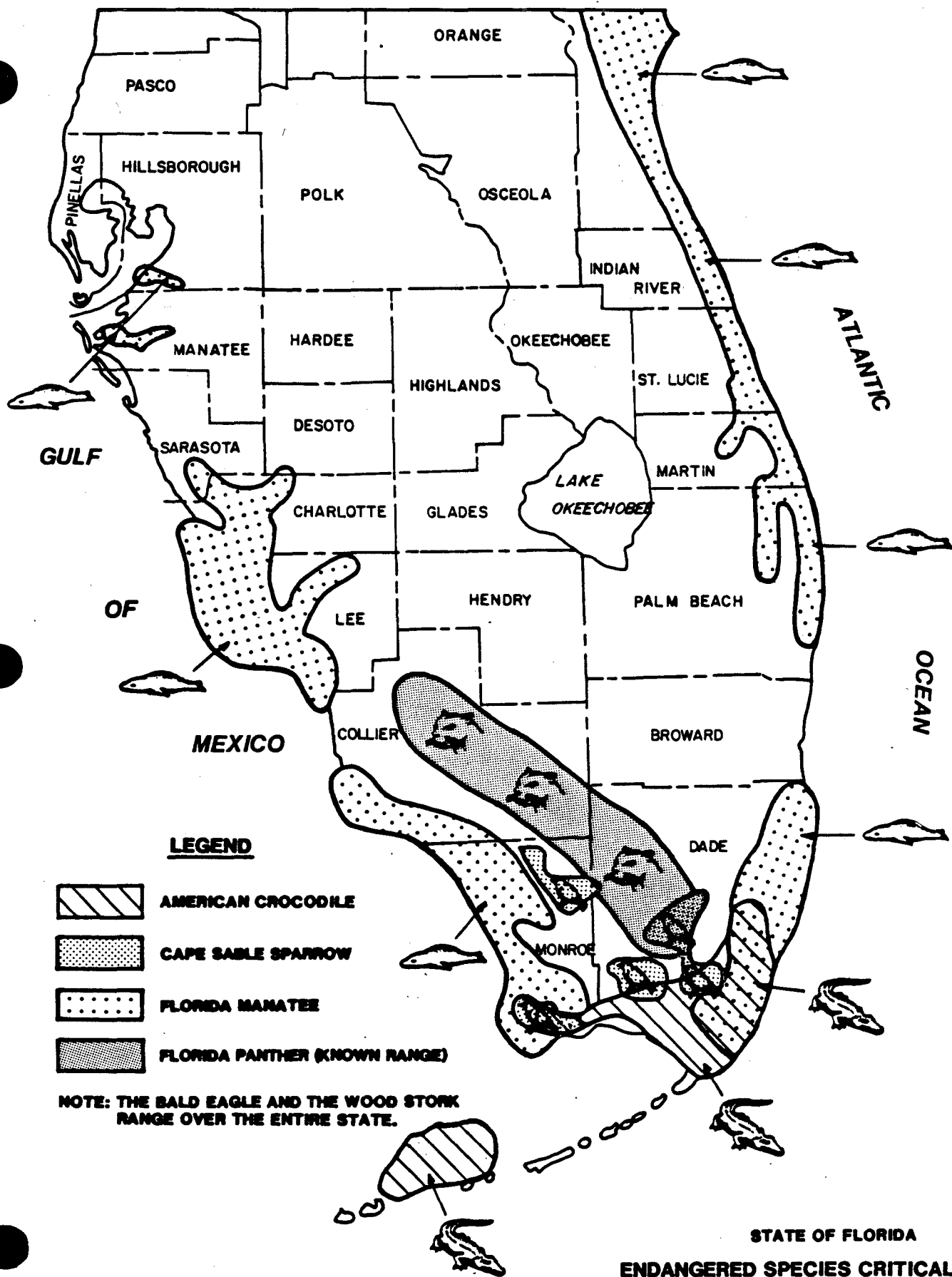


TABLE 2.3.6.1

VERTEBRATES, REPORTED FROM BROWARD COUNTY, CONSIDERED
TO BE ENDANGERED (E), THREATENED (T), RARE (R), A
SPECIES OF SPECIAL CONCERN (SSC), OR OF STATUS UNDETERMINED (SU)

<u>Scientific Name</u>	<u>Common Name</u>	<u>USDI</u> <u>(1979)</u> ¹	<u>State of</u> <u>Fla. (1978)</u> ²	<u>Pritchard</u> <u>(1978)</u> ³
MAMMALS				
<u>Sciurus niger</u>				
<u>avicennia</u>	Mangrove Fox Squirrel	E	E	E
<u>Felis concolor coryi</u>	Florida Panther	E	E	E
<u>Ursus americanus</u>				
<u>floridanus</u>	Florida Black Bear		T	T
<u>Mustela vison</u>				
<u>evergladensis</u>	Everglades Mink		T	T
<u>Trichechus manatus</u>				
<u>latirostris</u>	Manatee	E	T	T
<u>Neofiber alleni</u>	Round-tailed Muskrat			SSC
BIRDS				
<u>Mycteria americana</u>	Wood Stork			E
<u>Rostrhamus sociabilis</u>				
<u>plumbeus</u>	Florida Everglade Kite	E		E
<u>Piocoires borealis</u>				
<u>hylonomus</u>	Red-cockaded Woodpecker	E	E	E
<u>Pelecanus occidentalis</u>				
<u>carolinensis</u>	Eastern Brown Pelican	E	T	T
<u>Fregata magnificens</u>				
<u>rothschildi</u>	Magnificent Frigate-bird		T	T
<u>Haliaeetus l.</u>				
<u>leucocephalus</u>	Southern Bald Eagle	E	T	T
<u>Pandion haliaetus</u>	Osprey		T	T
<u>Falco sparverius</u>				
<u>paulus</u>	Southeastern Kestrel		T	T
<u>Grus canadensis</u>				
<u>pratensis</u>	Florida Sandhill Crane		T	T
<u>Haematopus palliatus</u>	Oystercatcher			
<u>Sterna albifrons</u>				
<u>antiilarum</u>	Least Tern		T	T
<u>Buteo brachyurus</u>				
<u>fuliginosus</u>	Short-tailed Hawk			R
<u>Vireo altiloquus</u>	Black-whiskered Vireo			R
<u>Ardea herodias</u>				
<u>occidentalis</u>	Great White Heron		T	SSC
<u>Florida caerulea</u>	Little Blue Heron			SSC
<u>Casmerodius albus</u>	Great, Common Egret			SSC
<u>Egretta thula</u>	Snowy Egret			SSC
<u>Hydranassa tricolor</u>	Louisiana Heron			SSC
<u>Nycticorax nycticorax</u>	Yellow-crowned Night Heron			SSC
<u>Ixobrychus exilis</u>				
<u>exilis</u>	Least Bittern			SSC

TABLE 2.3.6.2

VERTEBRATES POTENTIALLY INHABITING THE SITE OF THE
PROPOSED BROWARD COUNTY RESOURCE RECOVERY FACILITY

<u>Common Name</u>		<u>Scientific Name</u>
	MAMMALS	
Cotton Rat		<u>Sigmodon hispidus</u>
Cottontail Rabbit		<u>Sylvilagus floridanus</u>
Dog		<u>Canis familiaris</u>
Cat		<u>Felis catus</u>
Gray Squirrel		<u>Sciurus carolinensis</u>
Raccoon		<u>Procyon lotor</u>
Fox Squirrel		<u>Sciurus niger</u>
Opposum		<u>Didelphis marsupialis</u>
Skunk		<u>Mephitis mephitis</u>
	BIRDS	
Cattle Egret		<u>Bubulcus ibis</u>
Turkey Vulture		<u>Cathartes aura</u>
Black Vulture		<u>Coragyps atratus</u>
American Kestrel		<u>Falco sparverius</u>
Pigeon, Rock Dove		<u>Columba livia</u>
Mourning Dove		<u>Zenaida macroura</u>
Ground Dove		<u>Columbina passerina</u>
Killdeer		<u>Charadrius vociferus</u>
Meadowlark		<u>Sternella magna</u>
Redwing Blackbird		<u>Agelaius phoeniceus</u>
Common Grackle		<u>Quiscalus quiscula</u>
Mockingbird		<u>Mimus polyglottos</u>
House Sparrow		<u>Passer domesticus</u>
Song Sparrow		<u>Melospiza melodia</u>
Palm Warbler		<u>Dendroica palmarum</u>
Cardinal		<u>Cardinalis cardinalis</u>
Bobwhite Quail		<u>Colinus virginianus</u>
Redbellied Woodpecker		<u>Melanerpes carolinus</u>
Red-Shouldered Hawk		<u>Buteo lineatus</u>
Sea Gull		<u>Larus argentatus</u>
	REPTILES	
Striped Mud Turtle		<u>Kinosternon bauri</u>
Six-lined Racerunner		<u>Cnemidophorus sexlineatus</u>
Skink		<u>Eumeces sp.</u>
Corn Snake		<u>Elaphe g. guttata</u>
Everglades Rat Snake		<u>Elaphe obsoleta rossalleni</u>
Ribbon Snake		<u>Thamnophis sauritus sackeni</u>
Black Snake		<u>Coluber constrictor</u>
	AMPHIBIANS	
Eastern Spadefoot Toad		<u>Scaphiopus holbrookii</u>

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2.3.7 METEOROLOGY AND AMBIENT AIR QUALITY

2.3.7.1 METEOROLOGY

The meteorological and air quality data collected at existing monitoring stations were used to describe the local and regional climatology and air quality in the vicinity of the proposed plant. The closest existing meteorological station with complete meteorological data to the proposed plant is the primary National Weather Service (NWS) station in Miami, Florida, situated approximately 55 kilometers (km) south-southwest of the proposed plant site. NWS has recorded weather observations for at least the last 40 years at this site, and these data are the most complete for the region surrounding the proposed project. Existing air quality data were obtained from monitoring stations maintained and operated by the Broward County Environmental Quality Control Board (EQCB) and Florida Power and Light Company (FP&L).

Temperature

Temperature means and extremes for Miami are presented in Table 2.3-1. The climate is tropical with a large marine influence from the Atlantic Ocean and Biscayne Bay. The mean temperature varies from 67 degrees Fahrenheit (°F) in January to 83°F in August with an annual average temperature of 75.6°F. Record extreme temperatures ranged from a low of 31°F to a record high of 98°F. Although the sun's elevation is nearly zenith during the summertime, temperatures do not exceed 100°F. The reason can be attributed to the high relative humidities with subsequent cloud cover formation and the abundant convective-type precipitation.

Relative Humidity and Precipitation

Relative humidity, an indication of the amount of moisture in the air at a given temperature, is presented in Table 2.3-2 for the hours of 0100 and 0700 in the morning and 1300 and 1900 in the afternoon. The highest humidities coexist with the coolest ambient temperatures, namely at 0700 or near dawn. Similarly, the lowest humidities coincide with the highest ambient temperatures, in this case at 1300.

Table 2.3-1. Temperature Means and Extremes (°F) Measured at Miami International Airport, Miami, Florida--1951 to 1980

Month	Mean	Average Diurnal Maximum	Average Diurnal Minimum	Record Maximum*	Record Minimum*
January	67.1	75.0	59.2	87	31
February	67.8	75.8	59.7	89	32
March	71.7	79.3	64.1	92	32
April	75.3	82.4	68.2	96	46
May	78.5	85.1	71.9	94	53
June	81.0	87.3	74.6	98	65
July	82.4	86.7	76.2	98	69
August	82.8	89.2	76.5	98	68
September	81.8	87.8	75.7	95	68
October	77.9	84.2	71.6	95	51
November	72.8	79.8	65.8	89	39
December	68.5	76.2	60.8	87	33
Annual	75.6	82.6	68.7	98	31

*34-year period of record, 1943 to 1983.

Source: National Oceanic and Atmospheric Administration (NOAA), 1983.

Table 2.3-2. Precipitation and Diurnal Relative Humidity Measured at Miami, Florida

Month	Precipitation (inches)			Relative Humidity** (%) hour (LT)			
	Mean*	Maximum†	Minimum†	0100	0700	1300	1900
January	2.08	6.66	0.04	80	84	60	69
February	2.05	8.07	0.01	79	83	57	66
March	1.89	7.22	0.02	77	82	57	65
April	3.07	17.29	0.07	75	79	55	64
May	6.53	18.54	0.44	79	81	60	70
June	9.15	22.36	1.81	84	86	66	75
July	5.98	13.51	1.77	82	85	63	72
August	7.02	16.88	1.65	83	87	66	74
September	8.07	24.40	2.63	85	89	67	77
October	7.14	21.08	1.50	83	87	64	73
November	2.71	13.15	0.09	81	85	61	71
December	1.86	6.39	0.13	79	83	59	70
Annual	57.55	89.33	37.00	81	84	61	70

*1951-1980.

†1943-1983.

**1965-1983.

Source: NOAA, 1983.

Over 75 percent of the annual precipitation falls during the six warmest months, May through October. The mean annual precipitation is 58 inches, but this has varied from as little as 37 inches to over 89 inches in the last 30 years. The majority of rain is in the form of short-lived convection showers. Precipitation means and extremes are also presented in Table 2.3-2.

Severe Storms

Thunderstorms are the most frequent of severe storms, occurring an average of 75 days per year. These storms occur throughout the year, but nearly 75 percent occur from May through October.

Tropical cyclones, and more specifically hurricanes, have invaded the Miami area coastline infrequently since the 1960s, but always remain a threat in any given year. According to statistics compiled by Simpson and Lawrence (1971), the probability that a tropical cyclone will enter the 50-mile coastal stretch from South Miami to Pompano Beach any given year is 20 percent, with a 16-percent chance that it will be of hurricane intensity, and only a 7 percent chance that its maximum winds will exceed 124 miles per hour (mph), that of a great hurricane. Tropical cyclones usually approach Miami from early August to late October.

Statistics compiled by the Severe Local Storms (SELS) branch of the National Severe Storms Forecast Center (Pautz, 1969) show that 25 tornadoes (or waterspouts) were spotted within the 1° latitude by 1° longitude square centered just south and west of Miami from 1955 to 1967. This averages approximately 1.9 tornadoes per year. The tornado recurrence interval for any specific point location within the 1° square is estimated by a methodology of Thom (1963) to be 802 years. Therefore, the mean recurrence interval for a tornado striking a point within this square is 802 years. The most common tornado month is June.

Mixing Depths

The monthly and average mixing depths for Miami as estimated by Holzworth are listed in Table 2.3-3. The highest afternoon mixing depths occur in the spring, and the lowest morning depths occur in mid-winter. The mean high humidity and low-level cloudiness prevent mean mixing depths subsidence below 500 meters (m).

Atmospheric Stability

Monthly and annual frequencies of Pasquill's stability classes are shown in Table 2.3-4. Frequent and strong sea breezes cause a predominance of neutral and stable air (D and E stabilities), counteracting the effect of high incidence of sunshine over urban Miami. The joint frequency of wind per stability class is given in Table 2.3-5. As can be seen, there is a large easterly component of wind under neutral and stable air masses.

Wind Patterns

A combination of easterly trade winds superimposed on frequent easterly (onshore) sea breezes gives Miami a large dominance of easterly winds. During several months, easterly winds prevailed over 25 percent of the time, and in an annual period, almost 19 percent of the time.

Figure 2.3-1 presents monthly and annual wind roses for the 6-year period from 1969 to 1974.

2.3.7.2 AMBIENT AIR QUALITY

A listing of all the ambient monitoring locations in Broward County is presented in Table 2.3-6. There are currently 18 sites operated by Broward County and 3 sites operated by FP&L. Based on the Prevention of Significant Deterioration (PSD) monitoring guidelines (EPA, 1981), for a proposed source located in an area of multisource emissions and flat terrain, existing ambient monitoring data may be acceptable if the existing monitor is within 10 km of the proposed source or 1 km of predicted maximum impacts.

Table 2.3-3. Mean Diurnal Mixing Depths* at Miami International Airport,
Miami, Florida

Month	Mean Diurnal Mixing Depth (m)	
	Morning	Afternoon
January	666	1,145
February	676	1,242
March	900	1,406
April	1,039	1,435
May	997	1,483
June	1,020	1,309
July	1,065	1,392
August	1,032	1,364
September	957	1,312
October	814	1,371
November	853	1,267
December	623	1,258
Annual	878†	1,330†

*5-year averaged data, 1960-1964.

†True weighted averages.

Source: Holzworth, 1972.

Table 2.3-4. Frequency of Occurrence of Pasquill's Stabilities for Miami, Florida--1969 to 1974

Month	Pasquill's Stability Class (%)				
	A	B	C	D	E
January	0.0	2.9	10.3	44.1	42.7
February	0.0	2.3	8.5	52.6	36.6
March	0.0	2.1	8.5	53.2	36.3
April	0.1	4.4	12.6	50.8	32.1
May	0.3	5.2	19.0	47.9	27.6
June	0.3	11.5	19.9	32.8	35.5
July	0.3	12.8	23.0	24.3	39.5
August	0.5	9.1	20.4	31.6	38.5
September	0.2	5.7	12.2	37.4	44.5
October	0.0	4.7	8.2	46.6	40.5
November	0.0	1.7	9.8	46.7	41.9
December	0.0	1.7	10.1	42.6	45.5
Annual	0.1	5.4	13.7	42.0	38.6

Source: NOAA, 1974.

Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974

DIRECTION	SPEED(KTS)						TOTAL
	0 - 3	4 - 6,	7 - 10	11 - 16	17 - 21	GREATER THAN 21	
N	0.000007	0.000057	0.0	0.0	0.0	0.0	0.000064
NNF	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NF	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENF	0.000007	0.000057	0.0	0.0	0.0	0.0	0.000064
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESF	0.000007	0.000057	0.0	0.0	0.0	0.0	0.000064
SE	0.000037	0.000285	0.0	0.0	0.0	0.0	0.000322
SSE	0.000079	0.000114	0.0	0.0	0.0	0.0	0.000193
S	0.000072	0.000057	0.0	0.0	0.0	0.0	0.000129
SSW	0.000079	0.000114	0.0	0.0	0.0	0.0	0.000193
SW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.000015	0.000114	0.0	0.0	0.0	0.0	0.000129
W	0.000151	0.000171	0.0	0.0	0.0	0.0	0.000322
WNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.000456	0.001027	0.0	0.0	0.0	0.0	

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.001483

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.000171

Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974 (Continued, Page 2 of 6)

		SPEED(KTS)					
DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001335	0.002225	0.000970	0.0	0.0	0.0	0.004530
NNE	0.000664	0.000970	0.000513	0.0	0.0	0.0	0.002148
NE	0.000240	0.000285	0.000342	0.0	0.0	0.0	0.000868
ENE	0.000314	0.000970	0.000742	0.0	0.0	0.0	0.002026
E	0.000621	0.001654	0.001997	0.0	0.0	0.0	0.004273
ESE	0.000584	0.002567	0.003537	0.0	0.0	0.0	0.006689
SE	0.000715	0.003195	0.003195	0.0	0.0	0.0	0.007105
SSE	0.000694	0.002282	0.001654	0.0	0.0	0.0	0.004631
S	0.000631	0.002054	0.001483	0.0	0.0	0.0	0.004168
SSW	0.000614	0.001312	0.000285	0.0	0.0	0.0	0.002211
SW	0.000599	0.000685	0.000171	0.0	0.0	0.0	0.001455
WSW	0.000667	0.001084	0.000799	0.0	0.0	0.0	0.002549
W	0.000965	0.001369	0.001255	0.0	0.0	0.0	0.003589
WNW	0.000723	0.000970	0.000513	0.0	0.0	0.0	0.002206
NW	0.001189	0.000970	0.000513	0.0	0.0	0.0	0.002673
NNW	0.001425	0.001084	0.000913	0.0	0.0	0.0	0.003422
TOTAL	0.011981	0.023676	0.014884	0.0	0.0	0.0	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.054541

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.000799

Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974 (Continued, Page 3 of 6)

DIRECTION	SPEED (KTS)						TOTAL
	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	
N	0.000210	0.003594	0.008957	0.009299	0.000628	0.000114	0.022803
NNE	0.000076	0.001769	0.003822	0.006276	0.001883	0.000228	0.014054
NE	0.000004	0.000399	0.006675	0.015290	0.002453	0.000399	0.025221
ENE	0.000014	0.001312	0.012380	0.026415	0.003138	0.000228	0.043487
E	0.000319	0.002967	0.031378	0.058079	0.006219	0.000571	0.099532
ESE	0.000087	0.002796	0.020938	0.031949	0.002453	0.0	0.058222
SE	0.000266	0.003423	0.012038	0.015689	0.000628	0.0	0.032044
SSE	0.000079	0.002054	0.007987	0.007702	0.000228	0.0	0.018050
S	0.000262	0.002967	0.007303	0.006960	0.001084	0.000114	0.018689
SSW	0.000254	0.002282	0.003081	0.003138	0.000571	0.000114	0.009440
SW	0.000127	0.001141	0.003252	0.002910	0.000628	0.000057	0.008114
WSW	0.000303	0.001369	0.002910	0.004678	0.000513	0.000171	0.009944
W	0.000656	0.002054	0.003309	0.003024	0.000799	0.000171	0.010012
WNW	0.000192	0.001826	0.003937	0.003880	0.000628	0.000114	0.010575
NW	0.000253	0.002168	0.006333	0.007645	0.001883	0.000057	0.018339
NNW	0.000149	0.003252	0.006789	0.009870	0.001940	0.000057	0.022057
TOTAL	0.003252	0.035372	0.141088	0.212802	0.025673	0.002396	

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.420584

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.000399

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Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974 (Continued, Page 4 of 6)

DIRECTION	SPEED (KTS)						TOTAL
	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	
N	0.000382	0.003138	0.004906	0.000513	0.0	0.0	0.008940
NNE	0.000267	0.001141	0.001597	0.000342	0.000057	0.0	0.003405
NE	0.000138	0.000742	0.002624	0.000856	0.0	0.0	0.004360
ENE	0.000031	0.001084	0.004564	0.002624	0.000114	0.0	0.008417
E	0.000302	0.002396	0.012894	0.006504	0.000171	0.0	0.022267
ESE	0.000343	0.001769	0.014833	0.005078	0.000278	0.0	0.022251
SE	0.000240	0.002282	0.012323	0.003081	0.000057	0.0	0.017983
SSE	0.000395	0.001540	0.006789	0.001826	0.000057	0.0	0.010602
S	0.000462	0.001826	0.004279	0.001027	0.000171	0.0	0.007765
SSW	0.000195	0.000685	0.001597	0.000399	0.0	0.0	0.002877
SW	0.000232	0.001997	0.001597	0.000342	0.000171	0.0	0.004340
WSW	0.000208	0.001141	0.001826	0.000285	0.000057	0.000057	0.003574
W	0.000749	0.001597	0.001769	0.000571	0.0	0.0	0.004686
WNW	0.000381	0.001027	0.002681	0.000628	0.0	0.0	0.004717
NW	0.000689	0.001540	0.001997	0.000513	0.000114	0.0	0.004853
NNW	0.000519	0.001769	0.003423	0.000399	0.000057	0.0	0.006167
TOTAL	0.005534	0.025673	0.079701	0.024989	0.001255	0.000057	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.137209

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.000856

Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974 (Continued, Page 5 of 6)

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DIRECTION	SPEED(KTS)						TOTAL
	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	
N	0.007391	0.021680	0.007588	0.0	0.0	0.0	0.036658
NNE	0.001588	0.005591	0.002168	0.0	0.0	0.0	0.009347
NE	0.000476	0.004507	0.003937	0.0	0.0	0.0	0.008920
ENE	0.001443	0.009414	0.011239	0.0	0.0	0.0	0.022096
E	0.004631	0.031321	0.026700	0.0	0.0	0.0	0.062652
ESE	0.004176	0.021394	0.010497	0.0	0.0	0.0	0.036067
SE	0.005349	0.015119	0.005762	0.0	0.0	0.0	0.026230
SSE	0.005350	0.010669	0.002396	0.0	0.0	0.0	0.018414
S	0.007115	0.016260	0.002282	0.0	0.0	0.0	0.025657
SSW	0.003625	0.009071	0.001312	0.0	0.0	0.0	0.014008
SW	0.002920	0.007759	0.001883	0.0	0.0	0.0	0.012562
WSW	0.003077	0.008729	0.002396	0.0	0.0	0.0	0.014202
W	0.005131	0.011125	0.002054	0.0	0.0	0.0	0.018309
WNW	0.006123	0.010726	0.002453	0.0	0.0	0.0	0.019302
NW	0.006698	0.016203	0.004906	0.0	0.0	0.0	0.027807
NNW	0.007192	0.019683	0.007074	0.0	0.0	0.0	0.033950
TOTAL	0.072284	0.219249	0.094648	0.0	0.0	0.0	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.366182

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH F STABILITY = 0.011182

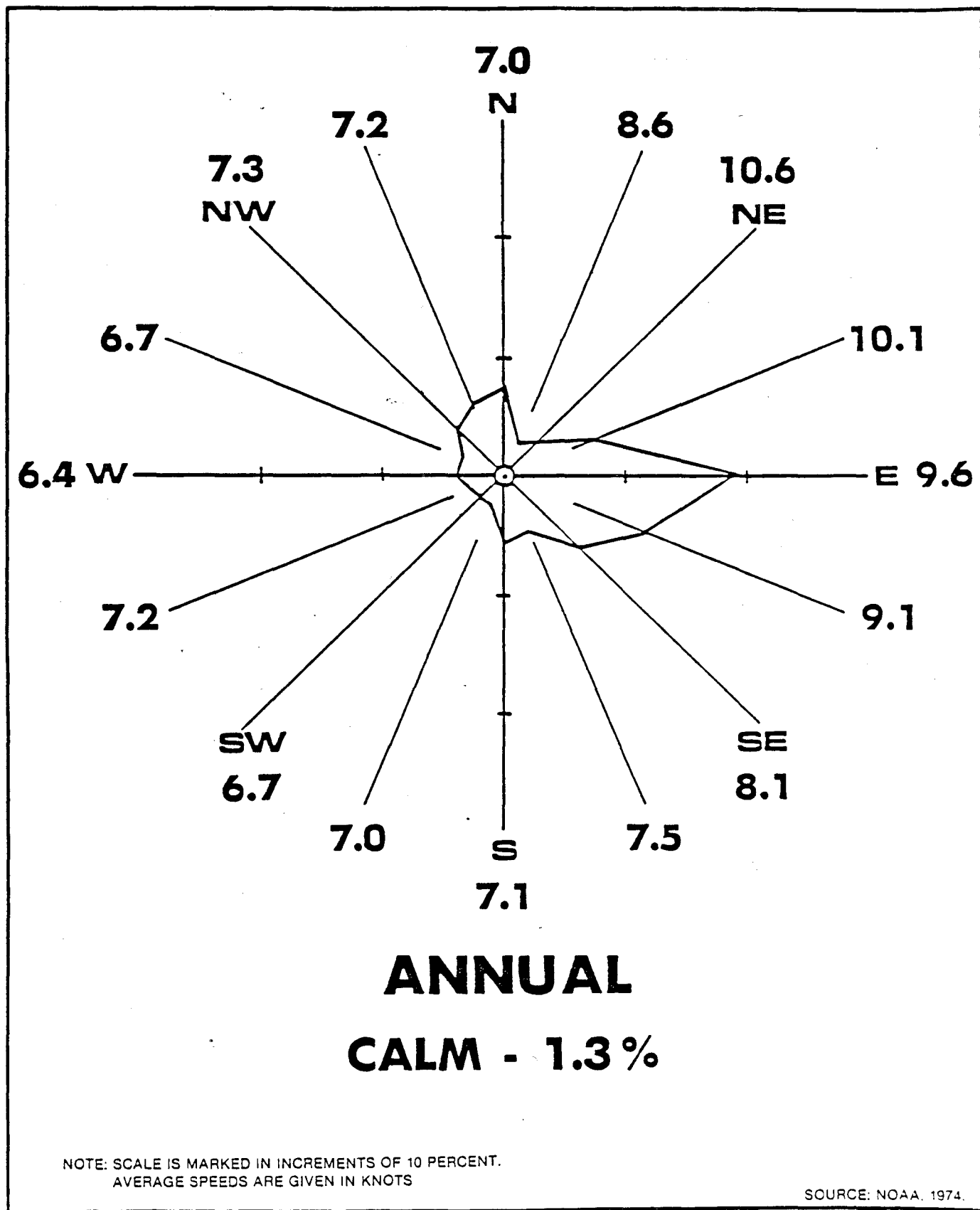
Table 2.3-5. Joint Frequency Distribution of Wind and Pasquill Stability Class
Miami, Florida, 1969 through 1974 (Continued, Page 6 of 6)

DIRECTION	SPFED(KTS)						TOTAL
	0 - 3	4 - 6,	7 - 10	11 - 16	17 - 21	GREATER THAN 21	
N	0.009334	0.030694	0.022421	0.009813	0.000628	0.000114	0.073003
NNE	0.002632	0.009471	0.008101	0.006618	0.001940	0.000228	0.028990
NE	0.000856	0.005933	0.013578	0.016146	0.002453	0.000399	0.039366
ENE	0.001805	0.012837	0.028925	0.029039	0.003252	0.000228	0.076066
E	0.005822	0.038339	0.072969	0.064582	0.006390	0.000571	0.188672
ESE	0.005187	0.028583	0.049806	0.037026	0.002681	0.0	0.123283
SE	0.006632	0.024304	0.033318	0.018770	0.000685	0.0	0.083708
SSE	0.006602	0.016659	0.018827	0.009528	0.000285	0.0	0.051901
S	0.008540	0.023163	0.015347	0.007987	0.001255	0.000114	0.056407
SSW	0.004779	0.013464	0.006276	0.003537	0.000571	0.000114	0.028740
SW	0.003886	0.011581	0.006903	0.003252	0.000799	0.000057	0.026479
WSW	0.004270	0.012437	0.007930	0.004963	0.000571	0.000228	0.030400
W	0.007653	0.016317	0.008387	0.003594	0.000799	0.000171	0.036920
WNW	0.007414	0.014548	0.009585	0.004507	0.000628	0.000114	0.036795
NW	0.008815	0.020881	0.013749	0.008158	0.001997	0.000057	0.053658
NNW	0.009281	0.025787	0.018199	0.010269	0.001997	0.000057	0.065591
TOTAL	0.093507	0.304997	0.334322	0.237791	0.026928	0.002453	

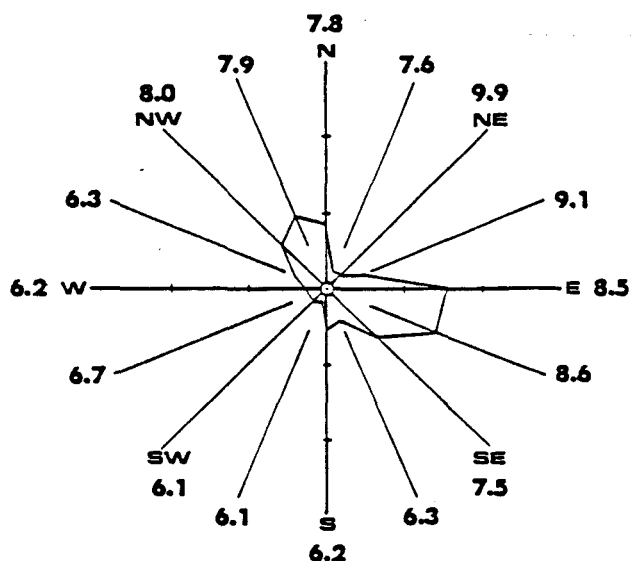
TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000000

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.013407

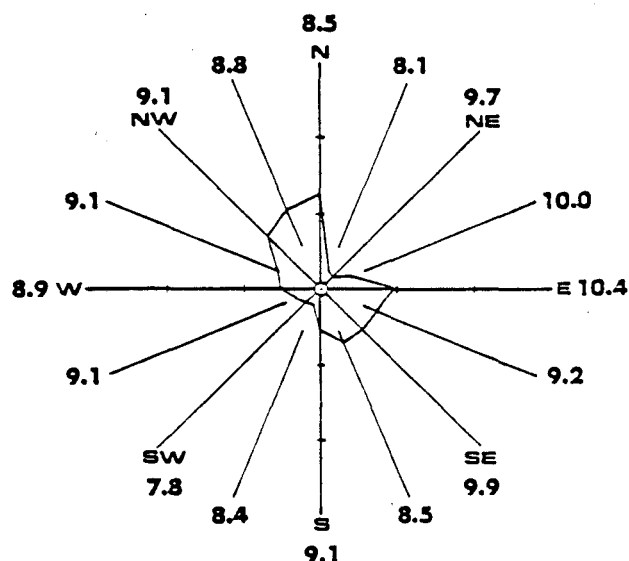
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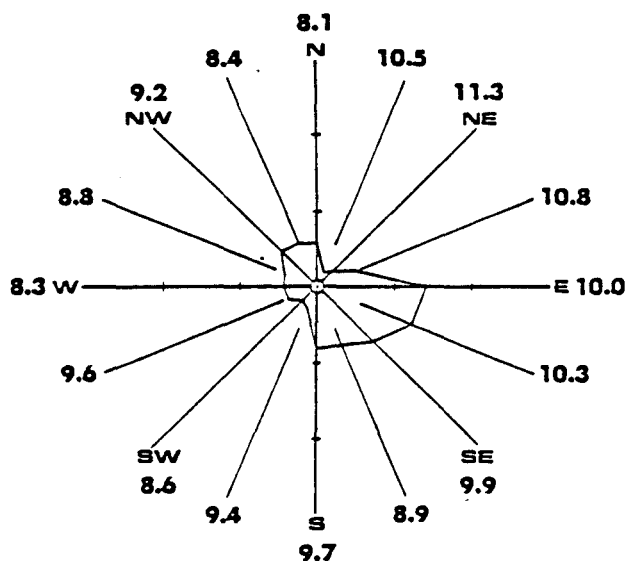
**AVERAGE MONTHLY AND ANNUAL WIND ROSES
FOR MIAMI, FLORIDA
1969-1974**



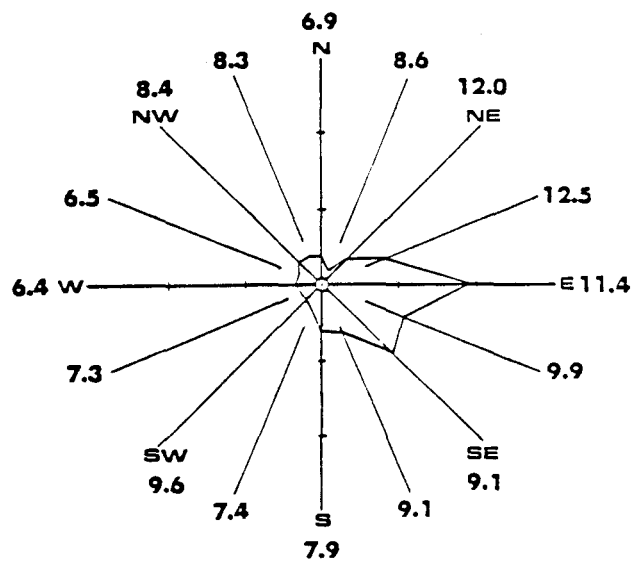
JANUARY
CALM - 1.4%



FEBRUARY
CALM - 0.4%



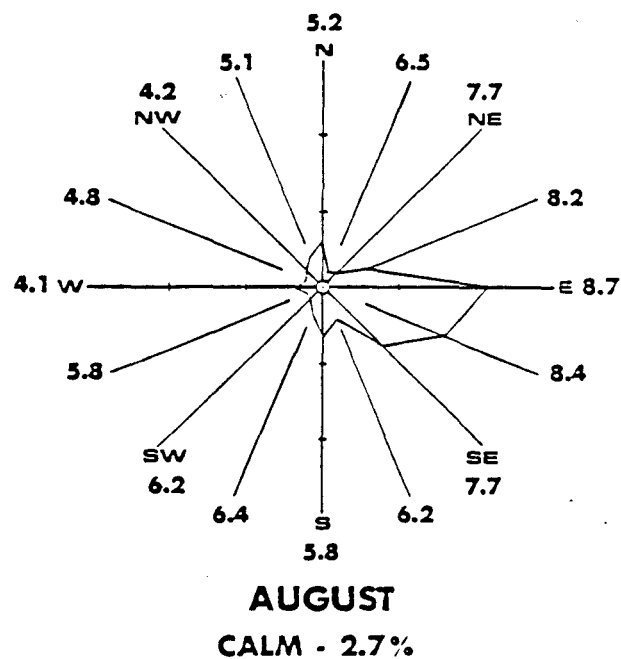
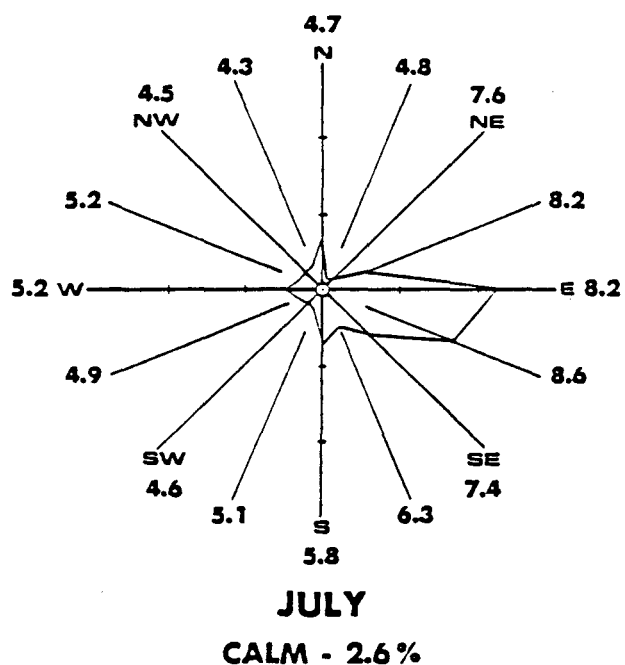
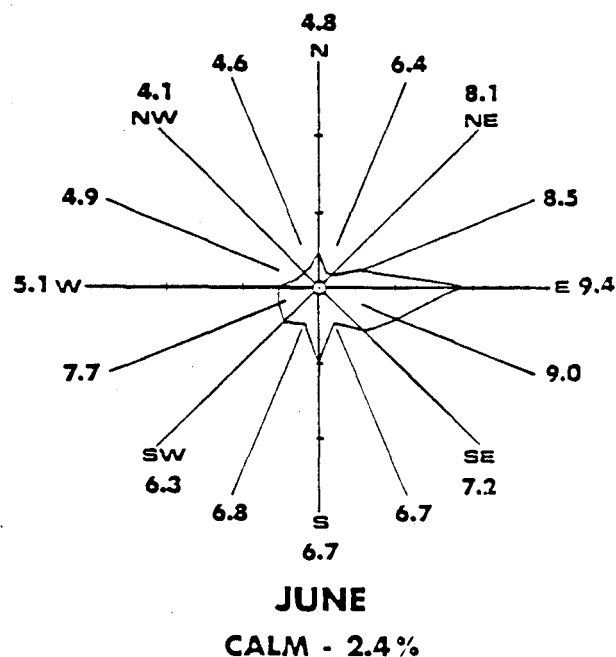
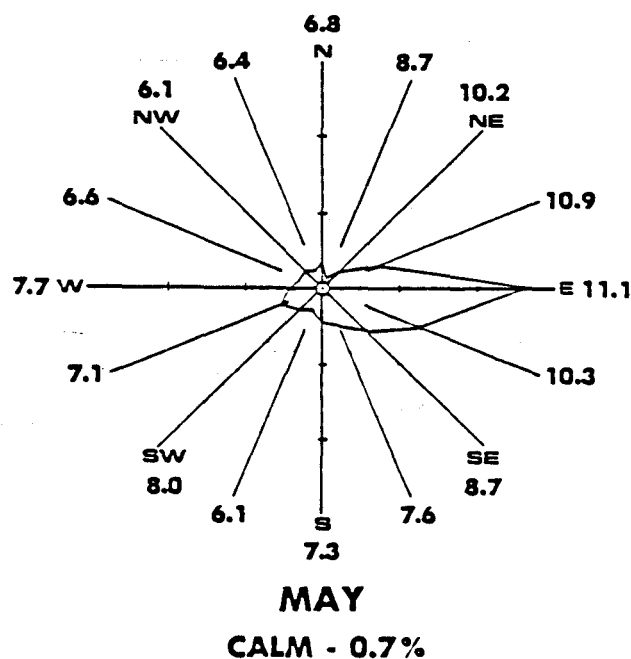
MARCH
CALM - 0.5%



APRIL
CALM - 0.1%

NOTE: SCALE IS MARKED IN INCREMENTS OF 10 PERCENT.
AVERAGE SPEEDS ARE GIVEN IN KNOTS

**AVERAGE MONTHLY AND ANNUAL WIND ROSES
FOR MIAMI, FLORIDA
1969-1974**

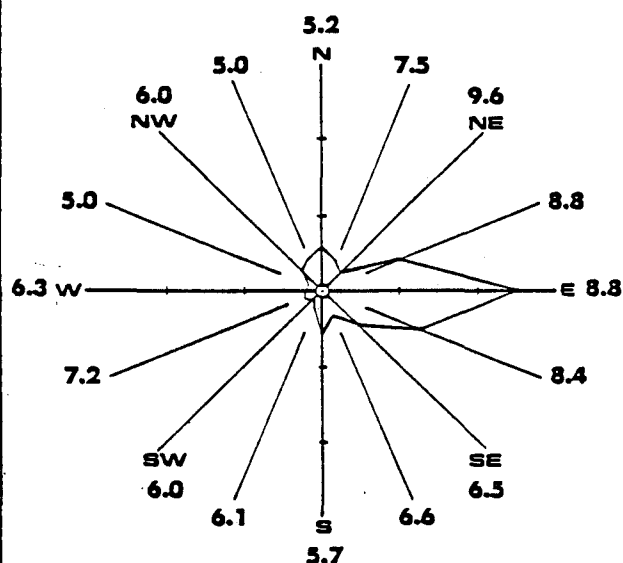


NOTE: SCALE IS MARKED IN INCREMENTS OF 10 PERCENT.
AVERAGE SPEEDS ARE GIVEN IN KNOTS

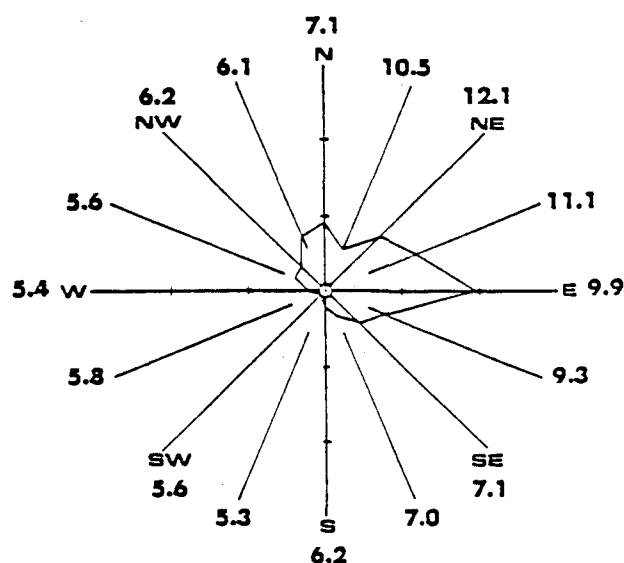
(PAGE 3 OF 4)

SOURCE: NOAA, 1974.

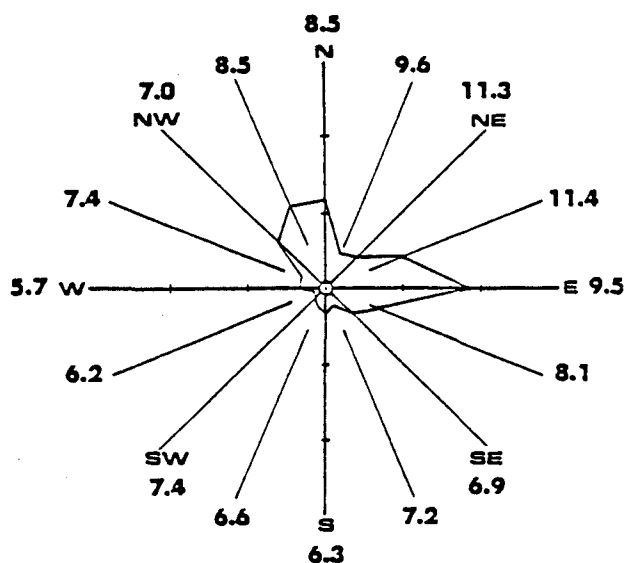
**AVERAGE MONTHLY AND ANNUAL WIND ROSES
FOR MIAMI, FLORIDA
1969-1974**



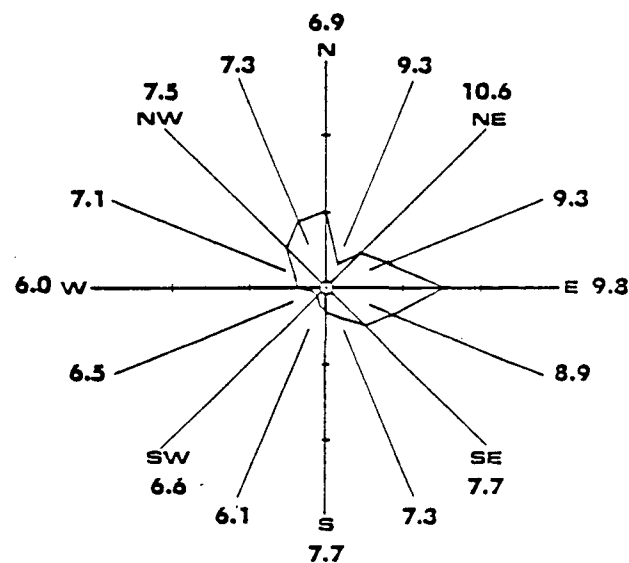
SEPTEMBER
CALM - 3.1%



OCTOBER
CALM - 1.3%



NOVEMBER
CALM - 0.2%



DECEMBER
CALM - 0.6%

NOTE: SCALE IS MARKED IN INCREMENTS OF 10 PERCENT.
AVERAGE SPEEDS ARE GIVEN IN KNOTS

**AVERAGE MONTHLY AND ANNUAL WIND ROSES
FOR MIAMI, FLORIDA
1969-1974**

Table 2.3-6. Ambient Air Monitoring Sites in Broward County During 1984

SAROAD No.	Broward County No. or Operator	Location		Pollutant Measured	Location with Respect to Proposed Facility	
		City/Division	UTM, X,Y Coordinates (km)		Direction (°)	Distance (km)
3700003G01	1	Pompano Beach	590.17, 2908.00	TSP, Pb	85	6.2
3700002G01	3	Pompano Beach	587.85, 2902.78	TSP	14	6.1
2270001G01/09	4	Lauderdale Lakes	579.55, 2894.76	TSP, NO ₂ , SO ₂ , CO	199	13.5
3640002G01	5	Plantation	575.52, 2891.27	TSP	208	18.3
1260003G01	6	Ft. Lauderdale	583.11, 2890.09	TSP, NO ₂ , SO ₂ , CO, Pb	183	17.4
4350001G01	7	Tamarac	574.44, 2897.87	TSP	225	13.6
0910002G01	8	Davie	576.19, 2884.99	TSP, NO ₂ , SO ₂	199	23.8
3530001G01	9	Pembroke Pines	575.26, 2877.44	NO ₂ , SO ₂	196	31.3
1840001G01	10	Hollywood	582.21, 2876.98	TSP, Pb	183	30.6
1640001G01	11	Hallandale	584.60, 2874.44	TSP	179	33.1
1260004G01/09	12	Ft. Lauderdale	585.20, 2887.20	TSP, NO ₂ , SO ₂	177	20.3
0420002G01	13	Hacienda Village	579.70, 2885.34	CO	191	22.6
0420003G03	14	Coral Springs	571.60, 2906.88	O ₃	267	12.4
3530002G01/09	15	Pembroke Pines	570.00, 2878.40	TSP	206	32.3

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Table 2.3-6. Ambient Air Monitoring Sites in Broward County During 1984 (Continued, Page 2 of 2)

SAROAD No.	Broward County No. or Operator	Location		Pollutant Measured	Location with Respect to Proposed Facility	
		City/Division	UTM, X,Y Coordinates (km)		Direc- tion (°)	Distance (km)
0420004001	16	N. Lauderdale	577.73, 2900.11	O ₃	220	9.7
3700004001	17	Pompano Beach	585.34, 2900.13	CO	170	7.5
1840002001	18	Hollywood	584.00, 2875.87	CO	180	31.6
2560002001	19	Margate	578.86, 2903.51	TSP, Pb	232	6.5
1260005J02	FP&L	Ft. Lauderdale	579.28, 2882.35	TSP, NO ₂ , SO ₂	191	25.6
1260006J02	FP&L	Ft. Lauderdale	583.05, 2883.85	TSP, NO ₂ , SO ₂	182	23.7
1260007J02	FP&L	Ft. Lauderdale	589.10, 2886.85	TSP, NO ₂ , SO ₂	166	21.3

Source: ESE, 1986.

The existing monitoring sites located within 10 km of the facility are listed in Table 2.3-7. The maximum concentrations measured during 1984 are also presented in this table. Based on these measured maximum concentrations, pollutant concentrations within a 10-km radius from the facility are less than the national and Florida Ambient Air Quality Standards (AAQS). Although Broward County Monitoring Site No. 4 is 13.5 km from the proposed facility site, concentrations from the monitor are included since it is the closest site with SO₂ and NO₂ concentrations. It should be noted that the SO₂ and NO₂ concentrations are not measured by an acceptable technique for use in PSD applications. However, based on the data presented in Table 2.3-7, the measured SO₂ and NO₂ concentrations are well below AAQS.

2.3.7.3 MEASUREMENT PROGRAMS

All information (i.e., meteorology and air quality data) was compiled from offsite monitoring stations maintained and operating by cooperating governmental agencies. Ambient air quality data were obtained from the Broward County EQCB and FP&L which operate a total of 21 monitoring stations throughout the county. No significant changes in these programs are anticipated after plant operation has begun.

Meteorological data were obtained from the NWS station in Miami. These include both surface- and upper-air data from which a 6-year (i.e., 1969 through 1974) average of the joint frequency of wind direction, wind speed, and atmospheric stability and a 5-year (i.e., 1960 through 1964) average of mixing heights were developed. Since 1957, the observing NWS station at Miami has been located 7 feet above mean sea level (msl) with wind sensors located 23 feet above grade. Regular surface observations are taken just before each hour, 7 days per week. Upper-air soundings are conducted twice per day at 0700 and 1900 Eastern Standard Time.

The Environmental Protection Agency (EPA)- and Department of Environmental Regulation (DER)-approved Industrial Source Complex Short-Term (ISCST) model were used to predict the maximum air quality impacts

Table 2.3-7. 1984 Ambient Air Quality Data for Monitoring Stations Within 10 km of the North Broward County Resource Recovery (NBCRR) Facility

Broward County No. or Operator	SAROAD No.	Concentration ($\mu\text{g}/\text{m}^3$)*								
		TSP		SO ₂		NO ₂	CO†		Pb	O ₃
		24-hr	Annual	24-hr	Annual	Annual	1-hr	8-hr	Quarter	1-hr
1	3700003G01	63	36	—	—	—	—	—	0.2**	—
3	3700002G01	120**	48**	—	—	—	—	—	—	—
4	2270001G01	76	38	6**	3**	33**	7	5	—	—
—	2270001G09	76	38	12**	6**	34**	—	—	—	—
16	0420003G03	—	—	—	—	—	—	—	—	202**
17	3700004G01	—	—	—	—	—	7**	5**	—	—
19	2560002G01	59	29	—	—	—	—	—	0.1**	—
Florida AAQS		150	60	260	60	100	40	10	1.5	235

*For short-term averages, second-highest concentration is shown.

†CO concentrations in mg/m^3 .

**Closest monitoring station for specified pollutant.

Notes: TSP = total suspended particulate.

SO₂ = sulfur dioxide.

NO₂ = nitrogen dioxide.

CO = carbon monoxide.

Pb = lead.

O₃ = ozone.

Source: ESE, 1986.

due to the proposed plant. The ISCST model is an extended version of the single-source CRSTER model. The ISCST model is designed to calculate hourly concentrations based on hourly meteorological parameters. The hourly concentrations are processed into non-overlapping short-term (e.g., 3- and 24-hour) average periods and then summed and averaged to produce annual average concentrations. Because the impacts from the proposed plant were low and generally less than the PSD significant impact levels, only emissions from the proposed plant were considered in the air quality modeling analysis.

2.3.8 Noise

A technical noise analysis was performed for this application and is contained in Appendix 10.10. Existing ambient source levels were recorded at separate locations along the perimeter and within the site itself. Figure 2.3.8.1 identifies the approximate location of the sampling points.

The maximum dBA level recorded during the survey and the added combined noise level for each location is presented in Table 2.3.8.1. These levels are in decibels (dB(A)). The higher the decibel level the louder the sound.

The land use designation for the area immediately surrounding the proposed site is industrial. The Broward County Code of Regulations sets the sound limit for industrial zoning at 70 dB(A). Therefore, as shown in Table 2.3.8.1 the ambient noise levels do not exceed the County sound level limits at the boundaries.

2.3.9 Other Environmental Features

All environmental features of the Project site have been addressed fully in preceding sub-sections of Section 2. No additional environmental evaluation of the site or site environs is required.

TABLE 2.3.8.1

AMBIENT NOISE
MAXIMUM RECORDED AND COMBINED, dBA

<u>Point</u>	<u>Maximum</u>	<u>Combined</u>
1	61	61.4
2	61	61.6
3	59	59.5
4	59	59.5
5	58	58.6
6	58	58.6
7	56	57.2
8	65	65.5
9	56	56.6

THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

SECTION 3

SECTION 3

THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

3.1 Background

3.1.1 Technology Selection

As previously mentioned in Section 1, a policy decision was made in 1982 by Broward County not to rely on landfill as a primary, long-term disposal solution, and to concentrate on alternatives that involve the recovery of materials and/or energy. The decision to build a resource recovery (waste-to-energy) system came after years of investigation by the County into other methods for waste disposal. These investigations have included the evaluation of the following technologies:

- o Materials Recovery
- o Composting
- o Energy Recovery
 - Solid, Gaseous and Liquid Refuse Derived Fuel (RDF) Combustion Systems
 - Mass Burning Incineration

The following subsections summarize the evaluation results with respect to each of the above listed technologies.

Materials Recovery

Materials recovery encompasses methods and procedures for extracting useful materials from solid waste for return to the economy. It generally involves the mechanical separation of the solid waste constituents through use of the following equipment:

- o Size Reduction Equipment (shredders, crushers, shear mills, etc.)
- o Air Classifiers (rotary drums, air knives, horizontal air separators, etc.)

- o Trommel Screens
- o Magnetic Separators
- o Glass and Aluminum Separators
(heavy media separators, aluminum magnets, froth flotation units, optical sorters, etc.)
- o Miscellaneous Separation Processes
(vibrating screens, hand sorting, etc.)

The abrasive heterogenous nature of solid waste makes it difficult to handle, and can subject the above listed mechanical equipment to excessive wear. The potential for explosions also exists. In addition, the current marketability of recovered solid waste materials is not sufficient to offset the high capital, operating and maintenance cost requirements of materials recovery systems where constructed exclusively for that purpose.

Composting

Composting is the decomposition of organic material by the action of aerobic microorganisms at temperatures in excess of 60°C. The basic concept of composting, whereby organic wastes are converted to stable humus, theoretically free of pathogens and suitable for return to the environment, appears to be attractive. This concept indicates that compost product may provide a useful resource for Broward County soils.

In the United States, the composting of sewage sludge and/or vegetative matter has attained a certain degree of success. The composting of solid waste, however, has experienced numerous difficulties. At present, there are only four solid waste composting facilities operating in the United States, and two of these add sludge to the solid waste prior to the composting process. All four facilities are operating at a capacity substantially less than that required for Broward County, and three of them have been unable to develop long term market arrangements for their final compost product.

In addition, the preprocessing of solid waste required to perform the compost process involves operation and maintenance problems similar to those encountered with material recovery systems (jamming, blockage and explosions in the equipment process train).

As a result of the above observations, in particular the fact that solid waste composting has never been demonstrated in the United States on a scale comparable to Broward County, this technology was deemed inappropriate for Broward County.

Energy Recovery

Energy recovery from solid waste can have many forms, including generation of useful energy by directly incinerating as-received, unprepared solid waste in furnaces equipped with boilers (mass burning incineration) and conversion of solid waste to various types of Refuse Derived Fuels (RDF) which in turn can be fired in furnaces equipped with boilers (RDF combustion).

RDF Combustion Systems - These systems involve the physical or biological processing of solid waste to produce a solid, liquid or gaseous fuel which can subsequently be used in boilers or furnaces.

RDF can be produced in a solid, liquid, or gaseous form depending upon the method utilized to process the raw solid waste. Shredding, air classification and/or screening can be utilized to produce a solid RDF which can be incinerated as is or densified into briquets or pellets. Processes such as pyrolysis (heating in an oxygen deficient atmosphere) or anaerobic digestion can transform the organic fraction of solid waste into a gaseous or liquid fuel.

There have been a number of solid RDF systems introduced in the 1970's that have failed as a result of both technological and economic reasons. Most of these systems experienced serious problems with solid waste shredding operations, various steps of materials separation and storage of the RDF. In

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addition, the RDF produced at these facilities has not been of a sufficient quality to enable successful marketing of the product. These problems have not been totally resolved to date and, therefore, represent a major setback to the successful demonstration of any full-scale municipal RDF operation.

Gaseous or liquid RDF systems generally involve solid waste processing equipment similar to that required for solid RDF systems. This equipment is subject to the same operational problems of excessive wear and explosion potential as previously discussed under solid RDF systems. In addition, gaseous and liquid RDF technology is more complex, and requires substantially higher capital costs. Although numerous processes have been developed in laboratory studies and pilot plants, none have been operational on a scale appropriate to Broward County.

Mass Burning Incineration - This technology involves the recovery of steam and/or electricity through utilization of convection (waste heat) or radiation (waterwall) boilers. These systems can consist of large field erected incinerators, or be constructed with a series of modular prefabricated incineration units.

Mass burning incineration of unprocessed solid waste, combined with heat recovery is currently the most developed and widely practiced resource recovery technique in the world. Efficient energy recovery, reduction of original waste volume and quality of ash residue are among the major assets of this technology. There are numerous mass burning stoker-fired incineration facilities in the United States, Canada, Europe and Japan that have successfully demonstrated this technology. Additional advantages of this technology include:

- o Relatively high systems on-line reliability
- o High thermodynamic efficiency
- o Available in proprietary and non-proprietary system designs

- o High volume reduction (10 percent) of input solid waste to be landfilled as ash residue
- o Marketable energy products
- o Adaptable to sewage sludge disposal

Modular Prefabricated Incinerators - Recent developments have occurred in the field of mass burning modular prefabricated incinerators. There are numerous domestic manufacturers that currently market various modular incineration systems based upon differing combustion processes. These systems require significantly less capital expenditures than the aforementioned field erected stoker-fired systems. These systems, however, have been operational only since 1977 and the majority of the operating facilities have capacities less than 100 tons per day. At present, there are no operating modular incineration systems with capacity greater than 360 tons per day nor are these facilities producing electricity.

The technical feasibility of modular incineration has therefore not been demonstrated for the capacity required for a Broward County facility. Since only proven technologies were contemplated for Broward County, modular mass burning incinerators were eliminated from further consideration.

Mass Burning Stoker-Fired Incineration Systems - This type of technology wherein waste is incinerated on stokers or grate systems in large furnace/boilers appear to represent the most viable technology available to Broward County for implementation under the proposed project. The major reasons for this recommendation are:

- o Mass burning systems firing as-received solid waste, rank the highest in technological development and demonstrated performance.
- o Mass burning systems firing as-received solid waste, rank the highest in demonstrated reliability.
- o Mass burning systems can generate either steam or electricity which is highly marketable.

- o Capital and operating and maintenance costs associated with mass burning systems are competitive with alternative solid waste processing systems.
- o To date, mass burning constitutes the only resource recovery system operating successfully at a scale similar to Broward County.

As a result, this technology was selected by Broward County for use in implementing its resource recovery project.

3.1.2 Site Selection

Details with regard to the site selection process are presented in Section 8.1, Alternative Sites. Presented below are the salient aspects of that process. The first step involved the identification of five landfill sites and three resource recovery facility sites for more detailed evaluation. The criteria used to select these sites included: general location, jurisdiction, size, existing zoning, land use designation and existing land use.

The identified sites were then evaluated by Malcolm Pirnie, Inc. to assess and compare:

- o Site adequacy
- o Required transport costs
- o Acquisition and development costs
- o Access and adequacy
- o Potential air and water quality impacts
- o Wetland impacts
- o Adjacent land use
- o Zoning and land use plans
- o Traffic impacts
- o Conformance with regulations
- o Permitting approval probability

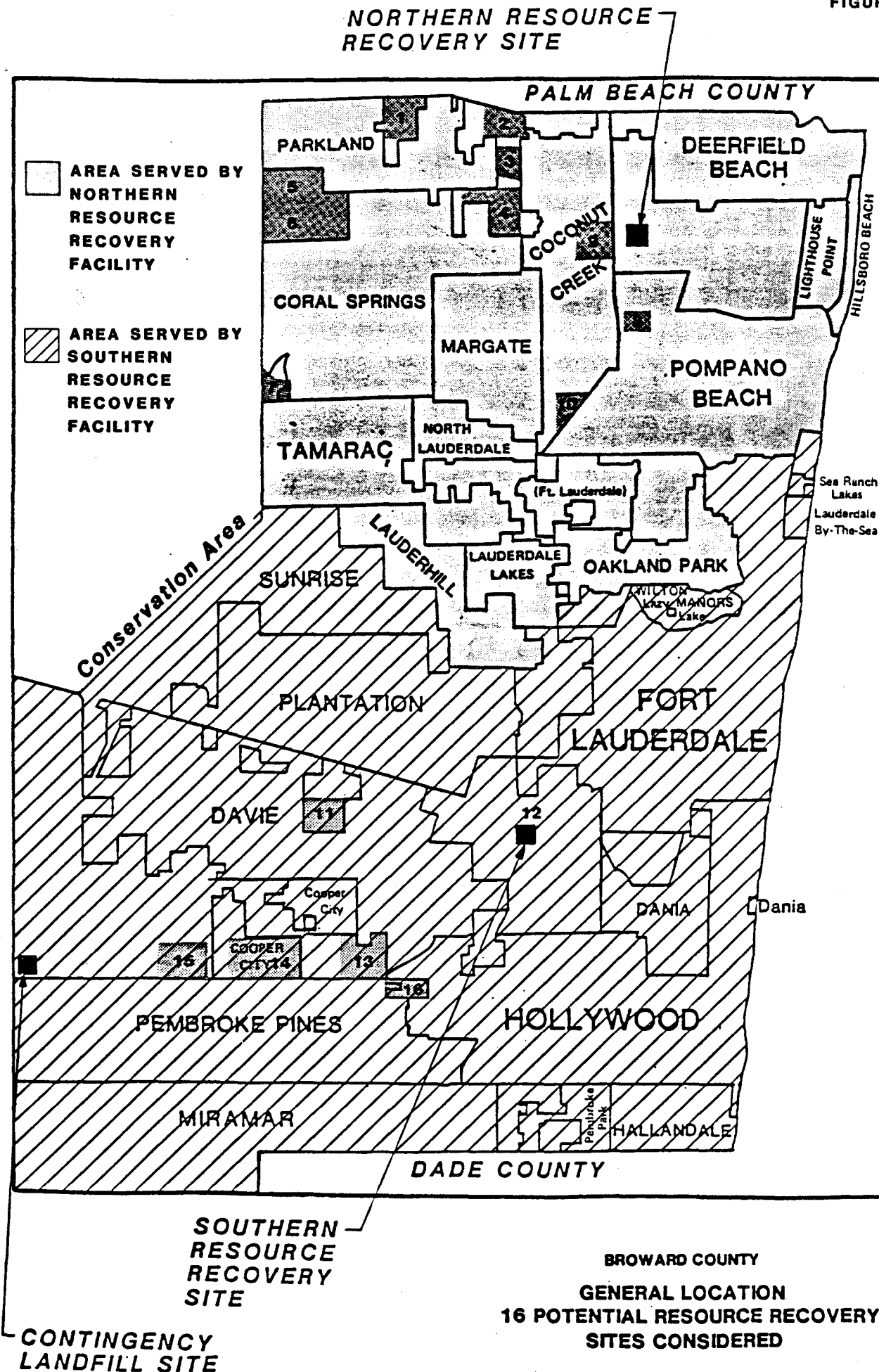
As mentioned in Section 8.1, verification of the results of this initial study and supplemental investigations were undertaken by the Broward County Office of Planning, which involved the identification of major undeveloped areas in the County through a review of current aerial photographs. This resulted in the identification of 97 potential sites which were assessed based upon: development status, location with respect to municipal jurisdictions, size, development of regional impact status and presence of large waterbodies. Sixteen potential sites met this criteria and were further evaluated by County staff and Malcolm Pirnie. Figure 3.1.2.1 presents the general location of the sixteen sites considered.

Site Number 8 located between Powerline Road and the Florida Turnpike on Copans Road in unincorporated Broward County was eventually selected by the County. A 140.23 acre site was acquired and rezoned to Planned Unit Development - Special Complexes to allow construction of a resource recovery facility and residue/unprocessable waste landfill to serve North Broward County. In September, 1983, the site was annexed into the City of Pompano Beach. The City immediately began the process of rezoning the site to Light Highway Industrial (I-1). This process was completed in March 1984. The County was unable to reverse this action in court or to rezone the property to another classification which would allow the Project to proceed through normal administrative actions.

In August, 1985, the County Commission directed staff to negotiate with the selected Project vendor, Waste Management, Inc., for use of a site on Hilton Road approximately two miles north of the original site. This unincorporated area location was designated as a potential site in November, 1984, after it was proposed by Waste Management as an alternate to the County owned site.

Waste Management and the County are currently in the process of and seeking rezoning of it to a Planned Unit

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Development - Special Complexes. This process should be completed in April 1986.

3.1.3 Vendor Procurement

On October 12, 1982, the County authorized the procurement process for a full service vendor to provide waste disposal capability including the design, construction, start-up and operation of two mass burn resource recovery facilities, one in northern and one in southern Broward, each with an accompanying residue/unprocessable waste disposal landfill. A prequalification of proposers document, Request for Qualifications (RFQ) was issued on February 1, 1983 requesting information regarding the technical, managerial and financial qualifications of full service vendors interested in participating in the project. Responses from potential vendors were received on March 14, 1983. Ten (10) firms submitted qualification statements for review.

An evaluation of the responses was completed and the results documented in a Engineer's Report entitled "Evaluation of Contractor Qualifications, Full Service Resource Recovery Project." The evaluation concluded and the County Board of Commissioners approved in April 1983 the prequalification of the following three vendors: Browning-Ferris Industries, Inc., Signal RESCO, Inc., and Waste Management, Inc.. These three vendors were thus found eligible to submit detailed proposals in response to a Request for Proposals (RFP) to be drafted by the County. Subsequently, Browning-Ferris Industries, Inc. (BFI) agreed to market waste processing services jointly with Air Products and Chemicals, Inc. under the name American Ref-Fuel Company.

An RFP was issued in September 1983, and proposals were received in January 1984 from Waste Management, Inc. and Signal RESCO; American Ref-Fuel elected not to respond to the RFP. In June 1984, the Broward County Board of Commissioners rejected the proposals as being non-responsive and instructed

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the County staff and consultants to revise the RFP to reflect current conditions and reissue it to the three prequalified vendors.

The RFP was revised and reissued in September 1984 such that the sizing of the facilities were increased to meet solid waste disposal requirements into the early 1990's, and the County had the flexibility to award separate contracts for the northern and southern facilities. Proposals were received on November 16, 1984 from Signal RESCO and American REF-FUEL for the South Broward County Resource Recovery Project and Signal RESCO and Waste Management for the North Broward County Resource Recovery Project. On July 2, 1985, after an extensive proposal evaluation process, the Board of County Commissioners selected Signal RESCO to be the vendor for the South County Project and Waste Management as the vendor for the North County Project.

Waste Management, Inc.

Waste Management is a recognized leader in the waste services industry because of its demonstrated expertise in planning and operating waste management systems throughout the world.

Waste Management's resource recovery experience includes performance as a full service contractor and operator of a 1,000 ton per day waste-to-electricity plant in Tampa, Florida. Waste Management has owned and operated a 600 ton per day System Volund steam generating plant in the Chicago area for 20 years. In addition, Waste Management is thoroughly familiar with Broward County's solid waste collection and disposal needs through its day-to-day activities in the County and has a major commitment to waste collection and disposal in the South Florida area.

Waste Management will utilize Morrison-Knudsen Company, Inc. to perform overall facility design and the construction utilizing System Vølund technology for waste incineration and energy recovery.

System Vølund

The Vølund Company, which was established in 1875 is headquartered in Copenhagen, Denmark. Vølund is one of the world's most experienced companies in the design and installation of waste-to-energy systems. The world's first continuous flow waste-to-energy plants were designed and installed by the Vølund Company in 1931 and 1932 in Copenhagen, Denmark. These plants operated until 1971 when they were replaced by two large, modern waste-to-energy Vølund plants. Vølund has had a major role in Denmark's achievements in energy recovery from solid wastes, which lead the world, in that more than 65% of its wastes are incinerated in energy recovery plants.

Vølund's Energy Technology and Heat Technology Divisions are widely recognized for their expertise in the design, production, and erection of boilers for residential, utility and industrial use. The Energy Technology Division designed, manufactured, and erected the Ensted Power Station, the largest fossil fuel power station in Scandanavia which produces 4.3 million pounds of steam per hour and is rated at 630 megawatts. Vølund's experience as a major boiler designer and manufacturer will ensure the design of efficient, high temperature and pressure steam conditions for the North Broward County Project. In addition, a number of System Vølund plants in Japan as well as in Tampa are producing electricity. This expertise will be applied to the Project.

3.2 Site Layout

The facility is slated to have an initial maximum installed capacity of 2,200 tons per day and an estimated

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projected ultimate capacity of approximately 3,300 tons per day. Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion. Solid waste will be delivered in collection trucks to the facility. It will be dumped directly into a bunker located entirely inside the main facility building. All waste will be stored inside the building, therefore no waste will be visible from the outside. Two of three overhead cranes will mix the solid waste in the bunker and load the charging hoppers as required.

Waste will enter the furnace via a charging hopper and will progress through the combustion chamber by means of a stoker/rotary kiln system that agitates the waste providing the proper air/fuel mixture to complete the combustion process. The resulting ash will be quenched, and the heat from the furnace will be transferred through waterfilled steel tubes lining a waste heat boiler to produce steam. The steam will then be transmitted to turbine generator to produce electricity for internal use and sale to Florida Power and Light Company.

Each furnace train will be equipped with an electrostatic precipitator (ESP) for particulate air emission control. An electrostatic precipitator is a pollution control device that removes small particles from exhaust gases. The gases pass through a strong electric field where the particles are charged and attracted to the opposite electrically charged collecting plates. The dust is then removed mechanically from these plates. The flue gas will be drawn through the ESPs by an induced draft fan located between the stack and the ESPs.

Electrostatic precipitators (ESPs) represent one of the most reliable pieces of equipment in a facility of this type. Modern ESPs installed at the facility will be equipped with continuous readout devices for performance monitoring. Further, the application of microprocessors on these ESPs for

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optimal operating control has resulted in a high degree of performance reliability. These factors in combination with periodic, routine inspection and maintenance effectively minimize the frequency of malfunction.

It is important to note that, except in the case of a complete ESP system failure which rarely, if ever occurs, malfunction of an ESP does not mean pollutants escape from the facility with no removal or control being afforded. Rather, the microcircuitry designed into the control system will register a decay in applied voltage, as an example, before the condition manifests itself in terms of a significant reduction in pollutant removal efficiency. When such a condition occurs, the ESP can be brought off-line, together with the balance of the effected furnace train, before the degree of pollutant control is seriously compromised. Immediately upon noting such a condition, waste charging to the furnace train would cease, refuse present on the furnace grate would proceed under normal combustion design conditions to a burnout state, the furnace would be allowed to return to a cold condition and the ESP disengaged from service. Inspection and maintenance would then be performed to correct the malfunction.

The carryover of burning cinders into the ESP is not considered a major problem in the proposed furnace/boiler design. Fluidization of waste which might cause such carryover is minimized by introduction of primary air at low velocity.

Those cinders which are entrained tend to be very small and burn out due to the long retention time in the furnace and waste heat boiler or settle out in the boiler hoppers and heat transfer surfaces.

Bottom ash from the furnace and flyash from the precipitator will be mixed prior to removal from the facility. The combined ash will comprise approximately 10 percent of the volume and 25 percent of the weight of the solid waste

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processed by the facility. The ash will be quenched with water to about 30 percent moisture prior to transport to the adjacent Central Disposal landfill.

While the proposed facility will have ultimate design capacity of approximately 3,300 tpd and six boiler units, its maximum initial installed capacity will be 2,200 tpd and four boiler units. Each boiler unit operates independently from the others. It will, therefore, be possible to routinely shut down units for periods of maintenance and inspection and still continuously operate the facility.

3.2.1 Site Selection

The Broward County Board of County Commissioners selected the Hilton Road site for the North Broward County Resource Recovery Project site on August 13, 1985 after a lengthy and comprehensive site selection process that began in 1981. A detailed account of the site selection process is presented in Section 8.1, "Alternative Sites".

3.2.2 Resource Recovery Facility

As illustrated on Figure 2.1.3.1 and described in Section 2, Site and Vicinity Characterization, the resource recovery facility will be developed such that:

- o The main on-site roadway will provide two-way traffic (north and south).
- o A visitor parking area and administrative building will be located east of the main facility building.
- o Vehicles entering the site will be weighed at the scalehouse/weigh station located between the main facility building and site entrance.
- o A receiving area including an enclosed turning platform, tipping floor, overhead crane, and refuse pit will be located on the north side of the main facility building.
- o The furnace/boilers and auxiliary equipment will be located south of the receiving area.

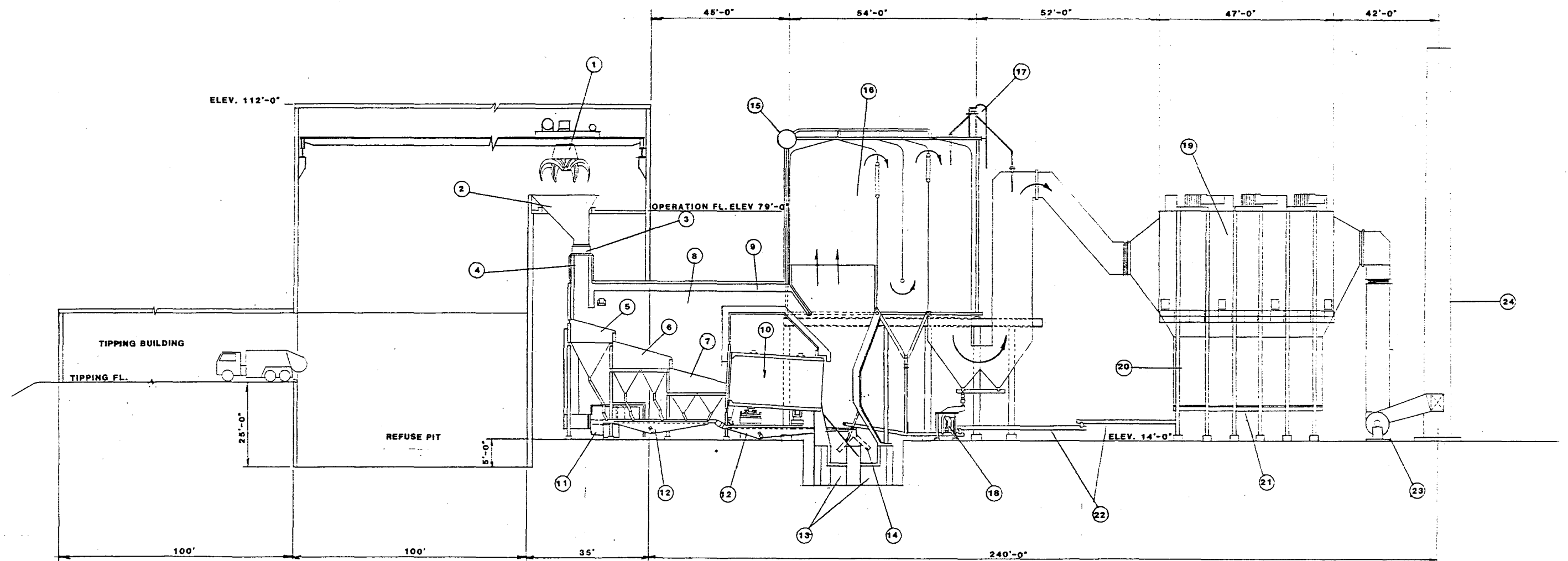
- o The turbine generator will be located adjacent to the furnace/boilers.
- o The electrostatic precipitators (air pollution control equipment) will be located south of the boilers, adjacent to the ash handling area and directly in front of the plant's stack.
- o The electrical substation necessary to tie into the Florida Power and Light grid system will be located just east of the facility stack.

The following figures and descriptions have been included to provide an overview of the resource recovery facility's operations. The figures were supplied by Waste Management, Inc. and Figure 3.2.1.1 presents a cross sectional view of the facility.

Plant Design

The Plant is designed to be architecturally pleasing and take into account existing site conditions. With the low site elevation large volumes of fill are required to raise the finished grade above the 100-year flood plain. The low site elevations also make it impractical and inordinately costly to build substantial structures, such as the waste storage pit, below grade level. Therefore, the design elevation of the slab for the plant floor and pit base is only a few feet below finished grade in contrast to a more conventional pit design where the base is often extended well below grade. The tipping floor is approximately 20 feet above finished grade and vehicle access is by fill-supported elevated ramps. The pits are approximately 28 feet deep, 255 feet long and 100 feet wide. This wide, shallow pit design avoids the complications and expense of elevating the tipping floor and access ramps to the high elevation that would be required by the typical deep, narrow pit. This design provides for the discharge of 18 vehicles simultaneously.

FIGURE 3.2.1.1



- | | | | |
|----|-------------------------------|----|--|
| 1 | REFUSE CRANE | 15 | DRUM |
| 2 | CHARGING HOPPER | 16 | BOILER (5-PASS) |
| 3 | CHARGING DAMPER | 17 | SHOT CLEANING SYSTEM |
| 4 | CHARGING CHUTE | 18 | ROTARY VALVE |
| 5 | DRYING GRATE | 19 | ELECTROSTATIC PRECIPITATOR |
| 6 | BURNING GRATE #1 | 20 | FLY ASH COLLECTION HOPPER |
| 7 | BURNING GRATE #2 | 21 | PRECIPITATOR ASH COLLECTING SCREW CONVEYOR |
| 8 | FURNACE | 22 | FLY ASH SCREW CONVEYORS |
| 9 | BY-PASS DUCT | 23 | INDUCED DRAFT FANS |
| 10 | ROTARY KILN | 24 | STACK |
| 11 | SECONDARY AIR SYSTEM | | |
| 12 | SIFTING CONVEYORS | | |
| 13 | BOTTOM ASH VIBRATING CONVEYOR | | |
| 14 | DOUBLE FLAP GATE | | |

REV.	DATE	DESCRIPTION	DR BY	APP BY
SCALE:		PROJECT NO.		
DES BY		PROJECT TITLE		
DR BY		NORTH BROWARD COUNTY		
CHK BY		RESOURCE RECOVERY PROJECT		
APP BY		SHEET TITLE		
		GENERAL ARRANGEMENT		
		SECTION		
		SHEET _____ OF _____		
		DRAWING NO.		
		D-G-105		

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Tampa, Florida 33618

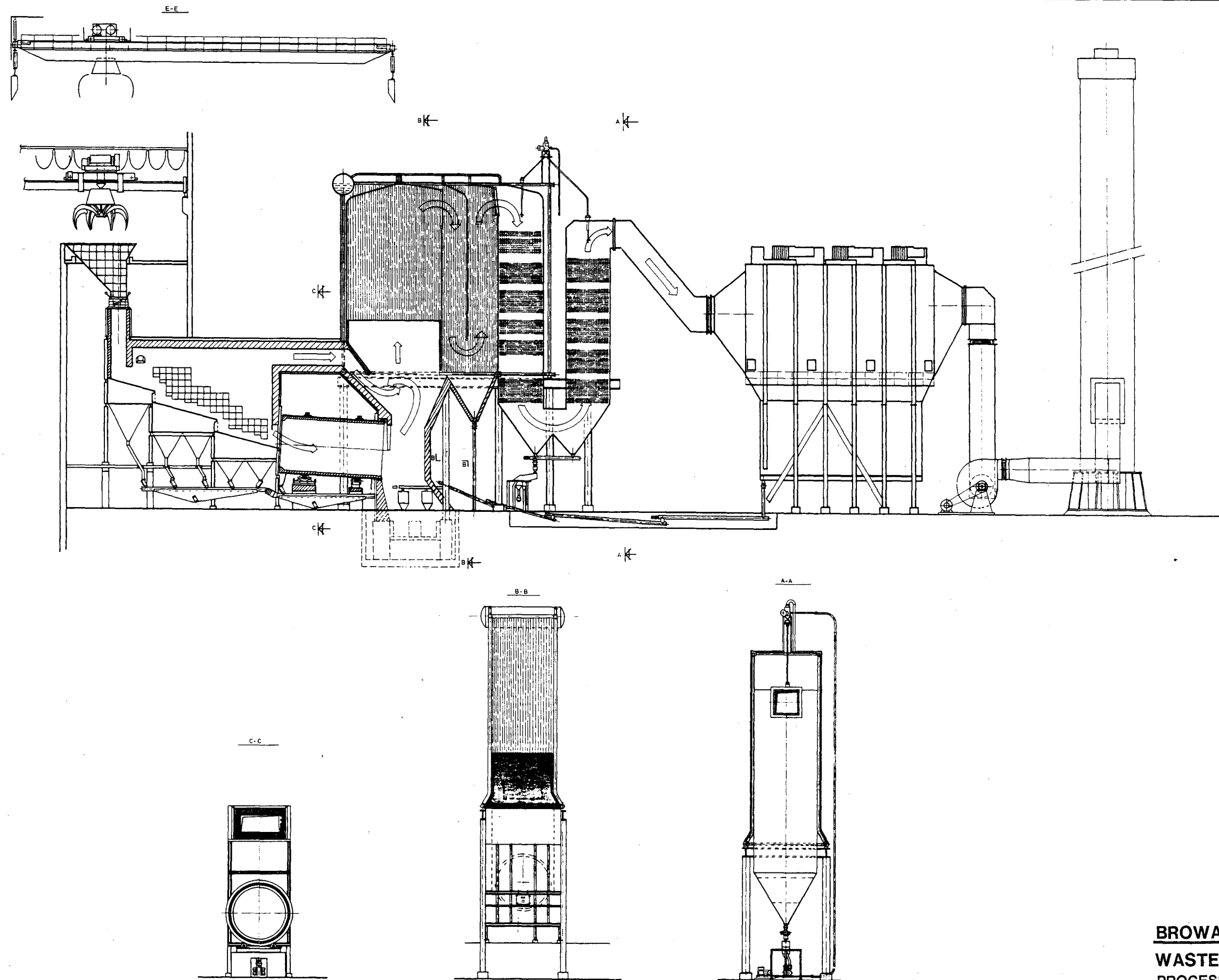
Processible waste delivered to the Plant will be dumped directly into the waste storage pit. The waste storage pit is sized to hold a four-day volume of waste generation. The pit also provides surge capacity and waste storage for operations during periods when waste is not delivered to the Plant. Waterline volume of the pit is 26,444 cu. yds. Materials in the pit which are not appropriate for processing, such as white goods and potentially hazardous materials, are removed from the pit using the overhead crane. These materials are placed via a bypass bay located at one end of the hopper floor into trucks for transport to the landfill.

Processible waste is removed from the pit and fed to the charging hopper of each individual process line (Figure 3.2.1.2). The cranes are operated from the control room from which the entire pit can be viewed. The entire tipping area is enclosed and combustion air necessary for furnace operation is drawn from this part of the building. This design configuration maintains a slight negative pressure which effectively prevents odor and dust from escaping the tipping building. An additional odor scrubbing system is not deemed necessary due to the multiple number of operating lines where at least one will always be operating.

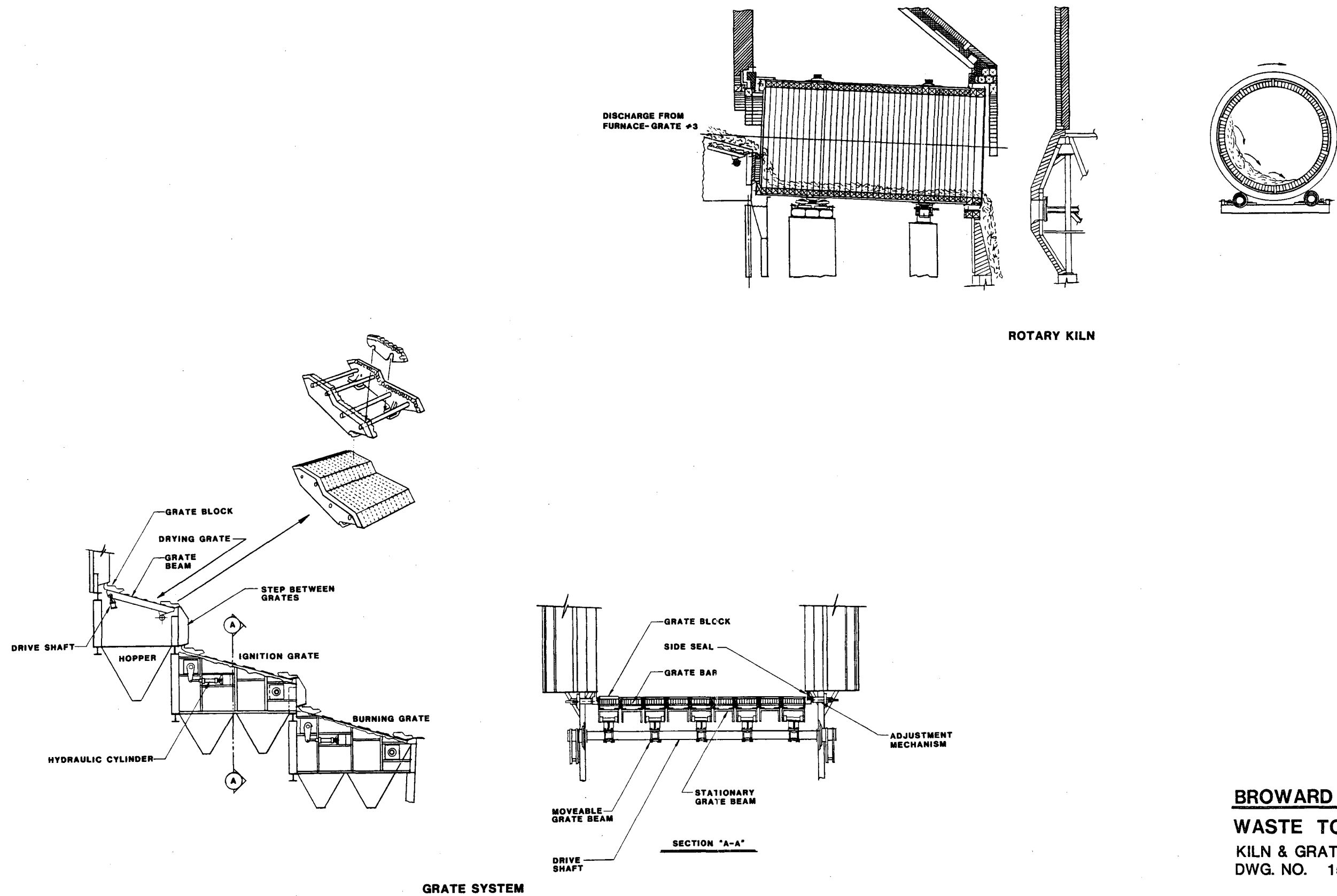
Combustion System

Each of the furnaces is equipped with a charging hopper into which the crane deposits waste. The hoppers are designed for even flow of waste into the charging chute and are equipped with a closed circuit television system to permit close monitoring of waste feeding operations. The chute is equipped with a damper which can be used to seal the furnace. Normally the refuse in the chute provides an air seal to the furnace which is under negative pressure, thus enabling close control of furnace air flows.

FIGURE 3.2.1.2



BROWARD COUNTY, FLORIDA
WASTE TO ENERGY PROJECT
PROCESS LINE - SECTION
DWG. NO. 14



BROWARD COUNTY, FLORIDA
WASTE TO ENERGY PROJECT
KILN & GRATE DETAILS
DWG. NO. 15

From the lower section of the charging chute the waste flows evenly onto the grates. The Vølund furnace utilizes a reciprocating step-grate design comprised of three separate grate sections (Figure 3.2.1.3). The refuse is dried and partially ignited on the first grate section and as it moves forward into the furnace, the rocking motion of the grate sections cause it to tumble, thus ensuring thorough mixing and drying. From the drying grate the refuse drops down onto the first burning grate where complete ignition of the refuse takes place. The refuse then falls onto the second burning grate on which the more volatile material is burned out. At the grate transitions, additional tumbling of the refuse takes place, ensuring that refuse is brought to the surface, ignited and burned. The action of the Vølund grate system also provides for an effective lifting and shearing movement, particularly of the lowest refuse layers, and ensure effective distribution of the combustion air. System Vølund employs proprietary self-cleaning grate bars which are efficiently cooled and easily interchangeable.

The heat for drying and ignition of the waste is supplied partly by the flue gases generated by the combustion of the refuse and partly by heat radiation from the hot refractory walls and brick arches of the furnace structure. No auxiliary fuel is used at any time during operation. The temperature of the flue gases exiting the furnace are maintained at approximately 1,750°F (954°C) ±50°F. The furnace is refractory lined on all sides with air cooling of the refractory walls immediately above the grate line to reduce slag accumulation on the walls. The refractory lining ensures an even distribution of radiant heat over the grate and acts as a "thermal flywheel" in maintaining a stable level of combustion on the grate.

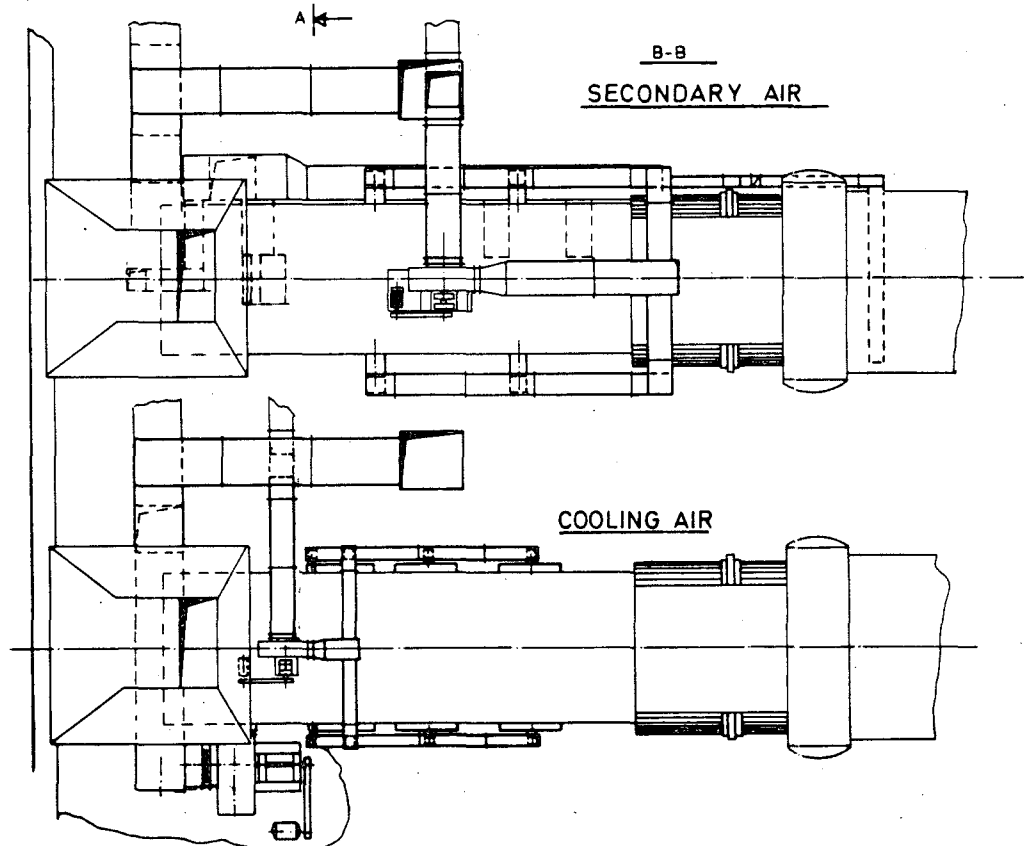
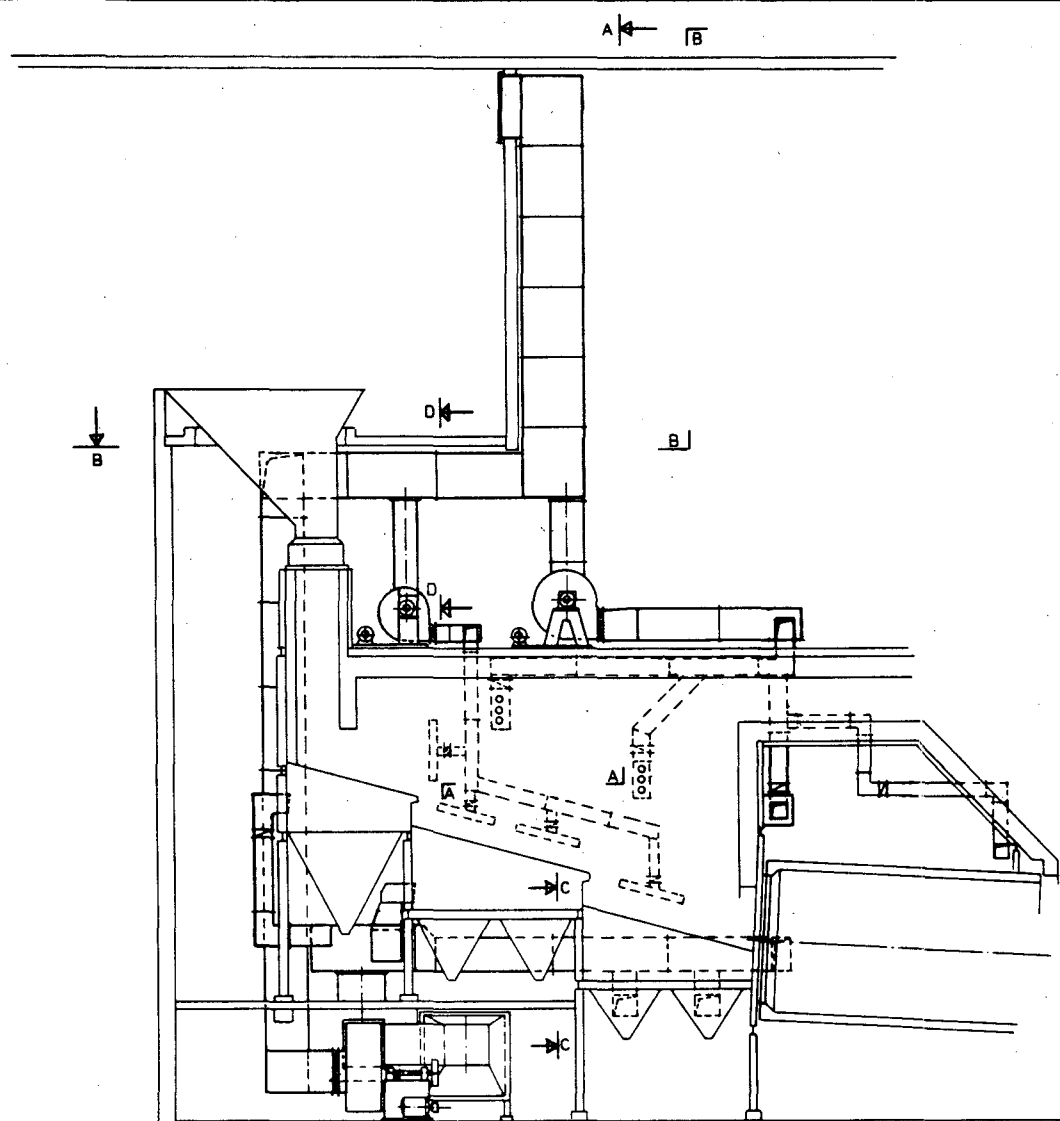
From the last burning grate the refuse passes into the refractory-lined rotary kiln (Figure 3.2.1.3). Complete com-

bustion of remaining unburned refuse takes place within the kiln. The rotating movement provides continual agitation and a long residence time which results in an exceptionally high degree of residue burn-out and reduction. The kiln rotational speed is variable to provide residence time corresponding to the higher heating value and moisture content of the waste being processed. Typical residence time through the system is two hours. This ability to control residence time of the waste is essential in an area such as Broward County where waste composition varies seasonally.

A portion of the flue gases generated by waste combustion passes through a brick-lined duct above the furnace to an afterburner chamber, while the remaining flue gases pass through the rotary kiln. The two gas currents are thoroughly mixed by the turbulences in the afterburn chamber at a temperature of approximately 1,750°F (954°C). The result is a thoroughly combusted flue gas which is essential for avoiding high temperature corrosion damage of the boiler tube walls.

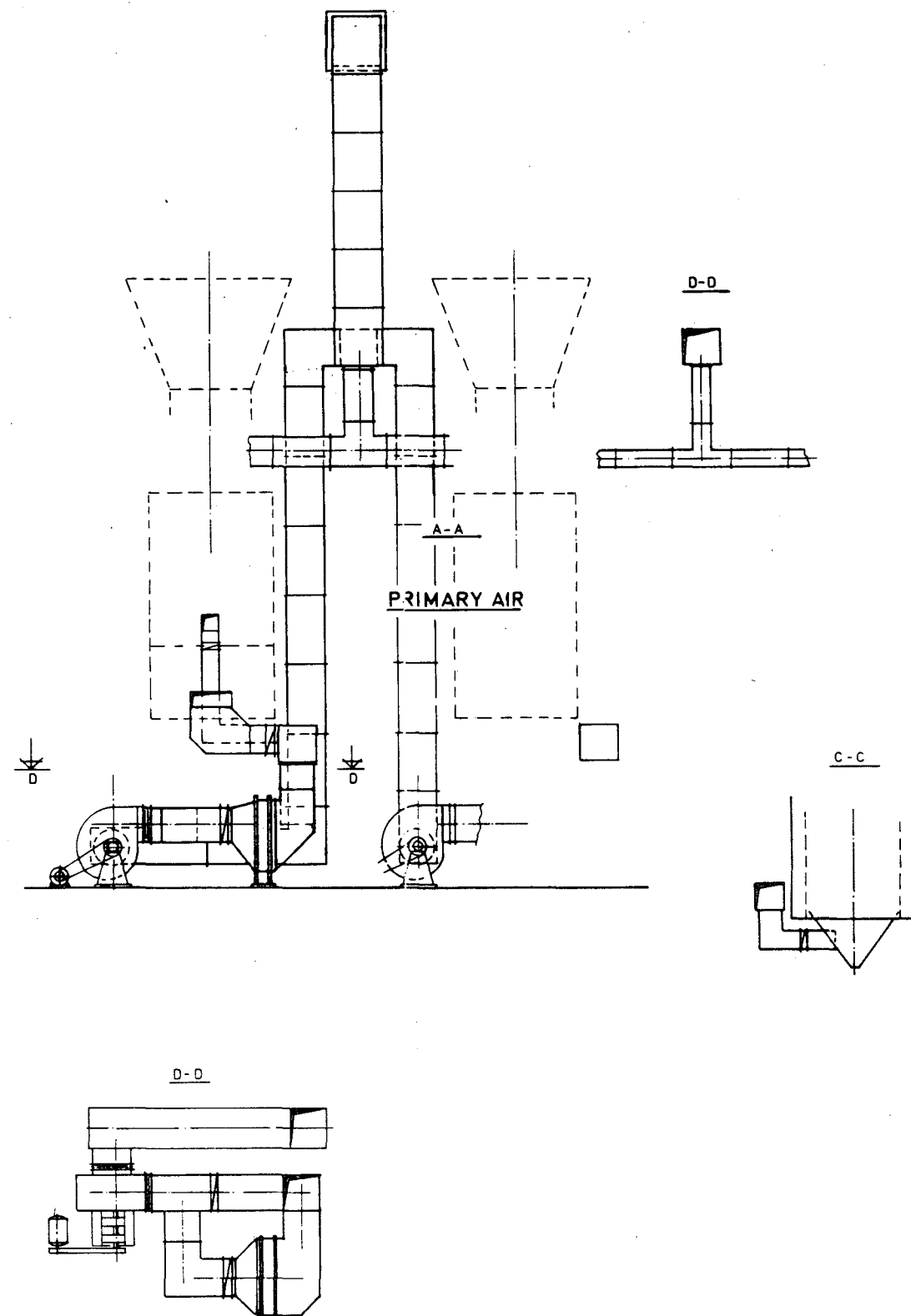
Each furnace is equipped with a separate primary air fan (Figure 3.2.1.4). Combustion air is drawn from the upper pit area and fed under the grates, from where it flows up between the grate bars to be distributed evenly throughout the grate area. Primary air flow can be regulated from the control room as can the distribution of air to each individual grate section.

Each furnace is also equipped with a secondary air fan, (Figure 3.2.1.4) which injects secondary air into the furnace above the grates and through the back wall of the furnace. Secondary air is required to secure effective burn-out of the flue gas and acts as control on the combustion temperature. The entire furnace volume is maintained under negative pressure by the induced draft fan which draws the generated combustion flue gases through the system.



B-B
SECONDARY AIR

COOLING AIR



A-A
PRIMARY AIR

BROWARD COUNTY, FLORIDA
WASTE TO ENERGY PROJECT
COMBUSTION AIR SYSTEM
 DWG. NO. 16

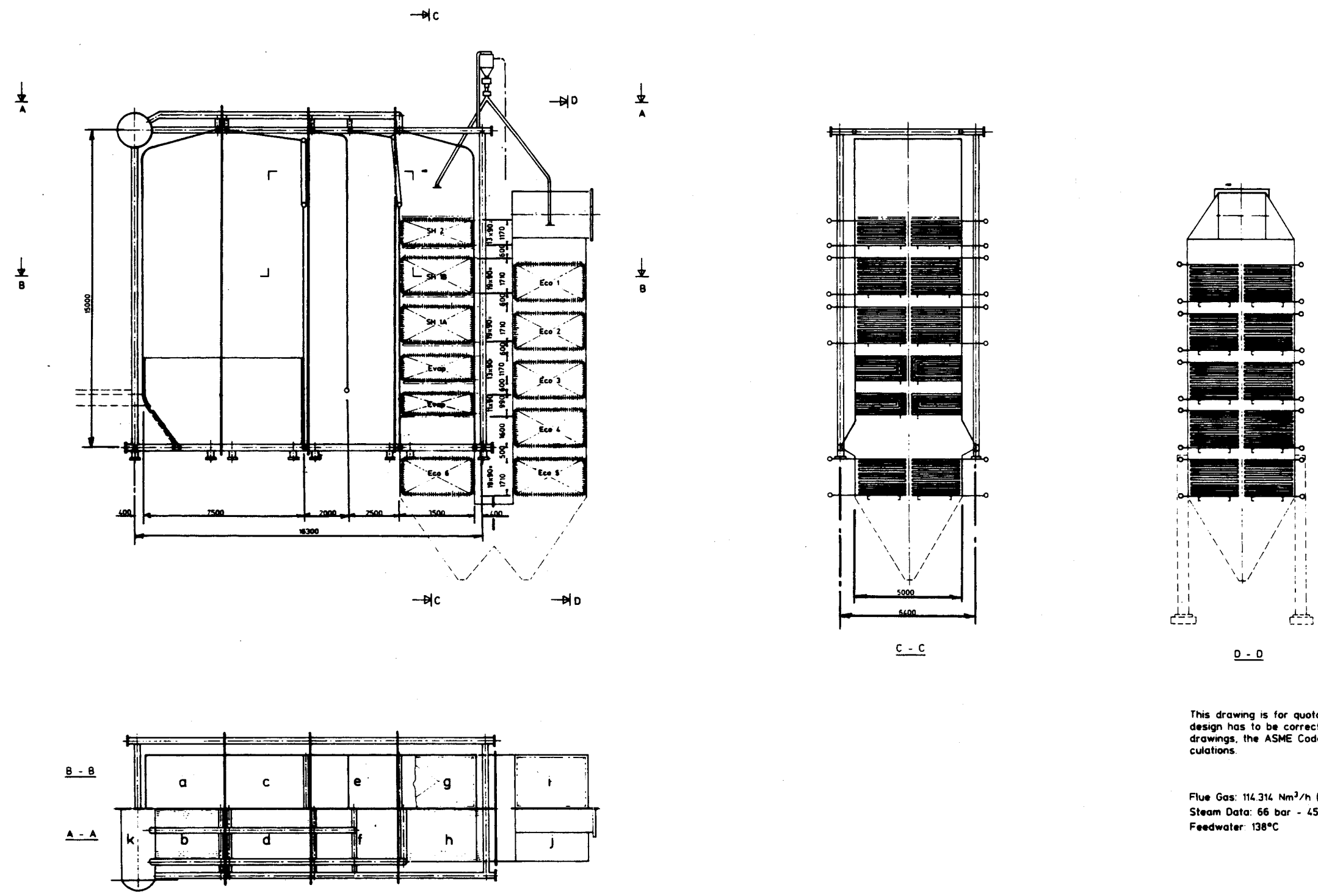
Steam Generation System

From the afterburner chamber the hot flue gases flow through a waterwall waste heat boiler which is designed exclusively for refuse combustion service (Figure 3.2.1.5). The boiler has five vertical passes. The first three passes from the radiation section and the last two passes contain the superheater, evaporator and economizer sections. The waterwalls in the radiation section are gas-tight welded membrane walls and the alloy superheater tube banks are of two-stage in-line design. Superheated steam is generated at 950 psig/842°F (66 bar/450°C).

Low gas velocity is maintained in the boiler which results in less erosion from fly ash. The gas flow patterns within the boiler are such that a large part of the coarse fly ash is disentrained and collected in ash hoppers below the boiler. The soot cleaning system is of the shot type and includes a blower, and piping and ash separation unit.

A feedwater system consisting of turbine and motor-driven pumps, heaters, and necessary controls, supply treated feedwater to the boiler at 280°F (138°C). In order to provide water quality sufficient to insure optimum performance of the boiler and to minimize corrosion, a make-up water treatment system is included in the design. The process water from the available county water system is demineralized and inhibited by the addition of chemicals. The high temperature boiler/turbine system requires high-purity water to protect the boiler tubes and turbine surfaces from corrosion and scaling. A single bed cation/anion ion-exchanged system is provided for this purpose. The water treatment system provided in the design will produce the high quality boiler makeup water required and will thus reduce boiler blowdown requirements.

FIGURE 3.2.1.5



This drawing is for quotation only and the final design has to be corrected according to the shop drawings, the ASME Code and the strength calculations.

Flue Gas: 114,314 Nm³/h (100%) - 954°C/180°C
Steam Data: 66 bar - 450°C
Feedwater: 138°C

BROWARD COUNTY, FLORIDA
WASTE TO ENERGY PROJECT
BOILER ARRANGEMENT
DWG. NO. 18

Ash Handling System

Ash from the combustion process falls from the rotary kiln into a quench trough from which it is removed by a drag chain conveyor (Figure 3.2.1.6). For reliability, the quench trough and conveyor system is fully duplicated. The makeup water required for the quench trough is supplied from boiler and cooling tower blowdown. The drag chain conveyor carries the ash up to an elevated transfer tower. The cooled ash then falls onto one of two redundant belt conveyors for transport to the ash loadout area behind the Plant.

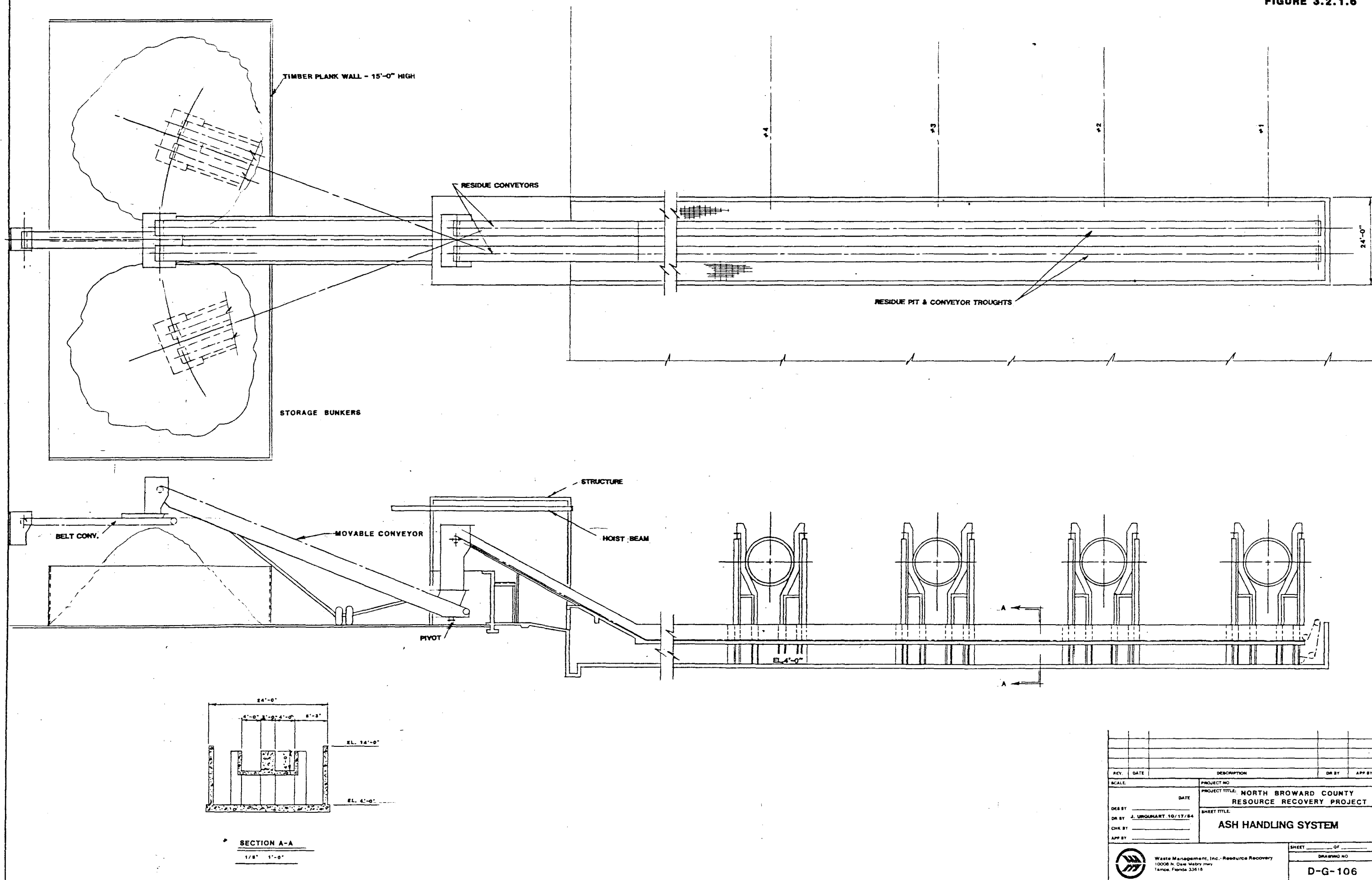
Fine particles which fall through the grates will be collected in hoppers below the grates and transported by enclosed vibrating conveyors to the quench trough, where it is mixed with ash from the rotary kiln. The fly ash collected in the boiler sections is conveyed by means of rotary valve and screw conveyors to this area also. The fly ash separated in the electrostatic precipitator is also transported via screw conveyors to the bottom ash collection area. The fly ash collected in the boilers and ESP's is combined with the bottom ash before leaving the Plant area. The combined ash stream is anticipated to be accepted for unrestricted landfilling. Generally, combustible material remaining in the ash is typically less than 2% of the total ash content, depending on the test method used. Putrescibles remaining in ash are generally less than 0.2%. The ash is approximately 5 to 10% by volume and 30% by weight of the raw waste.

Environmental Control System

Each furnace line is equipped with a three-field electrostatic precipitator (ESP) to remove the remainder of the fly ash from the flue gases. The ESP is designed to limit particulate matter emissions to 0.02 grains/dscf corrected to 12% CO₂, maximum. Based upon good engineering practices and experience at other waste incineration facilities, the other regulated pollutants are expected to be within an acceptable

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FIGURE 3.2.1.6



REV.	DATE	DESCRIPTION	DR BY	APP BY
SCALE		PROJECT NO.	PROJECT TITLE: NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT	
DES BY		DATE	SHEET TITLE:	
DR BY: J. URBANET 10/17/84			ASH HANDLING SYSTEM	
CHK BY				
APP BY				
		SHEET	OF	
		DRAWING NO.	D-G-106	

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10006 N. Dale Mabry Hwy
Tampa, Florida 33618

range of emissions. The flue gases flow through a duct from the boiler to the precipitator, which is essentially a gas-tight steel casing in which vertical electrodes are suspended. The electrodes are charged with high voltage electricity and the resulting field causes the dust particles within the flue gas to become charged. The particles are then attracted to the electrode plates and are periodically shaken loose by mechanical rappers. The precipitators are equipped with automatic voltage controls and environmental monitoring equipment to insure continuous optimum operation. The units are designed for outdoor installation and incorporate electric hopper heating and full insulation to avoid condensation.

Power Generation System

Steam generated in the boilers is piped to a fully-condensing turbine-generator, nominally sized at approximately 55.5 MW, where electricity is generated. A portion of the power generated is directed by appropriate switchgear to meet in-plant requirements. The remaining electric power is stepped-up to transmission line voltage for sale to Florida Power and Light Company.

The turbine-generator is provided with all appurtenances required for proper operations, including cooling system, exciter and voltage regulation system, and electrohydraulic control systems. Three extraction points are provided deaeration and feedwater heating. A dump condenser is provided to receive and dissipate heat from the full flow of steam in the event that the turbine-generator is out of service. The extensive power distribution system includes all switchgear, transformers, controls and accessories required for effective power distribution.

A circulating water system provides cooling water to the condenser. After service in the condenser, circulating water is cooled in a three-cell mechanical draft cooling tower.

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Control System

Plant operations are monitored and controlled from the central control room. The plant operators and crane operators, with their controls, are located in the control room to facilitate coordinated plant operation. Each furnace line has a main control board fully instrumented and equipped with processed controls to monitor waste combustion, steam production, and other process variables. An automatic combustion control system monitors furnace temperature at several locations within the furnaces and modulates combustion air feed. Control of the electrical generation facility is also accomplished from the central control room. The design has extensive microprocessing capability to compile data, alarm deviations, and display control function readouts, permitting computer assisted Plant operation.

Support Facilities

The proposed Project design utilizes centralized administration and control facilities thereby affording coordinated and cost effective project management. The administrative facilities located within the main building will house plant management, plant supervisory personnel, County personnel, a visitors' center, and a conference room. Offices within the plant accommodate plant operating and maintenance personnel.

The majority of the office space and administrative functions are housed in the floors below the main control room at the east end of the refuse pit. On the first floor, a machine shop and associated storage area will be located, in order to provide support to the furnace and turbine-generator area. On the second floor (El. 36'-0"), will be the locker/change room facilities, and the general offices. The third floor (El. 51'-0"), will include library, conference, and accounting facilities. Management, reception, and visitor functions are

located on the fourth level (El. 65'-0"). All support facilities are illustrated on Figure 3.2.1.7.

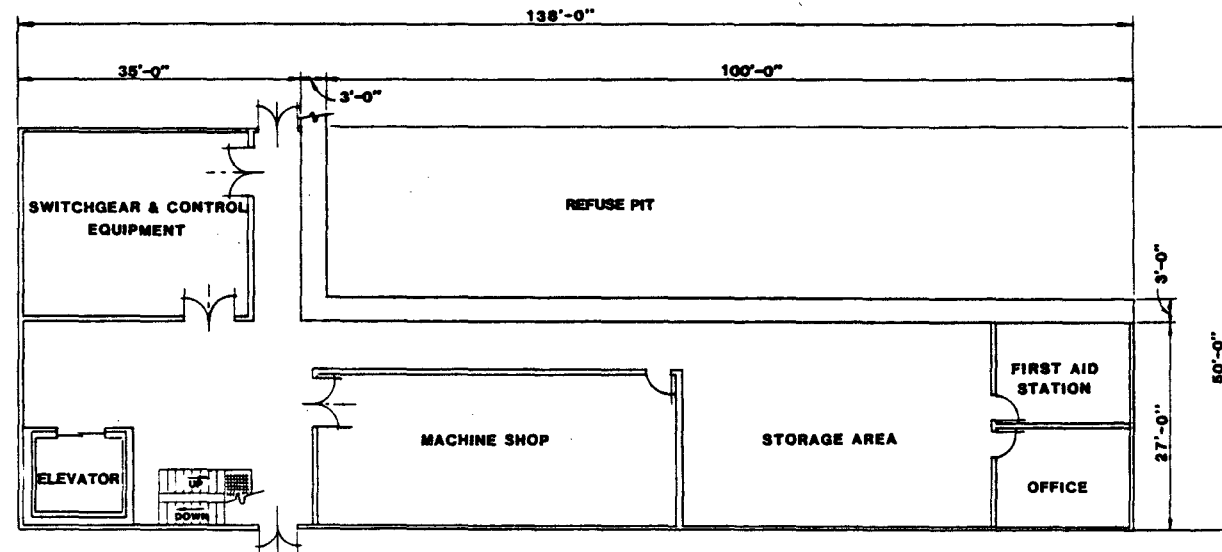
Typical east, west, south and north elevation views of the facility are provided in Figures 3.2.1.8, 3.2.1.9 and 3.2.1.10, respectively. As these views illustrate, the facility will be designed to provide a pleasing aesthetic appearance.

3.2.3 Contingency Disposal

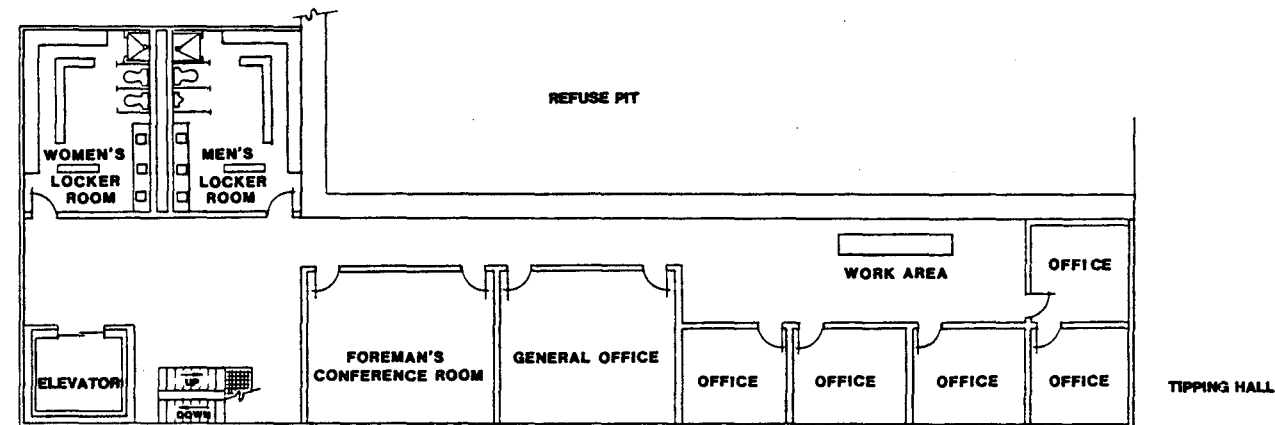
Contingency plans have been formulated to address periods during which raw refuse processing capability is unavailable due to either scheduled or unscheduled downtime at the proposed facility. Basically, the overall contingency plan consists of a multi-phased approach. We wish to note that the processing capacity of the proposed facility has been selected based, in part, on a projected annual availability factor of at least 80 percent. This factor includes scheduled downtime for routine maintenance activities as well as unscheduled downtime for unforeseen circumstances based on operating experience at other similar facilities.

The first phase of the contingency plan is the storage capacity of the receiving pit and multiple, redundant processing units at the proposed facility. A minimum four-day pit capacity represents one of the facility design criteria. While the primary purpose of this requirement is to assure adequate on-site storage of refuse to sustain plant operations over a weekend, the excess pit capacity that will normally be available could be used to store incoming refuse for one to three days when the facility is down for scheduled or unscheduled maintenance. Thus, during such periods refuse delivery to the facility will proceed uninterrupted.

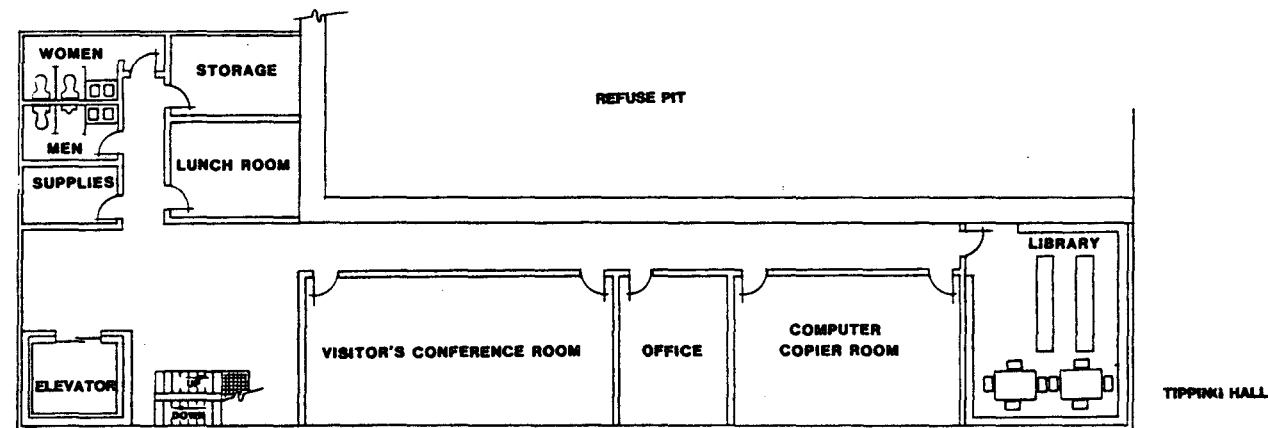
The following three cases have been prepared to illustrate the waste processing capabilities of the plant with one or more units out of operation.



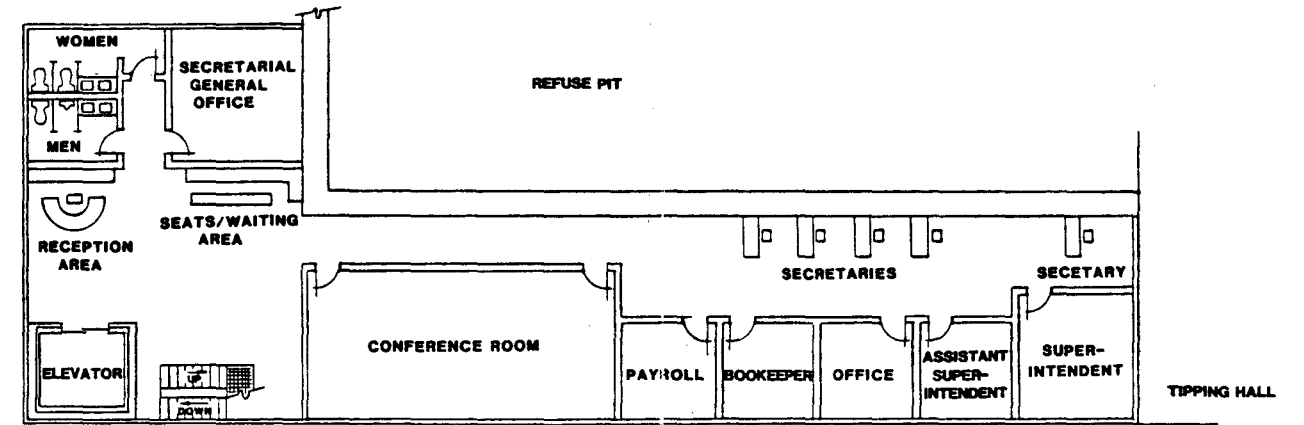
1st FLOOR
ELEVATION 14'-0"



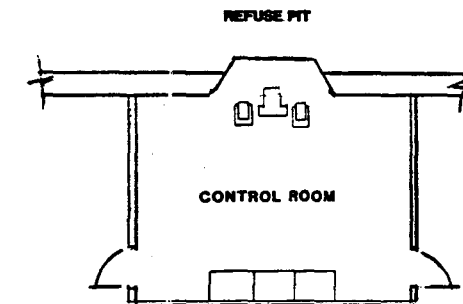
2nd FLOOR
ELEVATION 36'-0"



3rd FLOOR
ELEVATION 51'-0"



4th FLOOR
ELEVATION 65'-0"

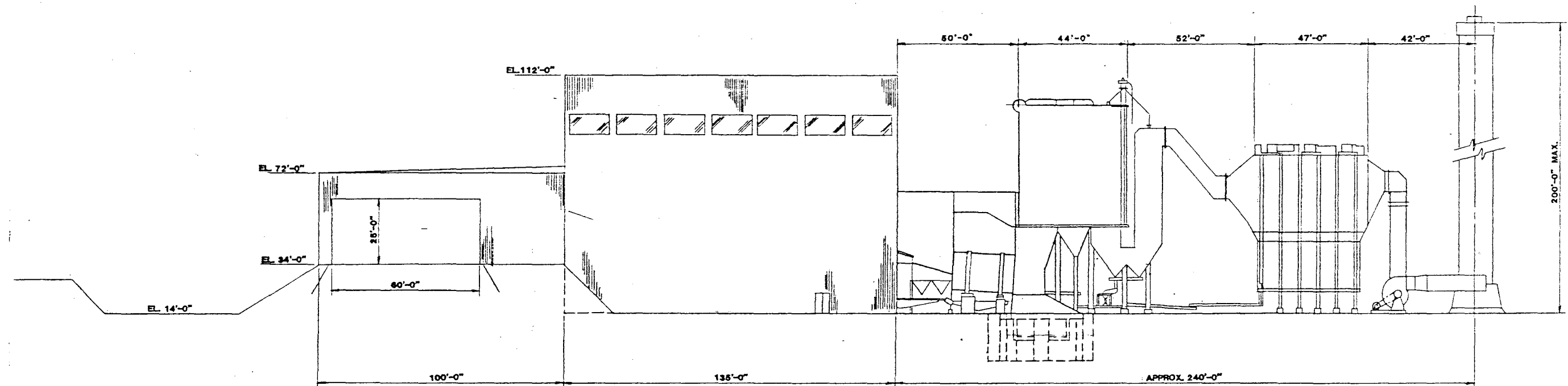


5th FLOOR
ELEVATION 78'-0"



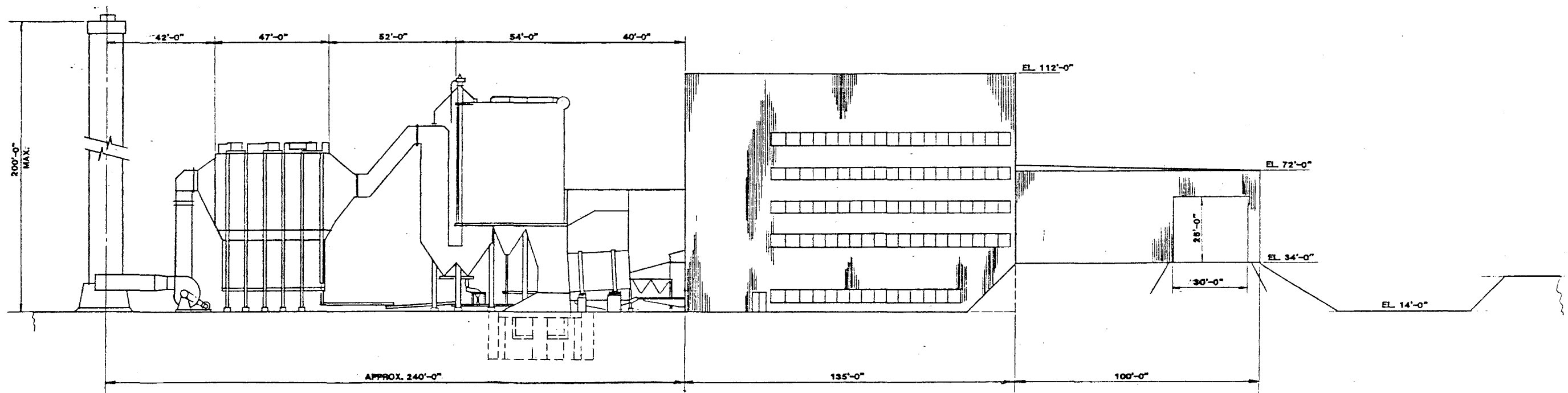
BROWARD COUNTY, FLORIDA
WASTE TO ENERGY PROJECT
SUPPORT FACILITIES
DWG. NO. 11

FIGURE 3.2.1.8



WEST ELEVATION

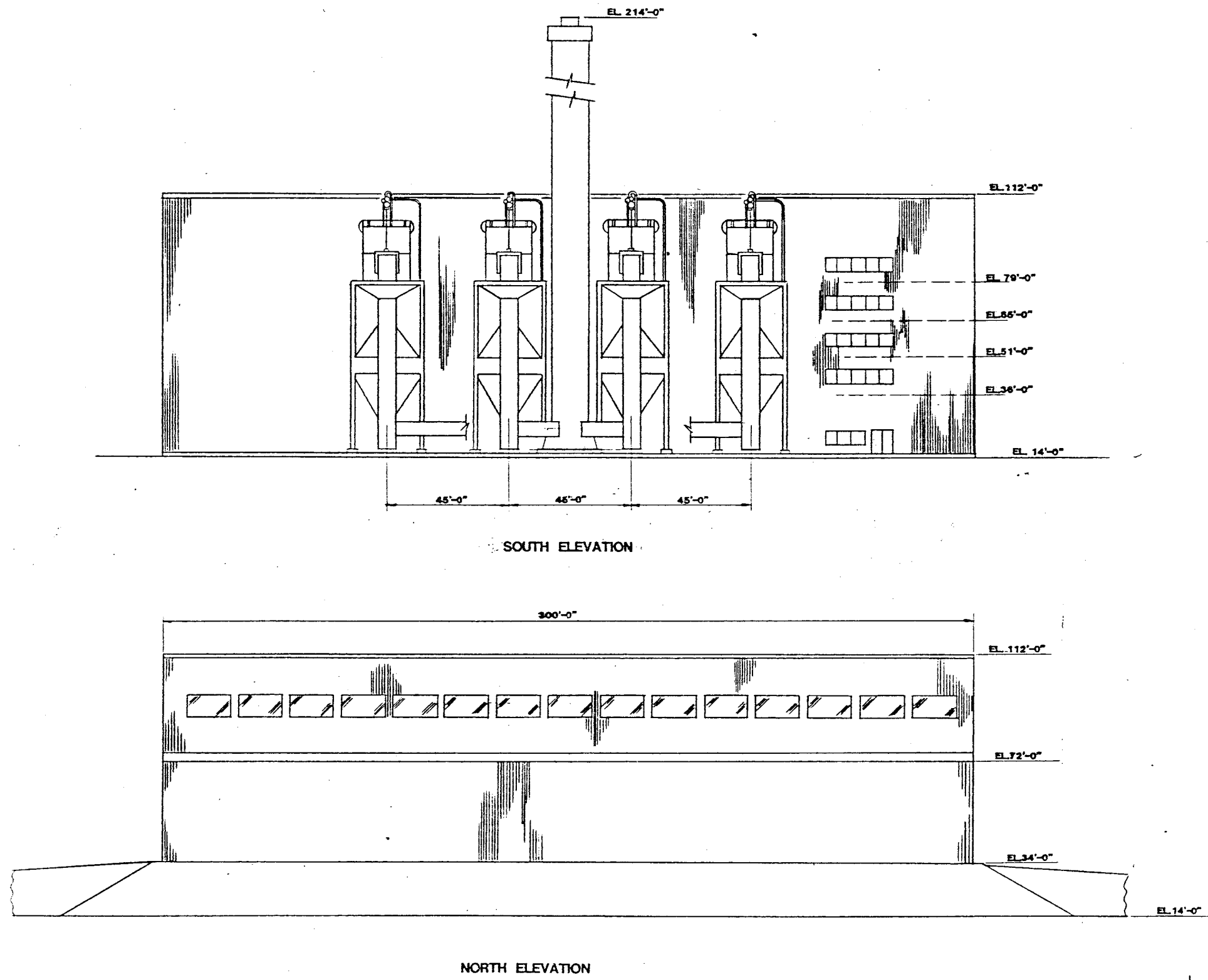
REV.		DATE	DESCRIPTION	DR BY	APP BY
SCALE		1" = 20'			
DES BY		DATE			
DR BY		PROJECT TITLE: NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT			
CHK BY		SHEET TITLE: BUILDING ELEVATIONS			
APP BY		SHEET _____ OF _____			
DRAWING NO		D-G-102			
Waste Management, Inc. - Resource Recovery 10000 N. Dale Mabry Hwy Tampa, Florida 33619					



EAST ELEVATION

REV.		DATE	DESCRIPTION	DR BY	APP BY
SCALE:		1" = 20'-0"	PROJECT NO.		
DES BY		DATE	PROJECT TITLE		
DR BY		J. LINDHART	NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT		
CHK BY			SHEET TITLE		
APP BY			BUILDING ELEVATIONS		
SHEET		OF	DRAWING NO.		
D-G-103		Waste Management, Inc., Resource Recovery 10000 N. Dixie Highway Tampa, Florida 33618			

FIGURE 3.2.1.10



REV.	DATE	DESCRIPTION	DR BY	APP BY
SCALE:	1"=20'-0"	PROJECT NO.		
DES BY:	J. GREGORY	DATE:	10/1/88	
DR BY:		PROJECT TITLE:	NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT	
CHK BY:		SHEET TITLE:	BUILDING ELEVATIONS	
APP BY:				
Waste Management, Inc. - Resource Recovery 10008 N. Dixie Highway Tampa, Florida 33618		SHEET _____ OF _____ DRAWING NO. D-G-104		

Assumptions:

- o The plant will operate 24 hours per day, 7 days per week.
- o The plant will receive approximately 11,900 tons of waste per week (2,380 tons per day, Monday through Friday).
- o The plant will have four (4) units, each unit having a nameplate capacity of 550 tons per day.
- o The storage pit will have a water level storage capacity of approximately 26,444 cubic yards. (Based on a stored density of 500 pounds per cubic yard, the pit will store 8,000 tons of waste.)

Case I - Two Unit Operation

One unit shuts down due to mechanical failure at 6:00 a.m. on Monday. The remaining three units are capable of operating at 100% of their nameplate capacity. The pit at the time of breakdown contains 850 tons (normal minimum half day storage reserve).

<u>Time/Day</u>	<u>Received</u>	<u>Processed</u>	<u>Waste in Pit</u>
			850T
6 a.m. Mon #1	2380T	1650T	+730
6 a.m. Tues.	2380T	1650T	1580 +730
6 a.m. Wed.	2380T	1650T	2310 +730
6 a.m. Thurs.	2380T	1650T	3040 +730
6 a.m. Fri.	2380T	1650T	3770 +730
6 a.m. Sat.	0	1650T	4500 -1650
6 a.m. Sun.	0	1650T	2850 -1650
6 a.m. Mon #2			1200

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Case II - Continuation of Case I

At 6 a.m. on the second Monday of Case I, second unit shuts down due to mechanical failure. The remaining unit continues to process waste at 100% of its nameplate capacity.

<u>Time/Day</u>	<u>Received</u>	<u>Processed</u>	<u>Waste in Pit</u>
6 a.m. Mon #2	2380T	1100T	1200T +1280
6 a.m. Tues.	2380T	1100T	2480 +1280
6 a.m. Wed.	2380T	1100T	3760 +1280
6 a.m. Thurs.	2380T	1100T	5040 +1280
6 a.m. Fri.	2380T	1100T	6320 +1280
6 a.m. Sat.	0	1100T	7600 -1100
6 a.m. Sun.	0	1100T	6500 -1100
6 a.m. Mon. #3		1100T	5400 +1280
6 a.m. Tues.			6680

Note: The pit will be filled to capacity sometime during the morning of Monday #3. (This example also indicates the processing capability of the plant if on any Monday morning two of the four units suddenly go off line.)

Case III - Alternate to Case II

At 6 a.m. on Saturday of Case I, a second unit shuts down due to mechanical failure. The remaining units continue to process waste at 100% of their nameplate capacity.

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<u>Time/Day</u>	<u>Received</u>	<u>Processed</u>	<u>Waste in Pit</u>
6 a.m. Sat. #1		1100T	4500T -1100
6 a.m. Sun		1100T	3400 -1100
6 a.m. Mon. #2	2380T	1100T	2300 +1280
6 a.m. Tues.	2380T	1100T	3586 +1280
6 a.m. Wed.	2380T	1100T	4860 +1280
6 a.m. Thurs.	0	1100T	+6140

Note: The pit will be filled to capacity sometime during Wednesday #2.

The above three scenarios show that the plant will continue to receive the entire waste stream without any by-pass to the landfill or other facility; for numerous days (Case I); for seven days when two units fail simultaneously (Case II); or for ten days when two units fail in a staggered manner (Case III). At no time during such periods would incoming refuse be delivered or stored outside the enclosed pit area or diverted to the adjacent landfill.

As discussed above, the facility will consist of four independent process lines. Common elements such as waste feed cranes, ash conveyors, and boiler feedwater system will have redundant capabilities. Further, the facility will have a condenser capable of wasting all of the facility's steam if the turbine generator is being serviced or its inoperable. These features will minimize the need to bypass waste to a greater extent than any facility developed in this country to date.

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The contingency second phase consists of transporting solid waste to the adjacent Central Disposal landfill or the Southern Resource Recovery Facility. Thirdly, if required, solid waste can be transported to the new contingency landfill for disposal. This landfill is currently being developed by the County. Consisting of 589 acres, the landfill site is referenced, for planning purposes, as the Broward Correctional Institute (BCI) site. Its location is shown on Figure 1.1.1 of the Certification Application. Sufficient acreage exists at the site for the developed facility to serve as a long-term contingency disposal landfill during periods of prolonged downtime at the proposed resource recovery facility due to unforeseen circumstances. Because design of the landfill facility will take into consideration the potential for delivery of most or all of the County solid waste stream at any given time (a worst case scenario for contingency planning purposes), sufficient capability to dispose of the potential volume of waste received will exist.

In summary, contingency planning has been, and continues to be, an important part of the overall County solid waste management plan. The capacity of the facility proposed, the flexibility offered by the two-facility resource recovery project approach, and the existence of a permitted landfill site and development of a new landfill to address contingency disposal needs offers a multi-phased contingency program to serve Broward County into the foreseeable future.

3.3 Fuel

3.3.1 General

The fuel to be utilized to generate electricity through the mass-burn technology of the resource recovery facility will be processable solid waste. Processable solid waste is simply that portion of the total incoming waste stream to the facility that can be burned in stoker fired furnaces and

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waste heat boilers. Processable waste includes: all forms of garbage, commercial waste, rubbish, leaves and brush, paper and cardboard, plastics, wood and lumber, rags, carpeting, a limited amount of tires, wood furniture, mattresses, stumps, wood pallets, timber, tree limbs, ties, and logs, and not separated and recycled at the source of generation, and minor amounts of pathological and biological wastes. Since solid waste is the fuel, the following provides details on the quantity and character of the fuel stream.

Unprocessable Waste is that portion of the County's waste stream that is predominantly non-combustible and therefore should not be processed by a mass burn resource recovery system. Unprocessable Waste will include, but not be limited to, metal furniture and appliances, concrete rubble, mixed roofing materials, noncombustible building debris, rock, gravel and other earthen materials, automobiles, trailers, equipment, wire and cable, and processable wastes (to the extent that it is contained in the normal Unprocessable Waste stream), but excluding hazardous wastes, sludges, pathological and biological wastes, sewage, manure, explosives, chemicals, and radioactive materials.

Separation of waste into processable and unprocessable fractions will be the responsibility of the waste hauler and scalehouse attendant. The two waste streams will be separated at the scalehouse. Vehicles carrying processable waste (most packer trucks) will be directed to the plant tipping floor to unload into the storage pit while vehicles carrying unprocessable waste (most open top vehicles) will be directed to the Central Disposal landfill. Visual inspections will be made of waste deposited at the resource recovery facility by attendants and equipment operators and on a spot basis by supervisory personnel to assure a minimum amount of unprocessable waste is being processed. When necessary, the County will directly contract generators and haulers of waste to secure a

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better source separation of the two waste streams in order to maximize the processing of waste through the proposed facility.

3.3.2 Waste Stream Control

Broward County currently controls approximately 165,000 tons per year of solid waste. This volume represents waste generated in unincorporated Broward County. Approximately 1,030,000 tons per year of additional Broward County solid waste is delivered to the County owned and operated sanitary landfill at Davie and to the Central Disposal landfill at Pompano, owned and operated by Waste Management Inc. (WMI). The origin of these wastes are the Broward municipalities, of which Fort Lauderdale and Hollywood, Florida, represent the largest fraction. Broward is currently in the process of negotiating an Interlocal Agreement (ILA) with the Broward County League of Cities for waste commitments from the individual Broward municipalities.

3.3.3 Waste Quantities

The following table presents the total quantities of solid waste landfilled at the two existing Broward County landfills from 1981 through 1985.

LANDFILL WASTE QUANTITIES (1981-1985)
(TONS PER DAY)

<u>Year</u>	<u>Central Disposal Landfill</u>		<u>Davie Landfill</u>		<u>Total</u>
	<u>Garbage</u>	<u>Trash</u>	<u>Garbage</u>	<u>Trash</u>	
1981	1429	540	628	207	2804
1982	1540	438	628	171	2777
1983	1663	490	862	205	3220
1984	1694	655	824	223	3396
1985	1973	660	770	250	3653

1. Based upon available waste volume records and an assumed density of 300 pounds per cubic yard.

As indicated on the preceding page, the County's waste stream has been categorized as either garbage or trash. The waste classified as garbage consists of all wastes collected in packer-type vehicles. All garbage wastes are projected to be processable at a resource recovery facility. The tabulated garbage data is based upon actual weigh scale records from 1981 through 1985.

The other listed waste category, trash, consists of wastes collected in roll-off containers, pick-up trucks or other open non-packer vehicles. This waste category includes yard wastes, construction and demolition debris, packaging materials, discarded tires and miscellaneous wastes collected from commercial establishments. Only a fraction of trash is considered to be processable.

3.3.4 Seasonal Variations

The actual waste generation rates in Broward are subject to seasonal variations. The following table notes the variation in solid waste generation on a monthly basis for both garbage and trash. The tabulated figures are based upon 1981 weigh scale data and volume estimates at the Broward County sanitary landfill.

MONTHLY VARIATION OF SOLID WASTE

<u>Month</u>	Percent of Average ² Month	
	<u>Garbage</u> ¹	<u>Trash</u> ²
January	81	90
February	86	103
March	108	109
April	104	103
May	102	94
June	111	110
July	110	105
August	98	103
September	110	103
October	96	102
November	94	88
December	100	88

1. Based upon weigh scale data.
2. Based upon volume estimates.

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3.3.5 Waste Composition and Type

An estimate of the average composition of the processable portion of the Broward County waste stream is provided in the following table. This table represents a compilation of sampling data obtained from the Central Disposal landfill in Pompano Beach; the County landfill in Davie; Hillsborough County; Daytona Beach; and a range for the State of Florida as published by the Florida Department of Environmental Regulation.

GARBAGE AND TRASH DISTRIBUTION

(As Received Basis)

<u>Fraction</u>	<u>Percent By Weight Of Total</u>	
	<u>Solid Waste Delivered</u> <u>CDL</u>	<u>Davie</u>
Garbage	60	55
Trash	40	45
Processable trash as received	20	17
Processable trash requiring size reduction	4	7
Non-processable trash	16	21

Based on weighing and sampling programs conducted at the Central Disposal landfill, during September 1983 and the County landfill in Davie, during April 1983, the following data were compiled on garbage and trash:

PHYSICAL COMPOSITION - GARBAGE AND PROCESSABLE TRASH FRACTIONS

(As Received Basis)

<u>Component</u>	<u>Percent by Weight</u>					
	<u>Garbage</u>		<u>Trash</u>		<u>Combined</u>	
	<u>CDL</u>	<u>Davie</u>	<u>CDL</u>	<u>Davie</u>	<u>CDL</u>	<u>Davie</u>
Paper, Cardboard	39	47	9	11	27	36
Plastics	8	9	10	3	5	7
Rubber, Tires	-	-	-	9	-	3
Textiles, Rags, Carpeting and Mattresses	3	2	1	1	2	2
Food Wastes	9	9	-	-	5	6
Garden Wastes, Stumps, Leaves and Brush	21	17	45	36	24	22
Wood	2	3	28	35	8	13
Glass	12	7	-	-	7	5
Metals	6	6	-	-	5	4
Rock, Brick	-	-	-	-	15	-
Other	-	-	7	5	2	2
	100	100	100	100	100	100

Based on examination of all information compiled, a range of proximate and ultimate analyses is provided in Tables 3.3.5.1 and 3.3.5.2. Based on the results of the laboratory analyses, a conservative BTU waste content range has been established at 4500 to 5000 BTU per pound of processable solid waste.

TABLE 3.3.5.1

COMPARISON OF PROXIMATE ANALYSES
GARBAGE FRACTION

	Central Landfill September 1983 (1)						Broward County Landfill at Davie April 1983 (2)						Central Landfill August/September 1982 (3)					
	As Received			Dry Basis			As Received			Dry Basis			As Received			Dry Basis		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
3-32 % Moisture	20.66	40.46	30.70	0	0	0	19.27	27.98	23.82	0	0	0	37.70	52.21	45.04	0	0	0
% Volatile	41.79	55.58	47.55	60.28	75.36	68.69	51.41	62.03	57.77	71.38	82.39	75.83	NR	NR	NR	48.20	66.50	57.65
% Ash	7.60	25.08	15.21	11.20	34.62	21.97	7.34	19.60	14.35	9.75	24.31	18.82	NR	NR	NR	13.60	36.00	21.73
% Fixed Carbon	2.25	10.13	6.55	3.47	14.53	9.53	0.82	6.90	4.05	1.06	9.05	5.35	NR	NR	NR	15.80	20.40	18.13

Notes:

- NR - Not Reported
(1) - Based on twelve (12) samples
(2) - Based on eleven (11) samples
(3) - Based on four (4) samples

TABLE 3.3.5.2

COMPARISON OF ULTIMATE ANALYSES
GARBAGE FRACTION

	Central Landfill September 1983 (1)						Broward County Landfill at Davie April 1983 (2)						Central Landfill August/September 1982 (3)					
	As Received			Dry Basis			As Received			Dry Basis			As Received			Dry Basis		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
% Carbon	26.85	36.60	30.91	41.67	47.44	44.58	24.15	35.90	30.60	31.69	44.80	40.17	NR	NR	NR	36.5	49.50	43.43
% Hydrogen	6.81	8.64	7.68	5.37	7.03	6.14	5.48	7.74	6.80	3.55	6.61	5.53	NR	NR	NR	4.5	5.90	5.1
% Nitrogen	0.31	0.49	0.39	0.43	0.68	0.56	0.25	0.40	0.31	0.31	0.52	0.41	NR	NR	NR	0.26	0.66	0.45
% Sulfur	0.10	0.17	0.13	0.16	0.22	0.18	0.05	0.12	0.09	0.06	0.16	0.12	NR	NR	NR	0.17	1.47	0.81
% Oxygen	34.89	55.79	45.54	14.39	34.25	26.35	40.93	59.40	47.71	27.50	49.08	34.76	NR	NR	NR	20.60	30.6	25.77
% Chlorine	0.11	0.19	0.15	0.17	0.26	0.21	0.10	0.17	0.14	0.12	0.23	0.19	NR	NR	NR	0.40	0.47	0.4
% Fluorine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.00	0.005	0.003

Notes:

- NR - Not Reported
 (1) - Based on twelve (12) samples
 (2) - Based on eleven (11) samples
 (3) - Based on four (4) samples

A high percentage of paper material in the processable waste fraction is highly desirable since it will result in a higher heating value in the refuse which will, in turn, result in more steam and electricity being generated per unit quantity of waste incinerated. From an environmental impact standpoint, the presence of a higher paper fraction in the processable waste is not a cause for concern. Combustion temperatures achieved in the mass-burn resource recovery system in combination with the retention time of waste on the grate leads to very efficient burnout. The facility is required to produce a residue or ash containing no more than 0.3 percent putrescible matter and 4.0 percent combustible matter (dry weight).

Each furnace will be equipped with an electrostatic precipitator for control of particulate emissions. With efficiency of burnout to be achieved at the facility, the exposure of combustion gases containing particulates to high temperatures (greater than 1,800°F) for more than two seconds of residence time, and the efficiency of the particulate control device (greater than 99% removal efficiency) the release of loose paper from the stack is inconceivable.

The Physical Composition Table currently presents the combined composition of the Broward County waste stream. However, it should be noted that the combined column includes data collected during both sampling programs (April and September, 1983). The garbage and trash columns present data collected during the April program only. Hence, the combined totals are not derived from the preceding garbage and trash columns.

3.3.6 Daily Variations

During each week, there traditionally have been large variations in the quantities of solid waste collected on a given day. For example, more waste is generally collected on Mondays and Tuesdays than is collected on Wednesdays and Saturdays.

The Applicant will be responsible for accepting solid waste at the facility in accordance with normal collection and delivery practices of the County and the Contract Communities.

Similarly, during each day, more solid waste can be expected to be delivered at certain times than at other times. Again, the Applicant will be responsible for accepting the County's waste at the facility in accordance with the normal collection and delivery practices of the County and the Contract Communities.

3.3.7 Population Projections

Total population for the County in April 1985 was 1,124,136, as reported by the University of Florida. The Broward County Office of Planning has projected an annual population growth rate of approximately 2 percent resulting in a total Broward County population of 1,268,000 by 1989.

Table 3.3.7.1 presents a range (low, medium and high) of projected population growth from 1985 through 2010, based upon the projections developed by the University of Florida at Gainesville. These projections provide an indication of the type of growth that can be expected in Broward County during the operation of the project.

3.3.8 Facility Sizing

As previously discussed, the County is in the process of negotiating an Interlocal Agreement (ILA) with the Broward County League of Cities. Based upon these negotiations the County has agreed to provide a put-or-pay commitment of 1,300 tpd for the Project.

To allow for future growth and growth rate uncertainty, this Certification Application has been based on an initial installed capacity of 2,200 tpd and a projected ultimate capacity of approximately 3,300.

TABLE 3.3.7.1

BROWARD COUNTY POPULATION PROJECTIONS¹

	<u>Low</u>	<u>Medium</u>	<u>High</u>
1985	1,103,000	1,149,000	1,194,900
1986	1,121,000	1,177,700	1,234,000
1987	1,139,300	1,207,200	1,274,500
1988	1,158,000	1,237,400	1,316,300
1989	1,177,000	1,268,300	1,359,400
1990	1,196,100	1,300,000	1,404,000
1991	1,211,200	1,328,200	1,445,000
1992	1,226,500	1,357,100	1,487,100
1993	1,242,000	1,386,500	1,530,500
1994	1,257,800	1,416,600	1,575,100
1995	1,273,700	1,447,400	1,621,100
1996	1,286,100	1,475,200	1,663,800
1997	1,298,700	1,503,500	1,707,700
1998	1,311,300	1,532,300	1,752,700
1999	1,324,100	1,561,700	1,799,000
2000	1,337,000	1,591,700	1,846,400
2001	1,342,700	1,614,600	1,885,400
2002	1,348,400	1,637,800	1,925,300
2003	1,354,200	1,661,300	1,966,000
2004	1,360,000	1,685,200	2,007,500
2005	1,365,800	1,709,400	2,050,000
2006	1,371,600	1,734,000	2,093,300
2007	1,377,500	1,758,900	2,137,600
2008	1,383,400	1,784,200	2,182,700
2009	1,389,300	1,809,800	2,228,900
2010	1,395,200	1,835,800	2,276,000

1. Based on University of Florida (Gainesville) projected population data for years 1985, 1990, 1995, 2000, and 2010.

3.3.9 Residue and Unprocessable Waste Disposal

The County will monitor the delivery of waste to the Project to ensure that processable and unprocessable wastes are directed to proper disposal areas.

Residue generated by the Project and unprocessable waste that cannot be incinerated at the resource recovery facility will be disposed of at the Central Disposal landfill owned by Waste Management adjacent to the facility. The residue and unprocessable waste will be transported to the Central Disposal Landfill in compliance with all applicable codes, rules, and laws regulating such material and its transportation.

The residue generated by the facility must meet the specification of not more than 0.3 percent putrescible matter and 4.0 percent combustible matter (dry weight).

Fugitive emissions will not be observed from the solid waste and residue handling areas of the facility. All solid waste storage and handling will occur in enclosed structures and will be maintained under negative air pressure. All fugitive dusts and odors will be drawn into the furnace and subjected to extremely high temperatures. Residue hauling vehicles will be covered to minimize wind aide drying and dispersion during transport to the landfill.

The ash system proposed for the Project results in a residue containing approximately 10% to 15% bound moisture by weight. This ash is stored in an enclosed building in a concrete bunker. Therefore, the release of ash to the ambient air is minimized and no specific control device is needed.

Hazardous wastes shall not be accepted at the facility. Any hazardous wastes inadvertently accepted at the resource recovery facility will be properly stored and disposed of off-site.

3.4 AIR EMISSIONS AND CONTROLS

3.4.1 AIR EMISSIONS TYPES AND SOURCES

The data presented in this report are based on preliminary or conceptual design of the proposed facility. However, the conceptual design is based on conservative or worst-case assumptions from a potential air quality impact viewpoint, particularly in minimizing the exit gas flow rate and maximizing pollutant emissions.

The North Broward County Resource Recovery (NBCRR) facility is assumed to have nameplate capacity of 2,200 tons per day (TPD). The municipal solid waste (MSW) charging rate and location of the facility is presented in Table 3.4-1. The stack and operating parameters for the projected maximum capacity (i.e., 110 percent of nameplate) of the facility considered in the air quality modeling are presented in Table 3.4-2.

The emission factors for the regulated pollutants that will be emitted from the proposed NBCRR facility are presented in Table 3.4-3. For most of the regulated pollutants, the emission factors are based on estimates derived for resource recovery facilities similar in size to the proposed facility. The emission factors are given as a function of the heat content and amount of MSW burned. These emission factors were obtained from the Broward County Resource Recovery Office (1986) and are based on a review of the literature, such as U.S. Environmental Protection Agency (EPA) AP-42 emission factors and A.D. Little reports, or manufacturer's design specification. The maximum hourly and annual average emission rates for the facility are 110 percent of nameplate capacity.

3.4.2 AIR EMISSIONS CONTROL

Permitted emissions for other MSW-fired resource recovery facilities are presented in Table 3.4-4.

The only applicable emission-limiting standard for MSW-fired facilities is for PM and is contained in the federal NSPS (40 CFR Part 60 subpart E, Standards of Performance for Incinerators) and in the state emission

Table 3.4-1. MSW Charging Rate and Location of the NBCRR Facility

Parameter	Value
<u>MSW Charging Rate</u>	
100 Percent Capacity	2,200 TPD (91.7 tph)
110 Percent Capacity	2,420 TPD (100.8 tph)
<u>Heat Input Rate*</u>	
100 Percent Capacity	825.0 x 10 ⁶ Btu/hr
110 Percent Capacity	907.5 x 10 ⁶ Btu/hr
<u>Location</u>	
Latitude, Longitude	26.29, 87.16°
UTM Zone	17
UTM East, North Coordinate	583.8, 2,907.6 km

*Based on average heating value of MSW of 4,500 British thermal units per pound (Btu/lb).

Notes: tph = tons per hour.
 Btu/hr = British thermal units per hour.
 km = kilometer.

Sources: Malcolm Pirnie, Inc., 1986.
 Broward County Resource Recovery Office, 1986.

Table 3.4-2. Stack and Operating Parameters for the Projected Maximum Capacity of the NBCRR Facility Considered in the Air Quality Modeling

Parameter	Value
<u>MSW Charging Rate</u>	
Stack Height	200 ft (61.0 m)
Stack Diameter	9.84 ft (4.92 m)*
<u>Exit Gas Temperature</u>	
Projected	430°F (494 K)†
Modeled	400°F (477 K)
<u>Exit Gas Flow Rate</u>	
Projected	456,280 acfm†
Modeled	342,210 acfm
<u>Exit Gas Velocity</u>	
Projected	100 fps (30.5 m/s)†
Modeled	75 fps (22.9 m/s)

*Effective diameter for 4 flues. Each flue will have a diameter of 4.92 ft (1.5 m).

†Based on 110 percent of nameplate capacity and at 9.2-percent CO₂.

Note: m = meters.
acfm = actual cubic feet per minute.
m/s = meters per second.

Sources: Malcolm Pirnie, Inc., 1986.
Waste Management, 1986.
Broward County Resource Recovery Office, 1986.

Table 3.4-3. Pollutant Emission Factors for the Proposed NBCRR Facility

Pollutant	Emission Factor	
	(lb/10 ⁶ Btu)	(lb/ton of MSW)*
Particulate Matter (PM)	0.046	0.42
Sulfur Dioxide (SO ₂)	0.55	4.95
Nitrogen Dioxide (NO ₂)	0.56	5.0
Carbon Monoxide (CO)	0.09	0.80
Volatile Organic Compounds (VOC)	0.013	0.12
Lead (Pb)	0.002	0.018
Fluorides (F ⁻)	0.018	0.16
Sulfuric Acid Mist (H ₂ SO ₄)	0.047	0.42
Hydrogen Sulfide (H ₂ S)	NA	NA
Total Reduced Sulfur	NA	NA
Reduced Sulfur Compounds	NA	NA
Asbestos	NA	NA
Beryllium (Be)	9.3 x 10 ⁻⁷	8.4 x 10 ⁻⁶
Mercury (Hg)	0.00092	0.0083
Vinyl Chloride	NA	NA
Benzene	NA	NA
Radionuclides	NA	NA
Inorganic Arsenic (As)	3.1 x 10 ⁻⁵	2.8 x 10 ⁻⁴

NA = Not applicable.

*Based on average heating value of MSW of 4,500 Btu/lb.

Source: Broward County Resource Recovery Office, 1986.

Table 3.4-4. BACT Determinations for MSW, Florida Resource Recovery Facilities and Proposed BACT Emission Limit for the North Broward Facility

MALCOLM
PIRRIE

3-42

Pollutant	Emission Limit (in lb/ton of MSW unless otherwise indicated)*						Proposed for North Broward
	Hillsborough	Pinellas Units 1 & 2	Pinellas Unit 3	McKay Bay	Bay County	Dade County	
Particulate Matter (PM)	0.021 gr/dscf	0.08 gr/dscf	0.03 gr/dscf	0.67†	0.56	0.08 gr/dscf	0.02 gr/dscf
Sulfur Dioxide (SO ₂)	3.2	1.9	1.9	4.1	2.8	—	4.95
Nitrogen Oxides (NO _x)	3.0	—	3.0	7.2	2.2	—	5.0
Carbon Monoxide (CO)	1.8	—	1.5	0.4	11.4	—	0.8
Volatile Organic Compounds (VOC)	0.2	—	0.3	0.2	0.232	—	—
Lead (Pb)	0.048	—	0.03	0.074	0.0036	—	0.018
Mercury (Hg)	0.00052	—	0.01	0.0996	0.00171	—	0.0083
Beryllium (Be) (x 10 ⁻⁶)	13.1	—	1.3	6.2	48	—	8.4
Fluorides (F ⁻)	0.06	—	0.1	0.1	—	—	0.16
Sulfuric Acid Mist (H ₂ SO ₄)	0.0768	—	—	—	—	—	0.42
Inorganic Arsenic (As) (x10 ⁻⁴)	—	—	—	—	—	—	2.8

*Multiply by 0.11 to obtain lb/10⁶ Btu based on an average heating value of 4,500 Btu/lb.

†Required LAER due to non-attainment area.

Note: Emissions given in gr/dscf are corrected to 12 percent O₂.

Sources: Hillsborough County, Energy Recovery Facility, Case No. 83-19, Conditions of Certification, Revised 11/6/84

Pinellas County, Resource Recovery Facility, Case No. PA 78-11 and PA 83-18, Conditions of Certification.

FIER Permit AC 29-47277, McKay Bay

FIER Permits AC 03-84703 and AC03-84704, Bay County

Metropolitan Dade County Resource Recovery Facility, Case No. 77-607 Conditions of Certification

limiting and performance standards for incinerators (17-2.600(1) F.A.C.). Both regulations limit particulate emissions to 0.08 grains per dry standard cubic feet (gr/dscf) (corrected to 12 percent CO₂).

In June 1984, EPA proposed revisions to New Source Performance Standards (NSPS) for industrial/commercial/ institutional steam-generating units that would limit particulate emissions to 0.1 lb/10⁶ Btu for MSW-fired boilers capable of combusting more than 100 x 10⁶ Btu/hr heat input (49FR25102). This regulation is currently under review with final promulgation set for late 1986.

Emission-limiting standards for SO₂ are scheduled for proposed promulgation in June 1986. Emission of SO₂ from MSW-fired steam generation units will not be included in this proposal since sulfur content of MSW is low relative to other fuels (Burn, 1986).

The sections that follow present the emissions and control technology proposed as BACT for the facility.

3.4.2.1 PARTICULATE MATTER (PM)

The proposed PM emission limit is 0.02 gr/dscf, corrected to 12 percent CO₂ (or 0.046 lb/10⁶ Btu), based upon operation of a well designed electrostatic precipitator (ESP). This level of control is substantially lower than the federal NSPS and Florida emission standards of 0.08 gr/dscf and is consistent with two recent permit approvals in Florida (Pinellas County Unit 3 and Bay County). In addition, this limitation results in emissions well below the proposed NSPS for PM of 0.1 lb/10⁶ Btu.

PM generated by the combustion of MSW will be minimized through a combination of combustion controls/boiler design and installation of an ESP. PM exiting the boilers in the exhaust gases will be controlled by use of ESPs. The combustion design will be the mass-burn type and

capable of firing as-received MSW on a continuous-feed basis without auxiliary fuel firing. The combustion efficiency will yield a residue, or ash, containing not more than 4-percent combustibles and 2-percent noncombustibles. This design requirement will serve to minimize the generation of ash.

ESPs are the traditional method of controlling PM emissions from incinerators and steam-generating units. ESPs use the principle of attraction between electrostatically charged objects and an uncharged ground or an oppositely charged object. In 1907, Cottrell developed the first successful application of ESP. The first ESP used for collecting fly ash was installed 1923 and since then thousands have been installed.

Operation of a modern ESP includes the following sequence:

1. Generation of a high-voltage corona discharge;
2. Bombardment and charging of particles in the gas stream;
3. Migration of charged particles to a collection plate; and
4. Transfer of collected particles from the ESP for disposal.

The generation of a high-voltage corona discharge is accomplished with transformer-rectifiers which energize discharge and grounded electrodes. The flue gas is passed between the electrodes, and the PM in the gas stream becomes charged. The charged particles then migrate to the collecting electrodes, where they are periodically displaced and removed to collecting hoppers, and subsequently removed by the fly ash handling system.

ESP design depends on the electrical properties of the particulate being collected, flue gas volume and properties, and the desired collection efficiency. ESP efficiency is affected by the alignment of ESP electrodes, the specific collection area (SCA), the flow pattern of gas through the ESP, the rapping method, and the electrical characteristics of the corona discharge system.

The ESP will be complete with all appurtenances, structural supports, foundations, external and internal walkways, platforms, access stairways, fly-ash hoppers with discharge, air-lock valves; power and control wiring; induced-draft fan; and other accessories for a complete operation system. Each ESP will be a multi-field type with the output of each ESP flowing into a single flue. The fields will be sized adequately considering both the volume of gases and amount of excess air. The temperature of flue gases entering the ESP will be below 550 degrees Fahrenheit (°F) and at least 40°F above the dew-point temperature. The maximum ESP-inlet temperature is based on operating experience from ESPs at incinerator installations (EPA, 1979) and Waste Management's preliminary design.

ESP gas distribution will be accomplished via a low-velocity, multiple-vane system or a perforated-plate system. ESP collecting surface rapping will be by shaft-driven rotary hammers. Solenoid impact or vibration rapping generally is not acceptable. ESP high-voltage systems will have stainless-steel electrodes. Weighted-wire systems generally are not acceptable. ESP discharge electrode rapping will be accomplished by shaft-mounted rotary hammers; solenoid impact or vibrating rapping is not acceptable.

ESP fly ash hopper heaters will be the resistance type, extending two thirds of the ash-hopper height from the bottom of the hopper (to prevent blockage). The fly-ash handling systems include, but are not limited to, screw conveyors inside precipitator hoppers, rotary or double-flap air lock valves, and dry-drag-type transfer conveyors.

3.4.2.2 SULFUR DIOXIDE (SO₂)

SO₂ formation in a MSW-fired furnace is a function of the sulfur content of the fuel and the chemical form in which it occurs. Sulfur in refuse occurs in several organic forms as sulfides, sulfates, and sulfites.

Only the sulfate fraction can be converted to SO₂ during combustion.

Literature has suggested that a significant fraction of the total sulfur in the fuel is retained in the furnace bottom ash and in the fly ash. The form of the sulfur emitted in the flue gas exiting the ESP is predominantly SO_2 , with a very small percentage as gaseous sulfur trioxide and H_2SO_4 .

There are no state emission-limiting standards for SO_2 from MSW-fired boilers. NSPS have not been promulgated or proposed which would regulate SO_2 emissions from the proposed facility.

From Table 3.4-4, SO_2 emissions for other permitted or proposed MSW-fired facilities in Florida have ranged from 1.9 to 4.1 lb/ton MSW. According to Florida Department of Environmental Regulation (DER), the lower factor of 1.9 pounds per ton (lb/ton) (Pinellas County Unit 3) has not been achieved based on source testing, and a revised higher emission rate of 4.1 lb/ton MSW has been requested. According to Camp, Dresser & McKee, Inc. (CDM) (1984), stack test results from six mass-burn facilities located throughout the United States showed SO_2 emissions ranging from 1.0 to 4.0 lb/ton. Three other facilities were permitted at rates ranging from 2.0 to 4.0 lb/ton. EPA (1984a) cites an average emission factor of 2.5 lb/ton. Henningson, Durham, and Richardson (HDR) (1985b) surveyed a total of 16 incinerators throughout the world and reported SO_2 emissions ranging from 0.8 to 6.5 lb/ton. An A.D. Little (1981) literature survey found emissions to range from 0.77 to 4.6 lb/ton.

EPA (1982) has reported an average SO_2 emission rate of $0.492 \text{ lb}/10^6 \text{ Btu}$ for overfeed stoker mass-burn facilities. California Air Resources Board (CARB) (1984) reported emission rates from mass-burn and Refuse-Derived Fuel (RDF) facilities ranging from 0.02 to $1.19 \text{ lb}/10^6 \text{ Btu}$, with average emissions of about $0.3 \text{ lb}/10^6 \text{ Btu}$.

These data illustrate that MSW is a non-homogeneous fuel and that sulfur content and SO₂ emissions can vary over a wide range. Nevertheless, SO₂ emissions from MSW firing are lower compared with other solid and liquid fuels.

By comparison, NSPS for fossil-fuel-fired boilers and electric utility steam generators firing solid fuel [40 CFR 60, Subparts D and D(a)] would allow up to 1.2 lb SO₂/10⁶ Btu. No SO₂ emission-limiting standard currently exists or are proposed for incinerators or MSW-fired boilers. In addition, BACT determination for the south Broward Resource Recovery Projects (DER, 1985) states:

Burning low sulfur fuel is one acceptable method of controlling SO₂ emissions. The installation of flue gas desulfurization to control SO₂ emissions is not warranted when burning MSW.

The proposed BACT emission limit for the north Broward Resource Recovery project is 0.55 lb/10⁶ Btu which is consistent with the upper end of available data and represents a maximum limit. This emission limit is equivalent to about 0.12 percent sulfur in fuel with no sulfur retained in the ash and is about the same as observed in 23 samples taken from the Central and Davie Landfills in 1983. Depending upon the amount of sulfur retained in the ash, actual SO₂ emissions will vary but would likely be less than the proposed limit.

3.4.2.3 NITROGEN OXIDES (NO_x)

Factors that influence NO_x emissions from MSW-fired furnaces include furnace design, excess air, and combustion temperatures. Formation of NO_x is due to "thermal" NO_x formation and "fuel" NO_x formation. Thermal NO_x is produced by oxidizing the nitrogen contained in the combustion air at high temperatures. Fuel NO_x is formed when the nitrogen contained in the fuel is oxidized to NO₂. Fuel NO_x is most likely the dominant formation mechanism. The level of NO_x produced, therefore, is a function of temperature and excess air (oxygen availability).

Review of Table 3.4-4 shows NO_x emission factors for other MSW-fired facilities in Florida have ranged from 2.2 to 7.2 lb/ton. CDM (1984) reported emission factors for five operating MSW-fired facilities in the United States ranging from 2.1 to 4.6 lb/ton. Three other facilities were permitted at a rate of about 3.0 lb/ton. EPA (1984a) also cites a factor of 3.0 lb/ton. CARB (1984), in its exhaustive study of MSW-fired facilities throughout the United States, found NO_x emissions ranging from 0.08 to 0.47 lb/ 10^6 Btu for mass-burn and RDF facilities. EPA (1982) found an average emission rate of 0.308 lb/ 10^6 Btu for overfeed stoker mass-burn units. HDR (1985b) surveyed 11 MSW incinerators throughout the United States and found NO_x emissions ranging between 1.1 and 4.7 lb/ton. A.D. Little's (1981) survey showed emissions to range from 0.7 to 4.4 lb/ton.

An emission limit of 0.55 lb/ 10^6 Btu (approximately 5 lb/ton MSW) is proposed as Best Available Control Technology (BACT). Although this emission rate is consistent with the upper end of available data, it provides a reasonable, conservative safety factor for possible variations in fuel composition and furnace operation. In addition, application of NO_x control technology would tend to create greater emissions of CO and VOC. Also, the desire to achieve combustion conditions [$\geq 1,000$ degrees Celsius ($^{\circ}\text{C}$) for at least 1 second] that allow complete destruction of chlorinated organics could be inhibited using NO_x control technology. A proposed limit of 0.55 lb/ 10^6 Btu is lower than the NSPS NO_x limit for solid-fuel-fired, steam-generating facilities [i.e., NSPS for fossil-fuel-fired boilers codified in 40 CFR 60, Subparts D and D(a) limit NO_x (as NO_2) emissions to 0.7 and 0.6 lb/ 10^6 Btu, respectively, for bituminous coal firing].

3.4.2.4 CARBON MONOXIDE (CO)

CO emissions from MSW-fired furnaces are a product of incomplete combustion conditions, and solid-waste composition is not an important factor. The quantity of CO produced is dependent upon the design and

operation of the furnace. Advancements in combustion technology have resulted in a decreasing trend in CO emissions from MSW furnaces.

High excess air and proper air/fuel mixing are important factors in reducing CO emissions. Even when operated at high excess air levels, CO can be generated from localized areas of the furnace where oxygen deficiencies may exist. Modern MSW-fired furnaces are designed to maximize air and fuel mixing and complete combustion through proper design and refuse feed control.

Table 3.4-4 shows that CO emission factors approved for other similar facilities in Florida have ranged from 0.4 to 11.4 lb/ton.

CMD (1984) reported CO emission factors ranging from 0.62 to 4.3 lb/ton for over eight operating or permitted MSW-fired facilities located throughout the United States. EPA (1984a) cites a factor of 35 lb/ton, and A.D. Little (1981) reported a range of 0.05 to 34.8 lb/ton based on a literature survey. However, these higher factors are based on an old-design (prior to 1970) furnace. The CARB (1984) study found CO emissions from MSW-fired facilities ranging from 0.18 to 2.0 lb/10⁶ Btu for mass-burn and RDF units.

For the north Broward Resource Recovery Project, a CO emission limit of 0.09 lb/10⁶ Btu (approximately 0.8 lb/ton) is proposed.

3.4.2.5 LEAD (Pb)

Emissions of Pb from MSW-fired furnaces is primarily a function of the Pb content of the MSW. Pb is a trace metal found in solid waste. Pb is melted and then volatilized in the combustion process but then is deposited onto the fly ash or condensed into the solid phase after leaving the furnace. The Pb is thus susceptible for collection by an ESP or other particulate control device. Pb emission factors for Florida resource recovery facilities, shown in Table 3.4-4, range from 0.0036 to

0.074 lb/ton. A.D. Little (1981) reports emission rates ranging from 0.04 to 0.34 lb/ton. The CARB (1984) study showed a range of from 5,600 to 16,000 micrograms per megaJoules ($\mu\text{g}/\text{MJ}$) (0.013 to 0.37 lb/ 10^6 Btu) with an average of $9,531$ $\mu\text{g}/\text{MJ}$ (0.022 lb/ 10^6 Btu).

A BACT emission limit of 0.002 lb/ 10^6 Btu (approximately 0.02 lb/ton MSW) is proposed for the NBCRR facility. A high efficiency ESP will be installed to meet this limit (see section 3.4.2.1).

3.4.2.6 MERCURY (Hg)

Hg is present in solid waste in trace quantities. Because of its low boiling point and high vapor pressure, it will exit MSW-fired furnace primarily in the vapor phase. As a result, Hg emissions are not generally capable of control by the PM control device. Florida MSW-fired facilities have accepted Hg emission factors ranging from 0.00171 to 0.0996 lb/ton MSW. The McKay Bay emission factor of 0.0996 lb/ton, which is considerably higher than the other values, is considered unrepresentative of Hg content in Florida MSW. CARB (1984) found rates ranging from 17 to 390 $\mu\text{g}/\text{MJ}$ (0.000039 to 0.000905 lb/ 10^6 Btu), with an average emission level of 157 $\mu\text{g}/\text{MJ}$ (0.00036 lb/ 10^6 Btu).

Based on this information, an Hg emission factor of 0.00092 lb/ 10^6 Btu was considered to represent a reasonable upper limit for the NBCRR facility. The NBCRR facility will not burn any sewage sludge, which may contain Hg in higher concentrations than MSW.

3.4.2.7 BERYLLIUM (Be)

Be emissions from MSW-fired furnaces, like Pb emissions, are emitted primarily in the solid phase and are dependent upon trace element content of the MSW and PM control device collection efficiency.

Be emission rates for Florida MSW-fired facilities range from 1.3×10^{-6} lb/ton to 48×10^{-6} lb/ton. The CARB (1984) study reported a

range of from less than 0.08 to 3.0 $\mu\text{g}/\text{MJ}$ (0.19×10^{-6} to 7.0×10^{-6} lb/ 10^6 Btu). Based upon these studies and the application of a high efficiency ESP, a Be factor of 9.3×10^{-7} lb/ 10^6 Btu (approximately 8.4×10^{-6} lb/ton MSW) is proposed for BACT.

3.4.2.8 FLUORIDES (F^-)

F^- emissions from MSW-fired furnaces are a function of the F^- content of the MSW. Little is known about concentrations of F^- in MSW. F^- can be emitted as a gaseous product or be bound or absorbed in the fly ash. In the gaseous form, the F^- will be emitted primarily as hydrogen fluoride (HF).

Little test data is available for F^- emissions from MSW-fired furnaces. Previously permitted Florida facilities have used emission factors ranging from 0.06 to 0.1 lb/ton. A.D. Little (1981) reported HF emissions from MSW incinerators, based upon a literature survey, to range from 0.1 to 0.12 lb/ton (only two facilities reporting). The CARB (1984) study found limited test data (only one facility) and reported emissions were 0.003 lb/ 10^6 Btu.

Sufficient data is not available on fluorine content in Broward County MSW to estimate emissions. However, limited data suggest an emission limit of 0.018 lb/ 10^6 BTU (0.16 lb/ton) is appropriate as BACT.

3.4.2.9 SULFURIC ACID (H_2SO_4) MIST

H_2SO_4 mist emissions are expected from MSW-fired facilities due to small quantities of sulfur trioxide (SO_3) associated with the SO_2 emissions. The SO_3 reacts with water droplets in the flue gases to form H_2SO_4 mist. H_2SO_4 formation will depend upon the amount of SO_3 present and the degree of oxidation to H_2SO_4 . Test data for H_2SO_4 from MSW-fired furnaces is not available from literature. Only one Florida facility is currently permitted for this pollutant (Table 3.4-4). This factor is 0.077 lb/ton

MSW. An emission rate of $0.047 \text{ lb}/10^6 \text{ Btu}$ (approximately 0.42 lb/ton MSW) is proposed for the Broward County Resource Recovery project.

3.4.2.10 INORGANIC ARSENIC (As)

As is another trace element present in MSW which will be emitted primarily in the solid phase and, therefore, is susceptible to collection by the PM control device. The only information available concerning As emission rates is from the A.D. Little (1981) and CARB (1984) studies. A.D. Little found four MSW facilities in the literature which had reported As emissions, which ranged from 0.0001 to 0.0014 lb/ton . The CARB study reported uncontrolled As emissions ranging from 16 to $1,763 \text{ } \mu\text{g}/\text{MJ}$ (0.000037 to $0.0041 \text{ lb}/10^6 \text{ Btu}$), with an average of $469 \text{ } \mu\text{g}/\text{MJ}$ ($0.0011 \text{ lb}/10^6 \text{ Btu}$). Based on using a high efficiency ESP, an emission rate of $3.1 \times 10^{-5} \text{ lb}/10^6 \text{ Btu}$ (approximately $2.8 \times 10^{-4} \text{ lb/ton MSW}$) is proposed for the Broward County project.

3.4.3 BEST AVAILABLE CONTROL TECHNOLOGY

3.4.3.1 EVALUATION OF ALTERNATIVE CONTROL TECHNOLOGIES

The following subsections describe and evaluate control technologies that could provide a higher degree of control for the air-regulated pollutants. In some cases, similar control technology can remove a variety of air pollutants. For these common pollutant control applications, a variety of air pollutants will be grouped together.

The economic and energy information presented was developed from:

1. Cost of Sulfur Dioxide, Particulate Matter and Nitrogen Oxide Controls on Fossil Fuel Fired, Industrial Boilers, EPA, August 1982, EPA-450/3-82-021; and
2. Costs of Particulate Matter Controls for Non-Fossil Fuel Fired Boilers, EPA, February 1983, EPA-450/3-83-004.

These references include algorithms for calculating annualized control costs (Table 3.4-5) and provides the most applicable information for developing economic and energy estimates on MSW-fired steam generators. In addition, the algorithms developed in these documents have been used by EPA to assess economic impacts of various proposed emission-limiting standards. However, the costs developed from these documents are generic and should be considered as a lower level estimate of actual costs.

All costs presented in this section are adjusted to mid-1985 using the Chemical Engineering Plant Cost Index.

The alternative technologies considered are presented in Table 3.4-6. Tables 3.4-7 and 3.4-8 present the annualized costs and energy usage, respectively, of the alternative technologies considered in the BACT evaluation.

Particulate Matter (PM)

Application of a higher level of particulate control than that proposed has been permitted as either BACT or lowest achievable emission rate (LAER) in various states (EPA, 1985b). In general, these permits restricted emissions to 0.015 gr/dscf corrected to 12 percent CO₂. This level of control will be evaluated in the evaluation of alternative control technologies (see also Table 4-4).

PM control technologies for MSW firing in furnaces and boilers has been extensively examined by EPA (1979) in its review of the NSPS for incinerators, by EPA (1982) in its Background Information Document (BID) for nonfossil-fuel-fired industrial boilers, by CARB (1984), and in the several applications for MSW-fired facilities in Florida as discussed in Section 3.4.2. The major conclusions of these studies are summarized below:

1. Three types of control devices are potentially applicable to MSW-fueled facilities: ESP, fabric filters, and venturi scrubbers.

Table 3.4-5. Components of Capital, Operating, and Maintenance and Total Annualized Costs.

Capital Costs

Direct Costs--Equipment and Installation

Indirect Costs

Engineering
Construction and Field Expenses
Construction Fees
Start Upcosts
Performance Costs
Contingencies
Working Capital

Operating and Maintenance Costs

Supervision
Maintenance
Electricity
Water
Solid Waste
Chemicals
Indirect (Overhead)

Total Annualized Costs

Operating Costs
Capital Charges
Capital Charges

Source: EPA, 1982.

Table 3.4-6. Alternative Control Technologies Evaluated

Pollutant	Type	Alternative Control	
		Level of Control	Decrease of Pollutant Emission Over Proposed BACT (TPY)
Particulate	ESP/FF	0.015 gr/dscf (corrected to 12 percent CO ₂)	33.4
SO ₂	Dry Scrubber	70 Percent	1,114
F-	Dry Scrubber	90 Percent	122
H ₂ SO ₄ Mist	Dry Scrubber	90 Percent	47
Pb	ESP/FF	See Particulate	1.9
Be	ESP/FF	See Particulate	9 x 10 ⁻⁴
As	ESP/FF	See Particulate	0.03
Hg	Dry Scrubber	50 Percent	1.4

ESP/FF = Electrostatic Precipitator/Fabric Filter

Source: KBN, 1986.

Table 3.4-7. Annualized Costs of Proposed and Alternative Control Technologies Evaluated

Control	Annualized Cost	Annualized Cost Difference Over Proposed Level of Control
Proposed--ESP @ 0.02 gr/dscf corrected for 12 percent CO ₂	\$2,670,000	N.A.
ESP/Fabric Filter @ 0.015 gr/dscf corrected for 12 percent CO ₂	\$2,778,000 - 3,131,000	\$108,000 - 461,000
Dry Scrubber/Fabric Filter	\$5,548,000 - 8,827,000*	\$2,878,000 - 6,157,000*

*Includes lost revenue; based on 10-percent downtime due to dry scrubber operation.

NA = Not applicable.

Source: KBN, 1986.

Table 3.4-8. Energy Usage of Proposed and Alternative Control Technologies Evaluated

Control	Energy Usage (kwh/year)	Energy Usage Difference (kwh/year)
Proposed--ESP @ 0.02 gr/dscf corrected to 12 percent CO ₂	4,590,000	N.A.
ESP/Fabric Filter @ 0.015 gr/dscf	4,880,000	+290,000
Dry Scrubber/Fabric Filter	5,096,900	+506,900

NA = Not applicable.

Source: KBN, 1986.

2. ESP and fabric filters can generally be designed to achieve the same level of control. However, fabric filters can generally provide a greater degree of emission reduction than ESP for particles less than 2 μm . ESPs provide a much better emission reduction than do venturi scrubbers.
3. Fabric filters and venturi scrubbers have not been extensively tested and proven on MSW boilers. Those which have been installed on MSW boilers have encountered severe operational and maintenance problems that include: fires and corrosive attack (fabric filters); plugging, severe corrosion, and wastewater treatment (venturi scrubbers).
4. The ESP is by far the most common control technique for control of PM at these facilities and are well proven.
5. Venturi scrubbers require much greater energy requirements in order to provide adequate PM control, operating and maintenance costs are high, and the liquid scrubber waste must be treated and/or disposed.
6. ESP and fabric filters have low energy requirements, and the waste by-product can be handled in a dry manner.
7. ESP have been proven capable of meeting the proposed BACT emission limit of 0.02 gr/dscf, corrected to 12 percent CO_2 . A fabric filter would also be capable of meeting the 0.02 gr/dscf limit, but this control technique has not been proven as reliable as the ESP.
8. ESP have been used on both MSW-burning facilities, and have been proven reliable.
9. All operating, permitted or proposed MSW-fired facilities in Florida have selected the ESP as the PM control device.

Based on these data, the venturi scrubber was not considered as a PM control alternative. The ESP is considered to be the most proven control device for limiting PM emissions from MSW-fired facilities. A fabric filter is also capable of achieving this level of control, and energy and

environmental impacts are similar to the ESP. However, significant questions arise with the fabric filter regarding their reliability and maintenance when MSW is fired. Applications of fabric filters to MSW-fired facilities generally require flue gas quenching to insure particles still under combustion do not reach the filters and cause a fire.

Economic Impacts--The costs of the alternative control are shown in Table 3.4-9 and will range from \$3,240/ton of PM removed (ESP) to \$13,800/ton of PM removed (ESP). Over the proposed level of control, a 4- to 17-percent increase in annualized cost is calculated.

Environmental Impacts--Table 3.4-10 presents the improvement in air quality from installing a higher level of control (i.e., 0.015 gr/dscf corrected to 12 percent CO₂). As shown by Table 3.4-9, the maximum predicted air quality improvement for PM will be less than 1 percent of the PSD increments on AAQS.

Energy Impacts--The installation of an ESP to achieve the alternate PM control level will increase annual average energy usage by 290,000 kilowatt hours (kwh) or by about 6.3 percent. The installation of a fabric filter will be higher in overall energy usage. Although cost algorithms are not available to make an estimate, the differential in energy usage is expected to be low.

Sulfur Dioxide (SO₂), Fluorides (F⁻), and Sulfuric Acid (H₂SO₄) Mist

Currently, there are no emission-limiting standards which apply to SO₂, H₂SO₄, F⁻, or HCl emissions from MSW-fired boilers. NSPS have not been proposed or promulgated (nor will they be in the near future) (Burn, 1986), and there are no FDER emission-limiting standards.

Emissions of SO₂, H₂SO₄, and F⁻ can all be controlled by the same control technique. H₂SO₄ emissions are a function of SO₂ emissions; thus, controlling SO₂ also controls H₂SO₄.

Table 3.4-9. Economic Evaluation for Alternative Control Technologies for BACT Pollutants

Pollutant	Annualized Cost Differential (\$)	Cost Per Ton Pollutant Removed (\$/Ton)	Difference From Proposed Control Level (%)
PM	108,000 to 461,000	3,240 to 13,800	4 to 17
SO ₂	2,878,000 to 6,157,000	2,580 to 5,530	108 to 231
F-	2,878,000 to 6,157,000	23,600 to 50,500	108 to 231
H ₂ SO ₄ Mist	2,878,000 to 6,157,000	61,200 to 131,000	108 to 231
Pb	108,000 to 461,000	56,840 to 242,600	4 to 17
Be	108,000 to 461,000	1.2×10^8 to 5×10^8	4 to 17
As	108,000 to 461,000	3.6×10^6 to 1.5×10^7	4 to 17
Hg	2,878,000 to 6,157,000	2.1×10^6 to 4.4×10^6	108 to 231

Source: KBN, 1986.

Table 3.4-10. Environmental Impacts of Alternative Control Technologies for BACT Pollutants Evaluation

Pollutant	<u>Improvement in Air Quality*</u> ($\mu\text{g}/\text{m}^3$)			Maximum Percentage of PSD Increment	Maximum Percentage or AAQS
	3-hour	24-hour	Annual		
PM	1.0	0.2	0.03	0.5	0.1
SO ₄	24.2	5.8	0.7	6.4	2.2
F-	1.0	0.3	0.03	--	--
H ₂ SO ₄ Mist	2.6	0.6	0.07	--	--
Pb	0.04	0.01	<0.01	--	<0.5
Hg	0.03	<0.01	<0.01	--	--

*Decrease in maximum predicted ground-level concentrations based on results for the proposed plant presented in Section 7.0.

Source: KBN, 1986.

Pre- and post-combustion control technologies for SO_2 have been developed for fossil-fuel-fired boilers, but not for MSW combustion, primarily due to the low sulfur content of the MSW fuel and resultant low SO_2 emissions. Pre-combustion controls include using low sulfur fuel and physical or chemical cleaning. MSW would be classified as a low-sulfur fuel. MSW, at a maximum of 4.9 lb/ton SO_2 emissions, would yield about 0.55 lb/ 10^6 Btu. By comparison, high sulfur (2.5 percent) coal and low sulfur (0.5 percent) coal would yield about 5.0 lb/ 10^6 Btu and 1.0 lb/ 10^6 Btu, respectively. Physical/chemical cleaning methods to remove sulfur from MSW fuel are not known to have been developed, primarily because there has not been a need for such methods. Consequently, pre-combustion sulfur and F- removal from MSW is considered unnecessary and technologically infeasible at this time.

Post-combustion controls for SO_2 include wet scrubbers and dry scrubbers, the latter requiring a PM collection device to remove the dry waste material from the flue gases. Wet scrubbing systems developed to date include limestone/lime, sodium, and dual alkali scrubbing. Dry scrubbing systems are based upon calcium or sodium scrubbing and evaporation of the scrubbing medium, leaving behind a dry waste material which can be captured in an ESP or fabric filter. Because of the relative low sulfur content of MSW dry scrubbing can be less costly than wet scrubbing.

CARB (1984) presented a comprehensive review of SO_2 , H_2SO_4 and F- control technologies for MSW-fired facilities. This study concluded that both wet and dry scrubbing systems have been satisfactorily proven for application to MSW-fired facilities. Depending on scrubber technology and scrubbing media, SO_2 , H_2SO_4 , and F- (as HF) removal efficiencies can range from 70 to more than 90 percent depending upon design.

The major drawbacks of all these systems are:

1. The capital and annual operating costs of a wet or dry scrubbing system is large.

2. These systems are rarely available 100 percent of the time due to operational problems. Either costly redundancy built into the system is required to ensure 100 percent availability or loss of plant operation will occur.
3. They produce large amounts of solid and/or liquid wastes which must be treated and/or disposed. Proper disposal to avoid related environmental contamination is required.
4. Energy usage of these systems is high, typically requiring 10 to 15 percent of the energy output of the facility.
5. Large amounts of water may be required for the scrubber systems.

Much of the information in this report was developed from MSW-fired facilities in Japan and Europe with no major facilities in the United States.

Because a number of facilities have been recently permitted (but not yet operated) that use dry scrubbing, this alternative control technology was evaluated (see Table 3.4-6) for SO_2 , H_2SO_4 and F- removal.

Economic Impacts--The annualized cost differential between the proposed level of control (i.e., ESP) and dry scrubbers is from \$2,878,000 to \$6,157,000 or about 108 to 231 percent higher than the ESP alone (see Table 3.4-6). Pollutant removal costs are estimated to be \$2,580/ton to \$5,530/ton for SO_2 , \$23,600/ton to \$50,500/ton for F-, and \$61,200/ton to \$131,000/ton for H_2SO_4 . When combined, the pollutant removal costs is \$2,240/ton without lost revenue. Including lost revenue, the costs for removal would escalate to approximately \$4,800/ton.

Environmental Impacts--Improvements in maximum predicted impacts at the alternative control level, i.e., approximately 0.17 lb SO_2 /10⁶ Btu, will not exceed 7 percent of the PSD increment and 3 percent of the AAQS (Table 3.4-10).

Federal or State of Florida AAQS do not exist for F- or H₂SO₄. Acceptable ambient concentration (AAC) levels for toxic and hazardous pollutants are currently under development by DER (Mora and Gunn, 1985). For pollutants such as HF or H₂SO₄, AAC levels of approximately 1/300 of the Threshold Limit Value (TLV) promulgated by the American Conference of Government and Industrial Hygienist is being considered by DER for new source BACT. A comparison of these developmental AAC levels and predicted concentrations are presented below.

<u>Pollutant</u>	<u>TLV† (µg/m³)</u>	<u>AAC (µg/m³)</u>	<u>Predicted Concentration (µg/m³)</u>
HF	2,452	8.2	0.03
H ₂ SO ₄	1,000	3.3	0.3

† 8-hour, time-weighted average.

As illustrated above, even at the maximum predicted concentration level (i.e., 3-hour averaging time) the AAC currently under development will not be exceeded.

Energy Impacts--The energy associated with the alternative control is calculated to increase by approximately 506,900 kwh/year or approximately 11 percent higher.

Nitrogen Oxides (NO_x)

NO_x emissions from MSW combustion processes result for the oxidation of nitrogen compounds in the combustion air (thermal NO_x) and in the fuel (fuel NO_x). Thermal NO_x formation is highly dependent on temperature and design of the combustion unit (i.e., heat release rates, residence time, and oxygen availability). However, according to CARB (1984), 75 to 80 percent of the NO_x generated from refuse burners is a result of fuel NO_x. Fuel NO_x is influenced by the fuel nitrogen content, combustion air distribution, and excess air. The amount of NO_x released from a specific

source, both thermal and fuel, is, therefore, a function of the design and operation of the combustion unit.

NO_x emissions from combustion sources can potentially be reduced by three methods:

1. Reduce fuel nitrogen content,
2. Combustion design, and
3. Flue gas denitrification.

Reducing fuel nitrogen content is not presently feasible. No cost-effective method has been found to separate out materials in MSW which are high in nitrogen content. Flue gas denitrification processes have not been demonstrated on MSW combustion systems on a commercial scale. One process, the selective non-catalytic reduction (SNCR) method, has been applied to four refuse burning facilities in Japan (CARB, 1984). However, operating problems are reported, which reflects the developmental status of this technology. Flue gas denitrification processes were not considered further as BACT for the NBCRR facility due to the lack of reliable, full-scale operating experience and the large costs associated with such a process.

No emission-limiting standards or NSPS exist for NO_x emissions from MSW-fired facilities. The proposed BACT for NO_x emissions due to MSW firing, and the only feasible control alternative, is combustion controls.

More extensive NO_x controls, such as low excess air firing, would tend to create greater emissions of CO and VOC and possibly chlorinated organics due to incomplete combustion; therefore, more extensive NO_x controls would be counterproductive to the design of the facility. Thus, the combustion design will attempt to limit NO_x, CO, and VOC emissions to the greatest extent possible within practical limits. As a consequence, a more detailed evaluation of NO_x control will not be performed.

The analysis of the air quality impacts of the proposed NO_x emission levels demonstrated minimal NO_x impacts as a result of operation of the proposed facility at the proposed BACT emission rate. This proposed BACT is also consistent with control technologies and BACT determinations for all operating and permitted MSW facilities in Florida.

Carbon Monoxide (CO)

CO emissions from burning are a result of incomplete combustion. High combustion temperatures, good mixing, and proper air/fuel ratios allow optimum control of CO. However, high combustion temperatures and high excess air rates can lead to greater levels of NO_x; therefore, a tradeoff must exist between NO_x and CO emissions.

No emission-limiting standards exist for CO emissions from MSW-fired facilities. Specific add-on technologies for control of CO have not been developed or incorporated into operating or permitted MSW-fired facilities designs. As a result, the selected BACT for the proposed facility is good combustion control and furnace design. This BACT is consistent with CO control techniques employed at all operating or permitted MSW-fired facilities in Florida, including four facilities located in O₃ nonattainment areas (two in Hillsborough County, one in Pinellas County, and one in Dade County). The proposed BACT emission rate for CO is 0.09 lb/Btu of MSW. The air quality impact of the proposed CO BACT emission level is predicted to be insignificant.

Lead (Pb), Beryllium (Be), and Arsenic (As)

As discussed in Section 3.4.2, small quantities of Pb, Be, and As are present in MSW, and a portion of these metals will be volatilized and then condensed or absorbed upon other particulates contained in the flue gas exhaust stream. Thus, control of PM will also control these trace metals. No emission-limiting standards have been promulgated or proposed to restrict emissions of these trace metals from MSW-fired boilers.

The ESP or fabric filter was chosen as an alternative control technology of PM emissions.

Economic Impacts--As shown in Table 3.4-9, the cost for an alternative level of control for these pollutants exceeds \$50,000/ton for Pb and \$1 million/ton for both Be and As. Even when combined with PM, the overall cost of additional control exceeds \$3,000/ton.

Environmental Impacts--The maximum predicted impact of Pb emissions at the BACT emission rate is small and well below the AAQS (see Table 3.4-10). No Florida AAQS exist for Be or As, although the State of New York has established an AAQS of 0.01 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), monthly average, for Be. The maximum predicted 24-hour impact of Be due to the proposed NBCRR is $0.000014 \mu\text{g}/\text{m}^3$, well below the New York State standard.

Energy Impacts--The energy impacts associated with an alternative control are presented in Table 3.4-8.

Mercury (Hg)

No emission-limiting standards for Hg emissions from MSW-fired facilities exist. As discussed in Section 3.4.2, emissions of Hg from MSW combustion will occur primarily in the gaseous phase and, therefore, will not be controlled by the ESP or fabric filter. Although no known technology currently exists to remove trace quantities of Hg in flue gas streams, some type of scrubbing device may remove a fraction of the Hg emitted. Therefore, for the purpose of this analysis, it was assumed that installation of a dry scrubber system would remove 50 percent of the emitted Hg.

Economic Impacts--The economic impacts of potentially controlling 50 percent of the emitted Hg using dry scrubbing is estimated to exceed

\$2 million/ton. The cost for removal including SO₂, F, and H₂SO₄ would not change by adding Hg removal.

Environmental Impacts--An AAQS has not been established for Hg. However, EPA (1984b) developed a guideline of 0.1 ug/m³, 30-day average, as part of the development of the National Emission Standards for Hazardous Pollutants (NESHAP) for Hg. (The NESHAP for Hg does not apply to the proposed NBCRR because sewage sludge will not be burned at the facility.) The predicted maximum impact of the proposed facility is 0.014 ug/m³, 24-hour average. This short-term maximum is well below the 30-day average guideline.

3.4.3.2 RATIONALE FOR PROPOSED BACT

The proposed BACT for NBCRR consists of:

1. A high efficiency ESP to control PM, as well as Pb, Be, and As, to 0.02 gr/dscf corrected to 12 percent CO₂;
2. Combustion controls to control NO_x and CO emission; and
3. Fuel content to control SO₂ and H₂SO₄ emission.

The alternative control technologies evaluated in Section 3.4.3.1 provide the basis for comparing economic, environmental, and energy impacts with the proposed BACT. The subsections that follow evaluate the significance of that information.

Economic Impacts

The economic information presented in Section 3.4.3.1 was, in part, presented in dollars per ton of pollutant removal. EPA, in evaluating the cost/ benefits of various control technologies, uses such economic indicators. Currently, EPA does not have a standard policy for evaluating pollutants but uses a range of values depending on the pollutant and the governmental organization performing the evaluation (Burn, 1986 and Stevenson, 1986). Recent EPA proposed regulations (EPA,

1984c) and general policy guidance (Burn, 1986 and Stevenson, 1986) indicate that the following ranges are applicable for PM and SO₂:

PM: \$2,000¹ - \$3,000²/ton pollutant removed

SO₂: \$1,250³ - \$2,000²/ton pollutant removed

1. Proposed NSPS for non-fossil fuel boilers;
2. EPA Office of Air Quality Planning and Standards; and
3. Office of Policy, Planning, and Evaluation.

As discussed in Section 3.4.3.1, the costs developed for the alternative control evaluation were based upon information developed by EPA. Sufficient experience has not been developed in the installation of dry scrubbers on MSW-fired facilities to accurately estimate costs. Costs estimated for the scrubber/fabric filter combination were adapted from fossil fuel burning technology. Using the algorithms developed for fossil fuel technology alone would tend to underestimate the costs for MSW applications since the greater variability in MSW fuel characteristics compared with fossil fuel must be considered in design. Consequently, the estimated costs for the dry scrubber/fabric filter are generic and conservative (i.e., underestimating costs). A comparison of the costs and the EPA criteria clearly indicate that the cost of the alternative control technologies evaluated are significant and above the cost which is reasonable.

Environmental Impacts

As discussed in Section 3.4.2, the improvement in air quality by applying the alternative control technologies are considered insignificant. The maximum improvement by applying alternative controls as a percentage of PSD increment is 6.4 percent for SO₂ and 0.5 percent for PM. For the proposed control level, less than 10 percent of the PSD increments for SO₂ and 1 percent of the PSD increments for PM will be consumed at the maximum impact receptor. Clearly, the primary purpose of BACT will be met with the proposed control because sufficient PSD air quality

increments are available for potential future economic growth without significantly degrading air quality.

The predicted environmental impacts as a percentage of the AAQS are also minimal with SO₂ and PM concentrations less than 5 percent of the applicable standard. Improvements in air quality with alternative technology will be less than 2.5 percent of the applicable AAQS for these pollutants. For Pb, the air quality impacts associated with the proposed BACT will be less than 1 percent of the AAQS.

The impacts associated with the non-criteria pollutants (i.e., F⁻, H₂SO₄, Be, As, and Hg) are well below the currently recognized health or impact levels.

Recent permits issued in other states (especially the northeastern United States and western United States) have required control of "acid gases" (including SO₂, F⁻, and H₂SO₄). Dry scrubbing has been the most common control technology selected in these cases. However, the controls were generally associated with LAER determinations and possibly reflect greater air quality impacts associated with the site-specific meteorology. This latter effect is illustrated in Table 3.4-11 which compares the environmental impacts from the proposed BACT for NBCRR with a similar-sized, MSW-fired facility (with a dry scrubber located in Connecticut). As indicated in this comparison, the impacts in Connecticut are from 3.5 to 7 times that of south Florida. Furthermore, in many cases the permitted emissions are not significantly lower (with a dry scrubber) than that proposed for NBCRR. This comparison illustrates that the application of more stringent control of MSW-fired facilities for other states is not directly comparable to that proposed for NBCRR because of site-specific conditions.

Energy Impacts

The increased energy usage caused by the alternative BACT control technologies is considered moderate.

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Table 3.4-11. Comparison of Proposed BACT Environmental Impacts with Alternative Control Technology—Dry Scrubber Permitted in Connecticut

Pollutant	North Broward County				Bridgeport, Connecticut			
	Proposed Emissions* (TPY)	Air Quality Impact			Proposed Emissions† (TPY)	Air Quality Impact		
		3-hour	24-hour	Annual		3-hour	24-hour	Annual
PM	134	2.9	0.7	0.061	145	23.2	2.65	0.6
SO ₂	1,592	34.6	8.4	0.73	1,367	219	25	6
F ⁻	52	1.1	0.27	0.024	19.5	3.1	0.4	0.09
H ₂ SO ₄ Mist	136	3.0	0.72	0.062	132	21.1	2.4	0.6
Pb	5.8	0.13	0.031	0.0027	2.8	0.5	0.05	0.01
Hg	2.7	0.058	0.014	0.0012	3.9	0.6	0.07	0.02

*Based on 642,400 tons of MSW.

†Based on 821,250 tons of MSW.

**Predicted highest, second-highest 3- and 24-hour and highest annual concentrations due to proposed emissions only (see Section 7.0 for proposed NBCRR facility).

Sources: Connecticut DEP, 1985b.
ESE, 1986.

Conclusion

Based on an evaluation of the proposed and alternative control technologies, the proposed control technology is considered the appropriate choice for BACT. This conclusion is based on the relative significance of economic impacts associated with the low air quality benefits and greater proven reliability of the proposed technology. Energy impacts do not appear to vary significantly for the technologies evaluated. The matrix illustrates the engineering conclusion drawn from the data presented in the BACT section and Table 3.4-12.

Table 3.4-12. BACT Conclusion Matrix for Alternative Control Technologies Evaluated

Summary of Impacts of Alternative Control Technologies		
Economic	Environmental	Energy
Significant - o Cost greater than EPA criteria - o Dry scrubbing will cost from \$4.5 to \$9.6/ton of MSW or approximately 16 to 34 percent of tipping fee	No significant improvement for proposed BACT - o Small percentage (<7 percent) of PSD increment consumed - o Impacts small (<3 percent) compared to AAQS	Moderate increase in energy consumption over proposed from 6.3 to 11 percent

Source: KBN, 1986.

3.4.4 Design Data for Control Equipment

The following information in Table 3.4.4.1 is based on the design data provided by Waste Management, Inc. for the electrostatic precipitators proposed for the control of air emissions at the northern resource recovery facility.

3.4.5 Design Philosophy

As previously mentioned on Section 3.4.3.1, Particulate Matter, USEPA data suggests that the electrostatic precipitator is highly proven for municipal incinerator application and is capable of achieving PM emission levels well below NSPS and State of Florida emission standards. Figure 3.4.5.1 presents the mass and energy balance.

3.5 Plant Water Use

A quantitative water use diagram for the plant is provided in Figure 3.5.1. Presented in this figure are estimated quantities of water flows to and from the various plant water systems including the heat dissipation system, sanitary wastewater system, potable water systems, and process water system. The source of all plant intake water is from the County treated sewage effluent and potable water supply.

The water balance diagram referred to above is a preliminary one. Water balance data will be refined upon development of detailed design plans.

Data regarding wastewater flows from process line and sanitary sewer sources as provided the vendor includes the following:

	<u>Average</u>	<u>Peak</u>
Process Water Requirements	11,491 gal/wk	12,640 gal/wk
Sewer Discharges	3,661 gal/wk	2,927 gal/wk

Approximately 60 employees will be required at the facility over a 24 hour seven day period. An estimated 120 gallons of potable water per day per capita will be consumed at the plant.

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TABLE 3.4.4.1

ENVIRONMENTAL DATA

Air Pollution Control Equipment
(Electrostatic Precipitators)

Four (4) electrostatic precipitators, arranged for outdoor installation, each containing three electrical fields.

Design

Volume (lb/hr at operating conditions)	367,330
Temperature (°F at design conditions)	660
Gas velocity ft/sec	2.35 to 2.90
Maximum outlet dust burden	0.02 grains/dscf corrected to 12% CO ₂

A comparison with pre- and post-construction is presented in Table 3.5.1. Temporary shutdowns of the plant would result only in potable and sanitary water flow (5 gpm) and service water flow (5 gpm). Upon abandonment, no water flows would occur.

No water data will be required by the South Florida Water Management District (SFWMD) for this project because the Broward County Utilities Division (BCUD) will supply all water requirements and treat all wastewaters prior to ocean outfall discharge.

3.5.1 Heat Dissipation System

3.5.1.1 System Design

The heat dissipation system will employ a conventional circulating water, evaporative type cooling tower. Make-up water will be effluent from the sanitary waste treatment plant nearby and will be tertiary treated prior to being used as make-up. Cooling tower blowdown will be returned to the sanitary waste treatment plant. Cooling tower data is shown in Table 3.5.1.1.

3.5.1.2 Source of Cooling Water

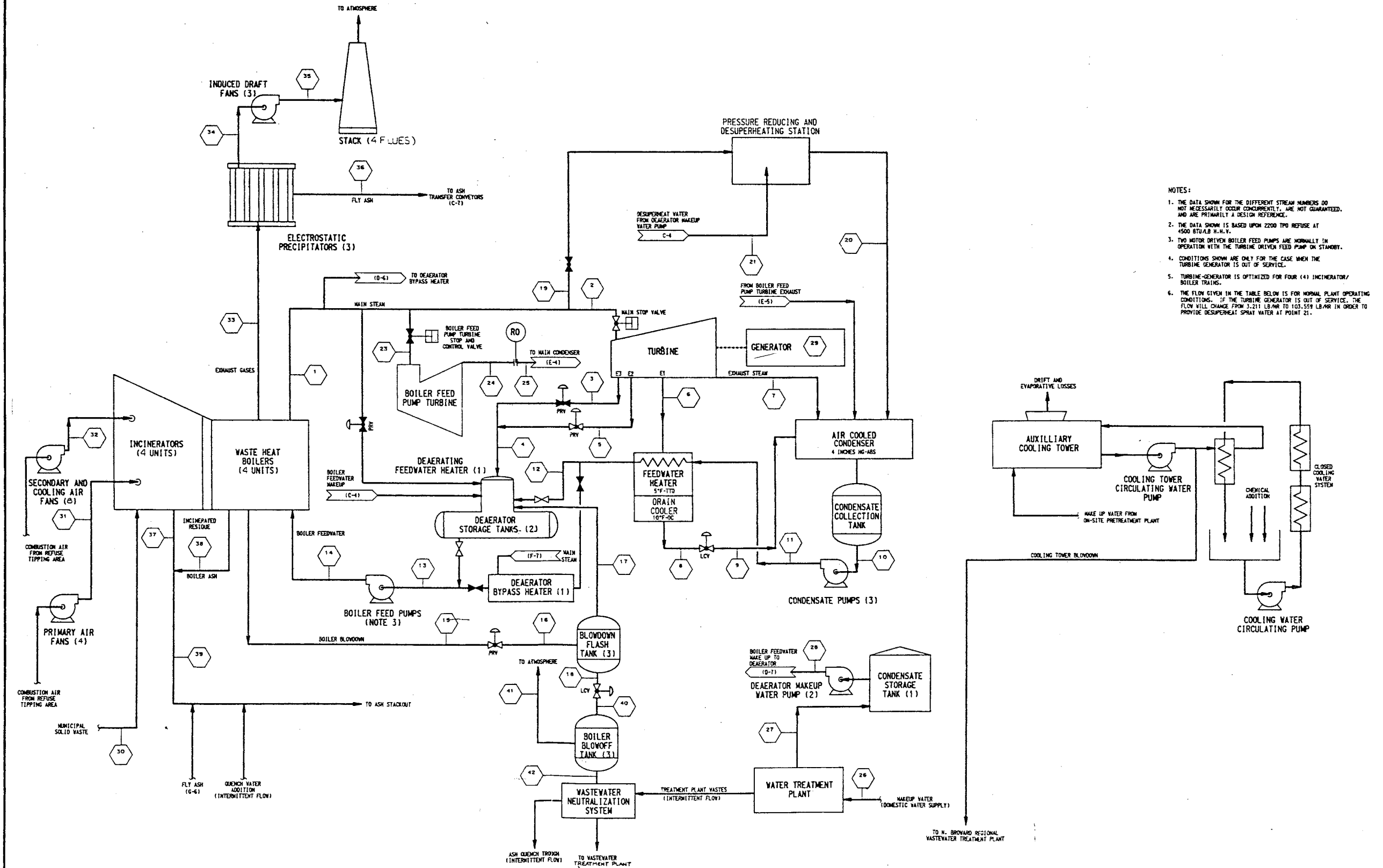
Cooling water requirements will be provided with secondary treated sewage effluent from Broward County Utilities Division. Pumps and pipeline will be installed to transport the effluent from the County plant to the project site. The cooling system will require 1,000 gpm maximum makeup at a maximum temperature of 90°F. Analyses of the potable water and secondary treated effluent are included in Tables 3.5.1.2 and 3.5.1.3. The secondary treated effluent will be treated on the project site to remove phosphorus to less than 1.0 ppm prior to entering the cooling system.

3.5.1.3 Dilution System

Since all cooling water intake will be from the Broward County Utilities Division, no dilution of intake water will occur. All discharge waters will be disposed of directly to the County sanitary sewer with no dilution. All wastewater discharges will meet the pretreatment standards of the Broward County Utilities Division.

3.5.1.4 Blowdown, Screened Organisms, and Trash Disposal

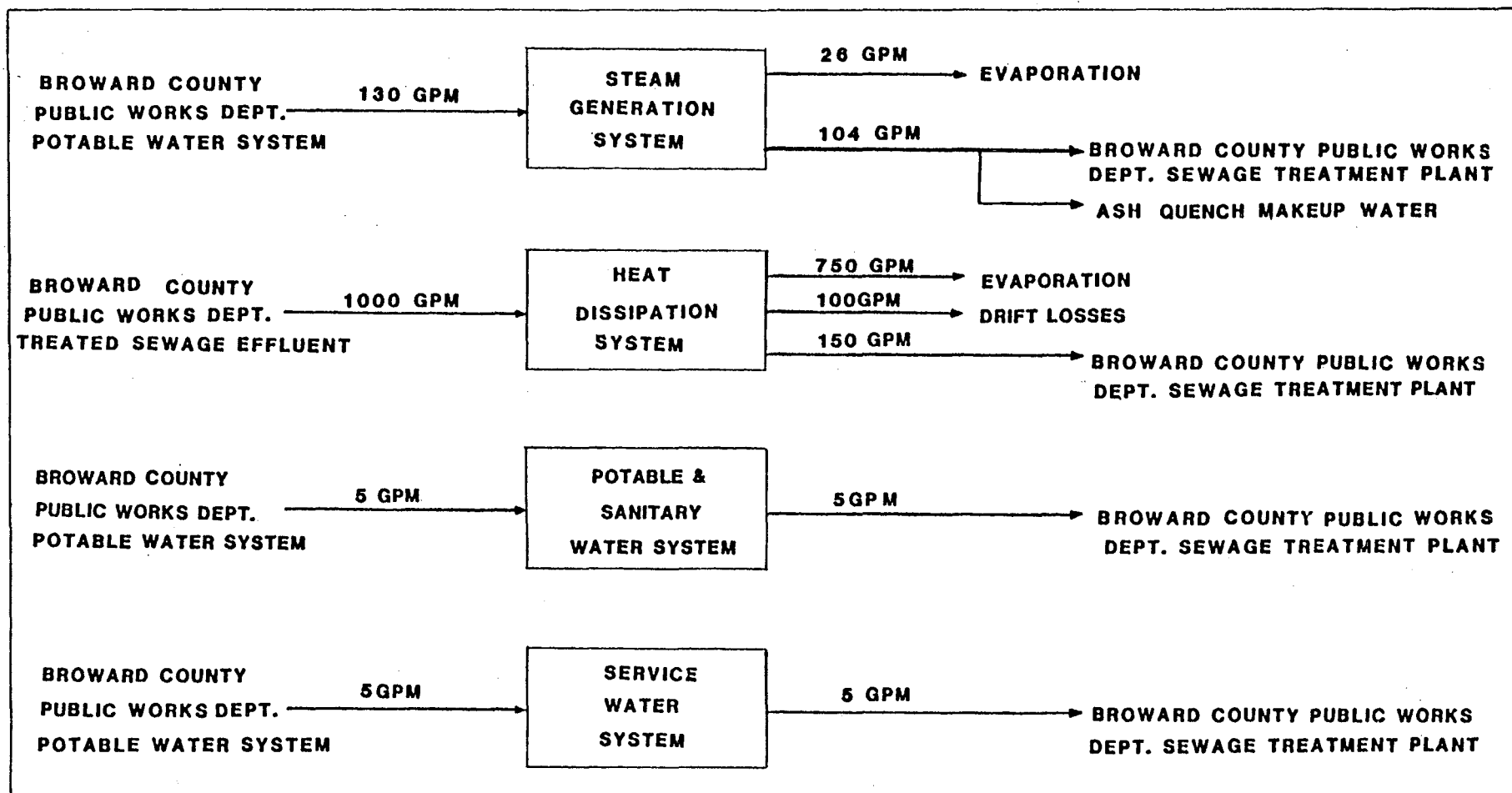
Since all water will be supplied by the Broward County Utilities Division, screened organisms and trash associated with intake screens will not be a problem. Boiler and cooling tower blowdown will be discharged directly to the County sewer main.



- NOTES:
1. THE DATA SHOWN FOR THE DIFFERENT STREAM NUMBERS DO NOT NECESSARILY OCCUR CONCURRENTLY, ARE NOT GUARANTEED, AND ARE PRIMARILY A DESIGN REFERENCE.
 2. THE DATA SHOWN IS BASED UPON 2200 TPD REFUSE AT 4500 BTU/LB H.W.V.
 3. TWO MOTOR DRIVEN BOILER FEED PUMPS ARE NORMALLY IN OPERATION WITH THE TURBINE DRIVEN FEED PUMP ON STANDBY.
 4. CONDITIONS SHOWN ARE ONLY FOR THE CASE WHEN THE TURBINE GENERATOR IS OUT OF SERVICE.
 5. TURBINE-GENERATOR IS OPTIMIZED FOR FOUR (4) INCINERATOR/BOILER TRAINS.
 6. THE FLOW GIVEN IN THE TABLE BELOW IS FOR NORMAL PLANT OPERATING CONDITIONS. IF THE TURBINE GENERATOR IS OUT OF SERVICE, THE FLOW WILL CHANGE FROM 3,211 LB/MR TO 103,559 LB/MR IN ORDER TO PROVIDE DESUPERHEAT SPRAY WATER AT POINT 21.

DESIGN REFUSE	PARAMETER	STREAM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		23	24	25	26	27	28	29	30
		UNIT																														
	FLOW	LB/HR	471,520	471,520	32,869	32,869	-	49,049	389,602	49,049	49,049	438,651	438,651	438,651	476,235	476,235	4715	4715	1504	3211	471,520	571,868	100,348		8690	8690	8690	130 GPM	130 GPM	3211	52.3 mm	183,300
	ENTHALPY	BTU/LB	1416.2	1415.5	1178.1	1178.1	-	1102.1	989.7	181.9	181.9	93.4	93.4	207.1	245.2	251.8	542.6	542.6	1173.2	247.2	1415.4	1172	28.3		1415.3	1247	1247	-	28.3	-	-	4500 MM
	TEMPERATURE	°F	842	837	324	271	-	213.7	125.4	135.4	135.4	125.4	125.4	208.7	276.1	280.0	544.6	278	278	278	837	274.5	60		837	457.2	450.2	50	50	50	-	-
PRESSURE	PSIA	965	915	95	46.3	-	15.2	1.97	13.2	8.2	1.97	100	90	46.3	1381	1300	47.7	47.7	47.6	915	45	85		915	25	1.97	-	-	85	-	-	
DESIGN REFUSE	PARAMETER	STREAM NUMBER	31	32	33	34	35	36	37	38	39	40	41	42																		
		UNIT																														
	FLOW	LB/HR	754,930	503,287	417,500	408,175	408,175	9325	6657	17,950	24,607	3211	221	2990																		
	ENTHALPY	BTU/LB	-	-	-	-	-	-	-	-	-	-	-	-																		
	TEMPERATURE	°F	-	-	350	350	356	-	-	-	-	-	-	-																		
PRESSURE	PSIA	10.4%	8.1%	1.1%	9	-	-	-	-	-	-	-	-	-																		

BROWARD COUNTY
WASTE TO ENERGY PROJECT
MASS & ENERGY BALANCE
4 LINE - DRY



BROWARD COUNTY
WATER BALANCE

TABLE 3.5.1

PRECONSTRUCTION AND POST CONSTRUCTION COMPARISON

<u>Operational Phase</u>	<u>Evaporation gpm⁽¹⁾</u>	<u>Diversion gpm</u>	<u>Blowdown gpm⁽²⁾</u>	<u>Seepage gpm</u>	<u>Other gpm⁽³⁾</u>
Preconstruction	0	0	0	0	0
Post Construction	776	0	254	0	110

Notes:

1. Boiler and cooling tower evaporation.
2. Boiler and cooling tower blowdown.
3. Cooling tower drift losses, sanitary waste and service water waste.

TABLE 3.5.1.1
COOLING TOWER DATA

(a) Heat dissipated:	375,000,000 BTU/HR
(b) Water withdrawn:	1,000 gpm make-up
(c) Consumptive use:	1,000 gpm make-up
(d) Design size:	400,000,000 BTU/HR
(e) Location of tower:	Within 100 ft. of the turbine-generator building.
(f) Blowdown:	150 gpm
(g) Physical Characteristics:	Redwood construction on a concrete basin 3 cells, each with a * horsepower induced draft fan. Overall size: * ft. long x * ft. wide x * ft. high
(h) Temperature changes and hold-up times in the cooling ponds:	Not applicable
(i) Rate of evaporation:	750 gpm
(j) Dams and dikes for cooling reservoir:	Not applicable
(k) Water intake structure:	Not applicable
(l) Point of discharge	Not applicable

*To be determined during final design.

TABLE 3.5.1.2

BROWARD COUNTY UTILITIES DIVISION
TYPICAL POTABLE WATER ANALYSIS

pH	9.1	
Total Combined Cl ₂	2	mg/l
Total Hardness	63	mg/l as CaCO ₃
Alkalinity	24	mg/l
Ca Hardness	39	mg/l
Calcium	22.5	mg/l
Magnesium	1.6	mg/l
Bicarbonate	20.9	mg/l as CaCO ₃
Carbonate	2.5	mg/l
Hydroxide	0.6	mg/l
Sodium	11	mg/l
Chloride	22	mg/l
Color	8-10	Color Units
Foaming Agents	0.14	mg/l
Sulfate	27	mg/l
TDS	115	mg/l
Nitrate	0.04	mg/l as N
Fluoride	0.9	mg/l as N
Turbidity	0.3	NTU
Iron	<0.01	mg/l
Manganese	<0.01	mg/l
Arsenic	<0.001	mg/l
Cadmium	<0.001	mg/l
Barium	<0.001	mg/l
Zinc	<0.02	mg/l

TABLE 3.5.1.3

SECONDARY TREATED EFFLUENT RESULTS
BROWARD COUNTY UTILITIES DIVISION NORTH REGIONAL
WASTEWATER TREATMENT PLANT
FEBRUARY 22, 1984

Dissolved Oxygen	3.0 - 3.2 mg/l
pH	6.9 - 7.1
Temperature	77 - 79°F
Total Chlorine	.6 - 2.12 mg/l
Free Chlorine	0
Total Coliform	320 colonies/100 mls
Fecal Coliform	<10 colonies/100 mls
BOD	3.9 mg/l - nitrogen inhibited
COD	42 mg/l
Dissolved Solids	195 mg/l no NaCl
Suspended Solids	8 mg/l
Turbidity	3.7 NTU's
Total Nitrogen	9.34 mg/l as N
Total Phosphorus	3.47 mg/l as P
Cyanide	.02 mg/l
Oil & Grease	<1 mg/l
MEAS	.114 mg/l
Phenols	.0054 mg/l
Arsenic	<.001 mg/l
Cadmium	<.005 mg/l
Chromium	<.05 mg/l
Copper	<.02 mg/l
Lead	<.1 mg/l
Mercury	<.0002 mg/l
Nickel	<.04 mg/l
Silver	<.01 mg/l
Zinc	<.06 mg/l

3.5.1.5 Injection Wells

Injection wells are not included in the design of the facility.

3.5.2 Domestic/Sanitary Wastewater

All sanitary wastewaters from the facility will be discharged directly to the County sewer main without pretreatment. Approximately 5 gpm of typical human sanitary wastewater will be discharged.

3.5.3 Potable Water Systems

All potable water requirements will be supplied by the Broward County Utilities Division. No treatment is anticipated for non-processed water applications (i.e., sanitary uses). Approximately 5 gpm of typical human sanitary wastewater will be discharged without treatment directly to the County sewer main.

3.5.4 Process Water Systems

Boiler water makeup (130 gpm) and service water (5 gpm) will be supplied from the Broward County Utilities Division potable water system. Service water (i.e., site washdown water, etc.) will receive no pretreatment. Boiler water makeup will be demineralized and then chemically treated prior to entering the boilers as follows:

- o Typical Boiler Water Treatment

- Iron Dispersant
- Phosphate
- Hydrazine
- Neutralizing/Filming Amines

- o Demineralizer Regeneration

- H_2SO_4 (leaves H^+ ion on cation resin: H^+ ion replaces cations in water)
- $NaOH$ (leaves OH^- ion on anion resin: OH^- ion replaces anions in water)

Process wastewater will be neutralized and either used as ash quench makeup water or discharged to the County sanitary sewer.

Cooling tower water makeup (1000 gpm) will be supplied from the Broward County Utilities Division secondary treated sewage effluent. The effluent will be pretreated with alum and clarified prior to going to the cooling tower. The recirculating cooling water will be chemically treated as follows:

o Typical Cooling Water Treatment

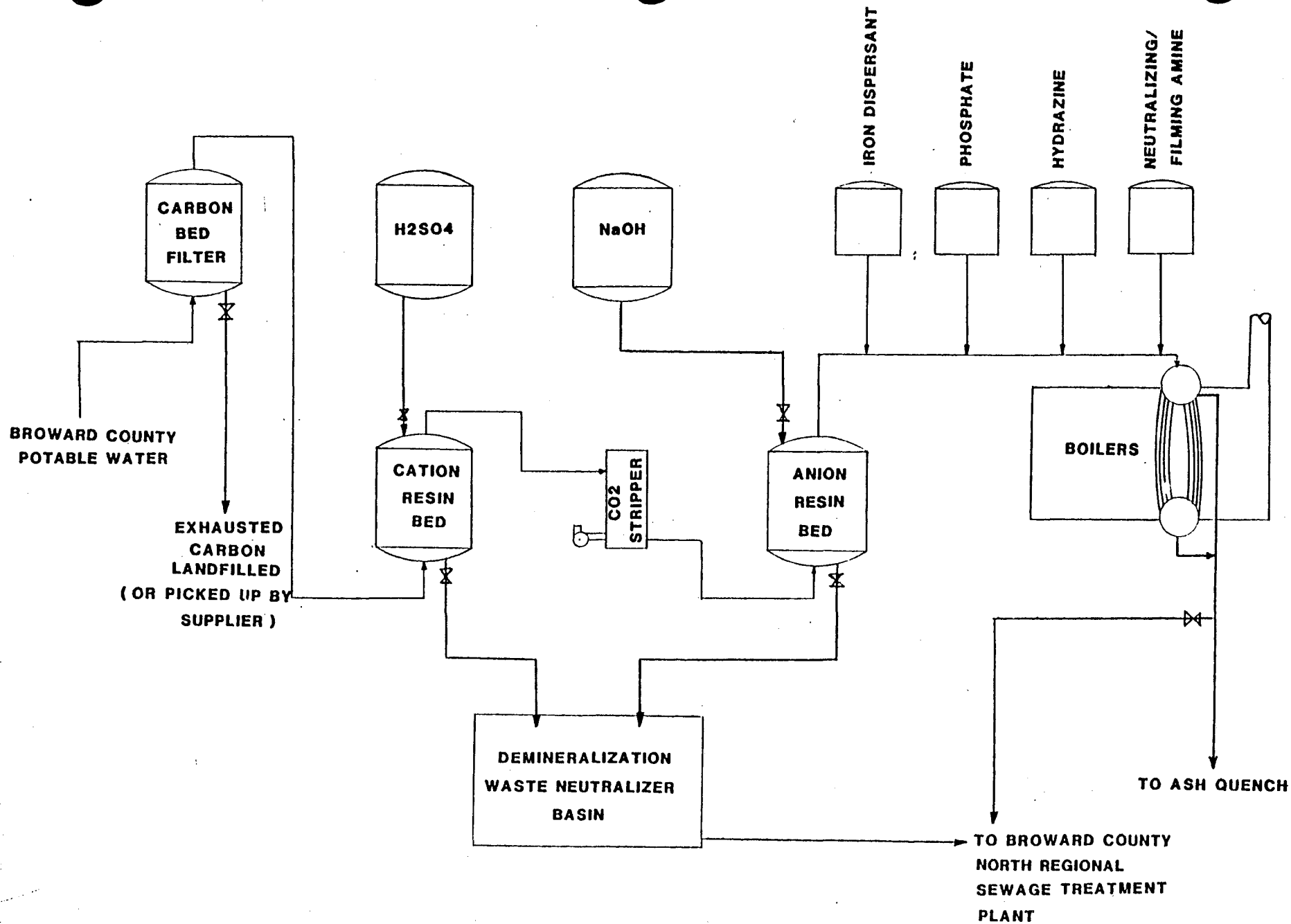
- Phosphate
- Acrylate
- Azole
- Chlorine (Periodic doses)
- Biocide (Periodic doses)
- H_2SO_4 (pH control)

Sludge from secondary treatment water will be discharge to the adjacent landfill. Cooling tower blowdown will be discharged directly to the county sewer.

3.6 Chemical and Biocide Waste

Provided in Figure 3.6.1 is a flow diagram of the chemical waste associated with the boiler water makeup. Potable water from Broward County Utilities Division will be passed through an activated carbon bed to remove chlorine and organics. Exhausted carbon will be picked up by the vendor supplying the replacement carbon or the exhausted carbon can be landfilled (final arrangements have not been determined at this time). The water will then be passed through resin beds to remove cations (Na, Ca, Si, Fe, etc.) and anions (CO_3 , SO_4 , Cl, etc.). Sulfuric acid will be used to regenerate the cation resins by replacing the cations with hydrogen ions. Caustic will be used to regenerate the anion resins by replacing the anions with hydroxyl ions. The acid and caustic wastes will be discharged to a basin, neutralized and then discharged to the County sewer. The demineralized water will then be chemically treated with an iron dispersant (prevents iron deposition), phosphate (prevents catonic deposition),

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**BROWARD COUNTY
FLOW DIAGRAM OF THE CHEMICAL WASTE
ASSOCIATED WITH
THE BOILER WATER MAKEUP**

hydrazine (chemically converts oxygen to water) and a neutralizing/filming amine (protective filming agent for metals). Blowdown from the boiler will be used as ash quench water makeup with any excess going directly to the County sewer.

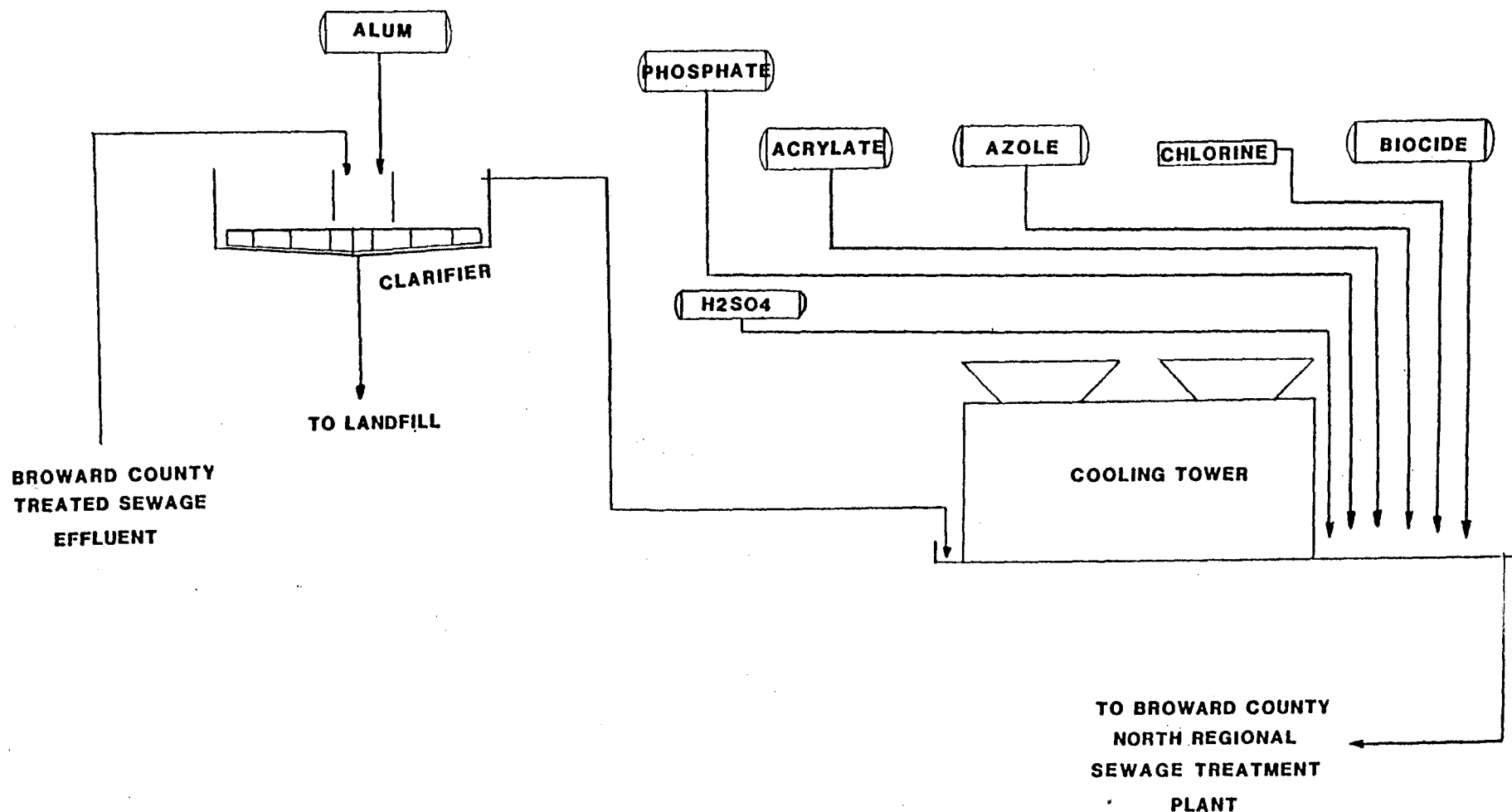
Figure 3.6.2 contains a flow diagram of the chemical waste associated with the cooling tower water makeup. Secondary treated sewage effluent from the Broward County Utilities Division will be mixed with alum and settled in a clarifier to reduce the water's phosphorus content. Sludge from the clarifier will be landfilled. The clarifier water will be then treated with sulfuric acid (pH control), polyphosphate (dispersant for iron), acrylate polymer (prevent CaPO_4 , MgPO_4 and ZnPO_4 precipitation) chlorine (microorganism control) and biocide agent (biocide control). An inhibitor may be used depending on final selection of the condenser metallurgy. Blowdown from the cooling tower will be discharged directly to the County sewer.

Since all chemical and biocide waste will be discharged to the Broward County North Regional Wastewater Treatment Plant for treatment, no local environmental impact will occur as a result of water plant operation.

3.7 Solid and Hazardous Waste

Anticipated solid waste generation from the facility will be in the form of ash residue. As indicated in previous sections, disposal of ash residue will be at a landfill located adjacent to the resource recovery plant.

Although these waste streams will be disposed of in the most efficient and environmentally secure manner, there still exists the possibility for recycling some of the waste products. For example, water used for the facility's operations will be cooled and recycled through the facility for other operational users such as ash quenching. Ash residue has been used on an intermittent basis in other cities and countries



**BROWARD COUNTY
FLOW DIAGRAM OF THE CHEMICAL WASTE
ASSOCIATED WITH
THE COOLING TOWER WATER MAKEUP**

as an aggregate base for road construction. Although consideration has been given to this type of reuse, additional research concerning its environmental impacts is required.

3.7.1 Solid Waste (Ash Residue)

Sources of Solid Waste

Solid waste in the form of ash residue is generated at three points in the proposed resource recovery facility. In each case, waste is conveyed from its point of generation to an ash quench tank for the purpose of cooling the ash, facilitating its handling, preventing fugitive dust emissions and serving as a seal to prevent air from leaking into the grate area through the ash discharge chute.

It is anticipated that ash will be generated at approximately 35 cubic yards per hour with four boilers operating at their initial installed capacity. The four points at which ash residue waste is generated and collected are as follows:

- o Bottom-Ash - Burnout is achieved as waste is tumbled along the grates and kiln which comprise the stoker system. The residue passes through the kiln and falls off into the residue extractor trough below. A siftings hopper under the stoker system will catch siftings that fall through the grate bars. The siftings will then be gravity-discharged onto a vibrating conveyor which transfers the siftings to the ash quench tank.
- o Boiler Fly Ash - A substantial amount of entrained particulate material (fly ash) carried by the combustion gas leaving the grate enclosure is removed in the boiler. The boiler is equipped with hoppers and valves for removing the accumulated fly ash while the boiler is in operation. Material collected in these hoppers is transferred by screw conveyors to the residue extractor trough.
- o Electrostatic Precipitator Fly Ash - Fly ash remaining in the flue gas as it leaves the boilers is removed in electrostatic precipitators. This reduces its particulate concentration to the level required by environmental regulations. The fly ash is collected in hoppers at the bottom of the precipitator and is conveyed to the ash quench tank.

3.7.1.1 Handling System for Ash Residue

Ash from the combustion process falls from the rotary kiln into a quench trough from which it is removed by an drag chain conveyor. For reliability, the quench trough and conveyor system is fully duplicated. The makeup water required for the quench trough is supplied from boiler and cooling tower blowdown. The drag chain conveyor carries the ash up to an elevated transfer tower. The cooled ash then falls onto one of two redundant belt conveyors for transport to either a loading station for the landfill haul vehicles, or to stockpiles for night operations (Figure 3.2.1.6).

Fine particles which fall through the grates will be collected in hoppers below the grates and transported by enclosed vibrating conveyors to the quench trough, where it is mixed with ash from the rotary kiln. The fly ash collected in the boiler sections is conveyed by means of rotary valve and screw conveyors to this area also. The fly ash separated in the electrostatic precipitator is also transported via screw conveyors to the bottom ash collection area. The fly ash collected in the boilers and ESP's is combined with the bottom ash before leaving the plant area.

Following are the anticipated technical specifications for components of the ash handling system:

- o Quenching Tank/Basin/Trough

Number per Furnace/Boiler	2
Dimensions (LxW) ft.	200 x 8
Capacity (cu.ft.)	6,500

- o Conveyors

Bottom Ash:	
Type	Drag chain
Capacity (tons/hr)	25
Fly Ash:	
Type	Screw

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Capacity (tons/hr)	1.1
o Ash Bunker	
Dimensions (LxWxH) ft.	Two: 75 x 75 x 15
Capacity (tons)	1,500
o Overhead Cranes for Ash Handling	
Number	None
Capacity (tons)	N/A

3.7.1.2 Disposal of Ash Residue

Residue generated and collected at the resource recovery facility will be transferred by transfer truck to the residue/unprocessable waste landfill located adjacent to the facility.

The combined ash residue is required to meet the following criteria:

- o Putrescible content: 0.3% by dry weight.
- o Moisture content (excluding free liquid): 30% by weight.
- o Bulk density (lbs/cu.ft.) 70
- o Combustible content: 4.0% by dry weight.

3.7.2 Hazardous Waste

As previously mentioned, no hazardous materials will be accepted at the facility for disposal. Operators of delivery vehicles will be asked the source of the solid waste at the facility weigh station. Personnel will be present on the tipping floor and in the control room observing the dumping of garbage into the storage pit. Deliveries with a high probability for containing pathological wastes or hazardous wastes, because of the nature of the source or generator of the wastes, will be periodically inspected by facility personnel. Also, any suspicious trucks will be required to dump their loads on the tipping floor and the contents inspected.

The above method is used by mass burn facilities in the United States and has proved to be a very effective way of preventing pathological and hazardous wastes from entering the process stream.

Waste Management, Inc. has supplied the data presented in the table below. Predicted values are from combustion and heat transfer calculations for average conditions at nameplate capacity (550 tpd) of each furnace unit firing solid waste with a higher heating value of 4,500 btu/lb at 100% excess air.

WASTE MANAGEMENT, INC.
ESTIMATE OF FURNACE/BOILER CONDITIONS
NORTH BROWARD COUNTY RESOURCE RECOVERY FACILITY

<u>Elevation Above Grate</u>	<u>Cumulative Residence Time (sec)</u>	<u>Temperature (°F)</u>
Feed Grate #1	0.00	960
Feed Grate #2	0.76	2005
Feed Grate #3	1.24	2110
Rotary Kiln	1.88	2280
Gas By-Pass	1.92	1850
Afterburn Chamber	2.75	1800

The ash residue will be tested periodically to insure conformance with the Federal Resource Conservation and Recovery Act standards. Testing and characterization of ash residue produced by mass-burn resource recovery facilities in the United States has been limited to date but, research is continuing.

3.8 On-Site Drainage System

3.8.1 General

The Project site is a 25 acre facility located on the north side of the C-14 east drainage basin. On-site drainage will be controlled by a wet detention system in accordance with the guidelines of The South Florida Water Management District (SFWMD) "Management and Storage of Surface Waters Permit Information Volume IV". The design calculations are provided in Appendix 10.11.

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We are seeking a certification condition that detailed design drawings relocating the drainage ditch and indicating the flow drainage be provided to SFWMD for review and approval prior to facility construction.

3.8.2 Water Quality Design Criteria

SFWMD water quality guidelines for wet detention areas requires a volume for the greater of the first inch of runoff from the developed project or the total runoff from a 3 year, 1 hour rainfall. This required volume will be stored in a 1.4 acre wet detention basin. Discharge of the 3 year 1 hour rainfall runoff will be through a bleed-down V-notch in a weir that will be sized to discharge no more than one-half of the detention volume in 24 hours.

3.8.3 Peak Discharge Criteria

Detention for the 25 year storm will be provided by the 1.4 acre detention basin plus storage provided by the 3 acre drainage swale and catch basin system. The peak discharge from the 25 year 72 hour design storm will be regulated by a weir to limit discharged to the maximum value allowed for the C-14 canal drainage basin.

3.8.4 Seasonal Water Table Elevations/Control Elevation

Water levels in the C-14 canal at pump station S37B are at a maximum elevation of 8.0 NGVD for the dry season and 7.0 NGVD for the wet season. Groundwater levels in the area fluctuate during the various seasons with maximum ground water occurring during the fall months. Design high ground water table for the resource recovery site will be 9.0 NGVD and is based upon the ground water values used for the permitted adjacent landfill facility.

3.8.5 Resource Recovery Facility Drainage Control

All rainwater runoff for the facility will be collected by a drainage swale and catch basin system that transports all water to the on-site wet detention basin. Disposal of detained water will be accomplished through a weir system that

discharges into a canal adjacent to the site. Release will be gravity controlled with the rate of discharge in accordance with SFWMD criteria. The detention basin will be a 1.4 acre facility located along the north side of the plant. The outfall structure for the site will be located on the east side of the detention basin and will be a reinforced concrete broad crested weirs. The 3 year design storm is detained for water quality purposes with a weir crest elevation of 10.2 NGVD. During the 25 year-72 hour storm the water level in the pond will rise to elevation 13.0 NGVD and will be discharging through the 10 inch wide weir at a maximum rate of 15.5 cfs. Discharge from the weir to the canal will be conveyed via 24 inch diameter reinforced concrete pipe. The water level in the pond will be returned to the control elevation of 9.0 NGVD with a V-notch bleeder slot in the weir. The berms for the pond will be constructed to an elevation of 13.5 NGVD to provide a 0.5 foot freeboard for the maximum water elevation. The basin side slopes will be 4 horizontal to 1 vertical and will be grassed to prevent erosion. All building floor elevations shall be set at a minimum elevation of 14.0 NGVD to provide protection for the 100 year flood. This elevation was based upon design charts supplied by SFWMD.

3.9 Materials Handling

3.9.1 Facility

No heavy equipment such as large cranes, plant components such as boilers, or other voluminous materials will be transported to the site, unloaded, stored, or moved around the site during normal operation or maintenance of the facility. Most equipment will be positioned inside the facility's buildings, and most maintenance will be carried out within the building except for routine painting, electrical work, and minor maintenance. The area where the steam turbogenerator is housed will have an overhead crane for maintenance of the turbogener-

TABLE 3.9.2.1
EQUIPMENT LIST

Ash Handling

1 Caterpillar 980 F.E.L.
1 Caterpillar 966 F.E.L.
3 Dump Trucks
1 Street Sweeper

ator. The solid waste and residue will be hauled in trucks.
Section 5.9 describes and analyzes the impact of the truck
traffic.

**EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED
FACILITIES CONSTRUCTION**

SECTION 4

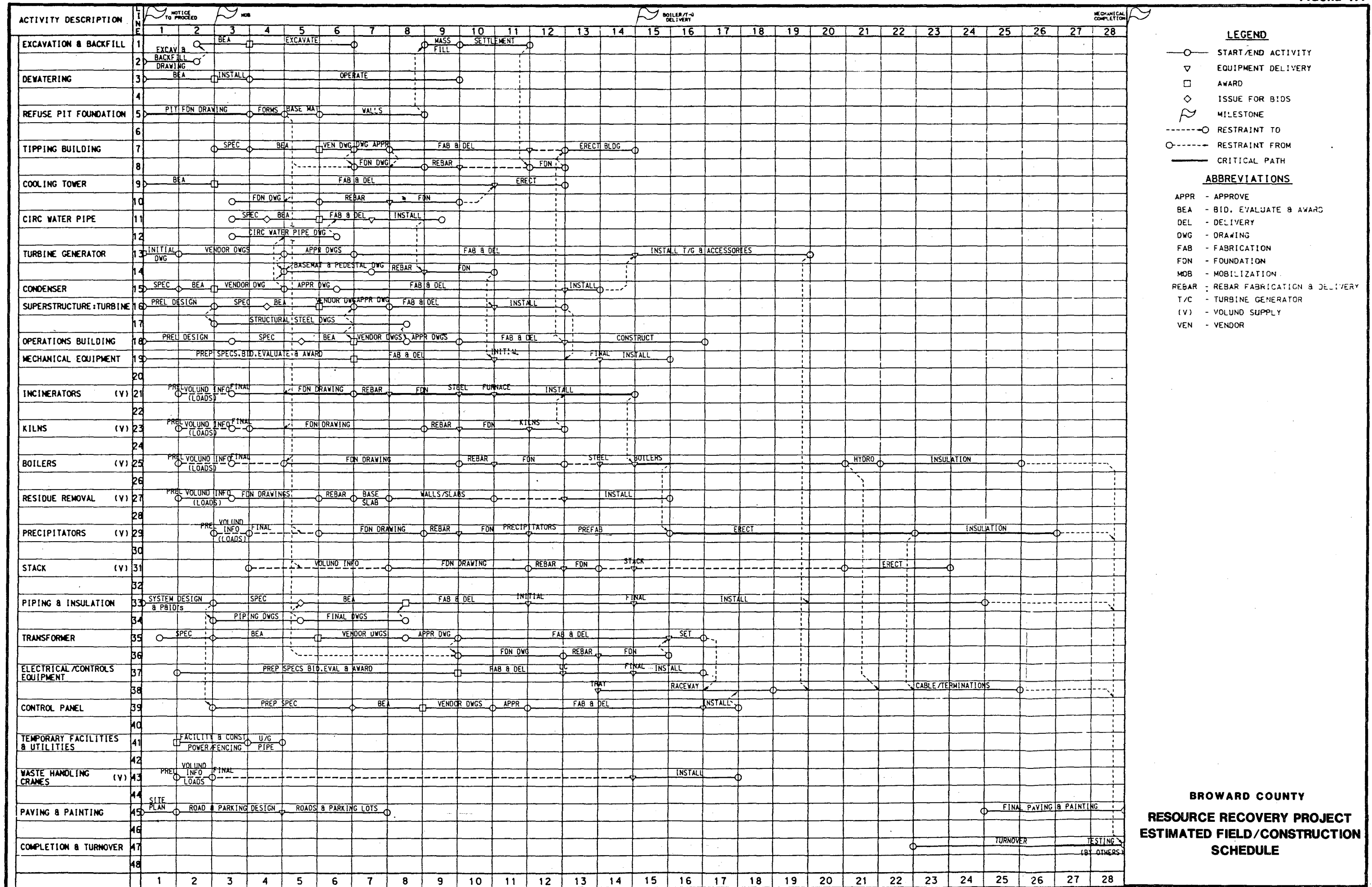
ENVIRONMENTAL EFFECTS OF SITE PREPARATION AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

Introduction to Construction Phases and Activities

It is anticipated that the construction period for the Northern Broward County Resource Recovery Facility will be approximately 28 months. Initially, there will be a seven-month period for preparation of final process, civil, and structural design and the design and purchase of major equipment. This would be followed by an intensive 16 month construction phase. After construction, there will be approximately five months of personnel training, equipment testing, plant start-up shakedown.

The principal construction phases for the resource recovery facility will include site preparation (site clearing and preparation, grading, excavation, pile driving and back-filling), facility construction (foundations, building and process equipment erection, electrical and mechanical systems installation, instrumentation), and finalization (road construction and paving, equipment start-up and testing, final grading, landscaping and cleanup). Possibly the completion of the final construction activities will extend into the shakedown period.

Figure 4.1 is a graphic representation of the expected progression of field construction activities. This figure indicates the activities that will be involved in the construction of the resource recovery facility and the estimated time required for completion of each activity. The environmental effects of the construction activities are presented in the following sections.



4.1 Land Impact

4.1.1 General Construction Impacts

4.1.1.1 Land Disturbance

The amount of land which will be disrupted by construction is approximately 25 acres. The existing terrain will be disturbed by the following activities.

1. Initial Site Preparation and Clearing

The site will be cleared, grubbed, and graded to provide proper drainage. Topsoil will be stripped from all areas to be cut and filled and stockpiled in designated areas of the site. Borrow will be obtained from off-site as necessary. The drainage ditch will be relocated to the eastern side of the site.

2. On-Site Excavation and Filling

Excavation will be required for the retention pond, the area for the switchyard, building areas, refuse bunker, cooling tower and all roads up to the limit of the backfill. Excavated soil that is unsuitable for fill material will be stockpiled for use as landfill cover or wasted in designated areas on the site. The stockpile and waste areas will be graded to drain properly. The fill area will be constructed of approved earth or friable materials free of organic substances, spongy soil, or other objectionable material that would prevent satisfactory compaction. All fill will be compacted in accordance with applicable specifications.

3. Fill Placement for Tipping Floor

Coincident with the excavation activities will be the placement of backfill required for the elevation of the tipping floor and its associated access ramps.

The site is comprised of basically a flat terrain and therefore, minimal erosion during construction is anticipated. The erosion that will occur can be controlled by various methods. They include the use of netting, sodding or mulch seeding, as well as leaving exposed areas bare for as little time as possible during construction.

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4.1.1.2 Staging, Material, Lay-Down, and Work Force Parking Areas

The staging, materials lay-down, storage, and parking areas must be directed to areas where there are minimal construction activities. Areas west and east of the resource recovery facility will be utilized as materials lay-down areas due to their closeness to the facility and site entrance. These locations will minimize the level of traffic near the center of construction and reduce the handling distances for construction materials. A construction office and general work force parking area will be located adjacent to the site entrance. Locating the parking area near the site entrance will minimize traffic interference. Figure 4.1.1.2.1 indicates the construction support areas in relation to the construction areas.

4.1.1.3 Impact on Solid Waste Generation and Disposal

A variety of solid waste materials will be generated periodically throughout each of the construction phases of the resource recovery facility. These wastes will include vegetation, trees, concrete, metal, paper, trash and oils and fluids required for equipment operations. They will be disposed of off-site.

The initial clearing of the facility will produce vegetative matter and wood and concrete debris. These types of wastes will be generated by the removal of vegetative ground cover, trees and demolition of a structure located on the north central portion of the site. All the debris will be hauled to the adjacent landfill for disposal.

As a result of equipment maintenance and various construction activities, waste oils and solvents will be generated on-site. The rate of generation for waste oil will be approximately two to three drums (55 gallon barrel) every three months. Waste solvent on the other hand will be generated mostly during certain phases of equipment installation, e.g.,

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[illegible]

BROWARD COUNTY
RESOURCE RECOVERY PROJECT
STAGING MATERIAL LAY DOWN
AND WORK FORCE AREAS

pipng and electrical systems where solvent generation could be two to three times that of oil. The waste oil and solvents will be stored in 55 gallon drums, contained in a bermed area, covered with a weather-proof canvas and properly labeled. Properly licensed contractors will transport and dispose of these wastes every two to three months as required under the Resource Conservation and Recovery Act manifest system.

A total of approximately 250 tons of solid wastes will be generated over the duration of construction. The pattern of waste generation follows the type and level of activities occurring on-site (Figure 4.1.1.3.1). During site preparation and clearing there will be an initial peak, which will then be followed by a waste generation drop and then by an increase which coincides with the actual construction and installation activities.

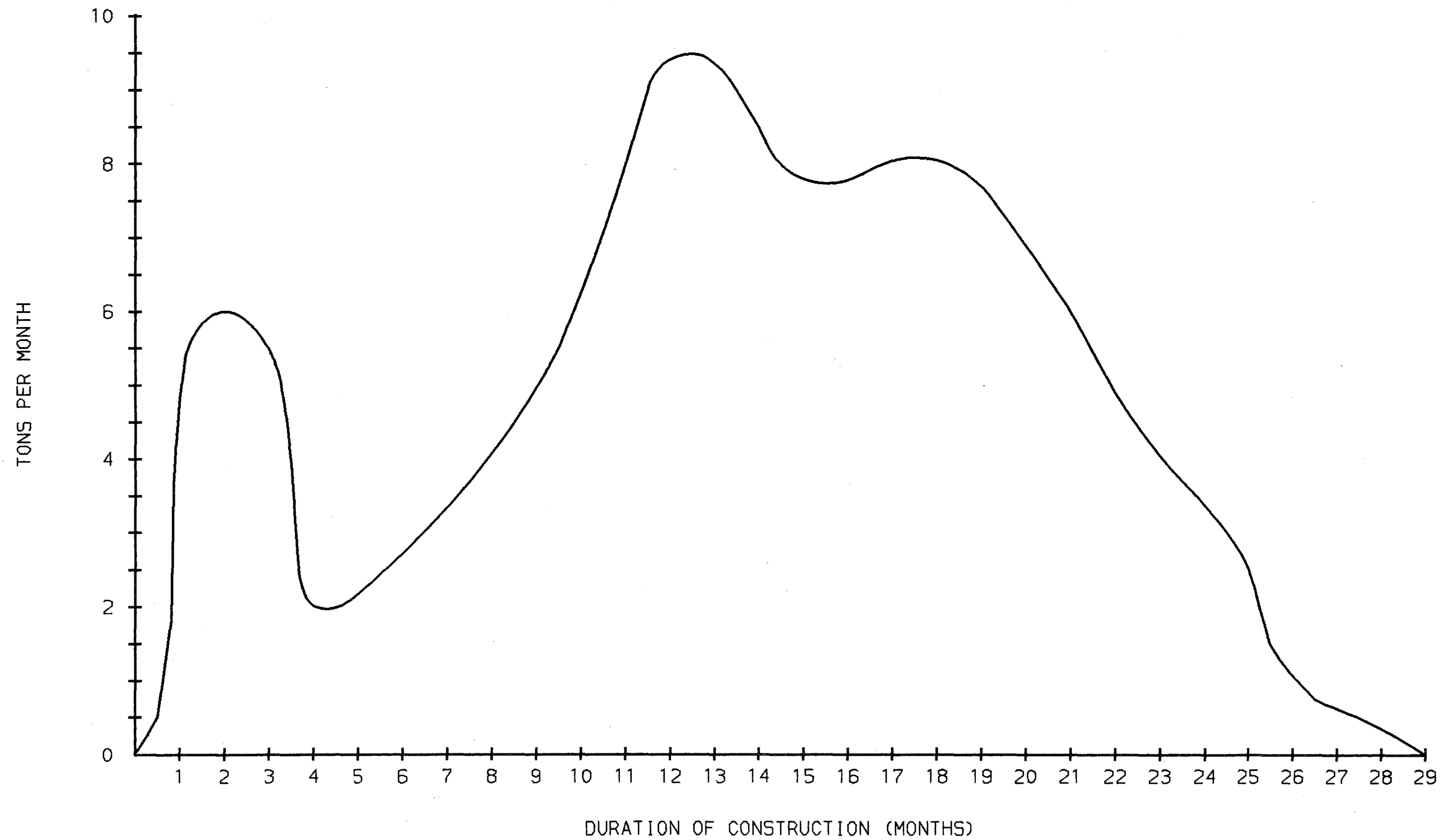
4.1.2 Roads

On-site access roads will be the only roads constructed for this Project. These access roads will be paved. Soil holding vegetation will be indigenous grasses.

Roadways will be designed at a minimum to provide a 12 foot asphalt pavement width per lane with a 4.0 foot shoulder on each side. Roadways will meet Florida Department of Transportation Manual Standards. The shoulders will be sodded and the sideslopes constructed at a maximum slope of 3 horizontal to 1 vertical. Roadway sideslopes and swales will be covered with 6 inches of topsoil and seeded immediately to reduce surface erosion.

Access roadways to the remaining portions of the areas to be landfilled, around the retention ponds, etc., provide for one-way traffic movement on a single lane 12 foot paved asphalt surface with 4.0 foot shoulders.

During construction, on-site access roads will be adequately wetted to minimize wind erosion and dust generation as needed. Chemical binders will be used only as required. The specific binders have not yet been identified.



BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ESTIMATED SOLID WASTE GENERATED
DURING CONSTRUCTION

4.1.3 Flood Zones

Proposed structures are to be placed above the 100-year flood plain; therefore, the Project will be constructed in compliance with local flood program regulations. The 100-year flood plain map, with site location, is presented in Figure 2.1.4.1.

4.1.4 Topography and Soils

The construction of a retention pond will alter the topography of the site. The retention pond will cover approximately 1.25 acres and will be dredged down to 4-7 feet.

Roads and buildings will cover more and more of the site as construction progresses. Approximately 339,925 square feet of impervious surfaces will cover the site by the end of construction. Buildings will cover approximately 197,250 square feet and roads and parking lots will cover approximately 192,675 square feet.

Due to these impervious surfaces the drainage features and percolation rates of the site will change, but the total runoff volume will not be substantially affected by the increase.

The subsurface conditions will be affected by the construction of the refuse bunker. The dimensions of the bunker will be 255 feet long, 100 feet wide and 28 feet deep. When the bunker is constructed, it will have to be excavated down to about thirty-three feet. Sheet piling will be used to shore up excavated areas, and load bearing piling will be installed underneath the areas of the main structure having the heaviest loads.

During construction berms will be constructed to contain water during filling. Sediment traps and screens will be strategically placed to trap runoff. All permanent berms constructed for the development will be grassed to prevent erosion. No discharge of sediment laden water will be made during construction.

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The changes in the site's drainage features or the planned construction activities will not result in the formation of any sink holes or result in any subsidence. Settlement will occur due to the increased load on soils by the planned backfilling, but it should be minor.

The use of piles to support heavy equipment will improve the bearing capacity of the site. The site's subsurface conditions should have no long-term problems due to the construction.

Aesthetically the construction activities will have some temporary negative impacts on nearby residences, but the visual impacts should be limited due to the distance to the closest residential area. Backfilling activities to bring existing grade up to + 34 feet MSL for the planned tipping floor will result in activities occurring above existing ground levels. A minor visual impact will result from the backfilling operation and resulting mounds.

4.2 Impact on Surface Bodies and Uses

4.2.1 Impact Assessment

No impact upon surface waters will result due to site preparation and construction activities nor shall any use of water bodies be made during plant construction.

4.2.2 Measuring and Monitoring Programs

Since no water bodies will be impacted by the construction or operation of the plant, no measuring and monitoring program will be required.

4.3 Groundwater Impacts

4.3.1 Impact Assessment

The chemical quality and physical condition of the local groundwaters will not be significantly affected by site

preparation or construction. The construction of the facility will have no significant impact on groundwater levels either on or off site.

Site dewatering may be necessary prior to construction of the refuse pit. If dewatering is necessary excavated material will be used to build a holding pond on the site for the water extracted in the dewatering process. The water will be allowed to percolate back into the ground. Detailed construction plans for this Project have not yet been completed so the amount of dewatering, if any, which will be required has not yet been established.

4.3.2 Measuring and Monitoring Program

Since the chemical quality or physical condition of the local groundwater will not be significantly affected by site preparation or construction, no measuring and monitoring programs will be required. Both groundwater and surface water monitoring is already done on an extensive basis in the area of the site because of its proximity to the Central Disposal Landfill.

4.4 Ecological Impacts

4.4.1 Impact Assessment

Almost the entire site will be modified from its existing state. This will be the result of actual facility construction, site grading for drainage, preparation of a retention basin, and final site landscaping. The ecological features of the site will be modified as a result of construction, but the site has been previously cleared, scraped, and bulldozed. Any fauna displaced by construction can move to adequate habitat adjacent to the site without serious detriment. The construction activities will have a very minor overall effect on both on and off-site local ecosystems.

4.4.2 Measuring and Monitoring Programs

No monitoring programs are required based upon the data presented in Section 2.3.6 and conclusions presented in Section 4.4.1.

4.5 Air Impact

4.5.1 Fugitive Dust and Mobile Source Emissions

Short-term and local air quality impacts are caused by land clearing, site preparation and emissions from construction equipment. These air quality impacts will vary during each phase of construction, with the greatest impact for fugitive dust occurring during the site preparation phase when approximately 20 acres (Table 4.5.1.1) of the facility will be exposed, and the greatest emission impacts from mobile sources occurring during the construction phase (Table 4.5.1.2) when the amount of equipment on-site is the greatest.

4.5.2 Mitigation Measures

For the impacts described in the preceding section a number of mitigation measures are available to minimize the impacts. If the following practices are carried out, particulate emissions can be reduced significantly.

- o Particulate matter from unpaved roads:

- Routine watering of the roadway would provide at least a 50% reduction in emissions
- Penetrating chemicals sprayed on the surface can also provide a 50 percent reduction in emissions. However, chemical spraying would cost more than watering.
- Paving the roads would provide up to an 85 percent reduction in emissions. This can be done by either soil compaction and adding base coarse material or by soil stabilization with an asphalt cap.

TABLE 4.5.1.1

CONSTRUCTION ACTIVITIES IMPACTING FUGITIVE DUST

Construction Phase	Anticipated Areas to be Exposed Simultaneously	Estimated Area of Land Cleared (Acres)
SITE PREPARATION	Relocation of Drainage Ditch	1
	Retention Pond	7.5
	Access Roadway Stripped to Subgrade	7.2
	Backfill Embankment	7.1
	Miscellaneous (Staging Area, Employee Parking, Materials, Lay Down Area, etc.)	4.3
FACILITY CONSTRUCTION	Access Roadway Stripped to Subgrade	7.2
	Backfill Embankment	7.1
	Miscellaneous (Staging Area, Employee Parking, Materials, Lay Down Area, etc.)	4.3
FINALIZATION	Estimated Area to be Exposed at One Time Due to Landscaping and Final Grading	11.0
	Miscellaneous (Staging Area, Employee Parking, etc.)	4.3

TABLE 4.5.1.2
CONSTRUCTION ACTIVITIES IMPACTING NOISE AND EMISSIONS
FROM CONSTRUCTION EQUIPMENT

Construction Phase	Activities Occurring Simultaneously	Anticipated Operating On Site	Relative Location of Equipment On Site
SITE PREPARATION	Relocation of Drainage Ditch	1 Backhoe 1 Dozer 1 Grader 2 Trucks	Localized
	Sheet Pile Driving for Refuse Bunker	1 Pile Driver 1 Front End Loader	
	Refuse Bunker Excavation	2 Backhoes 7 Trucks	Localized
	Placement & Compaction of Fill for Tipping Floor	2 Dozers 3 Trucks	Spaced 500 Ft. Along Access Road
FACILITY CONSTRUCTION	Concrete Placement	1 Pump 2 Saws 3 Vibrators 3 Trucks	Localized Spaced 500 Ft. Along Access Road
	Structural Steel Erection	2 Cranes 2 Dericks 4 Pneumatic Tools 2 Welders 1 Compressor	Localized Within A 200' Radius
	Major Equipment Installation	2 Cranes 1 Fork Lift 2 Generators 8 Pneumatic Tools 2 Compressors 3 Welders	
FINALIZATION	Scale Installation	1 Crane 2 Pneumatic Tools 1 Compressor 1 Welder & 1 Generator	Localized
	Paving of Access Road	1 Paver 2 Trucks	Mobile Along Paved Roadway
	Landscaping and Final	1 Dozer 1 Grader	Transit Over Entire Site

- o Particulate emissions across open and active construction areas:
 - Watering of the site would reduce emissions by 50 percent.
- o Particulate emissions from completed cut and fill areas:
 - Planting vegetation as soon as possible can reduce emissions between 65 and 85 percent.
 - Applying chemical binders also can reduce emissions between 65 and 85 percent.

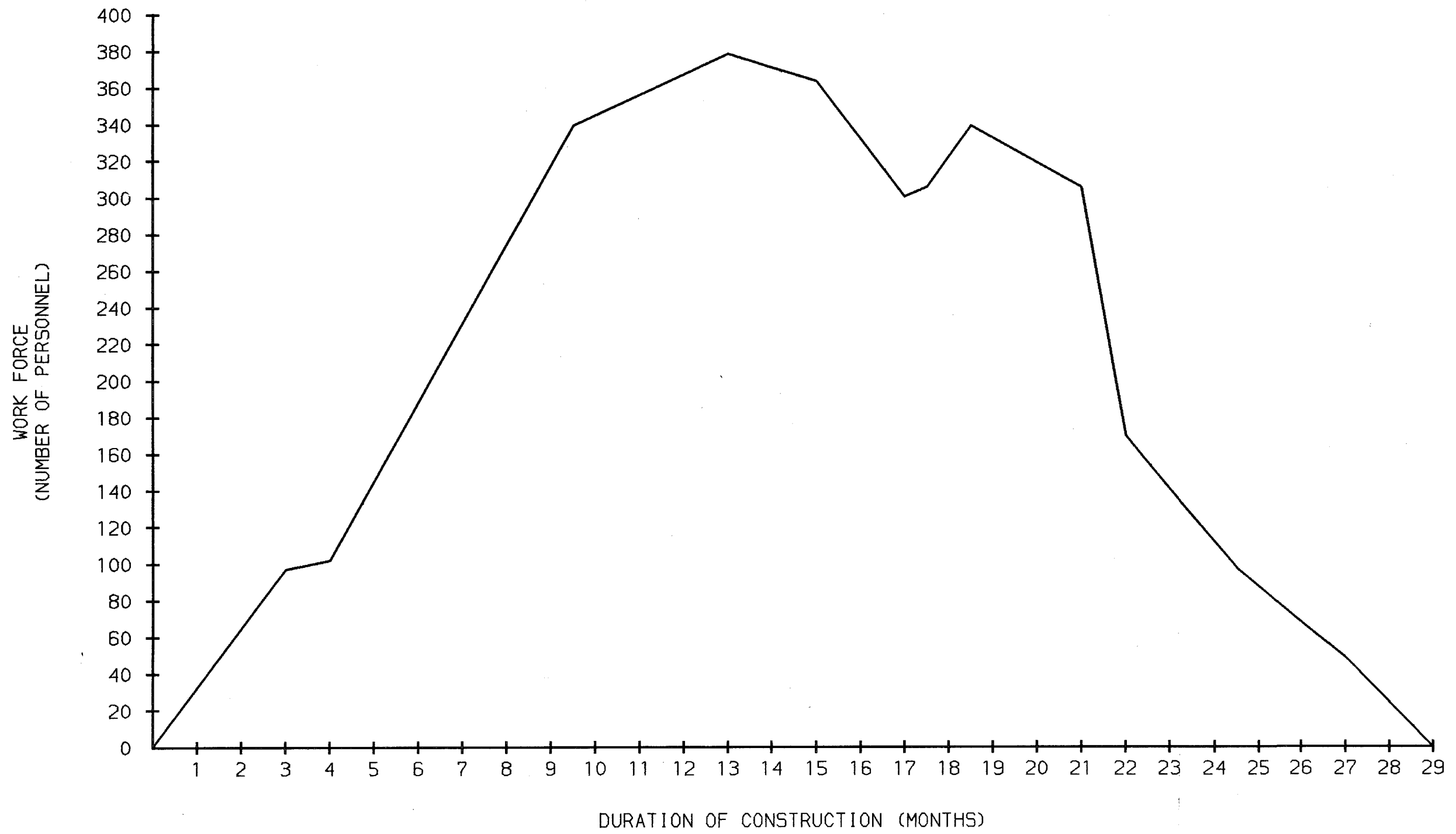
4.6 Impact on Human Populations

4.6.1 Sensitive Receptors

In Section 2.2, Socio-Political Environment, land use and demographic features were discussed in detail. The area around the site is used mostly for industry and recreation. These land uses are not considered sensitive receptors for this report. The nearest sensitive receptor is the residential area east of Powerline Road.. This area would be impacted temporarily most by traffic, noise and fugitive dust during the construction of the facility. There are no hospitals; churches or schools in the vicinity of the site.

4.6.2 Work Force

The estimated total peak construction work force will be approximately 380 personnel. The initial phase of construction (site clearing, access roads and excavation of retention pond) will require a work force of approximately 100 personnel for the first 6 months. From the ninth month to the twenty-second month the work force should increase to about 500 and average from 340 to 380 personnel. The estimated work force requirements are presented in Figure 4.6.2.1. The work will mainly take place on an eight hour per day shift, five days a week but some night time and weekend work can be expected.



BROWARD COUNTY
RESOURCE RECOVERY PROJECT
ESTIMATED WORK FORCE REQUIREMENTS
DURING CONSTRUCTION

The County's local economy and labor market will benefit from the project. Proposals submitted by potential vendors include provisions for hiring local construction labor and contractors. Preliminary commitments with the local labor force have been established through a National Industrial Construction Agreement. No major relocation of construction workers and families is anticipated. Therefore, no impact on available housing, schools or other community support assets is expected.

It is anticipated that local construction and equipment suppliers will realize both direct and indirect benefits from both the construction and operation of the resource recovery facility.

4.6.3 Traffic Associated with Construction

Traffic due to construction will enter and exit the site by way of Hilton Road (N.W. 48th Street). This traffic will consist of the daily work force, delivery of construction equipment and delivery of construction materials (Figure 4.6.3.1).

The general work force traffic will average about 80 vehicles per day for the first eight months, and then average about 350 vehicles per day for the next sixteen months. After the twenty-fourth month, the general work force traffic will fall off as construction is completed. The greatest impact of this traffic will occur at the start of the work day at 7:00 A.M. and at the end of the work day at 4:00 P.M.

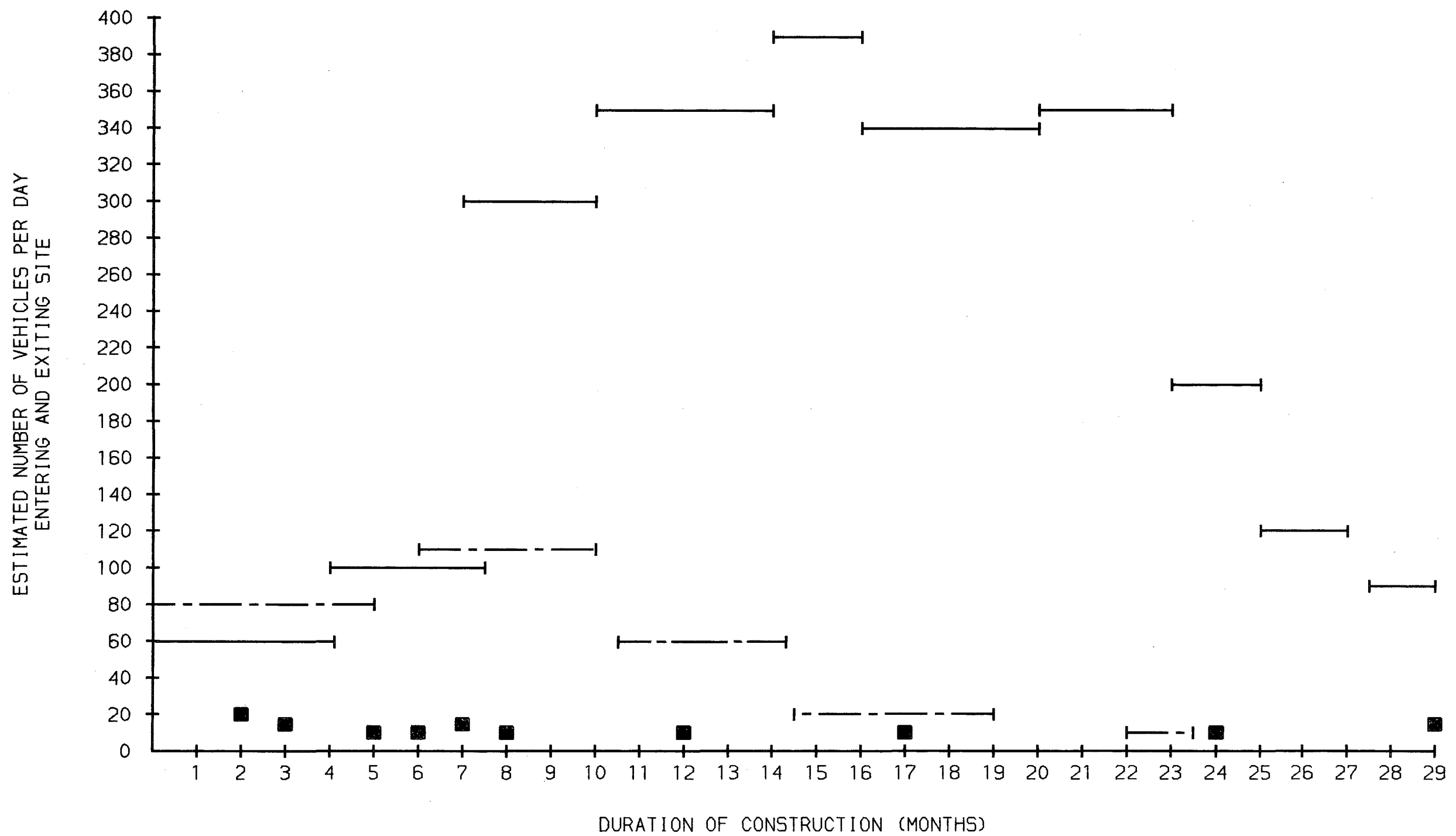
The traffic caused by the delivery and removal of construction equipment will be spread out over the duration of construction. Most of the equipment will be delivered at the start of site preparation, but other pieces will be delivered as needed. The impacts of this traffic will be of short duration of a few hours at a time.

The traffic caused by the delivery of construction material will average about 100 vehicles per day for the first

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BROWARD. TRAFFIC

<SY5B-3>C.448061000>C.448061190>S.BROWARD. TRAFFIC on 07 MAR 1985 at 10:43:53 by MCKENN



LEGEND: TRAFFIC CATEGORIES
WORK FORCE ———
CONSTRUCTION EQUIPMENT ■
CONSTRUCTION MATERIALS - - -

BROWARD COUNTY
RESOURCE RECOVERY PROJECT
TRAFFIC ASSOCIATED WITH PLANT CONSTRUCTION

ten months and then drop off to about sixty vehicles per day for the next nine months. The impacts of this traffic will be spread over the work day.

The maximum traffic during construction for all three categories will be approximately 400 vehicles per day. This will reduce the available capacity of N.W. 48th Street (Hilton Road) early morning and late afternoon but will not result in any unacceptable roadway capacity problems. A more detailed analysis on traffic is presented in Section 5.9.

4.6.4 Noise

Noise emissions from the proposed facility will not significantly impact the surrounding community and will meet standards of working condition comfort for on-site personnel. During the design phase, noise abatement features will be incorporated into the design. During the construction phase, temporary intrusive noise emissions will be controlled by the use of noise-attenuating devices (e.g. mufflers) or equipment, barriers and by ensuring compliance with vehicle noise regulations. Major noise-producing construction activities will be confined to normal working hours.

4.7 Impact on Landmarks and Sensitive Areas

The Project will not have an impact on landmarks or sensitive areas.

4.8 Impact on Archaeological and Historic Sites

As stated in Section 2.2.6, The State of Florida, Division of Archives, History and Records Management stated that there are no known or potential historic or archaeological resources at the site. Therefore, there will be no construction impacts on archaeological or historic sites.

4.9 Special Features

This section describes and discusses all special features associated with site preparation and plant and associated

facilities construction that may have an influence on the environment and ecological systems of the plant site and adjacent areas.

During construction there will be generated certain quantities of solid and liquid waste. This waste may take the form of earth spoils, discarded packaging materials, refuse produced by construction workers, sanitary wastes, or waste oils. To maintain the aesthetic and ecological integrity of the site and surrounding areas proper handling and disposal of these wastes on-site will occur.

4.10 Benefits From Construction

Section 7, Economic and Social Effects of Plant Construction and Operation provides an analysis of social and economic benefits arising from plant construction. Specifically, these benefits include:

- o Adequate Disposal
- o Economic Viability
- o Environmental Security
- o Energy Production
- o Local Economy Stimulators, and
- o Social Enhancement.

4.11 Variances

No variances from standards or guidelines are anticipated for this Project.

EFFECTS OF PLANT OPERATION

SECTION 5
EFFECTS OF PLANT OPERATION

5.1 Effects of the Operation of the Heat Dissipation System

The design of the heat dissipation system, as discussed in Section 3.5, is based upon the utilization of a water cooled condenser. Condensate from the turbine-generator will be collected, processed and returned to the deaerator. A dump condenser will be installed so that the facility can bypass the turbine (when out of service for maintenance) and condense the total output of all boilers under maximum steam generation. The condensing system will incorporate a flexible design to enhance operation and maintenance reliability. In addition, the systems will be designed to avoid sustained periods of steam release (from pressure relief valves) and thus mitigate any potential negative effects from its operation. As such, effects from limited steam venting, considered unavoidable, will only be temporary and later ameliorated.

Refer to Section 3.5.1 for a detailed description of the cooling tower system which removes the heat from the condenser and exhausts it to the air via evaporation.

5.1.1 Temperature Effect on Receiving Body of Water

This section is not applicable to the project since no heated effluent will be discharged from the resource recovery facility into any body of water. All discharges will be to the County sewer system.

5.1.2 Effects on Aquatic Life

This section is not applicable to the project since there will be no process effluent discharged from the resource recovery facility into any body of water.

5.1.3 Biological Effects of Modified Circulation.

The resource recovery facility will use wastewater plant effluent supplied by Broward County Utilities Division. Supply will be made available to the facility via an 8-inch

diameter water line adjacent to Powerline Road. Discharges from the resource recovery facility will flow to an existing 36-inch sanitary sewer line located directly adjacent Powerline Road. As such, no water body will be directly affected by the resource recovery facility cooling water demand or discharge.

5.1.4 Effects of Offstream Cooling

This section, as described, is not applicable to the Project since the water cooled system proposed will not have a measurable impact on the local environment.

5.1.5 Measurement Program

Programs and methods for measuring the physical and chemical parameters of waters which will be affected during operation of the facility are not applicable to the Project because no water body will be directly affected by the operation of the facility.

5.2 Effects of Chemical and Biocide Discharges

5.2.1 Industrial Wastewater Discharge

There will be no off-site industrial discharges to surface waters or to groundwater from the operation of the resource recovery facility. All discharges will go to the Broward County North Regional Wastewater Treatment Plant. This method of ultimate disposal will meet all applicable state and federal discharge regulations and water quality standards for industrial wastewater including chemical and biocide wastes, and oil and grease.

5.2.2 Cooling Tower Blowdown

Chemicals for treating the cooling water will be selected so that the blowdown can be sent to the Broward County North Regional Wastewater Treatment Plant. The County plant's secondary treated effluent will be the source of cooling water

makeup, therefore if the resource recovery plant is unable to accept the secondary treated effluent, it will simply be ocean outfall discharged as it presently is being done.

5.2.3 Measurement Programs

No measurement programs for water bodies or groundwater will be required since the cooling tower blowdown will be discharged directly to the County sewer system.

5.3 Impacts on Water Supplies

Due to the sensitive nature of the hydrologic environment of this portion of Broward County, the conceptual design for construction and operation of the resource recovery facility has been developed in order to have a minimal impact, both quantitative and qualitative, on groundwater and surface water supplies.

The major source of potential impact on water supplies from the facility is from on-site surface water runoff. Section 3.8, On-Site Drainage System, describes how uncontaminated stormwater runoff will be collected, retained and treated in order to conform with state and local regulations.

5.3.1 Surface Water

No changes in hydrologic or water quality conditions due to diversion, interception, or additions to surface waters will result because the plant will not withdraw from, consume, or discharge to any surface water bodies. All water supplies will be obtained from the Broward County Utilities Division as well as receiving all plant water discharges.

5.3.2 Groundwater

No impact will result upon groundwater or water table elevations from this facility because no withdrawal or discharges to groundwater will result. All water supplies will be obtained from the Broward County Utilities Division as well as receiving all plant water discharge.

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5.3.3 Drinking Water

Drinking water for the facility has been included in the sanitary water requirements (5 gpm), which will be supplied by the Broward County Utilities Division's potable water system. An analysis of the county's potable water is presented in Table 5.3.3.1. Sanitary wastewater discharge will go directly to the County's sewer system.

5.3.4 Leachate and Runoff

Residue from combustion of refuse will be stored in an enclosed bunker. The floor of the bunkers together with the surrounding surface area will be sloped and contoured to retain any runoff or leachate from the residue pile, and redirect it to the ash quench troughs within the plant.

This project does not include landfill construction or operation. No wastewater ponds will be constructed or operated. No flue gas desulphurization will be required.

All runoff within areas of potential leaching of toxic extracts from solid wastes will be retained within the immediate area of the source and will not affect the remaining runoff on the site. Therefore, seepage plumes predictions will not be applicable.

5.3.5 Measurement Programs

No measurement programs for water bodies or groundwater will be required since all runoff leaving the site will be essentially free of any potentially leached toxic extracts. An extensive ground and surface water monitoring program already exists in the area because of the close proximity to the Central Disposal Landfill.

5.4 Solid/Hazardous Waste Disposal Impacts

The impact of solid and hazardous waste disposal related to the project is expected to be minimal.

5.4.1 Solid Waste

As previously discussed in Section 3.7, Solid and Hazardous Waste, solid waste in the form of residue from the re-

TABLE 5.3.3.1

BROWARD COUNTY UTILITIES DIVISION
TYPICAL POTABLE WATER ANALYSIS

pH	9.1
Total Combined Cl_2	2 mg/l
Total Hardness	63 mg/l as CaCO_3
Alkalinity	24 mg/l
Ca Hardness	39 mg/l
Calcium	22.5 mg/l
Magnesium	1.6 mg/l
Bicarbonate	20.9 mg/l as CaCO_3
Carbonate	2.5 mg/l
Hydroxide	0.6 mg/l
Sodium	11 mg/l
Chloride	22 mg/l
Color	8 - 10 Color Units
Foaming Agents	0.14 mg/l
Sulfate	27 mg/l
TDS	115 mg/l
Nitrate	0.04 mg/l as N
Fluoride	0.9 mg/l
Turbidity	0.3 NTU
Iron	<0.01 mg/l
Manganese	<0.01 mg/l
Arsenic	<0.001 mg/l
Cadmium	<0.001 mg/l
Barium	<0.001 mg/l
Zinc	<0.02 mg/l

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source recovery facility will be handled in a safe, controlled manner from the point of generation to the point of disposal at an existing adjacent landfill owned by Waste Management, Inc.

5.4.2 Hazardous Waste

As described in Section 3.7.2, Hazardous Waste, it is expected that little, if any hazardous waste will enter or accepted at the facility. Any waste which is deemed to be hazardous will be stored, transported and disposed of off-site in accordance with all applicable hazardous waste regulations.

5.5 Sanitary and Other Waste Discharges

All sanitary and other waste discharges (i.e., boiler blowdown and process water waste) will be disposed of at the BCNRWTP. Therefore, there will be no expected effects of these discharges on off-site water supplies. No pretreatment of process or sanitary wastewaters is anticipated before ultimate disposal at the BCNRWTP and, therefore, no sewage or industrial sludge will be generated. If pretreatment becomes necessary in the future, sludges will be disposed of off-site at approved facilities.

Facility process wastewater treatment consists of neutralization of demineralizer regenerant waste and collection of all waters, except sanitary, for maximum reuse within the plant. Specific features include:

- o Wastewater Storage Basin - Floor drains, sample coolers, boiler blowdown, and neutralization tank streams are collected in this sump. Water is pumped for use in the ash collection system. Any excess waters are discharged to the sewer.
- o Neutralization Tank - Regenerant chemicals from the demineralizer are collected in this tank. After pH adjustment, water from this tank flows to the quench water storage basin for reuse.
- o Weir Box - A weir box will be provided to measure process water flow to the city sewer. Sanitary waste and any excess process water will be discharged to the city sewer.

As evidenced by the above data, it is not believed that the pretreatment of sanitary, process or leachate wastewaters will be necessary before ultimate disposal at the BCNPWWTP. However, in order to ensure that wastewater quality standards are met for this particular facility, periodic water quality testing will be performed during facility start-up and operations. If in the event treatment plant wastewater quality standards are not met, it will become necessary to incorporate some type of pretreatment before disposal to the sanitary system.

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5.6 AIR QUALITY IMPACTS

Predicted maximum impact concentrations for the proposed North Broward County Resource Recovery (NBCRR) facility at projected maximum operation, using screening and refined modeling receptor grids, are presented in Tables 5.6-1 and 5.6-2, respectively. These results are based on the plant charging 2,420 TPD or 100.8 tons per hour (TPH) of MSW at projected maximum operation. The average annual concentrations have been multiplied by a factor of 0.728 to reflect the 72.8-percent annual availability of plant operation.

For most of the pollutants, the predicted maximum concentrations are below the Prevention of Significant Deterioration (PSD) significant impact levels and de minimis monitoring levels. As a result, the proposed plants' emissions do not produce a significant impact for particulate matter (PM), nitrogen dioxide (NO₂), or carbon monoxide (CO) concentrations and, therefore, do not require additional modeling analyses. For sulfur dioxide (SO₂), the maximum 3- and 24-hour concentrations are greater than the significant impact levels.

For fluorides (F⁻), the maximum predicted 24-hour concentration is greater than the de minimis monitoring level. For the other regulated pollutants for which significant impact levels have not been established, the predicted maximum concentrations are well below the de minimis monitoring levels established for these pollutants. Based on these results and the existing low measured pollutant concentrations in Broward County, the proposed emissions from the NBCRR facility are expected to comply with the Ambient Air Quality Standards (AAQS) and PSD Class II increments.

Table 5.6-1. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Screening Modeling Methods

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period		
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending
SO ₂	3-hour	34.4	300	1.9	1971	126	12
	24-hour	8.1	310	1.9	1972	111	24
			270	2.3	1970	169	24
	Annual	0.73	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
TSP	24-hour	0.68	310	1.9	1972	111	24
			270	2.3	1970	169	24
	Annual	0.061	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
NO ₂	Annual	0.73	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
			270	2.3	1970	169	24
CO	1-hour	9.8	90	1.5	1973	191	11
	8-hour	3.6	310	1.5	1972	111	16
Pb	24-hour	0.029	310	1.9	1972	111	24
			270	2.3	1970	169	24
	(Quarterly)	0.0026††	280	4.3	(1972)	(--)	(--)
			(300)	2.3, 2.7	(1972, 1974)	(--)	(--)
F ⁻	24-hour	0.26	310	1.9	1972	111	24
			270	2.3	1970	169	24
Be	24-hour	0.000014	310	1.9	1972	111	24
			270	2.3	1970	169	24
Hg	24-hour	0.014	310	1.9	1972	111	24
			270	2.3	1970	169	24

*Annual average concentrations have been adjusted to reflect 72.8-percent annual availability factor.

†Highest, second-highest concentrations for short-term period; highest concentration for annual period. Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

**With respect to proposed facility.

††Annual average.

Table 5.6-2. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Refined Modeling Methods

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period			Concentrations (ug/m ³)		
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending	PSD Class II Increment	Significant Impact Level	De Minimis Monitoring Level
SO ₂	3-hour	34.6	300	1.9	1971	126	12	512	25	NA
	24-hour	8.4	312	1.9, 2.0	1972	112	24	91	5	13
	Annual	0.73	280	4.3	1970	--	--	20	1	NA
			300	2.3, 2.7	1972, 1974	--	--			
TSP	24-hour	0.71	312	1.9, 2.0	1972	112	24	37	5	10
	Annual	0.061	280	4.3	1970	--	--	19	1	NA
			300	2.3, 2.7	1972, 1974	--	--			
NO ₂	Annual	0.73	280	4.3	1970	--	--	NA	1	14
			300	2.3, 2.7	1972, 1974	--	--			
CO	1-hour	11.0	94	1.3	1973	191	11	NA	2,000	NA
	8-hour	4.0	312	1.7	1972	111	16		500	575
Pb	24-hour	0.031	312	1.9, 2.0	1972	112	24	NA	NA	0.1
	(Quarterly)	(0.0026††)	(280)	(4.3)	(1970)	--	--		(NA)	(0.1)
			(300)	(2.3, 2.7)	(1972, 1974)	--	--			
F ⁻	24-hour	0.27	312	1.9, 2.0	1972	112	24	NA	NA	0.25

Table 5.6-2. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Refined Modeling Methods (Continued, Page 2 of 2)

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period			Concentrations (ug/m ³)		
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending	PSD Class II Increment	Significant Impact Level	De Minimis Monitoring Level
Be	24-hour	0.000014	312	1.9, 2.0	1972	112	24	NA	NA	0.0005 (0.001)
Hg	24-hour	0.014	312	1.9, 2.0	1972	112	24	NA	NA	0.25

*Average annual concentrations have been adjusted to reflect 72.8-percent annual availability factor.

†Highest, second-highest concentration for short-term period; highest concentration for annual period.

Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

**With respect to proposed facility.

††Annual average.

NA = Not applicable.

Source: ESE, 1985.

The proposed emissions for the NBCRR facility also produce predicted maximum concentrations that are less than the PSD significant impact levels and de minimis monitoring levels in the PSD Class I area in the Everglades National Park (Table 5.6-3). These results are consistent with the predicted maximum concentrations within the near vicinity of the proposed facility. Thus, the emissions for the proposed facility are expected to comply with PSD Class I increments in the Everglades National Park.

Because SO₂ emissions for the proposed NBCRR produced impacts greater than 3- and 24-hour SO₂ significant impact levels, additional modeling was performed for other major SO₂ sources within 50 kilometers (km) of the proposed facility. The other major sources considered in the analysis were FPL Port Everglades and Fort Lauderdale facilities. The predicted maximum concentrations due to the NBCRR and Florida Power and Light (FP&L) facilities added to a background concentration are presented in Table 5.6-4. These results indicate that the predicted total SO₂ concentrations will comply with national and Florida AAQS. Also, the major contributors to the maximum total concentrations are the major FPL sources, with the proposed NBCRR facility producing either no or less than significant impacts.

Because results presented in Table 5.6-4 are based on receptors for which the NBCRR facility is aligned with the FP&L facilities, modeling was also performed with the FP&L facilities for those periods which produced the highest, second-highest 3- and 24-hour SO₂ concentrations for the NBCRR facility only. As shown in Table 5.6-5, the maximum predicted concentrations are primarily due to the NBCRR facility and are similar to results presented in Table 5.6-1. In all cases, the predicted total concentrations will comply with AAQS.

The results of the screening building downwash analysis for SO₂ concentrations are presented in Table 5.6-6. The maximum concentrations

Table 5.6-3. Predicted Maximum Concentrations at the PSD Class I Area Due to the Proposed NBCRR Facility at Maximum Projected Load (110 Percent of Nameplate Capacity)

Pollutant	Averaging Time	Maximum Concentration* (ug/m ³)	Receptor Location		Period			Concentrations (ug/m ³)		
			UTM Coordinates (km)		Year	Julian Day	Hour Ending	PSD Class I Increment	Significant Impact Level	De Minimis Monitoring Level
			x	y						
SO ₂	3-hour	3.2	532.75	2,847.4	1973	222	6	25	25	NA
	24-hour	0.61	532.75	2,847.4	1972	342	24	5	5	13
	Annual	0.0	All Receptors		1970-74	—	—	2	1	NA
TSP	24-hour	0.051	532.75	2,847.4	1972	342	24	10	5	10
	Annual	0.0	All Receptors		1970-74	—	—	5	1	NA
NO ₂	Annual	0.0	All Receptors		1970-74	—	—	NA	1	14
CO	1-hour	1.6	532.75	2,847.4	1973	222	5	NA	2,000	NA
	8-hour	0.29	532.75	2,847.4	1972	342	24		500	575
Pb	24-hour (Quarterly)	0.0022 (0.0)†	532.75	2,847.4	1972	342	24	NA	NA	0.1 (0.1)
F ⁻	24-hour	0.020	532.75	2,847.4	1972	342	24	NA	NA	0.25
Be	24-hour	0.0000010	532.75	2,847.4	1972	342	24	NA	NA	0.0005 (0.001)
Hg	24-hour	0.0010	532.75	2,847.4	1972	342	24	NA	NA	0.25

*Highest, second-highest concentration for short-term period, highest concentration for annual period. Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

†Annual average.

NA = not applicable.

Source: ESE, 1986.

Table 5.6-4. Maximum Predicted Total SO₂ Concentrations Due to Proposed NBCRR Facility and Interaction Sources

Averaging Period	Year	Highest, Second-Highest Concentration (ug/m ³)				Receptor† Location		Period	
		Total Due to			Back- Ground*	Direc- tion (°)	Dis- tance (km)	Julian Day	Hour Ending
		Total	NBCRR	FPL					
3-hour	1970	345	0	318	27	350	1.1	219	6
	1971	278	0	251	27	10	1.1	38	18
	1972	248	0	221	27	10	1.1	78	6
	1973	242	0	215	27	360	2.7	186	21
	1974	221	6, 7	215, 214	27	350	3.5, 3.9	175	21
24-hour	1970	95.6	0	83.6	12	10	1.9	47	24
	1971	82.9	2.6	68.3	12	350	4.3	73	24
	1972	60.5	1.4	47.1	12	350	1.9	171	24
	1973	71.1	2.2	56.9	12	10	2.3	186	24
	1974	73.9	1.0	60.9	12	350	3.9	211	24

*Based on monitoring data. Since 3-hour concentrations are not obtained by monitoring method, 3-hour concentration was assumed to equal 2.25 times the 24-hour concentration (DER, 1985).

†With respect to NBCRR. Receptors located along radials of 350, 360, and 10 degrees.

Notes: National and Florida 3-hour AAQS: 1,300 µg/m³.
 Florida 24-hour AAQS: 260 µg/m³.
 National 24-hour AAQS: 365 µg/m³.
 AAQS not to be exceeded more than once per year.

Source: ESE, 1986.

Table 5.6-5. Maximum Predicted Total SO₂ Concentrations for Periods that Produced Maximum Concentrations Due to NBCRR Facility Only

Averaging Period	Analysis	Highest, Second-Highest Concentration (ug/m ³)				Receptor Location		Period		
		Total Due to				Direction (°)	Distance (km)	Julian Day	Hour Ending	Year
		Total	NBCRR	FPL	Back-Ground*					
3-hour	Screening**	--	34.4	--	--	300	1.9	126	12	1971
	Refined	61.6	34.6	0	27	300	2.0	126	12	1971
24-hour	Screening**	--	8.1	--	--	270	2.3	169	24	1970
						310	1.9	111	24	1972
	Refined	28.8	9.8	7.0	12	314	2.0	111	24	1972
		28.8	9.6	7.2	12	314	2.1	111	24	1972
		28.8	9.4	7.4	12	314	2.2	111	24	1972

*Based on monitoring data. Since 3-hour concentrations are not obtained by monitoring method, 3-hour concentration was assumed to equal 2.25 times the 24-hour concentration (DER, 1985).

†With respect to NBCRR.

**Screening analysis considered only NBCRR facility (see Table 7-1).

Notes: National and Florida 3-hour AAQS: 1,300 µg/m³.
 Florida 24-hour AAQS: 260 µg/m³.
 National 24-hour AAQS: 365 µg/m³.
 AAQS not to be exceeded more than once per year.

Source: ESE, 1986.

Table 5.6-6. Screening Analysis of Maximum SO₂ Concentrations Due to Building Downwash Conditions

Averaging Period	Analysis	Maximum Concentration ($\mu\text{g}/\text{m}^3$)*		Increase in Maximum Concentration (Percent)
		Without Building Downwash	With Building Downwash	
3-hour	Refined	34.6	35.4	2.3
24-hour	Refined	8.4	9.0	7.1

*Based on periods which produced maximum concentrations without building downwash,

Source: ESE, 1986.

are given for conditions with and without building downwash based on the periods that produced the maximum concentrations without building downwash. These results indicate that if building downwash conditions occur, maximum concentrations could increase by approximately 7 percent from the maximum concentrations produced without building downwash. Therefore, based on this screening analysis, emissions from the proposed facility under building downwash conditions are not expected to produce concentrations that would exceed PSD increments or AAQS.

Potential Acid Rain Impacts

Acid rain can be defined as rain with high acidic content as reflected by low pH measurements. The acidity in rainfall is due to acid-forming pollutants, of which SO_2 and NO_x have been identified as the primary constituents. The effect of the proposed plant's emission on the formation of acid rain is expected to be minimal for the following reasons:

1. Acid deposition is unlikely to be an environmental problem in south Florida because reported levels of acidity and associated ions are much lower in south Florida precipitation than elsewhere in the eastern United States. For example, during 1982 and 1983, pH values in south Florida and northeastern United States precipitation were approximately 4.8 and 3.3, respectively. This difference is equivalent to an acidity factor 3 times higher in the northeastern United States compared to south Florida. Similarly, sulfate and nitrate concentrations are about a factor of 2 to 3 lower in south Florida, based on data collected by ESE for the Florida Electric Power Coordinating Group (PCG) and reported in the MAP3S precipitation chemistry network.
2. The maximum SO_2 and NO_x emissions for the proposed plant operating at maximum load for every hour throughout the year are estimated to be 1592 and 1620 TPY, respectively. Actual emissions are expected to be much lower. Based on the emission inventory for 1984 available from the Broward County Environmental Quality Control Board, the total SO_2 and NO_x emissions from area, mobile, and major point sources within Broward County were estimated to be approximately 29,800 and 46,400 TPY, respectively.

Therefore, the maximum projected SO₂ and NO_x plant emissions represent approximately 5.3 and 3.5 percent, respectively of countywide emissions. On a statewide basis, the proposed plant's maximum emissions represent less than 0.3 percent of total anthropogenic emissions.

3. The meteorological conditions in south Florida are conducive to the dispersion of air pollutants. For example, the air dispersion modeling performed for the proposed plant indicate very low simulated impacts, primarily due to the relatively low emission rates and the capability is demonstrated by the relatively high wind speeds, low occurrence of calm conditions, and low occurrence of fog formation along Florida's southeast coast as compared to sites located in Florida's northern peninsula and panhandle areas.

Also, the calcitic and dolomitic soils of south Florida have been estimated to have especially low sensitivity to acid deposition (reported by U.S.-Canadian Memorandum of Intent (MOI) on Transboundary Air Pollution, 1982).

The natural water bodies of south Florida also are relatively resistant to acidification. They host flora and fauna that appear to have natural tolerances of acidity not exhibited by related species in temperate ecosystems (reported by ESE for the FCG report).

Therefore, no significant additional impact is expected as a result of these emissions.

5.7 Noise

Noise baseline data and conditions are discussed in Section 2.3.8. Noise monitoring sites are illustrated in Figure 2.3.8.1 in Section 2.3.8 as well. In addition, baseline sound levels are shown in the same section (Table 2.3.8.1).

From the analysis presented in Appendix 10.10, the projected noise levels produced by the proposed facility at sensitive boundaries (Figure 5.7.1) will range from 31.9-60.3 dB(A). It is projected that any noises generated on-site will be attenuated adequately to ensure compliance with the applicable County regulations. This is based on an analysis of noise attenuation from the point of origin to all sensitive boundaries. As such, noise impacts with respect to various zoning classification criteria are projected to be in compliance with zoning standards. Table 5.7.1 is a summary of the projected noise levels at the receptors as compared to the standards set forth in the Broward County Code of Regulations, Chapter 27-7. Table 5.7.2 is a list of common noise levels.

Appropriate mitigation measures for reducing expected noise levels are included in the design of the Project. Different forms of noise control measures include equipment enclosures, absorption materials, barriers, mufflers, logging and vibration damping and insulation. Steam vents and safety valve vents will be muffled.

Special attention will also be given to refuse handling and preparation area, since this area is generally open for refuse trucks to unload.

There will be approximately a 30 percent decrease in vehicular traffic on Hilton Road (NW 48th Street) as a result of the facility. Traffic presently using the adjacent landfill will be directed to the facility instead. Also, trucks operating on a public right-of-way are exempted from noise control provisions.

TABLE 5.7.1

OPERATING dBA PROJECTED NOISE LEVELS AT RECEPTORS

<u>Equipment</u>	<u>On Site</u>	<u>C1</u>	<u>C2</u>	<u>LD1</u>	<u>LD2</u>	<u>U</u>	<u>I</u>
Refuse Handling	66	24.0	25.0	31.5	35.0	33.3	48.2
Turbine Generator	51	11.6	11.5	18.7	18.4	17.2	37.7
Cooling Tower	68	28.9	28.2	36.0	34.4	33.2	59.0
APC System	64	25.8	26.3	33.0	32.8	31.6	51.8
Residue Handling	61	20.5	23.0	28.8	32.4	31.0	48.1
Distance, feet		3835	4059	3796	3076	3476	478
Sound Level Limit		65	65	55	55	65	70
Combined Level	71.5	31.9	32.1	39.1	39.8	38.4	60.3

TABLE 5.7.2

COMMON OUTDOOR LEVELS	INDOOR LEVELS	NOISE LEVEL (dBA)	RESPONSE	CONVERSATION RELATIONSHIPS
Carrier Deck, Jet Operations		140		
		135		
		130	Limit Amplified Speech	
		125		
Jet Takeoff, 200 Ft.	Discotheque	120	Maximum Vocal Effort	
Auto Horn, 3 Ft.		115		
	Rock Band	110		
	Riveting Machine	105		Shouting in Ear
Jet Flyover, 1000 Ft.		100	Very Annoying	
Jet Takeoff, 2000 Ft.		95	Hearing Damage	
Gas Lawn Mower, 3 Ft.	N.Y.C. Subway	90		Shouting, 2 Ft.
Pneumatic Drill, 50 Ft.		85		
Diesel Truck, 50 Ft.	Food Blender, 3 Ft.	80	8 Hours - Annoying	Very Loud Conversation, 2 Ft.
Noisy Urban Daytime	Garbage Disposal, 3 Ft.	75		Loud Conversation, 2 Ft.
Freight Train, 50 Ft.	Shouting, 3 Ft.	70		
Gas Lawn Mower, 100 Ft.	Vacuum Cleaner, 10 Ft.	65	Telephone Use Difficult	Loud Conversation, 4 Ft.
Freeway Traffic, 50 Ft.		60		
Commercial Area	Normal Speech, 3 Ft.	55		
	Air Conditioner, 20 Ft.	50	Intrusive	
	Large Business Office	45		Normal Conversation, 12 Ft.
Quiet Urban Daytime	Dishwasher, Next Room	40	Quiet	
Light Auto Traffic, 100 Ft.		35		
Quiet Urban Nighttime	Small Theatre (Background)	30		
Quiet Suburban Nighttime	Library	25		
	Bedroom at Night	20	Very Quiet	
Quiet Rural Nighttime	Concert Hall (Background)	15		
		10	Just Audible	
		0	Threshold of Hearing	

There are a few measures available to mitigate on-site and off-site potential traffic-related noise impacts which can be utilized during design and operation of the proposed facility. These include the following:

- o Maintain trucks and especially exhaust silencer systems.
- o Design and operate facility such that traffic flows will be facilitated to minimize trucks stopping and queuing.
- o Use of sound barriers near property boundary sites.

5.8 Changes In Non-Aquatic Species Populations

5.8.1 Impacts

Long-term impacts to non-aquatic species populations resulting from plant operations are anticipated to be insignificant. There would be no anticipated changes in diversity, relative abundance, species composition, distribution, dominance, or gradient distribution of important non-aquatic species.

5.8.2 Monitoring

No long-term monitoring programs are proposed because significant impacts to non-aquatic species populations are not expected.

5.9 Other Plant Operation Effects

Auxiliary Burners - On a preliminary basis, auxiliary burners, located in the combustion chamber, may be utilized during start-up and shutdown procedures. The burners are expected to be operated for two continuous hours during each procedure. The burners will utilize either fuel oil or natural gas should natural gas be available in sufficient quantity.

Mass emissions would be less than those projected for the processing of solid waste. Given that the information presented in the Certification Application demonstrates that

emissions from the processing of solid waste would result in compliance with ambient air quality standards by a wide margin, we believe that it is reasonable to assume the operation of auxiliary burners would also result in compliance with such standards.

Spent Oils - Spent oils used as lubricants in the rotating machinery will be collected separately and disposed at an approved facility. An oily-water separator for wash water runoff from maintenance and scalehouse areas will be provided if required by local wastewater discharge regulations.

Odors - The tipping area and waste storage area will be totally enclosed. The air intakes will be adjusted to allow sufficient air flow to satisfy combustion requirements. The facility is designed to be partially operational at all times. Multiple processing lines are planned which can run practically independently. Where common elements are present, redundant systems are provided or alternative equipment in place to allow continued operation. If the entire plant is down for a prolonged length of time, refuse will not be accepted and stored waste will be removed from the pit. Therefore, odors will not be a problem.

Truck Traffic - Estimates of the truck traffic that will be required to transport waste to the facility, including trips from the facility after trucks have unloaded their waste, were utilized to project traffic impacts on the local access roads. Table 5.9.1 presents the results of these estimates. Vehicle trips expected on each of the impacted roadways and the percentage decrease is presented. As the figures on Table 5.9.1 indicate, there will be a minor decrease in traffic on Powerline Road and a 30 percent decrease in traffic on Hilton Road (48th Street). In addition, since both the resource recovery facility and the unprocessable ash/residue landfill will be located near the same site, there will be no need to haul ash residue over

TABLE 5.9.1

BROWARD COUNTY RESOURCE RECOVERY FACILITY
HILTON ROAD SITE

PROJECTED TRAFFIC IMPACTS

	<u>Average Daily Traffic Counts</u>	<u>Landfill Traffic</u>	<u>Facility⁽¹⁾ Traffic</u>	<u>Percent⁽²⁾ Decrease</u>
NW 48 Street (west of Powerline Rd)	2,100	1,680	1,140	30%
Powerline Rd. (between NW 48 & SW 10)				
Northbound	12,800	76	57	<1%
Southbound	9,800	76	57	<1%
Powerline Rd. (between NW 48 & Sample Rd)				
Northbound	14,200	684	513	1%
Southbound	13,300	684	513	1%

1. It has been assumed that 80 percent of the existing traffic on 48th Street will be trucks that will no longer use this landfill once both of the resource recovery facilities in Broward County are in operation. Approximately 90 percent of these trucks travel south on Powerline Road while approximately 10 percent travel north.
2. Based on a maximum facility throughput of 3,300 tons per day and refuse truck capacities of 6.5 tons per truck, approximately 500 trucks and 70 employee vehicles would be generated due to facility operations. This would result in 1,140 vehicle trips per day.
3. Facility traffic will replace estimated existing traffic to landfill. Decrease is calculated as percent of existing traffic counts.

public roads, thus eliminating traffic and environmental impacts associated with the hauling of ash residue. The incoming refuse trucks will be covered. Therefore, the amount of debris potentially deposited along the access roadways will be minimized. Designated areas for cleaning trucks will be provided to minimize spillage by exiting trucks. Refuse inadvertently deposited will be periodically cleaned by plant personnel including off-site patrols on nearby roads as necessary.

5.10 Archaeological Sites

The State of Florida, Division of Archives, History and Records Management stated that a review of the Florida Master Site File indicates that no archaeological or historic sites are recorded for the Project area. From their review they concluded that the proposed Project will have no effect on any sites listed or eligible for listing, in the National Register of Historic Places (see Appendix 10.16).

5.11 Resources Committed

Some of the resources committed to the Project will be consumed and converted and hence, be unavailable for future use once the Project is complete.

Resources and materials used in the construction phase of the project would be committed to the project. Building materials would be consumed and thus irretrievably used in the facility's construction. Lumber and concrete would be committed, as well as:

- o glass products
- o ceramics
- o paint
- o metals
- o insulation
- o electrical equipment, and
- o piping

In addition, human labor and energy utilized in the construction of the facility would be irretrievable. However, all of the above is typical of the commitment of resources necessary to bring to fruition a major capital project such as the North Broward County Resource Recovery Project.

Some significant financial commitments already have been made to the project. Approximately \$3 million has already been spent on acquisition of the site and another \$5-7 million has been spent on other development activities. In addition, approximately \$521 million in Industrial Revenue Bonds have been sold to finance the southern Route 441 and northern Hilton Road resource recovery projects. The Hilton Road facility will serve approximately 40 percent of Broward County residents. The commitment of finances, like labor and materials, is typical for a major project of this nature.

The mass-burning combustion process will chemically alter many of the compounds contained in the waste stream in a positive way (i.e., raw garbage is turned into a relatively inert ash residue). Materials thus consumed in the combustion process are converted to energy a large portion of which is recovered. This is considered a positive result of the combustion process since the materials burned will generate electricity. Otherwise, these same materials would have to be buried consuming landfill capacity. In contrast, the mass-burning of a projected ultimate capacity of approximately 3,300 tons per day at the facility could result in the conversion of up to one million tons of municipal solid waste per year into energy equivalent to one million barrels of crude oil.

5.12 Variances

As described previously, at this time no known variances from applicable standards will be required as part of the state certification program for the proposed resource recovery facility.

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TRANSMISSION LINES AND OTHER LINEAR FACILITIES

SECTION 6
TRANSMISSION LINES AND OTHER LINEAR FACILITIES

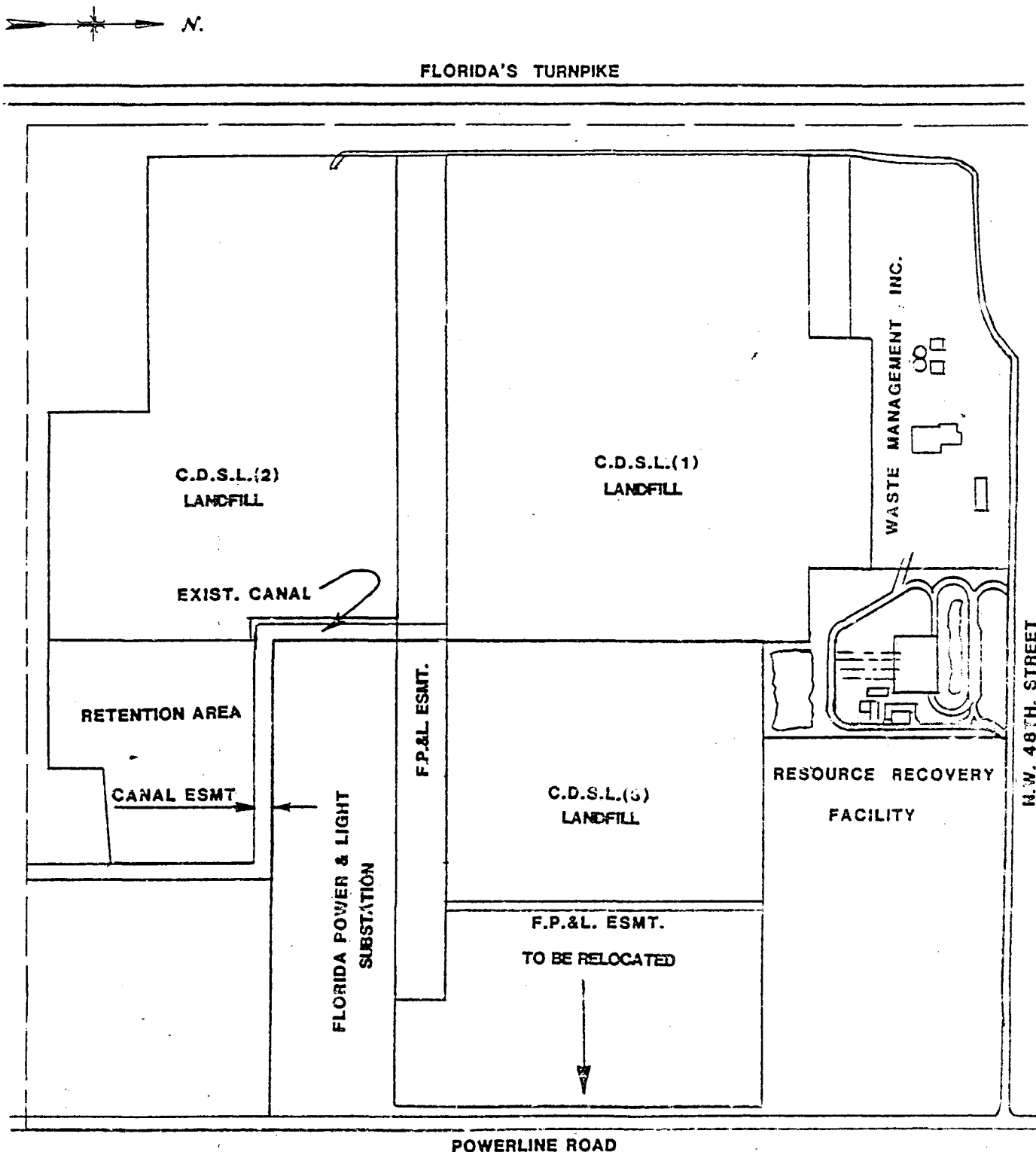
Based upon discussions with Florida Power and Light, Company (FP&L) officials and their preliminary investigation of electrical interconnection requirements, the existing FP&L transmission line is to be relocated along Powerline Road as a part of Central Disposal Landfill Cell 3. Figure 6.1.1 illustrates the general location of the electrical utility (FP&L) with respect to the site. Access to these transmission lines from the facility to FP&L will be readily available.

Since the transmission lines will not be located outside of the project site area, information pertaining to transmission lines and other linear facility impacts are consistent with the information pertaining to the site. The information requested in the permit application guidelines and identified as Sections 6.1.1 through 6.1.10, as well as 6.2 has been provided in Section 2 through Section 5.

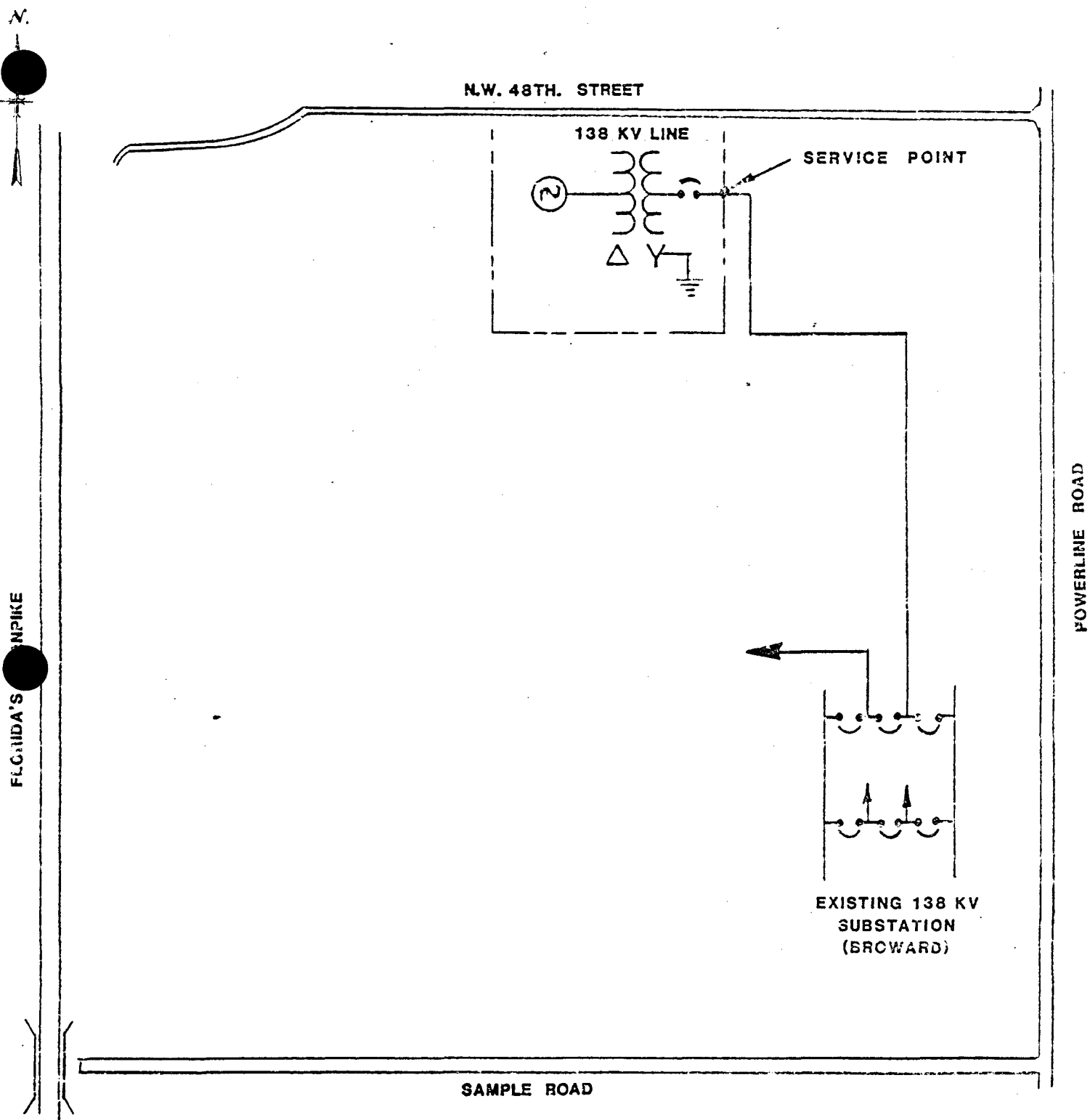
6.1 Electrical Power

Florida Power & Light will bring transmission power to the facility substation. The electrical interconnections proposed by FP&L are shown in Figure 6.1.2. FP&L indicates that a 138 KV transmission line will be extended northward along Powerline Road from FP&L's switchyard to the facility substation. The routing of this line will require coordination in the development of the proposed Central Disposal Landfill Cell 3 development and resource recovery plant.

The design and installation of all electrical interconnections, meters, plant distribution systems and protection equipment will be in accordance with the requirements and standards imposed by FP&L. FP&L will tie-in to the electrical substation to be located within the facility site.



BROWARD COUNTY
RESOURCE RECOVERY SITE &
UTILITY LOCATIONS



BROWARD COUNTY
 RESOURCE RECOVERY ELECTRICAL
 INTERCONNECTION SCHEMATIC
 WMI SITE

The mode of electrical energy distribution shall include the following:

- o The turbo-generator and associated power generation equipment will have its own bus which will be at the same voltage level as the generator. Synchronizing and protective relays will be provided on each generator breaker.
- o Interconnect transformers will each be sized for the full output of the plant.
- o Complete indoor relay and control switchboards will be provided for the facility's electric systems.

The distribution systems will have 4.16 KV and 480 volt systems with switchgear and related accessories housed in the processing section of the facilities.

The electrical output of the turbine-generator set will operate within the interconnection system established by FP&L. The turbine-generator set will be capable of operating in the full condensing mode, at maximum steam flow, even on the hottest day of the year, and still provide an efficient and adequate quantity of electrical energy.

6.2 Projected Interconnection Costs

Florida Power and Light has developed an interconnection cost estimate, including modifications to offsite substations and transmission lines, for the site. This estimate is \$600,000 which does not include the cost of the transformer, circuit breaker or protective equipment installed at the site.

In addition, payment to FP&L will be required for interconnection and protection costs associated with the facility electrical interconnections, and for the following additional costs:

- o Monthly telephone company charge for FP&L dispatcher communication channel, which has been estimated by FP&L at \$175 per month.
- o Maintenance and operation fee to FP&L for interconnections facilities.

- o Metering costs.
- o Suitable arrangements for termination of FP&L lines. The service points may be adjusted if desirable to provide suitable line terminations.
- o Costs of all fees and permits, if applicable, will also be paid.

The above costs, in current dollars, should be regarded as a budget estimate. Since the Project will pay on the basis of actual cost including appropriate overheads, rather than estimated cost, the estimates may change when specific designs become available.

**ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION
AND OPERATION**

SECTION 7

ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

For many areas, such as Broward County, an environmentally sound waste-to-energy facility can provide the best long-term solution to a solid waste disposal problem. A properly sited resource recovery facility using proven technology becomes a valuable asset to the community. The measurable costs associated with the proposed facility development should have a minimal impact on the facility users, and associated benefits far outweigh any additional costs.

The resource recovery project will:

- o Provide an environmentally sound and economically viable means for the disposal of solid waste over the long-term (20 or more years),
- o Decrease the potential threat to groundwater and land use as the need for disposal of raw garbage in landfills is eliminated,
- o Recover energy for sale thereby establishing a revenue stream that will offset the cost of disposal,
- o Reduce the need to consume natural energy sources such as gas, oil and coal, and
- o Stabilize or reduce future disposal cost escalation.

The following discussion addresses the socio-economic benefits and the costs associated with the proposed project.

7.1 Socio-Economic Benefits

7.1.1 State and Local Government Tax Revenues

Between \$1.9 and \$2.2 million in local tax revenues will be generated by the North Broward County Resource Recovery Project, Inc. based on Fiscal Year 1986 millage rates from the 1985 tax roll. Taxing authorities benefitting from this Project include Broward County, the Unincorporated Municipal

Service District, Broward County School Board, North Florida Water Management District, North Broward Hospital District, North Broward Park District and Fire Assessment.

State sales tax will be paid on equipment and materials not associated with pollution control for the Project.

7.1.2 Creation of Temporary and Permanent New Jobs

In addition to providing the County with an economical and environmentally responsive long-term solid waste disposal system which removes the major technical, operating, and business risks from the County at the lowest net cost, the County's local economy and labor market will also benefit from the project. Construction and Service Agreements between Waste Management, Inc. and the County include provisions for hiring local construction labor and businesses including use of minority subcontractors in accordance with the County's Disadvantaged Business Enterprise Affirmative Action Program.

It is anticipated that local construction and equipment suppliers will realize both direct and indirect benefits from the construction and operation of the resource recovery facility. Approximately 380 construction workers will be employed on the facility at the peak of activity.

The facility itself, once operational, will become an integral part of the local economy and community as a whole. An operational work force in excess of 57 people will be required to run the facility. It is estimated that a payroll of over \$4 million will offer the County economic stimulus. About 25 percent of available income (\$1 million) will boost retail sales. An estimated additional \$1.5 million in personal income will be realized by local residents and over 100 non-manufacturing jobs will be a direct result from project implementation. On the aggregate a total of \$5 million in estimated annual economic benefits to the economy of Broward County will be realized as a direct result of this facility.

7.1.3 Environmental Benefits

The primary benefit associated with the development of a resource recovery facility in Broward County is the reduced reliance on sanitary landfills, efficiency and effectiveness of the process itself, and its ability to provide an environmentally secure method of solid waste disposal.

The facility proposed for northern Broward County will have an initial installed nameplate capacity of approximately 803,000 tons per year of solid waste. This represents a significant reduction in the amount of waste requiring landfilling. The facility is designed so that increases in waste generation can be accommodated by facility expansion up to a projected ultimate capacity of 1,200,000 tons per year.

Although the majority of solid waste delivered will be processed at the facility, some unprocessable (by-pass) waste will still need to be landfilled. In addition, the combustion process will produce an ash residue that will require landfilling. The ash residue will represent approximately 10 percent of the processable waste's original volume and represents an environmentally secure waste product for disposal. The site chosen for the North Broward Resource Recovery Project is adjacent to Waste Management's existing Central Disposal Landfill.

Through a public awareness program, many County residents have already come to realize the pressing environmental problems of solid waste disposal in the County. Information pertaining to all facets of the completion of this project will be invaluable to other municipalities considering resource recovery.

Groundwater and Surface Water Protection

Another benefit resulting from the construction and operation of the resource recovery facility will be the reduced

potential for damage to both groundwater and surface water. Unprocessed solid waste that is disposed of at a landfill has the potential to contaminate water resources through the leaching of metals and organic compounds. Solid waste processed in a mass-burn resource recovery facility, as mentioned, produces an ash residue that is basically inert. This residue is required by specifications to consist of less than 4.0 percent combustible material and 0.3 percent putrescible material.

Hydrogeological Field Investigation Program

A hydrogeological field investigation program has been conducted at the Project site in accordance with the Florida Department of Environmental Regulation (FDER) Chapter 17-7 -- Resource Recovery and Management; Part I requirements (See Appendix 10.8). This program provides subsurface information at this site. The principal elements of the field investigation are:

- o Installation of soil borings to assess shallow subsurface geologic and hydrogeologic conditions and depths to ground water.
- o Inventory of active wells within several miles to the south of the site.
- o Water level measurements in the general area to assess ground water flow conditions.

The principal study outputs are as follows:

- o Definition of shallow subsurface geologic conditions.
- o Assessment (from existing reports) of regional ground water flow and quality conditions.

(For a more detailed discussion of this program, see Section 2.3).

7.1.4 Creation of a Source of Heated Discharge

The Project will not create a source of heated discharge.

7.1.5 Visitor Accommodations

On-site public education programs will be provided for individuals and groups visiting the North Broward Resource Recovery Facility.

In addition, controlled visitor viewing locations, in various process areas of the facility, will be provided.

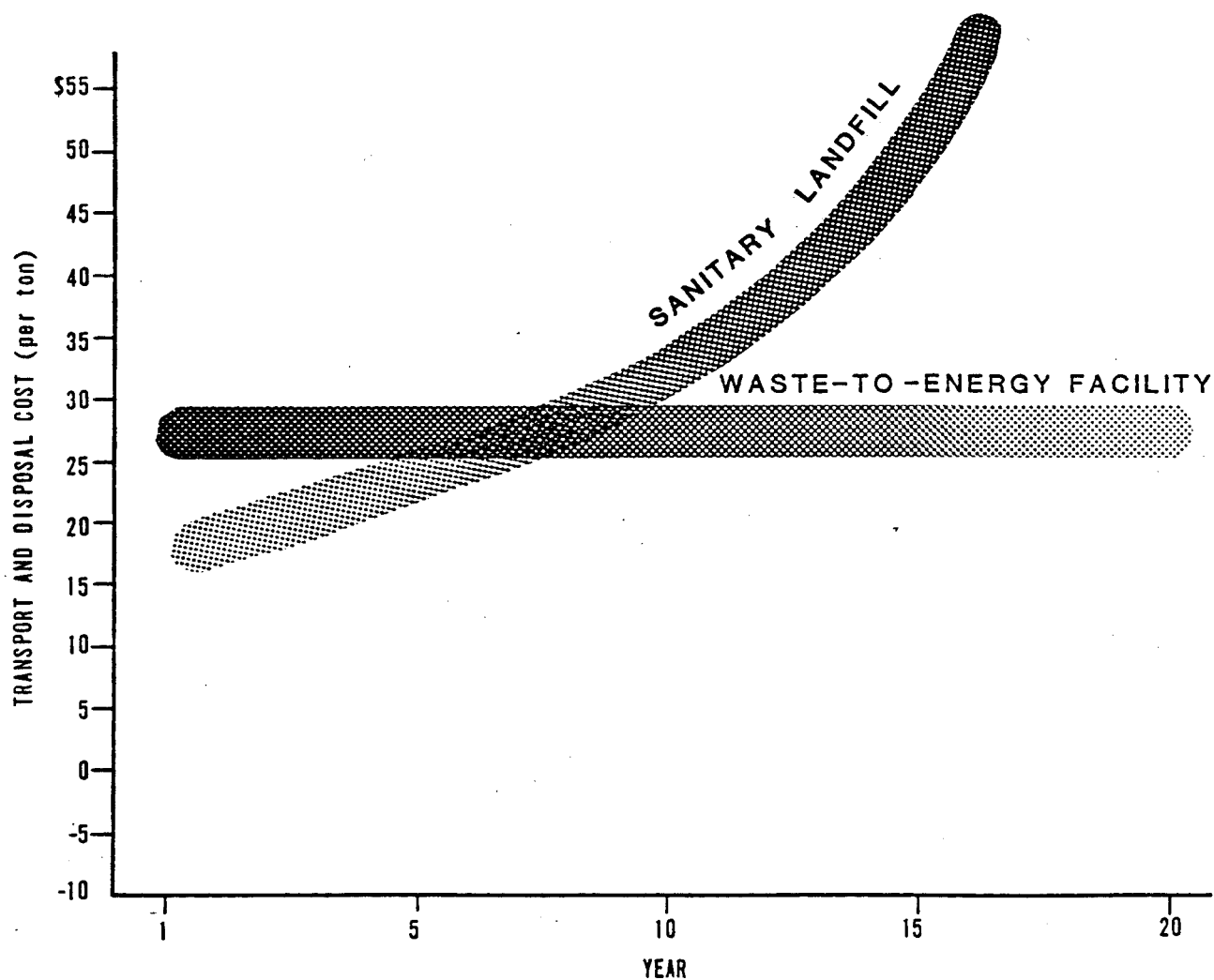
7.1.6 Economic Benefits

Figure 7.1.6.1 illustrates typical costs of solid waste disposal for both a sanitary landfill and waste-to-energy facility over a twenty year period. As shown, landfill costs generally increase at a faster rate and eventually surpass the costs associated with resource recovery development. There are a myriad of reasons for the continuous increase in land disposal costs:

- o Higher land and real estate escalation costs.
- o Higher transportation costs to and from landfills located further and further away from urban centers.
- o Higher permitting and operating costs, including daily cover, landfill liners, leachate and methane collection systems, and the need for a sinking fund accrual account for post-closure maintenance and monitoring.

Alternatively, a waste-to-energy project can result in a stabilized or decreased net cost for waste disposal over the life of the project. The reasons for this are:

- o Capital costs are fixed for the facility's life.
- o Only operating and maintenance expenses are subject to inflation.
- o Expected rising energy rates will offset increasing operating and maintenance costs.



* The curves shown on this figure represent current waste disposal cost trends. They may vary by community depending on current landfill life and disposal costs, waste-to-energy facility cost and energy rates.

BROWARD COUNTY, FLORIDA
RESOURCE RECOVERY PROJECT
ESTIMATED SOLID
WASTE DISPOSAL COST

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Resource recovery (waste-to-energy), although often more expensive initially than landfilling, usually becomes less expensive over the life of the project.

7.1.7 Energy Benefits

A significant benefit that will be realized once the facility becomes operational, is the generation of electric power. Approximately 305 million kilowatt hours (kwh) of electricity will be generated initially per year. It is likely that the electrical output will be significantly higher since the 305 million kwh estimate is based on a minimum guaranteed tonnage of 642,400 tons per year and a conservative electrical generation rate of 475 kwh per ton.

There is approximately a one-to-one fuel value relationship between garbage and crude oil (i.e., one ton of garbage equals approximately one barrel of crude oil). Thus, at a minimum, 642,400 barrels of crude oil per year or 12.9 million barrels of crude oil over the life of the project will be conserved. Assuming a conservative inflation rate (4 percent over the life of the project) the net present worth of the annuity relative to the conservation of 12.9 million barrels of imported crude oil is approximately \$139 million.

Although revenue generated from the sale of electricity will be the property of the vendor (owner and operator of the facility), users of the facility will share the revenue benefits in the following manner:

- o Projected revenues are included in the vendor's tip fee calculation thereby reducing the cost of solid waste disposal.
- o The users will benefit from power sharing if rates for purchase of electricity escalate at a more rapid rate than inflation, thereby further reducing disposal costs.

7.2 Socio-Economic Costs

There will be both direct and indirect costs associated with the construction of the resource recovery facility. The

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costs will be borne by the users of the facility over the twenty year life of the project. This section discusses both the direct and indirect cost streams resulting from the construction and operation of the proposed facility.

The County has selected Waste Management, Inc. as the full-service vendor for the construction and 20 year operation (plus addition of 5 year County and 15 year contractor option periods) of the resource recovery facility. The full-service vendor will be the owner operator of the facility. The County will be prime customer of the Project. Under this approach, the County expects Waste Management, Inc. to take on the substantial risks of construction, operation and marketing of solid waste disposal and energy output of the facilities as well as residue/unprocessable waste landfilling responsibilities. Ownership of the Project for federal income tax benefits will reside with Waste Management, Inc. The County also expects the vendor to pass through a substantial portion of the federal tax benefits available to the vendor, in the form of an up-front equity contribution during the construction period, which will serve to reduce the amount of bonds required to be issued and lower the net tipping fee.

Based on the final proposal submitted by Waste Management, Inc., the following presents a synopsis of the total estimated costs required for development of the Project.

Cost

The major cost components associated with the Project include the resource recovery facility construction, other related development cost, is site acquisition and development costs, and acquisition costs. The total costs have been reduced by a factor equaling the vendor's contribution (equity) to the project. The total cost to purchase the site and make it available for resource recovery construction will be approximately \$3,000,000 or \$150,000 per acre. To service the

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debt over the twenty year life of the project, including the cost of annual principle and interest, capitalized interest and debt service reserve fund, an assumed debt service factor of .175 is used. The preceding assumptions together with the cost proposals submitted by the Waste Management, Inc., a range of estimated capital costs were developed for the proposed Project and are presented in Table 7.2.1. These costs are subject to change during the final design and construction, however, they represent the best available estimates at the present time.

In addition to the preceding capital costs, estimates have been made for the operations and maintenance costs of both the resource recovery facility and disposal of ash residue and for the annual revenues anticipated from the facility. The following Table 7.2.2 presents projected annual operating costs and revenues (including interest income) for the proposed resource recovery facility and established a range for the net tipping fee.

The total capital and annual operating costs for the project are provided in order that a comparison can be made between present and future landfilling costs and the proposed resource recovery project.

At the present time, the cost to dispose of a ton of garbage is \$25. The fee is expected to increase to \$35/ton over the next few years. The upper estimate of the tip fee for disposing of a ton of garbage at the resource recovery facility in 1985 dollars is projected to be approximately \$39. Therefore, the cost differential between the resource recovery facility compared to existing landfilling is approximately \$14 per ton. As previously discussed this cost differential is expected to decrease as landfill costs increase.

TABLE 7.2.1*

CONSTRUCTION (CAPITAL) COST
(000's)

	<u>Facility</u>
A. <u>Design and Permitting</u>	<u>\$10,923</u>
B. <u>Site Work</u>	
1. Excavation and Fill	\$ 2,452
2. Foundations	5,292
3. Parking Area and Roadways	655
4. General Site Work - Fences, Grates Lighting, Grading, etc.	1,209
5. Landscaping (<u>Included Above</u>)	-
6. Sanitary Sewer (<u>Included Below</u>)	-
7. Water Supply	423
8. Storm Sewer (<u>Included Above</u>)	-
9. Utility Installation	317
10. Building(s) and Structure(s)	23,862
Subtotals	<u>\$45,133</u>
C. <u>Combustion Plant</u>	
1. Furnace	\$34,170
2. Grates	2,528
3. Boiler	17,701
4. Superheater (<u>Included Above</u>)	-
5. Economizer (<u>Included Above</u>)	-
6. Fuel Handling Equipment	1,941
7. Ash Collection Equipment	3,035
8. Process Control Equipment	2,305
9. Water Treatment Facility	2,407
Subtotals	<u>\$63,727</u>
D. <u>Cooling Systems</u>	<u>\$10,814</u>
E. <u>Air Pollution Control</u>	<u>\$11,854</u>
F. <u>Stack</u>	<u>\$ 2,529</u>

*Table 7.2.1 was excerpted from Waste Management, Inc. Final Project Contracts dated May 31, 1985.

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TABLE 7.2.1* (continued)

CONSTRUCTION (CAPITAL) COST
(000's)

G. <u>Power Plant</u>	<u>Facility</u>
1. Turbine	\$25,099
2. Generator (<u>Included Above</u>)	-
3. Switchgears	2,399
4. Transformers	2,892
5. Transmission Lines	-
6. Standby Electric Services	1,517
Subtotals	<u>\$31,907</u>
<u>Miscellaneous Mobile Equipment</u> (<u>Included Above</u>)	-
Project Totals	<u>\$165,964</u> <u>=====</u>

*Table 7.2.1 was excerpted from Waste Management, Inc. Final Project Contracts dated May 31, 1985.

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TABLE 7.2.2*

ANNUAL OPERATING COSTS AND REVENUES
(including interest income)

<u>Cost Component</u>	<u>Estimates (\$ in million)</u>
Annual Debt Service	24.5
Operations and Maintenance of Resource Recovery Facility and Landfill	8.0
Total Annual Cost	32.5
<u>Revenues</u>	
Electrical Power Sales	13.7
Interest Income	2.7
Non-County Tipping Fee	4.6
Proposers Adjustment	1.5
<u>Net Tipping Fee</u>	13.0

*Annual Operating Costs and Revenues was excerpted from Waste Management, Inc. Final Project Contracts dated May 31, 1985.

Even with the expectation of an increase in cost per household to support this Project which will provide an environmentally secure alternative to the landfilling of processable solid waste, the applicant believes the benefits described in the preceding subsections clearly outweigh the costs associated with the resource recovery facility.

To acquire and develop a new landfill site, which would be required if the County does not go ahead with this Project, would cost more than \$8 per ton over its available life. Therefore, in real dollars, no additional cost to dispose of garbage in the initial year of resource recovery operation is expected.

The following potential temporary costs and impacts have been considered through the course of the project.

Shortages of housing	None
Inflationary rentals or prices	None
Congestion of local streets and highways	Construction
Noise	Construction
Temporary aesthetic disturbance	Minor
Overloading of water supply and sewage treatment facilities	None
Crowding of local schools	None
Crowding of hospitals	None
Crowding of other public facilities	None
Overtaxing of community service	None
Disruption of lives or local community caused by acquisition	None

7.2.1 Long-Term External Costs and Benefits

Long-term external costs and benefits have been previously discussed throughout this report.

SITE AND DESIGN ALTERNATIVES

SECTION 8
SITE AND DESIGN ALTERNATIVES

8.1 Alternative Sites

To identify the most appropriate site for development of the North Broward County Resource Recovery Project, Broward County has undertaken a comprehensive site selection process which was initiated in 1981 and completed in 1983.

Initially, the site evaluation process for the Broward County resource recovery program involved the identification of one site for the construction of a resource recovery facility and a second site for the development of a new sanitary landfill.

In 1981, the former Broward County Solid Waste Division identified five prospective landfill sites and three prospective resource recovery facility sites for detailed evaluation. The criteria used to select these sites included:

- o general location
- o jurisdiction (unincorporated vs. incorporated areas)
- o size
- o existing zoning
- o land use plan designation
- o existing land use

The potential sites that were identified were:

LANDFILL

- Broward Correctional Institute (BCI) - This site represents between 480 and 710 acres surrounding the State of Florida Women's Correctional Institute located between Stirling Road and Sheriden Street near U.S. 27 in West Broward.
- Chapel Trail - This site consists of approximately 1830 acres located northeast of the intersection of Hollywood Boulevard and U.S. Route 27.

- Sportatorium - This site consists of approximately 440 acres located north of Hollywood Boulevard. The Sportatorium and the Miami/Hollywood Speedway are located on this site.
- Davie - This site is comprised of approximately 420 acres located adjacent to the existing Broward County Sanitary Landfill at the northwest intersection of Orange Drive and Shotgun Road.
- Markham Park - This 150 acre site is located in the eastern portion of the park, north of State Route 84 and west of Southwest 148th Avenue.

RESOURCE RECOVERY

- Fort Lauderdale Incinerator - This site is located on N.W. 31st Ave. in the City of Fort Lauderdale. It contains a City incinerator that is no longer in operation, and is currently used to park Department of Public Works sanitation vehicles.
- Route 441 - This site is located at the southeast intersection of U.S. Route 441 and State Route 84.
- Port Everglades - While a specific site had not been identified by the County, a tract bounded on the east by the Intracoastal Waterway and along the west and south by a discharge basin was reviewed.

An investigation of available information and on-site inspections was performed by Malcolm Pirnie, Inc. for each of the identified sites to assess:

- o Adequacy of site to contain the project
- o Proximity of site location to energy market(s)
- o Existing solid waste collection and transportation practices
- o Ability of the immediately adjacent transportation network to accommodate added collection vehicular traffic and associated loading
- o Conditions of existing roads to withstand vehicular loads
- o Identification of environmental and social constraints and existing land-use ordinances

- o Number of permits/approvals required for project development and the probability of obtaining the required approvals

The results of this evaluation were presented in a Malcolm Pirnie Site Evaluation report dated February 1982. These results indicated that the Route 441 site was the most promising of the potential resource recovery sites identified by the County. This was based upon the proximity of this site to the solid waste centroids, the adequacy of the access roadway system, the amount of acreage available for site development and the relative probability of receiving the required regulatory permits.

To verify the results of these initial studies, supplemental investigations to identify other potential sanitary landfill sites were undertaken by the Broward County Office of Planning in June 1982. This review involved the identification of major undeveloped areas in the County by means of current aerial photographs. This resulted in the identification of 97 locations. These sites were then evaluated based upon the following criteria:

- o Developed Area: Parcels that were clearly developed or being developed, based on evidence from observation, street maps and aerial photographs, were eliminated because it was assumed the cost of purchasing such areas would be prohibitive and would be strongly opposed by landowners and residents.
- o Location: Parcels within the unincorporated area of the County were considered because it was assumed that the necessary land use plan amendments and zone changes could not be obtained in a municipality.
- o Size: Parcels of approximately 300 acres within a section were the minimum considered. Smaller parcels were considered if their combination with parcels in adjacent sections would achieve the 300 acre threshold. The 300 acre minimum was used because it was assumed that smaller parcels would reduce the effective lifespan of a landfill operation.

- o Development of Regional Impact: Active and approved D.R.I.s were excluded from consideration because it was assumed that acquisition costs would be prohibitive.
- o Waterbodies: Parcels that included large waterbodies, such as abandoned rock pits, were eliminated, based on the assumption that filling the waterbodies would be impractical.

Sixteen possible sites (see Figure 3.1.2.1., Section 3.1.2, Site Selection) met the above criteria and were subjected to further evaluation by the Broward County Office of Planning, using the following criteria:

- o Surrounding Existing Land Use: The type of land use and its density were considered for compatibility and possible neighborhood opposition.
- o Surrounding Proposed Land Use: The land use type and density of any proposed projects or plats in progress were identified for compatibility.
- o Existing Land Use on Site: The site land use type was examined for compatibility with and adaptability to a possible operation.
- o Proposed Land Use on Site: Proposed uses were examined for compatibility and for present commitment.
- o Access: Roads adjacent to, leading to, or cutting through the site, as well as proposed roadway corridors, were examined for compatibility, adequacy and possible neighborhood opposition.
- o Environmental Sensitivity: Local Areas of Particular Concern (LAPC) and proposed Urban Wilderness Areas, both on and adjacent to the site, were identified to determine environmental compatibility.
- o Ownership Pattern: The number of landowners, and the size of their parcels on the site were examined to find sites with approximately three owners or less.
- o Jurisdiction by Other Agencies: Where it was known that agencies outside Broward County would have additional review or permitting powers (e.g., the FAA or the Army Corps of Engineers), they were noted.

Of the sixteen sites considered 9 were eliminated for reasons including LAPC status, size, parkland status and presence of development on-site. The 7 remaining sites were then further evaluated on the same level of detail as the sites previously investigated by Malcolm Pirnie, Inc.

Malcolm Pirnie supplemented the County evaluation of these seven sites by investigating several specific aspects of each site in addition to those evaluated by County staff.

Based upon the results of this study, it was concluded that only the Copans Road site should be considered for further evaluation along with the 441 site. By October 1982, the Broward County Commission made a firm policy decision not to rely on sanitary landfilling as the primary means of solid waste disposal, but rather to develop two full-service resource recovery projects.

On April 12, 1983 the County Commission approved the selection of the Copans Road and Route 441 site as locations for the proposed resource recovery facilities. On August 12, 1983 the Copans Road site, located in unincorporated Broward County, was rezoned by the County Commission from Limited Agricultural (A-1), Agricultural Utility (A-3) and General Industrial (M-3) to Planned Unit Development (PUD) for Special Complexes. By August 1984 the County had acquired all necessary property for the Copans Road site.

In May 1983, the Florida Legislature adopted House Bill 923 which annexed a portion of unincorporated Broward County into the City of Pompano Beach. Included within the area annexed was the 140 acre tract of land designated by the County as the proposed site for the North County resource recovery facility and ash residue/unprocessable waste landfill on Copans Road.

On September 1, 1983, House Bill 923 became effective annexing approximately three square miles of unincorporated Broward County, including the site on Copans Road designated

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for the North County resource recovery facility, into the City of Pompano Beach.

On October 12, 1983, the Pompano Beach City Commission directed the City planning and legal staff to institute the necessary procedures to rezone the Copans Road resource recovery facility and landfill property from the County designation of PUD for Special Complexes to the City designation of Highway Light Industrial (I-1). A resource recovery facility is not a permitted use or allowed as a special exception within the I-1 district. On March 6, 1984 the Pompano Beach City Commission unanimously voted on second reading to approve the ordinance rezoning the Copans Road I-1.

On April 5, 1984, Broward County filed its complaint for declaratory judgment, temporary and permanent injunction and other relief or, in the alternative, a petition for writ of certiorari. Pursuant to that petition, the Circuit Court judge issued an order to show cause, ordering the City of Pompano Beach to file their written response on or before May 1, 1984. The matter was set for hearing on May 31, 1984.

On April 30, the City of Pompano Beach filed a motion to dismiss the complaint for declaratory judgment, and temporary and permanent injunction and filed a motion to dismiss Broward County's petition for writ of certiorari. On May 15, 1984, Broward County filed a response to each of the City's motions to dismiss.

The hearing was held on May 31, 1984. At that time, the Court denied the City of Pompano Beach's motion to dismiss petition for writ of certiorari and heard Broward County's petition for writ of certiorari. On June 8, 1984 the judge issued a final judgment dismissing the action, stating that the County had not exhausted all the administrative remedies available to it through the City.

On July 9, 1984 the County filed a petition for a writ of certiorari with the District Court of Appeal, Fourth District

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of Florida requesting that the rezoning of the Copans Road Project site by Pompano Beach be voided and that the matter be remanded back to the Circuit Court so that the competing public interests could be balanced. This petition was denied by District Court on November 26, 1984.

On December 6, 1984 the County filed a motion for rehearing with the District Court which the Court denied on March 21, 1985. On July 1, 1985 the County filed an application for rezoning the Copans Road Project site from I-1 to Community Facilities (CF-1) and an application for a variance under I-1. If the City rezoned the Copans Road Project site from I-1 to CF zoning, the County would still be required to apply the City for a special use exception designation for this Project. The Pompano Beach Planning and Zoning Board unanimously denied the County's rezoning request on July 24, 1985. The County's variance request was scheduled to be heard on September 19, 1985.

In the meantime, Waste Management submitted an alternative proposal to the County in January 1984 as a part of the Company's overall proposal package by which the Company would locate a 2200 ton per day resource recovery facility at its Central Disposal Sanitary Landfill in unincorporated Broward County. On July 2, 1985 the Company was selected by the County Commission to be the full-service vendor for the North Broward County Resource Recovery Project. On August 13, 1985 the County Commission authorized staff to negotiate with Waste Management for the siting of the Project at the Hilton Road site. The County withdrew its Copans Road applications with the City of Pompano Beach in September, 1985 and filed a rezoning application for the Hilton Road site in February, 1986.

8.2 Proposed Site Design Alternatives

Presented below is a description of how the vendor, Waste Management, Inc., will provide the following facility systems while conforming to the RFP.

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8.2.1 Cooling System (exclusive of intake and discharge

The following cooling system alternatives were examined.

1. Once through cooling using secondary treated wastewater.
2. cooling pond using York Lake.
3. Wet cooling tower.
 - York Pond for makeup
 - Groundwater as makeup
 - Wastewater treatment plant effluent as makeup
4. Dry cooling tower.
5. Dry condenser.

As discussed in Appendix 10.15, Options 1, 2 and 3 were evaluated based strictly on water availability and environmental permitting requirements resulting in the elimination of all except for the wet cooling tower using treated effluent for makeup. The wet cooling tower, the dry cooling tower and the dry condenser options were then optimized based on an economic comparison and compared on the basis of environmental impact. The wet cooling tower was evaluated at three different approach temperatures and three different condenser temperature rise values. An examination of the dry cooling tower and the dry condenser confirmed that the economic penalty for those options would be significantly greater than any of the wet cooling tower options.

The life cycle present worth penalty for the dry cooling tower and dry condenser are estimated to be \$14 and \$7.6 million, respectively compared to the best wet cooling tower option. In comparing the wet cooling tower options, there is very little difference in the evaporation or the makeup between them.

8.2.2 Biological Fouling Control

Biological fouling will be directly controlled by the periodic use of chlorine and biocide (inhibits biological

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growth) in the circulating water. Biological fouling will be indirectly controlled through the continual addition of inhibitor and dispersant (reduces corrosion and deposition which would have provided breeding grounds for microorganisms) to the circulating water. Alum will be used to precipitate out phosphates (food stuff for microorganisms) in the cooling water makeup. Use of sulfuric acid, for pH control of the circulating water, will also indirectly help prevent biological fouling by keeping the pH of the water in a range where deposition is less likely to occur. Blowdown from the tower will be regulated to prevent buildup of precipitable chemicals that could serve as breeding grounds for microorganisms. Selection of a specific inhibitor, dispersant, or biocide has not been made at this time.

Blowdown from the cooling tower will not impact any water bodies or groundwater since it will be discharged directly to the Broward County North Regional Wastewater Treatment Plant. Selection of a biocide will be based on the chemical having a short toxic half-life so as not to detrimentally affect the County's treatment plant. All other chemicals to be used in the cooling tower will also be selected so as not to detrimentally affect the county's treatment plant as well.

No alternate is available that would have a lesser affect upon the environment.

8.2.3 Intake System

All intake water will be provided by pipeline from the Broward County Utilities Division. No other intake system is proposed.

8.2.4 Discharge System

All wastewater generated at the facility will be discharged to the county sewer for treatment at the Broward County North Regional Wastewater Treatment Plant. No other discharge system is proposed.

8.2.5 Chemical Waste Treatment

Blowdown from the boilers will be used for ash quench with any excess being discharged directly to the county sewer. Regeneration wastewaters from the boiler water makeup demineralizers will be neutralized prior to discharge to the county sewer for treatment at the Broward County North Regional Wastewater Treatment Plant.

Blowdown from the cooling tower will be discharged directly to the county sewer for treatment at the Broward County North Regional Wastewater Treatment Plant. Precipitation wastes from the cooling tower makeup water clarifier will be directly land filled.

As no other disposal methods are proposed, other methods of chemical waste treatment have not been developed.

8.2.6 Sanitary Waste System

All sanitary wastewaters will be discharged directly to the county sewer for treatment at the Broward County North Regional Wastewater Treatment Plant. No alternative disposal system is proposed.

8.2.7 Solid Waste Disposal System

8.2.7.1 Ash Wastes

The ash residue resulting from the incineration of solid waste has been used in parts of the United States and Europe as an aggregate for concrete, as well as a subbase material for roadway construction. This technology is still in the experimental stages. At present this type of application is not used in Florida. However, the possibility exists that after extensive study, the use of ash residue from incinerated solid waste as a construction material will prove to be environmentally benign. Ash residue used in this way would not only increase the life of the landfill associated with the resource recovery facility, but its sale would add revenue to the project.

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8.2.7.2 Other Solid Wastes

The potential exists that unprocessables (i.e., white goods and construction debris) and recovered metals and glass can be recycled. However, this potential is dependent on a future market for such materials. At present, there are no plans for the recovering of these materials since the markets for their reuse are not sufficient to justify the additional costs associated with their recovery.

8.2.8 Multiple Uses

The facility as designed will process solid waste only. The technology utilized is specific to this application.

8.2.9 Other Systems

The facility has been designed to include state-of-the-art technology in order to provide maximum environmental protection.

COORDINATION

SECTION 9
COORDINATION

Implementation of the resource recovery project has required coordination with numerous federal, state, regional, county and local government agencies. Information concerning the Project and its subelements has been obtained through correspondence, meetings and other forms of direct communication. Table 9.1 is a compilation of the agencies contacted for the development of this Project.

TABLE 9.1

COORDINATION DURING REZONING AND PREPARATION OF
POWER PLANT SITE CERTIFICATION APPLICATION

<u>Agency</u>	<u>Contact</u>	<u>Title</u>
	<u>Federal</u>	
U.S. Environmental Protection Agency Region IV Atlanta, Georgia	Winston A. Smith	Director, Air, Pesticides, and Toxics Management Division
	Bruce Miller	Acting Chief Air Programs Branch
	Michael Magee	Water Management Division
U.S. Department of Transportation Federal Aviation Ad- ministration	James E. Sheppard	Manager, Orlando Airport District Office
	<u>State</u>	
Florida Department of Environmental Regu- lation		
West Palm Beach District Office	Roy Duke	Regional Director
Divison of Archives, History and Records Mgt.	George W. Percy	Director
Florida Department of Land & Water Manage- ment	Paul Darst	Director
Power Plant Siting Section	Hamilton Oven	Power Plant Siting Section Administration
Power Plant Siting Section	Karen Anthony	Transmission Line Siting Coordinator
Bureau of Air Quality Management	Edward Palagyi	Engineer

TABLE 9.1 (continued)

COORDINATION DURING REZONING AND PREPARATION OF
POWER PLANT SITE CERTIFICATION APPLICATION

<u>Agency</u>	<u>Contact</u>	<u>Title</u>
	<u>State</u> (cont'd)	
Bureau of Air Quality Management	Larry George	Environmental Administrator
Bureau of Air Quality Management	Clair Fancy	Deputy Director Bureau of Air Qual. Mgmt.
Bureau of Air Quality Management	Edward Svec	Engineer
Office of General Counsel	Gary Early	Attorney (Tallahassee)
Bureau of Air Quality Management	Steven G. Conn	Permitting
Public Service Commission	Carrie Hightman Robert Trapp	Staff Counsel Engineer
State of Florida Planning and Develop- ment Clearinghouse	Richard Smith	Federal Consistency Coordinator
	<u>Local</u>	
Broward County:		
Environmental Quality Control Board, Broward County	Vic Howard	Pollution Control Officer
	John Chase	Groundwater Quality Monitoring Specialist
	Fran Henderson	Water Quality Investigator
Office of Planning Broward County	Don Kowell Roy Groves Al Shamoun	Director, Office of Planning Director, Plan Implementa- tion Division Associate Planner

TABLE 9.1 (continued)

COORDINATION DURING REZONING AND PREPARATION OF
POWER PLANT SITE CERTIFICATION APPLICATION

<u>Agency</u>	<u>Contact</u>	<u>Title</u>
	<u>Local</u> (cont'd)	
Intergovernmental Affairs	Eugenie Suter	Director
Engineering Division	Henry P. Cook	Director
Planning Council	Susan K. Philp	Director, Comprehensive Planning
Utilities Division	Ed Goscicki	Director
Parks and Recreation Division	Larry Lietzke	Director
Property Division	Frank Frey, Jr.	Director
General Counsel Office	Susan F. Delegal Annette Star Lustgarten	General Counsel Deputy General Counsel
Finance and Administra- tive Services Depart- ment	Foster Muzea	Director
Offices of Budget and Mgmt.	John Canada	Director
Florida Power & Light Company:	Douglas P. Macke	Administrator of Govern- mental Services
	Duane Bateman	Right-of-Way Represent- ative
	Robert H. Stevens Delia Perez	Distribution Engineering Dept.
Broward League of Cities:	Walter Falck	Executive Director
Resource Recovery Project Selection/ Negotiation Committee	Dick Marant	Former City Manager, City of Dania

TABLE 9.1 (continued)

COORDINATION DURING REZONING AND PREPARATION OF
POWER PLANT SITE CERTIFICATION APPLICATION

<u>Agency</u>	<u>Contact</u>	<u>Title</u>
	<u>Local</u> (cont'd)	
Resource Recovery Project Selection/ Negotiation Commit- tee (cont'd)	F.T. Johnson	Broward County Adminis- trator
	Ray M. Carson	Director, Broward County Public Work Dept.
	Milan Knor	Engineer, City of Miramar
	Robert Cox	City of Ft. Lauderdale Commissioner
	Alan Roberts	Director, City of Ft. Lauderdale Utilities Department
	Taylor P. Calhoun	Former Director, City of Hollywood Utilities Department
	Thomas Flynn	City of Pompano Beach Commissioner
	Scott I. Cowan	Broward County Commissioner
	Nicki Grossman	Broward County Commissioner
	Howard Forman	Broward County Commissioner
	Thomas M. Henderson	Resource Recovery Project Director
Broward County Economic Devel- opment Council	Skeet Jernigan	Director
City of Pompano Beach		City Commission City Manager Public Works Director Planning Office Director

TABLE 9.1 (continued)

COORDINATION DURING REZONING AND PREPARATION OF
POWER PLANT SITE CERTIFICATION APPLICATION

<u>Agency</u>	<u>Contact</u>	<u>Title</u>
<u>Local</u> (cont'd)		
City of Coconut Creek		City Commission City Manager City Engineer
City of Margate		City Manager
City of Lighthouse Point		City Manager
City of Parkland		City Manager
City of Coral Springs		City Manager
City of Hillsboro		City Manager
City of Deerfield Beach		City Manager
City of Tampa	Joe Murdoch	Environmental Spe- cialist MacKay Bay Resource Recovery Project
Hillsborough County	Marc J. Rogoff, Ph.D	Director, Resource Recovery
Pinellas County	W.W. Dasker	Director, Public Works Operation County Commissioners Executive
Palm Beach County	Tim Hunt	Director, Solid Waste Authority

APPENDICES

SECTION 10

APPENDICES

Appendices 10.1 through 10.17 are included as part of this submittal in a separate volume. Volume II contains Appendices 10.1 through 10.17.

SECTION 11

REFERENCES

SECTION 11

REFERENCES

- Broward County Planning Council; "Broward County Land Use Plan". Adopted by Board of County Commissioners, 1977.
- Broward County Planning and Administrative Systems Division. "Unincorporated Area Land Use Plan". Adopted by Board of County Commissioners, 1979; Amended 1980.
- Broward County Planning and Administrative Systems Division; "The Housing Element of the Broward County Comprehensive Plan", 1979.
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Broward County,
Florida



NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC.

**Solid Waste Energy Recovery Facility -
Application for Power Plant Site Certification**

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Volume II -
Hilton Road Site
Appendices

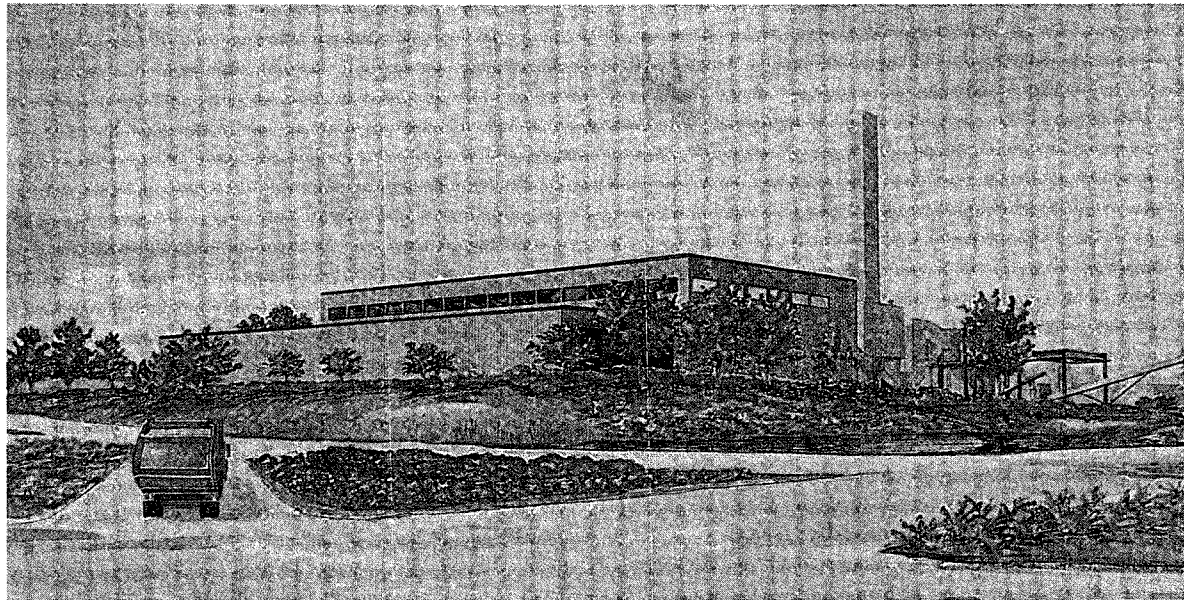
North Broward County Resource Recovery Project, Inc.

Solid Waste Energy Recovery Facility Application for Power Plant Site Certification

Volume II - Hilton Road Site - Appendices

Submitted By
The Broward County
Board of County Commissioners

Gerald Thompson, Chairman
Howard Forman, Vice Chairman
Scott I. Cowan Howard Craft
Ed Kennedy Sylvia Poitier
Nicki Englander Grossman



Floyd T. Johnson, County Administrator
Thomas M. Henderson, Director, Resource Recovery Office

February 1986

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VOLUME II

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 - 10.1.1 316 Demonstration
 - 10.1.2 NPDES Application/Permit
 - 10.1.3 Hazardous Waste Disposal/Permit
 - 10.1.4 Section 10 and 404 Application/Permit
 - 10.1.5 Prevention of Significant Deterioration
 - 10.1.6 Coastal Zone Management Certifications
- 10.2 ZONING APPLICATION
- 10.3 LAND USE PLAN DESCRIPTIONS
 - 10.3.1 Broward County Planning Council Formal Letter of Land Use Interpretation
 - 10.3.2 Broward County Ordinance No. 77-66: Land Use Planning
- 10.4 EXISTING STATE PERMITS
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- 10.6 PETITION FILED WITH PUBLIC SERVICE COMMISSION IN NOVEMBER 1985
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- 10.10 TECHNICAL NOISE ANALYSIS
- 10.11 DRAINAGE DESIGN CALCULATIONS
- 10.12 MASS BURN RESOURCE RECOVERY FACILITIES
- 10.13 NORTH DISTRICT REGIONAL WASTEWATER TREATMENT PLANT DATA
- 10.14 CLIMATOLOGICAL DATA
- 10.15 COOLING SYSTEM ALTERNATIVES
- 10.16 ARCHAEOLOGICAL SITES
- 10.17 POWER OF ATTORNEY

FEDERAL PERMIT APPLICATIONS OR APPROVALS

APPENDIX 10.1

FEDERAL PERMIT APPLICATIONS OR APPROVALS

Appendices 10.1.1 through 10.1.6 present a compilation of federal permit applications submitted, and general correspondence relating to their content.

316 DEMONSTRATION

APPENDIX 10.1.1

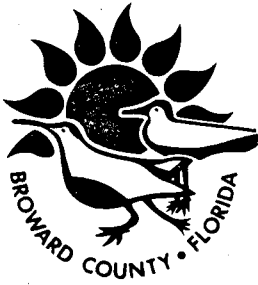
316 DEMONSTRATION

Demonstrations pursuant to Section 316(a) and (b) of the
Clean Water Act are not applicable to the project.

NPDES APPLICATION/PERMIT

APPENDIX 10.1.2

NPDES APPLICATION/PERMIT



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 14, 1986

U.S. Environmental Protection Agency
EPA Region IV
Water Management Division
345 Courtland Street
Atlanta, Georgia 30365

Attention: Mr. Michael Magee

Re: North Broward County Resource Recovery Project, Inc.
NPDES - Permit Application

Gentlemen:

Enclosed please find EPA Forms 3510-1 and 3510-2C which Broward County is submitting pursuant to the Clean Water Act under the National Pollutant Discharge Elimination System (NPDES) for the construction and operation of a Resource Recovery Facility in northern Broward County. The proposed facility will have an initial installed capacity of 2,200 tons per day with a projected estimated ultimate capacity of 3,300 tons per day of solid waste.

Uncontaminated stormwater will be the only discharge to surface waters during the construction and operation of this facility. This discharge will occur only during peak storms. The sanitary and process wastewater will be discharged to the existing Broward County Utilities Division North Regional Wastewater Treatment Plant.

In accordance with the requirements of the Federal Consistency Evaluation Procedures (15 CFR 930.50), the permit application is accompanied by an "NPDES Florida Coastal Zone Management Certification". As specified in 15 CFR 930.58, 10 copies of EPA Forms 3510-1 and 3510-2C and the "NPDES Florida Coastal Zone Management Certification" have been sent under separate cover to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

Mr. Michael Magee

-2-

February 14, 1986

Should you have any questions concerning the information presented in this submittal, please do not hesitate to contact us.

Sincerely,

A handwritten signature in cursive script, appearing to read "Thomas Henderson".

Thomas Henderson
Project Director
Resource Recovery Office

TH/lfc

FORM 1	EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY GENERAL INFORMATION <i>Consolidated Permits Program</i> <i>(Read the "General Instructions" before starting.)</i>	I. EPA I.D. NUMBER <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">S</td> <td style="width: 5%;">F</td> <td style="width: 5%;">T</td> <td style="width: 5%;">A</td> <td style="width: 5%;">C</td> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> <td style="height: 20px;"></td> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </table>	S	F	T	A	C					
S	F	T	A	C									
GENERAL LABEL ITEMS		GENERAL INSTRUCTIONS If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete items I, III, V, and VI (except VI-B which must be completed regardless). Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.											
II. EPA I.D. NUMBER III. FACILITY NAME IV. FACILITY MAILING ADDRESS V. FACILITY LOCATION	PLEASE PLACE LABEL IN THIS SPACE												

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK "X"			SPECIFIC QUESTIONS	MARK "X"		
	YES	NO	FORM ATTACHED		YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X		B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X		D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)	X		
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production; inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may effect or be located in an attainment area? (FORM 5)	X			J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may effect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1	SKIP	NO. BROWARD CO. RES. RECOVERY PROJ. INC.
---	------	--

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)		B. PHONE (area code & no.)		
2	HENDERSON THOMAS PROJ. DIR.	305	357	6456

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX		B. CITY OR TOWN	C. STATE	D. ZIP CODE
3	115 S. ANDREWS AVE. ROOM 521	FT. LAUDERDALE	FL	33301

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER		B. COUNTY NAME		C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
5	2700 HILTON RD. N.W. 48th ST.	BROWARD	POMPANO BEACH	FL	33060	10	

VIII. SIC CODES (4-digit, in order of priority)

A. FIRST				B. SECOND			
7	4	9	5	3	(specify)	7	(specify)
Refuse Systems							
C. THIRD				D. FOURTH			
7	(specify)	7	(specify)				

VIII. OPERATOR INFORMATION

A. NAME												B. Is the name listed in Item VIII-A also the owner?			
N O . B R O W A R D C O . R E S . R E C O V E R Y P R J . I N C .												☒ YES ☐ NO			
C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)														D. PHONE (area code & no.)	
F - FEDERAL		M - PUBLIC (other than federal or state)		(specify)		A									
S - STATE		O - OTHER (specify)		P											
P - PRIVATE															
E. STREET OR P.O. BOX															
1 1 5 . S . A N D R E W S A V E . R O O M . 5 2 1															
F. CITY OR TOWN										G. STATE		H. ZIP CODE		IX. INDIAN LAND	
F T . L A U D E R D A L E										F L		3 3 3 0 1		Is the facility located on Indian lands? ☐ YES ☒ NO	

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)										D. PSD (Air Emissions from Proposed Sources)									
9 N										9 P									
B. UIC (Underground Injection of Fluids)										E. OTHER (specify)									
9 U										(specify)									
C. RCRA (Hazardous Wastes)										F. OTHER (specify)									
9 R										(specify)									

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

The proposed Northern Resource Recovery Facility will receive and process initially approximately 2200 tpd of Municipal Solid Waste and ultimately approximately 3300 tpd of MSW from Northern Broward County. Processible waste received at the RRF will be burned to reduce the original volume by approximately 90 percent and Energy will be recovered from the combustion process in the form of electricity.

Items 3, 4 and 8 are subject to amendment pending initiation of final design for the facility.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)		B. SIGNATURE		C. DATE SIGNED	
Thomas Henderson Project Director		Thomas M. Henderson		1/14/86	

COMMENTS FOR OFFICIAL USE ONLY

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I. OUTFALL LOCATION

[illegible]

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

[illegible]

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES (complete the following table)☐ NO (go to Section III)

1. OUTFALL NUMBER (list)	2. OPERATION(s) CONTRIBUTING FLOW (list)	3. FREQUENCY		4. FLOW				c. DURATION (in days)
		a. DAYS PER WEEK (specify average)	b. MONTHS PER YEAR (specify average)	a. FLOW RATE (in mgd)		b. TOTAL VOLUME (specify with units)		
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	

III. MAXIMUM PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES (complete Item III-B)☒ NO (to Section IV)

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES (complete Item III-C)☐ NO (go to Section IV)

C. If you answered "Yes" to Item III-B, list the quantity which represents an actual measurement of your maximum level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. MAXIMUM QUANTITY

2. AFFECTED
OUTFALLS
(list outfall numbers)

a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. (specify)	2. AFFECTED OUTFALLS (list outfall numbers)

IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES (complete the following table)☒ NO (go to Item IV-B)

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COM- PLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE	a. RE- QUIRED	b. PRO- JECTED	

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs (or other environmental projects which may affect your discharges) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

V. INTAKE AND EFFLUENT CHARACTERISTICS

D. Use the space below to list any of the pollutants listed in Table 2c-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

A. Is any pollutant listed in Item V-C a substance or a component of a substance which you do or expect that you will over the next 5 years use or manufacture as an intermediate or final product or byproduct?

☐ **NO** (go to Item VI-B)

B. Are your operations such that your raw materials, processes, or products can reasonably be expected to vary so that your discharges of pollutants may during the next 5 years exceed two times the maximum values reported in Item V?

☐ **NO** (go to Section VII)

C. If you answered "Yes" to Item VI-B, explain below and describe in detail the sources and expected levels of such pollutants which you anticipate will be discharged from each outfall over the next 5 years, to the best of your ability at this time. Continue on additional sheets if you need more space.

☐ **YES** (identify the test(s) and describe their purposes below)

☐ NO (go to Section VIII)

VIII. CONTRACT ANALYSIS INFORMATION

☐ YES (list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)

☐ **NO (go to Section IX)**

A. NAME	B. ADDRESS	C. TELEPHONE (area code & no.)	D. POLLUTANTS ANALYZED (list)

IX. CERTIFICATION

A. NAME & OFFICIAL TITLE (type or print)

B. PHONE NO. (area code & no.)

C. SIGNATURE

D. DATE SIGNED

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER (copy from Item 1 of Form 1)

Form Approved
OMB No. 2000-0059
Approval expires 3-31-84

V. INTAKE AND EFFLUENT CHARACTERISTICS (continued from page 3 of Form 2-C)

OUTFALL NO.

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT						d. NO. OF ANALYSES	3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Biochemical Oxygen Demand (BOD)												
b. Chemical Oxygen Demand (COD)												
c. Total Organic Carbon (TOC)												
d. Total Suspended Solids (TSS)												
e. Ammonia (as N)												
f. Flow	VALUE		VALUE		VALUE					VALUE		
g. Temperature (winter)	VALUE		VALUE		VALUE			°C		VALUE		
h. Temperature (summer)	VALUE		VALUE		VALUE			°C		VALUE		
i. pH	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	X			STANDARD UNITS		X		

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2-a for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X'		3. EFFLUENT						d. NO. OF ANALYSES	4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Bromide (24959-67-9)		X												
b. Chlorine, Total Residual		X												
c. Color		X												
d. Fecal Coliform		X												
e. Fluoride (16984-48-8)		X												
f. Nitrate-Nitrite (as N)		X												

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X'		3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	b. LONG TERM AVERAGE VALUE		d. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic (as N)		X												
h. Oil and Grease		X												
i. Phosphorus (as P), Total (7723-14-0)		X												
j. Radioactivity														
(1) Alpha, Total		X												
(2) Beta, Total		X												
(3) Radium, Total		X												
(4) Radium 226, Total		X												
k. Sulfate (as SO ₄) (14808-79-8)		X												
l. Sulfide (as S)		X												
m. Sulfite (as SO ₃) (14265-45-3)		X												
n. Surfactants		X												
o. Aluminum, Total (7429-90-5)		X												
p. Barium, Total (7440-39-3)		X												
q. Boron, Total (7440-42-8)		X												
r. Cobalt, Total (7440-48-4)		X												
s. Iron, Total (7439-89-6)		X												
t. Magnesium, Total (7439-95-4)		X												
u. Molybdenum, Total (7439-98-7)		X												
v. Manganese, Total (7439-96-5)		X												
w. Tin, Total (7440-31-5)		X												
x. Titanium, Total (7440-32-6)		X												

CONTINUED FROM PAGE 3 OF FORM 2-C

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (*secondary industries, non-process wastewater outfalls, and non-required GC/MS fractions*), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe to be absent. If you mark either columns 2-a or 2-b for any pollutant, you must provide the results of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (*all seven pages*) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST- ING RE- QUIR- ED	b. BEL- IEVED PRE- SENT	c. BEL- IEVED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCEN- TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)			X												
2M. Arsenic, Total (7440-38-2)			X												
3M. Beryllium, Total, 7440-41-7)			X												
4M. Cadmium, Total (7440-43-9)			X												
5M. Chromium, Total (7440-47-3)			X												
6M. Copper, Total (7550-50-8)			X												
7M. Lead, Total (7439-97-6)			X												
8M. Mercury, Total (7439-97-6)			X												
9M. Nickel, Total (7440-02-0)			X												
10M. Selenium, Total (7782-49-2)			X												
11M. Silver, Total (7440-22-4)			X												
12M. Thallium, Total (7440-28-0)			X												
13M. Zinc, Total (7440-66-6)			X												
14M. Cyanide, Total (57-12-5)			X												
15M. Phenols, Total			X												
DIOXIN															
2,3,7,8-Tetra-chlorodibenzo-P-Dioxin (1764-01-6)			X	DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST ING RE- QUIR- ED	b. DE- LIVERED PRE- SENT	c. DE- LIVERED AB- SENT	8. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENTRATION	b. MASS	8. LONG TERM AVERAGE VALUE		d. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)			X												
2V. Acrylonitrile (107-13-1)			X												
3V. Benzene (71-43-2)			X												
4V. Bis (Chloro- methyl) Ether (542-88-1)			X												
5V. Bromoform (75-25-2)			X												
6V. Carbon Tetrachloride (56-23-5)			X												
7V. Chlorobenzene (108-90-7)			X												
8V. Chlorodi- bromomethane (124-48-1)			X												
9V. Chloroethane (75-00-3)			X												
10V. 2-Chloro- ethylvinyl Ether (110-75-8)			X												
11V. Chloroform (67-66-3)			X												
12V. Dichloro- bromomethane (75-27-4)			X												
13V. Dichloro- difluoromethane (75-71-8)			X												
14V. 1,1-Dichloro- ethane (75-34-3)			X												
15V. 1,2-Dichloro- ethane (107-06-2)			X												
16V. 1,1-Dichloro- ethylene (75-35-4)			X												
17V. 1,2-Dichloro- propane (78-87-5)			X												
18V. 1,3-Dichloro- propylene (542-75-6)			X												
19V. Ethylbenzene (100-41-4)			X												
20V. Methyl Bromide (74-83-9)			X												
21V. Methyl Chloride (74-87-3)			X												

CONTINUED FROM PAGE V-4

[illegible]

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	A. TEST-ING RE-QUIR-ED	B. DE-LIEVED PRE-SENT	C. DE-LIEVED AB-SENT	B. MAXIMUM DAILY VALUE		D. MAXIMUM 30 DAY VALUE (if available)		C. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANAL-YSES	B. CONCENTRATION	D. MASS	B. LONG TERM AVERAGE VALUE		D. NO. OF ANAL-YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS															
1B. Acenaphthene (83-32-9)			X												
2B. Acenaphthylene (208-96-8)			X												
3B. Anthracene (120-12-7)			X												
4B. Benzidine (92-87-5)			X												
5B. Benzo (a) Anthracene (56-55-3)			X												
6B. Benzo (a) Pyrene (50-32-8)			X												
7B. 3,4-Benzo-fluoranthene (205-99-2)			X												
8B. Benzo (ghi) Perylene (191-24-2)			X												
9B. Benzo (k) Fluoranthene (207-08-9)			X												
10B. Bis (2-Chloro-ethoxy) Methane (111-91-1)			X												
11B. Bis (2-Chloro-ethyl) Ether (111-44-4)			X												
12B. Bis (2-Chloro-isopropyl) Ether (39638-32-9)			X												
13B. Bis (2-Ethyl-hexyl) Phthalate (117-81-7)			X												
14B. 4-Bromo-phenyl Phenyl Ether (101-55-3)			X												
15B. Butyl Benzyl Phthalate (85-68-7)			X												
16B. 2-Chloro-naphthalene (91-58-7)			X												
17B. 4-Chloro-phenyl Phenyl Ether (7005-72-3)			X												
18B. Chrysene (218-01-9)			X												
19B. Dibenzo (a,h) Anthracene (53-70-3)			X												
20B. 1,2-Dichloro-benzene (95-50-1)			X												
21B. 1,3-Dichloro-benzene (541-73-1)			X												

CONTINUED FROM PAGE V-6

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST ING RE- QUIR- ED	b. BE- LIEVED PRE- SENT	c. BE- LIEVED AB- SENT	8. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANAL- YSES	8. CONCENTRATION	b. MASS	8. LONG TERM AVERAGE VALUE		b. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS (continued)															
22B. 1,4-Dichlorobenzene (106-46-7)			X												
23B. 3,3'-Dichlorobenzidine (91-94-1)			X												
24B. Diethyl Phthalate (84-66-2)			X												
25B. Dimethyl Phthalate (131-11-3)			X												
26B. Di-N-Butyl Phthalate (84-74-2)			X												
27B. 2,4-Dinitrotoluene (121-14-2)			X												
28B. 2,6-Dinitrotoluene (606-20-2)			X												
29B. Di-N-Octyl Phthalate (117-84-0)			X												
30B. 1,2-Diphenylhydrazine (as Azobenzene) (122-66-7)			X												
31B. Fluoranthene (206-44-0)			X												
32B. Fluorene (86-73-7)			X												
33B. Hexachlorobenzene (118-71-1)			X												
34B. Hexachlorobutadiene (87-68-3)			X												
35B. Hexachlorocyclopentadiene (77-47-4)			X												
36B. Hexachloroethane (67-72-1)			X												
37B. Indeno (1,2,3-cd) Pyrene (193-39-5)			X												
38B. Isophorone (78-59-1)			X												
39B. Naphthalene (91-20-3)			X												
40B. Nitrobenzene (98-95-3)			X												
41B. N-Nitrosodimethylamine (62-75-9)			X												
42B. N-Nitrosodi-N-Propylamine (621-64-7)			X												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						d. NO. OF ANALYSES	4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)			a. CONCENTRATION	b. MASS	b. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (continued)															
43B. N-Nitrosodiphenylamine (86-30-6)			X												
44B. Phenanthrene (85-01-8)			X												
45B. Pyrene (129-00-0)			X												
46B. 1,2,4 - Tri-chlorobenzene (120-82-1)			X												
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α -BHC (319-84-6)			X												
3P. β -BHC (319-85-7)			X												
4P. γ -BHC (58-89-9)			X												
5P. δ -BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α -Endosulfan (115-29-7)			X												
12P. β -Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												
15P. Endrin Aldehyde (7421-93-4)			X												
16P. Heptachlor (76-44-8)			X												

CONTINUED FROM PAGE V-8

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	A. TESTING REQUIRED	B. BELIEVED PRESENT	C. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	e. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - PESTICIDES (continued)															
17P. Heptachlor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11098-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

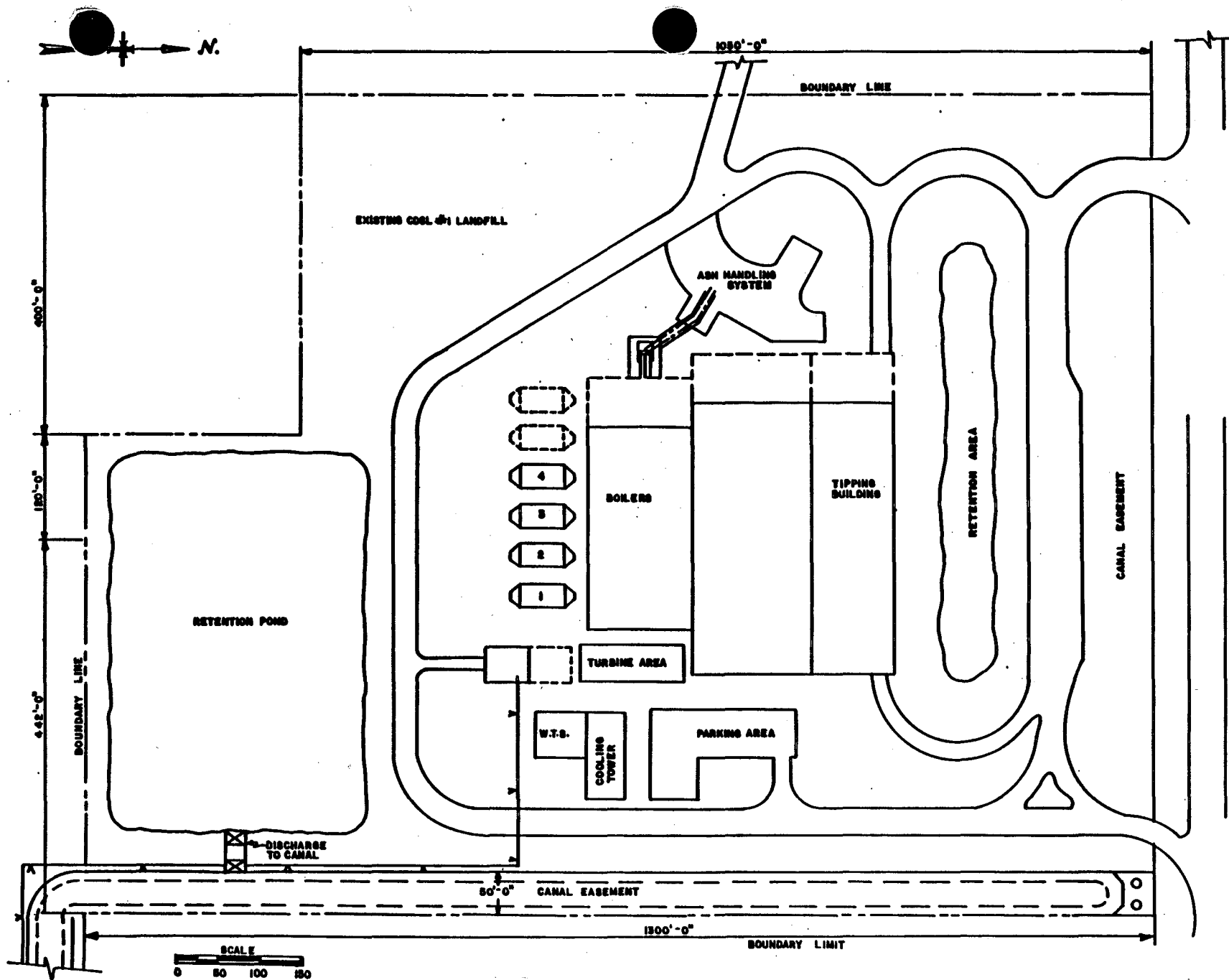
ATTACHMENT A

Resource Recovery Facility

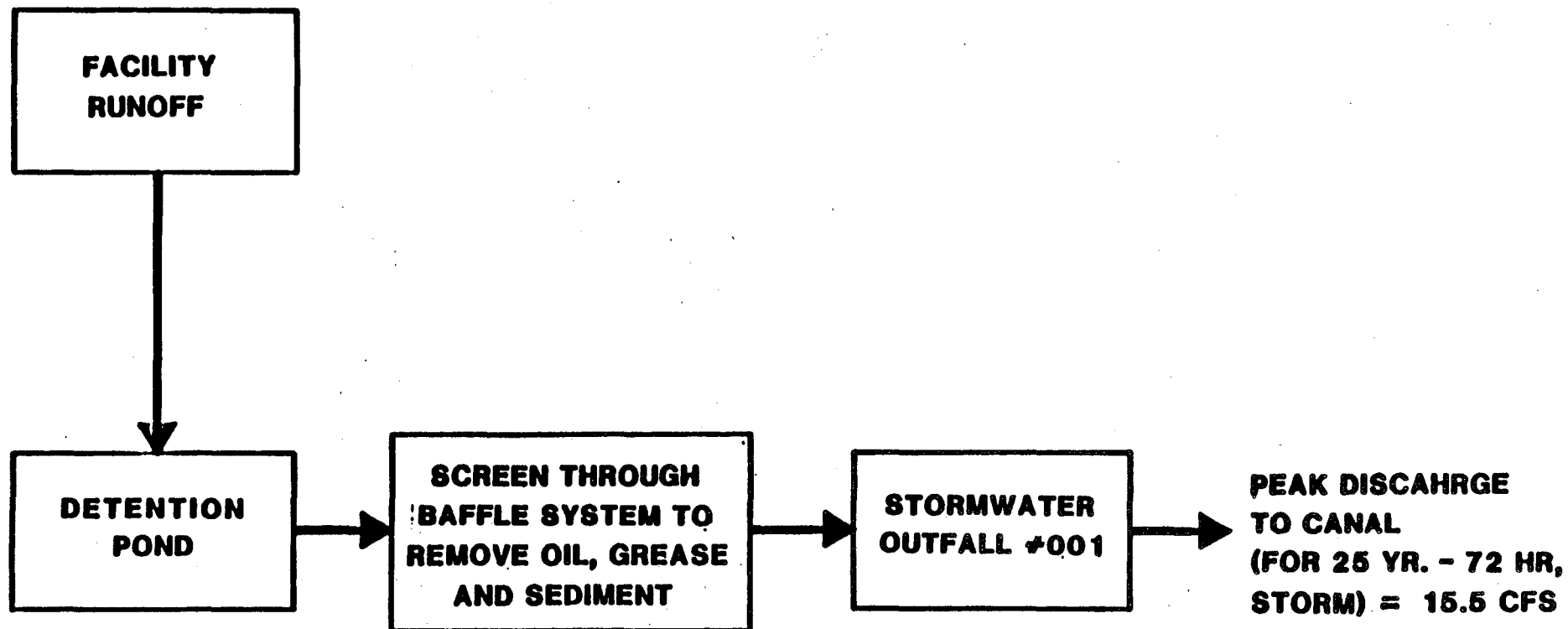
The required stormwater retention will typically be provided by on-site drainage swales and/or catch basin system. Disposal of retained water in these areas will be accomplished via precolation and evaporation processes. Excess runoff, beyond that which is retained in the retention areas will be conveyed to a wet detention pond. This pond, which is approximately 1.40 acres in area, will be constructed at the southern portions of the RRF site (Figure 1). Detained water in the pond will be released by controlled gravity discharge, via a weir/culvert structure to the C-14 canal in accordance with SFWMD discharge criteria.

The outfall structure for the site is located at the detention pond. It consists of a weir overflow structure (invert el. 10.2 ft. NGVD) with a pipe, sluice gate and a baffle for water quality and discharge control. An approximately 24-inch in diameter RCP connects the structure to the C-14 canal, which is the final discharge point for project drainage. Specifically, post development peak discharges from the resource recovery facility site, for the 25 year-72 hour design storm, will not exceed predevelopment levels. Peak discharge to the C-14 canal approximately 15.5 cubic feet per second (cfs) which is the estimated pre-development discharge. Discharge velocities will be limited to below 4 feet per second, for erosion control purposes. The weir outfall control structure will be furnished with a baffle for oil, grease and sediment control. The invert of the weir will be set at elevation 10.2 feet NGVD. This elevation provides sufficient retention for water quality control. Elevation 9.0 feet NGVD is the established control elevation for the site. Water level in the pond will rise to elevation 13.0 ft NGVD during 25 year-72 hour storm. The pond will be constructed with a 0.5 foot freeboard.

A berm will be constructed to contain water during dredging and filling. Sediment traps and screens will be strategically placed to trap runoff. All permanent berms constructed for the development will be grassed to prevent erosion.



**BROWARD COUNTY
SOUTHERN RESOURCE RECOVERY SITE
SITE DRAINAGE**



**BROWARD COUNTY
NORTHERN RESOURCE RECOVERY FACILITY
STORMWATER OUTFALL**



**BROWARD COUNTY
RESOURCE RECOVERY
HILTON ROAD SITE**

HAZARDOUS WASTE DISPOSAL/PERMIT

APPENDIX 10.1.3

HAZARDOUS WASTE DISPOSAL APPLICATIONS/PERMIT

There are no hazardous waste disposal applications/permits pursuant to the Resource Recovery and Conservation Act that are applicable to this project. No hazardous waste will be accepted, stored, or disposed of at the facility.

SECTION 10 AND 404 APPLICATION/PERMIT

APPENDIX 10.1.4

SECTION 10 AND 404 APPLICATIONS/PERMIT

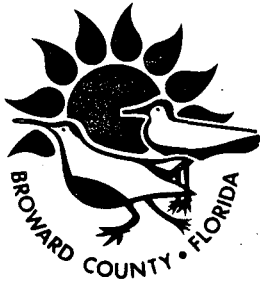
The facility site does not come under jurisdiction of
the U.S. Army Corps of Engineers and
Section 10 of the Rivers and Harbors Act and
Section 404 of the Clean Water Act does not apply.

PREVENTION OF SIGNIFICANT DETERIORATION

APPENDIX 10.1.5

PREVENTION OF SIGNIFICANT DETERIORATION

Application to Operate/Construct Air Pollution Sources



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301

February 14, 1986

(305) 357-6458

U.S. Environmental
Protection Agency
Air Programs Branch
345 Courtland Street
Atlanta, Georgia 30300

Attention: Mr. Bruce Miller
Acting Chief

Re: Prevention of Significant Deterioration (PSD)
Permit Application for the North Broward
County Resource Recovery Project, Inc.

Gentlemen:

Please find enclosed a Prevention of Significant Deterioration permit application for the North Broward County Resource Recovery Project, Inc. This application is being submitted to you in accordance with CFR Title 40, Part 52.21, Prevention of Significant Deterioration of Air Quality.

A copy of this application is also included in a Power Plant Siting Certification Application for the Project which we are filing with the State of Florida Department of Environmental Registration (FDER) Power Plant Siting Section. We have formally requested FDER to begin the administrative and technical review of the PSD application.

Should you have any questions regarding this application or the Project, please do not hesitate to contact me.

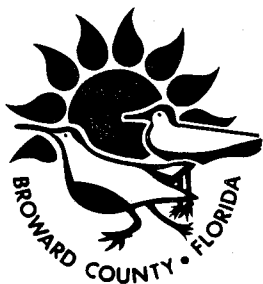
Very truly yours,

Thomas M. Henderson
Project Director
Broward County Resource Recovery Office
and
Attorney-in-Fact
North Broward County Resource Recovery Project, Inc.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 21, 1986

State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Attention: Mr. Hamilton Oven, P.E.
Power Plant Siting Section

Re: Power Plant Site Certification Application
North Broward County Resource Recovery Project, Inc.

Gentlemen:

Please find enclosed a copy of the Prevention of Significant Deterioration (PSD) application which was recently submitted to the U.S. Environmental Protection Agency, Region IV, Atlanta office for the North Broward County Resource Recovery Project, Inc.

Please begin the administrative and technical review of this application in conjunction with our Power Plant Siting Certification Application for the above referenced project. Should you have any questions on this material, please contact us at your convenience.

Very truly yours,

Thomas M. Henderson
Project Director
Broward County Resource Recovery Office
and
Attorney-in-Fact
North Broward County Resource Recovery Project, Inc.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

TECHNICAL SUPPORT DOCUMENT FOR
THE PREVENTION OF SIGNIFICANT DETERIORATION
(PSD) PERMIT FOR THE RESOURCE RECOVERY
FACILITY IN NORTH BROWARD COUNTY, FLORIDA

Prepared for:

MALCOLM PIRNIE, INC.

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

February 1986

ESE No. 86-100-0100-2110

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1.0 INTRODUCTION

This report presents the results of an air quality analysis and study performed by Environmental Science and Engineering, Inc. (ESE) for the proposed north Broward County Resource Recovery (NBCRR) facility. The proposed plant will be located in the north portion of Broward County and, therefore, is referred to as the NBCRR facility. The facility will be owned and operated by a partnership of Waste Management, Inc. and Morrison-Knudson Company, Inc. A conceptual design has been specified by Malcolm Pirnie, Inc., Broward County Resource Recovery Office, and Waste Management, Inc. based on conservative, or worst-case, assumptions from a potential air quality impact viewpoint. Once the conceptual design is finalized, the predicted impacts are not expected to be significantly different (i.e., not significantly higher) than those presented in this report. Solid waste will fuel steam generation boilers at the facility for the purpose of reducing waste volume and generating electricity.

The NBCRR facility will have a nameplate operating capacity of charging 2,200 tons per day (TPD) of municipal solid waste (MSW) at a 80.0-percent annual availability factor. For modeling purposes, the facility is assumed to operate for a short period of time at 110 percent of its nameplate capacity. This modeling assumption will produce conservative (i.e., higher-than-expected) concentrations because the facility will not operate at 110 percent of its nameplate capacity for every hour throughout the year. Normal fluctuations in waste generation, scheduled maintenance, and unscheduled repairs significantly reduce available capacity as noted previously.

In accordance with the Clean Air Act (CAA) Amendments of 1977, this report addresses the requirements of the Prevention of Significant Deterioration (PSD) review which will be submitted to the Florida Department of Environmental Regulation (DER) and the United States Environmental Protection Agency (EPA) Region IV for their approval. This review includes an emission control technology evaluation, an air quality modeling and monitoring assessment of expected air pollutant emissions and background sources, and an assessment of the impact of the proposed facilities on soils, vegetation, and visibility.

As part of the air quality modeling assessment, incremental and total ambient pollutant concentrations were simulated for comparison to the national and Florida Ambient Air Quality Standards (AAQS) and PSD increments in the area surrounding the proposed plants. Air quality dispersion modeling was conducted using the EPA Industrial Source Complex (ISC) model for estimating concentrations.

The air quality regulatory requirements pertaining to the proposed NBCRR facility are presented in Section 2.0. The facility design description and control technology review are presented in Sections 3.0 and 4.0, respectively. The air quality modeling procedures and assumptions are presented in Section 6.0. The results of the modeling analyses that compare the predicted impacts of the NBCRR facility to the national and Florida AAQS and the PSD Class I and II increments are discussed in Section 7.0. An evaluation of the predicted impacts on soils, vegetation, and visibility is presented in Section 8.0. A summary of the results of this analysis and the conclusions are presented in Section 9.0.

2.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussions pertain to the general project description and regulatory requirements that must be met for the construction and operation of the proposed resource recovery facilities, as required by federal and state PSD regulations and other air quality regulations.

2.1 PROJECT DESCRIPTION

Broward County occupies an area of approximately 1,200 square miles (mi²) and is located in the southeastern portion of the State of Florida. Broward County is bound on the north by Palm Beach County, on the east by the Atlantic Ocean, on the south by Dade County, and on the west by Hendry and Collier Counties.

In 1985, Broward County generated approximately 3,650 TPD of solid waste (Broward County Environmental Quality Control Board, 1986). Currently, the county's waste is disposed of at two landfills. One of these landfills, the county landfill at Davie, is projected to reach capacity in 1987. The other landfill, the central disposal landfill located at Pompano Beach, is owned and operated by Waste Management, Inc. It is estimated that this landfill will reach capacity in the early 1990's. A proposed expansion of the latter site could extend this date for several years at current disposal rates.

The capacity limitations of these landfills necessitate the development of a long-term countywide disposal plan. Recognizing this need, Broward County authorized the investigation of solid waste management alternatives. A policy decision was made by Broward County not to rely on landfills as a primary long-term disposal solution and to concentrate on alternatives that involve the recovery of materials and/or energy as valuable resources. The engineering firm of Malcolm Pirnie, Inc., in association with W.F. Cosulich and Associates, Inc., and Hazen and Sawyer, Inc., was retained by the county to assist representatives from applicable county agencies in developing a long-term, full-service waste disposal system.

The general location of the facility in Florida is shown in Figure 2-1. The northern site location in Broward County is shown in Figure 2-2. This site is accessible by Powerline Road to Hilton Road. Powerline Road is a 4-lane paved roadway with current industrial development in the vicinity of the site.

2.2 NATIONAL AND STATE AAQS

As a result of the requirements of the 1970 CAA Amendments, EPA enacted primary and secondary national AAQS (Federal Register, 1971) for six air pollutants. Primary national AAQS are required to protect the public health, and secondary national AAQS are required to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Pollutants for which AAQS have been established are called "criteria" pollutants.

The existing applicable national and Florida AAQS are presented in Table 2-1. Since the original standards were issued in 1971, the following changes have been made to national AAQS:

1. EPA eliminated the 24-hour and annual secondary AAQS for sulfur dioxide (SO_2);
2. AAQS for photochemical oxidants was redesignated as ozone (O_3), the concentration limit was increased, and the method for determining compliance was changed;
3. A new national AAQS for lead (Pb) was promulgated; and
4. AAQS for hydrocarbons, used as a guide in achieving the AAQS for photochemical oxidants, was eliminated.

Prior to these changes, the State of Florida promulgated the secondary national AAQS for SO_2 as the state AAQS. Since states have the authority to adopt AAQS more stringent than those established by EPA, the State of Florida has chosen to retain the secondary AAQS for SO_2 which were eliminated by EPA.

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

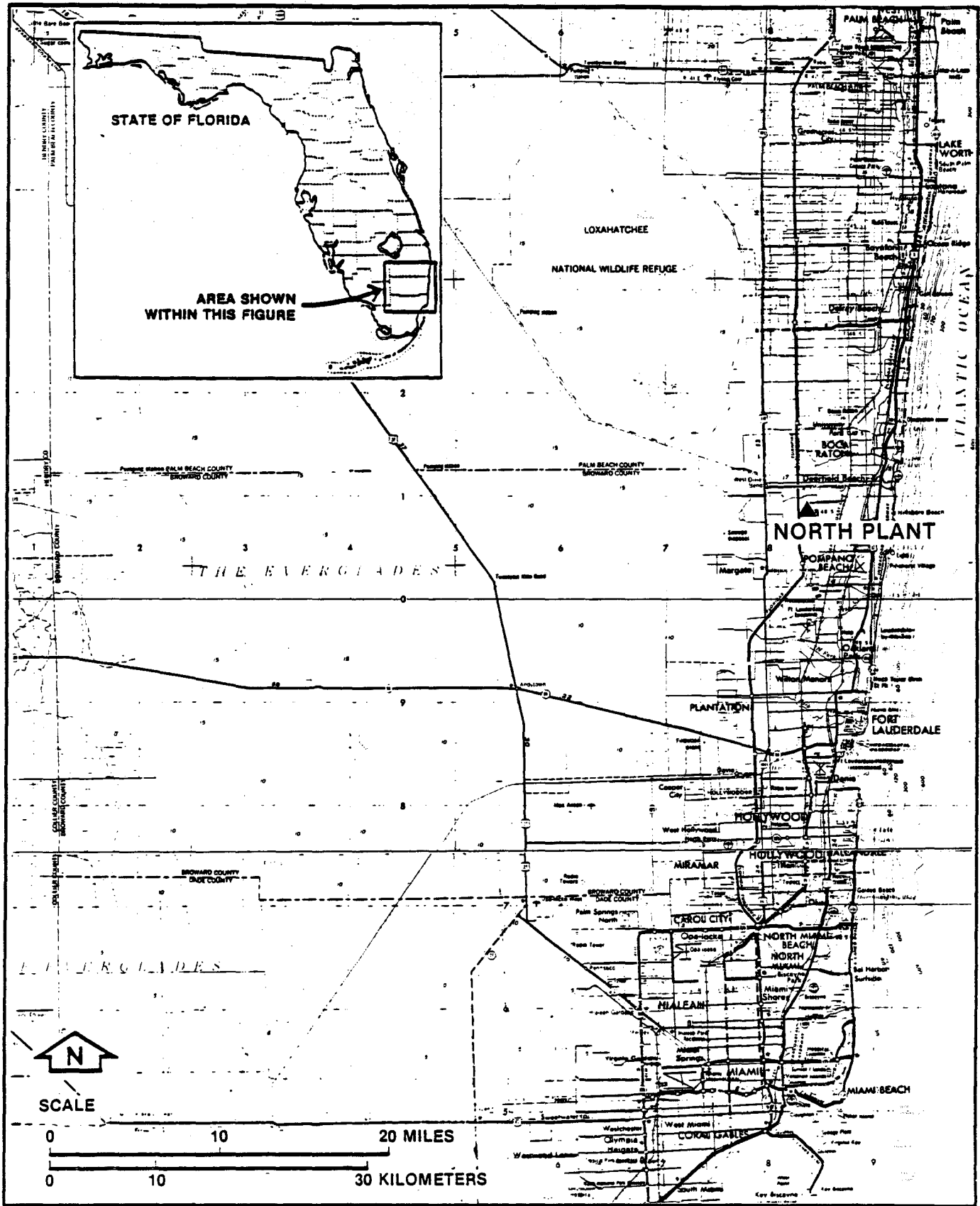


Figure 2-1
GENERAL LOCATION OF THE PROPOSED
NORTH RESOURCE RECOVERY FACILITY
IN FLORIDA

SOURCE: ESE, 1986.

MALCOM PIRNIE, INC.

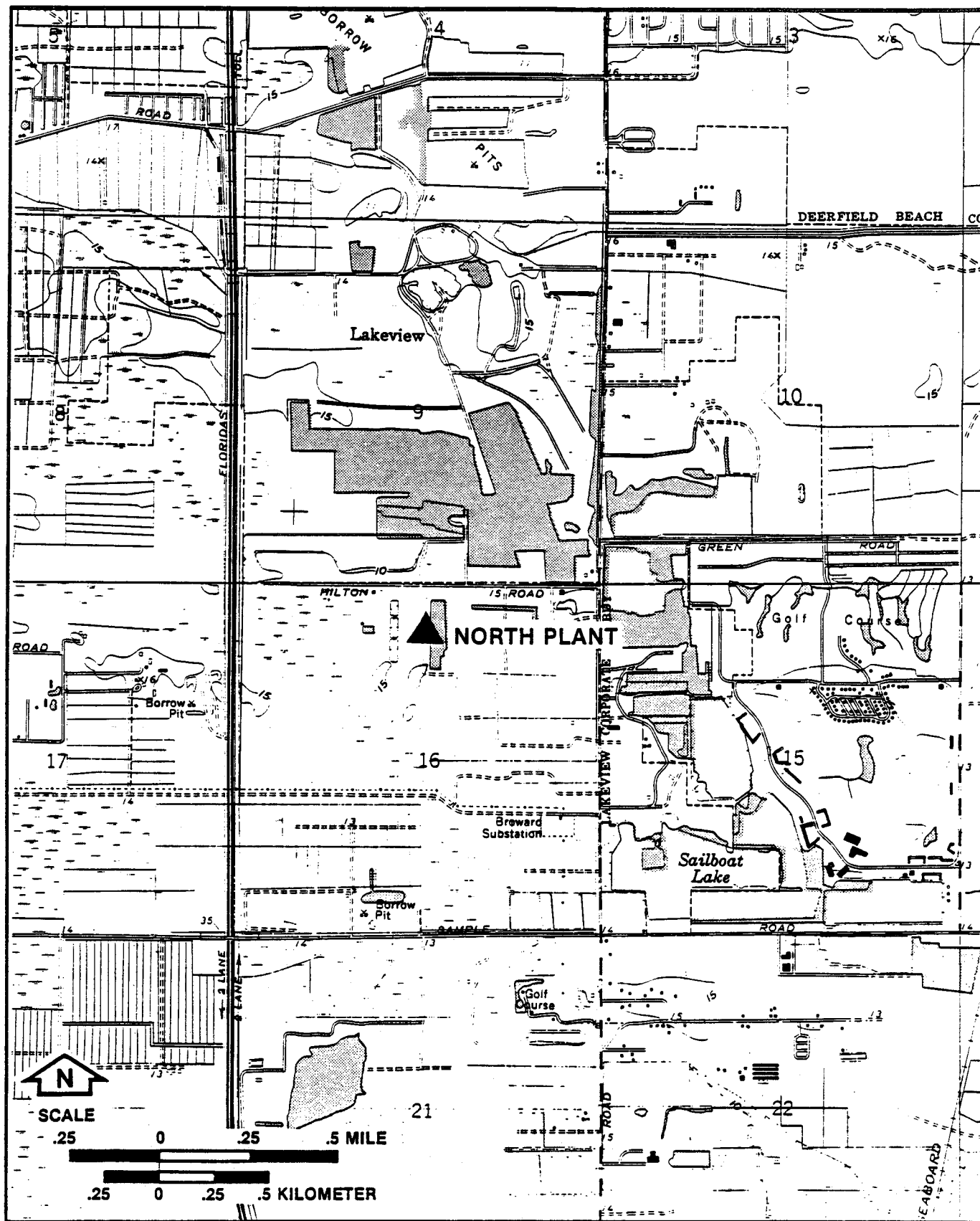


Figure 2-2
 LOCATION OF THE PROPOSED NORTH
 RESOURCE RECOVERY FACILITY IN
 BROWARD COUNTY
 SOURCE: ESE, 1986.

MALCOM PIRNIE, INC.

Table 2-1. National and Florida AAQS

Pollutant	Averaging Time	National AAQS* (ug/m ³)		FSD Increments (ug/m ³)	
		Primary	Secondary	Class I	Class II
Suspended Particulate Matter (PM)	Annual Geometric Mean	75	60	5	19
	24-Hour Maximum†	260	150	10	37
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean	80	NA	2	20
	24-Hour Maximum†	365	NA	5	91
	3-Hour Maximum†	NA	1,300	25	512
Carbon Monoxide (CO)	8-Hour Maximum†	10,000	10,000	NA	NA
	1-Hour Maximum†	40,000	40,000	NA	NA
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean	100	100	NA	NA
Ozone (O ₃)	1-Hour Maximum**	235	235	NA	NA
Lead (Pb)	Calendar Quarter	1.5	1.5	NA	NA

* Florida AAQS are identical to the secondary national AAQS except for the following SO₂ concentrations: 60 ug/m³, annual average, and 260 ug/m³, 24-hour average.

† Maximum concentration not to be exceeded more than once per year.

** Maximum concentration not to be exceeded more than an average of 1 calendar day per year.

ug/m³ = micrograms per cubic meter.

NA = Not applicable.

Source: 40 CFR, Parts 50 and 52.

Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Broward County is currently designated an O₃ nonattainment area. There are no other designated nonattainment areas for other pollutants within 100 kilometers (km) of the proposed plant sites.

2.3 PSD REQUIREMENTS

2.3.1 General Requirements

Under federal PSD review requirements, all major new sources of air pollutants regulated under CAA must be reviewed and approved by EPA. (In those cases in which sources apply for a PSD permit, the application is reviewed and approved by DER since PSD review authority has been delegated to the state. However, for those sources which are licensed under Florida's Electrical Power Plant Siting Act, DER has been delegated administrative and technical review but the final approval must be granted with EPA Region IV). A "major stationary source" is defined as any one of 28 named source categories which has the potential to emit 100 tons per year (TPY) or more, or any other stationary source which has the potential to emit 250 TPY or more, of any pollutant regulated under CAA. "Potential to emit" means the capability at maximum design capacity to emit a pollutant after the application of control equipment.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified source. PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. Major sources are required to undergo the following reviews related to PSD for each pollutant emitted in significant amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. Additional impact analyses.

"Significant" is defined as any increase in emissions in excess of specified levels (Table 2-2).

The control technology review includes determination of Best Available Control Technology (BACT) for each applicable pollutant. BACT emission limits cannot exceed applicable emission standards [e.g., new source performance standards (NSPS) or state emission limits] promulgated under 40 CFR 60. The source impact analysis requires demonstration of compliance with federal and state AAQS and allowable PSD increment limitations. Projected ambient impacts on designated nonattainment areas and federally promulgated Class I PSD areas must also be addressed. The air quality analysis (monitoring) portion of PSD review requires an analysis of continuous ambient air monitoring data to be performed for the impact area of the proposed source. Source information, including process design parameters and control equipment information, must be submitted to the reviewing agencies. Additional analysis of the proposed source's impact on soils, vegetation, and visibility, especially pertaining to Class I PSD areas, must be performed, as well as analysis of impacts due to growth in the area associated with the proposed source.

2.3.2 Increments/Classifications

In promulgating the 1977 CAA Amendments, Congress specified that certain increases above an air quality "baseline concentration" level of SO₂ and total suspended particulate (TSP) concentrations would constitute significant deterioration. The magnitude of the increment that cannot be exceeded depends on the classification of the area in which a new source (or modification) will have an impact. Three classifications were designated based on criteria established in the CAA Amendments. Initially, Congress promulgated areas as Class I [international parks, national wilderness areas, and memorial parks larger than 2,024 hectares (ha) (5,000 acres), and national parks larger than 2,428 ha (6,000 acres)] or Class II (all other areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than

Table 2-2. PSD Significant Emission Rates and De Minimis Impact Levels

Pollutant	Regulated Under	Significant Emission Rate (TPY)	<u>De Minimis</u> Air Quality Impact (ug/m ³)
Sulfur Dioxide (SO ₂)	NAAQS, NSPS	40	13, 24-hour
Particulate Matter (PM)	NAAQS, NSPS	25	10, 24-hour
Nitrogen Oxides (NO _x)	NAAQS, NSPS	40	14, Annual
Carbon Monoxide (CO)	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone) (O ₃)	NAAQS, NSPS	40	100 TPY*
Lead (Pb)	NAAQS	0.6	0.1, 24-hour
Sulfuric Acid Mist (H ₂ SO ₄)	NSPS	7	†
Total Fluorides (F ⁻)	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide (H ₂ S)	NSPS	10	0.04, 1-hour
Asbestos	NESHAP	0.007	†
Beryllium (Be)	NESHAP	0.0004	0.0005, 24-hour
Mercury (Hg)	NESHAP	0.1	0.25, 24-hour
Vinyl Chloride	NESHAP	1	15, 24-hour
Benzene	NESHAP	0	†
Radionuclides	NESHAP	0	†
Inorganic Arsenic (As)	NESHAP	0	†
Any Regulated Pollutant	—	Class I Impact**	

* Increase in volatile organic compounds (VOC) emissions.

† No ambient measurement method.

** Any emission rate for a source located within 10 km of a Class I area which causes impacts of 1 ug/m³, 24-hour average, or greater.

Notes: Ambient monitoring requirements for subject pollutants may be exempted if the impact of the increase in emissions is below air quality impact de minimis levels.

NAAQS = National Ambient Air Quality Standards.

NSPS = New Source Performance Standards.

NESHAP = National Emission Standards for Hazardous Air Pollutants.

In February 1981, the Ambient Monitoring Guidelines for PSD (EPA-450/4-80-012) were revised to reflect the following changes in the de minimis levels: lead—0.1 ug/m³, calendar quarter; hydrogen sulfide—0.2 ug/m³, 1-hour; and beryllium—0.001 ug/m³, 24-hour. These revisions have not been published in the Federal Register or incorporated into the Code of Federal Regulations.

Sources: 40 CFR 52.21.
Lutz, 1981.

Class II areas, were designated. However, the states were given the authority to redesignate any Class II area to Class III status, provided certain requirements were met. EPA then promulgated as regulations the requirements for classifications and area designations. The State of Florida has adopted the EPA class designations and allowable PSD increments (Table 2-2). The nearest Class I area is the Everglades National Park, located about 78 km from the NBCRR facility.

The term "baseline concentration" evolved from federal and state PSD regulations and denotes a fictitious concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition in the PSD regulations, as amended August 7, 1980, baseline concentration means the ambient concentration level which exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and shall include:

1. The actual emissions representative of sources in existence on the applicable baseline date; and
2. The allowable emissions of major stationary sources which commenced construction before January 6, 1975, but were not in operation by the applicable baseline date.

The following will not be included in the baseline concentration and will affect the applicable maximum allowable increase(s) (allowed increment consumption):

1. Actual emissions from any major stationary source on which construction commenced after January 6, 1975; and
2. Actual emissions increases and decreases at any stationary source occurring after the baseline date.

"Baseline date" means the earliest date after August 7, 1977, on which the first complete application under 40 CFR 52.21 is submitted by a major stationary source or major modification subject to the requirements of 40 CFR 52.21.

2.3.3 Control Technology Review

CAA mandated that EPA promulgate NSPS, which are a set of national emission standards for stationary sources of air pollution. These standards are applicable to specific categories of sources and apply not only to new sources, but also to modified or reconstructed existing sources of air pollution. Consequently, EPA promulgated NSPS for incinerators in June 1974 (40 CFR 60, Subpart E). NSPS for incinerators impose an emission limitation on particulate matter (PM) only.

Specifically, incinerators with a charging rate in excess of 50 TPD of solid waste may not discharge to the atmosphere flue gases that contain PM in excess of 0.08 grain per standard cubic foot dry gas (gr/dscf), corrected to 12-percent carbon dioxide (CO₂).

DER has promulgated pollutant emission limitations to attain and preserve ambient air quality. The only emission regulation that applies to the proposed NBCRR facility is a PM standard. Particulate emissions from a new incinerator with a charging rate equal to or greater than 50 TPD are limited to 0.08 gr/dscf corrected to 50-percent excess air. Opacity is limited to 20 percent.

On June 19, 1984, EPA proposed a revision to NSPS for fossil-fuel-fired steam generators (Subpart D of 40 CFR Part 60) capable of combusting more than 250×10^6 British thermal units per hour (Btu/hr) heat input. The revision would include PM and nitrogen oxides (NO_x) emission limits for industrial/commercial/ institutional steam generating units capable of combusting more than 100×10^6 Btu/hr heat input. For units that are capable of burning municipal-type solid waste, the PM emission standard is 0.10 pound (lb)/ 10^6 British thermal unit (Btu). No NO_x emission limits are proposed for this source type at this time. This regulation is currently under review with final promulgation expected in late 1986.

Under EPA's implementation of the CAA Amendments, the basic control technology requirement is the application and evaluation of BACT. BACT is defined as follows [40 CFR 52.21(b)(12)]:

An emission limitation...based on the maximum degree of reduction for each pollutant...which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable...for control of such pollutant.

In December 1978, EPA's Office of Air, Noise, and Radiation published Guidelines for the Evaluation of BACT to assist states and EPA Regional Offices in making BACT determinations. The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for this source, if applicable. An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is also required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems as well as the environmental benefits derived from these systems.

2.3.4 Air Quality Analysis

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain, for each pollutant regulated under CAA, an analysis of continuous ambient air quality data in the area affected by the proposed major stationary source or major modification. For a new major source, the affected pollutants are those that the source would potentially emit in a significant amount.

According to CAA, ambient air monitoring for a period of up to 1 year generally is appropriate to complete the PSD requirements of CAA. Existing data from the vicinity of the proposed source may be utilized if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA, November 1980a).

The regulations include an exemption which excludes or limits the pollutants for which an air quality analysis is conducted. This exemption states that the Administrator may exempt a proposed major stationary source or major modification from the monitoring requirements of 40 CFR 52.21(m) with respect to a particular pollutant if the emissions increase of the pollutant from the source or modification would cause, in any area, air quality impacts less than the de minimis levels presented in Table 2-2.

The State of Florida has passed similar PSD air quality analysis requirements. In February 1981, EPA revised the de minimis levels and averaging times for three of the pollutants (Lutz, 1981). The averaging period for the de minimis level for Pb was changed to 3 months, and the de minimis impact levels for beryllium (Be) and hydrogen sulfide (H₂S) were changed to 0.001 ug/m³ and 0.2 ug/m³, respectively. EPA and State of Florida de minimis air quality impact levels are currently identical.

2.3.5 Source Impact Analysis

A source impact analysis must be performed by a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rates (Table 2-2). The PSD regulations specifically require the use of atmospheric dispersion models in performing impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD.

increments. Designated EPA models must normally be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the EPA publications, "Guideline on Air Quality Models" (EPA, 1978a) and "Regional Workshops on Air Quality Modeling: A Summary Report" (EPA, 1983a). Criteria pollutants may be exempt from the source impact analysis if the net increase in impacts due to the proposed source is below significant impact levels, as presented in Table 2-3.

Various lengths of record for meteorological data can be utilized for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used, the highest concentration at each receptor must be used.

2.3.6 Additional Impact Analysis

In addition to air quality impact analyses, federal PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source. These analyses are to be conducted primarily for PSD Class I areas. Impacts due to general commercial, residential, industrial, and other growth associated with the source must also be addressed. These analyses are required for each pollutant emitted in significant amounts.

2.3.7 Good Engineering Practice (GEP) Stack Height

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height

Table 2-3. Significant Impact Levels for Criteria Pollutants

Pollutant	Averaging Period	Concentration (ug/m ³)
Sulfur Dioxide (SO ₂)	3-Hour	25
	24-Hour	5
	Annual	1
Particulate Matter (PM)	24-Hour	5
	Annual	1
Nitrogen Dioxide (NO ₂)	Annual	1
Carbon Monoxide (CO)	1-Hour	2,000
	8-Hour	500

Source: 40 CFR 52.

that exceeds GEP or any other dispersion technique. On July 6, 1985, EPA promulgated final stack height regulations (EPA, 1985a). Because the proposed plant was not in existence on January 12, 1979, GEP stack height is defined as the highest of:

1. 65 meters (m), or
2. A height established by applying the formula:

$$H_g = H + 1.5L$$

where: H_g = GEP stack height,

H = height of the structure or nearby structure, and

L = lesser dimension (height or projected width) of nearby structure(s).

"Nearby" is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature, but not greater than 0.8 km. While GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

"Dispersion technique" means any technique which attempts to affect the concentration of a pollutant in the ambient air by:

1. Using that portion of a stack which exceeds GEP stack height;
2. Varying the rate of emission of a pollutant according to atmospheric conditions or ambient concentrations of that pollutant; or
3. Increasing final exhaust gas plume rise by manipulating source process parameters, exhaust gas parameters, stack parameters, or combining exhaust gases from several existing stacks into one stack; or other selective handling of exhaust gas streams so as to increase the exhaust gas plume rise.

The preceding sentence does not include techniques which increase final exhaust gas plume rise where the resulting allowable emissions of SO_2 from the facility do not exceed 5,000 TPY.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where plume impaction occurs. "Plume impaction" is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. "Elevated terrain" is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of the proposed NBCRR is flat or gently rolling, plume impaction was not considered in determining the GEP stack height.

2.4 NONATTAINMENT RULES

On August 7, 1980, EPA promulgated rules for review of major new sources and major modifications in areas where air quality does not meet federal standards (i.e., nonattainment areas). Those rules defined source as either an entire plant or an individual piece of process equipment within the plant (i.e., dual definition). On October 14, 1981, EPA deleted the dual definition and defined a source as an entire industrial plant (i.e., plant-wide or bubble definition). In an opinion on Natural Resources Defense Council versus Gorsuch on August 17, 1982, the Washington, D.C. Circuit Court vacated the plant-wide definition and apparently reinstated the dual definition of source. Although no final decision has been reached, EPA's guidance to regional offices concerning the court decision is to reinstate the dual definition of a source. This ruling not only affects the new source review (NSR) permit program as specified in 40 CFR 51.18(j) but also the Emission Offset Interpretative Ruling (40 CFR 51, Appendix S), which applies to new and modified major sources affecting nonattainment areas. Under Section IV.A of the Ruling, such sources are required to: (1) meet an emission limitation which specifies the lowest achievable emission rate for such sources, (2) certify that all existing major sources owned or operated by the applicant in the same state are in compliance with all applicable emission limitations and standards under the Act, (3) obtain emission offsets such that there will be reasonable progress toward attainment of the applicable national AAQS,

and (4) demonstrate that the emission offsets would provide a positive net air quality benefit in the affected area [not applicable for volatile organic compounds (VOC) or NO_x].

Based on these current nonattainment provisions, all major new sources and modifications to existing major sources locating in the nonattainment area must undergo the nonattainment review procedures if the proposed pieces of equipment have the potential to emit 100 TPY or more of the nonattainment pollutant, or the major modification results in a significant net emission increase at the facility of the nonattainment pollutant. For major sources or major modifications which locate in an attainment or unclassifiable area, the nonattainment review procedures apply if the source or modification exceeds the significant impact levels presented in Table 2-3 at any locality that does not meet AAQS.

2.5 SOURCE APPLICABILITY

2.5.1 Pollutant Applicability

The estimated emissions of regulated pollutants from the NBCRR facility are presented in Table 2-4. These emissions are based on 110 percent of nameplate capacity. The proposed facility will be located in Broward County, which is designated by EPA and DER as an attainment area for all criteria pollutants except O₃ and a PSD Class II area for SO₂ and TSP. Because VOC emissions from the proposed facilities will be less than 100 TPY, nonattainment review is not required. The nearest nonattainment area for any other criteria pollutant is located more than 100 km from the proposed facility. Because impacts from the proposed plant's emissions are not expected to be significant at such distances, potential impacts on the nearest nonattainment areas were not addressed in the analysis.

The proposed NBCRR facility will be located about 78 km from the PSD Class I area of the Everglades National Park. As a result, potential impacts on the Class I area were addressed in the analysis.

Table 2-4. Maximum Hourly and Annual Average Emission Rates for the NBCRR Facility

Pollutant	Capacity = 2,420 TPD*		PSD Significant Emission Rate (TPY)
	lb/hr	TPY†	
Particulate Matter (PM)	42.0	134	25
Sulfur Dioxide (SO ₂)	499.1	1,592	40
Nitrogen Dioxide (NO ₂)	508.2	1,620	40
Carbon Monoxide (CO)	81.7	260	100
Volatile Organic Compounds (VOC)	11.8	37.6	40
Lead (Pb)	1.82	5.79	0.6
Fluorides (F ⁻)	16.3	52.1	3
Sulfuric Acid Mist (H ₂ SO ₄)	42.7	136	7
Beryllium (Be)	0.00084	0.0027	0.0004
Mercury (Hg)	0.84	2.7	0.1
Arsenic (As)	0.020	0.09	0

*This capacity is 110 percent of nameplate capacity of 2,200 TPD.

†Annual emissions are based on an 80-percent annual availability factor of nameplate capacity.

Source: ESE, 1986.

Under PSD regulations, the proposed project will be a major source because it is one of the 28 named "major stationary sources" (i.e., municipal incinerator capable of charging more than 250 tons of refuse per day) which has the potential to emit more than 100 TPY of PM, SO₂, nitrogen dioxide (NO₂), and carbon monoxide (CO). As a result, any regulated pollutant emitted from the facility above the significant emission rates presented in Table 2-4 is subject to PSD review.

Emissions of the following pollutants from the proposed source will be in excess of the appropriate significant emission levels: PM, SO₂, NO₂, CO, Pb, fluorides (F⁻), Be, mercury (Hg), sulfuric acid (H₂SO₄) mist, and arsenic (As). It should be noted that no significant emission rate has been established for As, and, therefore, any emissions are considered significant. The methods used to estimate the emissions of the regulated pollutants are presented in Section 3.0.

2.5.2 GEP Stack Height

The GEP stack height regulation allows any stack to be at least 65 m high. The proposed stack will be less than 65 m and, therefore, will not violate the GEP stack height regulation.

Since the maximum SO₂ emissions from the facility will be less than 5,000 TYP, the exit gases from the four flues within the proposed stack were combined and modeled effectively as one stack.

2.5.3 Ambient Monitoring

As discussed in Section 2.3.4, a new major source may be exempt from preconstruction air quality monitoring requirements of the PSD regulations for those pollutants which have air quality impacts less than the de minimis levels presented in Table 2-2. The maximum predicted impacts due to emissions from the proposed facility for regulated pollutants subject to PSD review are presented in Table 2-5. The methods

Table 2-5. Predicted Impacts for the Proposed NBCRR Facility Compared to De Minimis Air Quality Impacts

Pollutant	Averaging Period	Impacts (ug/m ³)*	
		Maximum Predicted Due to the Facility	<u>De Minimis</u> Level
Particulate Matter (PM)	24-hour	0.71	10
Sulfur Dioxide (SO ₂)	24-hour	8.4	13
Nitrogen Dioxide (NO ₂)	Annual	1.0	14
Carbon Monoxide (CO)	8-hour	4.0	575
Lead (Pb)	24-hour (Quarterly)	0.031 (0.0036)†	0.1 (0.1)
Fluorides (F ⁻)	24-hour	0.27	0.25
Beryllium (Be)	24-hour	0.000014	0.0005 (0.001)
Mercury (Hg)	24-hour	0.014	0.25

*Values in parentheses represent results associated with revised de minimis monitoring levels.

†Based on annual average concentrations.

**Based on emissions at 110 percent of maximum nameplate capacity.

Source: ESE, 1986.

used to predict the proposed facility's impacts are described in Section 7.0. Based on these results, the impacts from the proposed facility are expected to be below the de minimis impact levels for all pollutants except F^- . Currently, there are no de minimis levels designated for As and H_2SO_4 mist because an appropriate monitoring method has not yet been developed for these pollutants. Therefore, no monitoring is required, and no modeling has been performed for these pollutants in this analysis.

For F^- , the 24-hour impacts from the proposed facility operating at 110 percent of initial capacity are expected to slightly exceed the de minimis impact level of 0.25 ug/m^3 . Because the predicted impacts are low and conservative (i.e., emissions are based on 110 percent of nameplate capacity) and there are no national or state AAQS for F^- , monitoring is not considered necessary before the facility operates at maximum capacity.

3.0 FACILITY EMISSION AND STACK OPERATING PARAMETERS

The data presented in this report are based on preliminary or conceptual design of the proposed facility. However, the conceptual design is based on conservative or worst-case assumptions from a potential air quality impact viewpoint, particularly in minimizing the exit gas flow rate and maximizing pollutant emissions.

The NBCRR facility is assumed to have nameplate capacity of 2,200 TPD. The MSW charging rate and location of the facility is presented in Table 3-1. The stack and operating parameters for the projected maximum capacity (i.e., 110 percent of nameplate) of the facility considered in the air quality modeling are presented in Table 3-2.

The emission factors for the regulated pollutants that will be emitted from the proposed NBCRR facility are presented in Table 3-3. For most of the regulated pollutants, the emission factors are based on estimates derived for resource recovery facilities similar in size to the proposed facility (see Section 4.0). The emission factors are given as a function of the heat content and amount of MSW burned. These emission factors were obtained from the Broward County Resource Recovery Office (1986) and are based on a review of the literature, such as EPA AP-42 emission factors and A.D. Little reports, or manufacturer's design specification. The maximum hourly and annual average emission rates for the facility are presented in Table 2-4 and are 110 percent of nameplate capacity.

Table 3-1. MSW Charging Rate and Location of the NBCRR Facility

Parameter	Value
<u>MSW Charging Rate</u>	
100 Percent Capacity	2,200 TPD (91.7 tph)
110 Percent Capacity	2,420 TPD (100.8 tph)
<u>Heat Input Rate*</u>	
100 Percent Capacity	825.0 x 10 ⁶ Btu/hr
110 Percent Capacity	907.5 x 10 ⁶ Btu/hr
<u>Location</u>	
Latitude, Longitude	26.29, 87.16°
UTM Zone	17
UTM East, North Coordinate	583.8, 2,907.6 km

*Based on average heating value of MSW of 4,500 Btu/lb.

Sources: Malcolm Pirnie, Inc., 1986.
Broward County Resource Recovery Office, 1986.

Table 3-2. Stack and Operating Parameters for the Projected Maximum Capacity of the NBCRR Facility Considered in the Air Quality Modeling

Parameter	Value
<u>MSW Charging Rate</u>	
Stack Height	200 ft (61.0 m)
Stack Diameter	9.84 ft (4.92 m)*
<u>Exit Gas Temperature</u>	
Projected	430°F (494 K)†
Modeled	400°F (477 K)
<u>Exit Gas Flow Rate</u>	
Projected	456,280 acfm†
Modeled	342,210 acfm
<u>Exit Gas Velocity</u>	
Projected	100 fps (30.5 m/s)†
Modeled	75 fps (22.9 m/s)

*Effective diameter for 4 flues. Each flue will have a diameter of 4.92 ft (1.5 m).

†Based on 110 percent of nameplate capacity and at 9.2-percent CO₂.

Note: acfm = actual cubic feet per minute.

Sources: Malcolm Pirnie, Inc., 1986.

Waste Management, 1986.

Broward County Resource Recovery Office, 1986.

Table 3-3. Pollutant Emission Factors for the Proposed NBCRR Facility

Pollutant	Emission Factor	
	(lb/10 ⁶ Btu)	(lb/ton of MSW)*
Particulate Matter (PM)	0.046	0.42
Sulfur Dioxide (SO ₂)	0.55	4.95
Nitrogen Dioxide (NO ₂)	0.56	5.0
Carbon Monoxide (CO)	0.09	0.80
Volatile Organic Compounds (VOC)	0.013	0.12
Lead (Pb)	0.002	0.018
Fluorides (F ⁻)	0.018	0.16
Sulfuric Acid Mist (H ₂ SO ₄)	0.047	0.42
Hydrogen Sulfide (H ₂ S)	NA	NA
Total Reduced Sulfur	NA	NA
Reduced Sulfur Compounds	NA	NA
Asbestos	NA	NA
Beryllium (Be)	9.3 x 10 ⁻⁷	8.4 x 10 ⁻⁶
Mercury (Hg)	0.00092	0.0083
Vinyl Chloride	NA	NA
Benzene	NA	NA
Radionuclides	NA	NA
Inorganic Arsenic (As)	3.1 x 10 ⁻⁵	2.8 x 10 ⁻⁴

NA = Not applicable.

*Based on average heating value of MSW of 4,500 Btu/lb.

Source: Broward County Resource Recovery Office, 1986.

4.0 BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION

4.1 REQUIREMENTS AND APPLICABILITY

The control technology review requirements of the federal (40CFR52.21) and state [17-2.500(5)(b)F.A.C.] PSD regulations require that all applicable federal and state emission limiting standards be met and that BACT be applied to control emissions from the source. The BACT requirements are applicable to all "regulated" pollutants for which the increase in emissions from the source or modification exceeds the significant emission rate (see Table 4-1). For the north Broward County Recovery project the following pollutants must undergo BACT review [as set forth in 17-2.500(2)(f)]: PM, SO₂, NO_x, CO, Pb, F⁻, Be, Hg, H₂SO₄ mist, and As.

BACT is defined in Chapter 17-2.100(22) FAC as an emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which DER, on a case by case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable through application of production processes and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant. If the imposition of an emission standard is not feasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT.

DER has been delegated authority for PSD Review except where sources are licensed under Florida's Electrical Power Plant Siting Act (403.500 F.S.) and implementing regulations (Chapter 17-17 F.A.C.). In the latter case, DER has been delegated administrative and technical review but the final approval rests with EPA Region IV.

Table 4-1. Proposed BACT Emission Rates and Applicability for the NBCRR Facility

Pollutant	Proposed BACT Emission Rate		Emissions (TPY)	Significant Rates (TPY)
	(lb/10 ⁶ Btu)	(lb/ton of MSW)*		
Particulate Matter† (PM)	0.046	0.42	134	25
Sulfur Dioxide (SO ₂)	0.55	4.95	1,592	40
Nitrogen Oxides (NO _x)	0.56	5.0	1,620	40
Carbon Monoxide (CO)	0.09	0.80	260	100
Lead (Pb)	0.002	0.018	5.8	0.6
Fluorides (F ⁻)	0.018	0.16	52	3
Sulfuric Acid Mist (H ₂ SO ₄)	0.047	0.42	136	7
Mercury (Hg)	0.00092	0.0083	2.7	0.1
Beryllium (Be)	9.3 x 10 ⁻⁷	8.4 x 10 ⁻⁶	0.0027	0.0004
Inorganic Arsenic (As)	3.1 x 10 ⁻⁵	2.8 x 10 ⁻⁴	0.09	0

*Based on average heating value of MSW of 4,500 Btu/lb.

†0.02 gr/dscf corrected to 12 percent CO₂.

Sources: ESE, 1986.

KBN, 1986.

Broward County Resource Recovery Office, 1986.

In making a BACT determination, DER must consider [17-2.630(a) F.A.C.] the following:

1. Any EPA determination of BACT pursuant to Section 169 and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants). The above references are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and may be inspected at DER's Tallahassee office. In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed under 40 CFR Parts 60 or 61.
2. All scientific, engineering, and technical material and other information available to DER.
3. The emission-limiting standards or BACT determinations of any other state.
4. The social and economic impact of the application of such technology.

The primary purpose of BACT as promulgated by 1977 amendments of the CAA (P.L. 95-95) is to optimize consumption of PSD air quality increment thereby enlarging the potential for future economic growth without significantly degrading air quality. Guidelines for the evaluation of BACT can be found in EPA's Guidelines for the Evaluation of BACT (EPA, 1978b) and in the PSD Workshop Manual (EPA, 1980b). These guidelines were promulgated by EPA to provide a consistent approach to BACT and that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to another. The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility.

BACT must, as a minimum, demonstrate compliance with NSPS for this source. An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than NSPS, is also required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems as well as the environmental benefits derived from these systems.

4.2 DESCRIPTION OF PROPOSED CONTROL TECHNOLOGY AND EMISSIONS

The proposed BACT emission rates are presented in Table 4-1. Permitted emissions for other MSW-fired resource recovery facilities are presented in Table 4-2 for comparison.

The only applicable emission-limiting standard for MSW-fired facilities is for PM and is contained in the federal NSPS (40 CFR Part 60 subpart E, Standards of Performance for Incinerators) and in the state emission limiting and performance standards for incinerators (17-2.600(1) F.A.C.). Both regulations limit particulate emissions to 0.08 gr/dscf (corrected to 12 percent CO₂).

In June 1984, EPA proposed revisions to NSPS for industrial/commercial/institutional steam-generating units that would limit particulate emissions to 0.1 lb/10⁶ BTU for MSW-fired boilers capable of combusting more than 100 x 10⁶ BTU/hr heat input (49FR25102). This regulation is currently under review with final promulgation set for late 1986.

Emission-limiting standards for SO₂ are scheduled for proposed promulgation in June 1986. Emission of SO₂ from MSW-fired steam generation units will not be included in this proposal since sulfur content of MSW is low relative to other fuels (Burn, 1986).

The sections that follow present the emissions and control technology proposed as BACT for the facility.

Table 4-2. BACT Determinations for MSW, Florida Resource Recovery Facilities and Proposed BACT Emission Limit for the North Broward Facility

Pollutant	Emission Limit (in lb/ton of MSW unless otherwise indicated)*						Proposed for North Broward
	Hillsborough	Pinellas Units 1 & 2	Pinellas Unit 3	McKay Bay	Bay County	Dade County	
Particulate Matter (PM)	0.021 gr/dscf	0.08 gr/dscf	0.03 gr/dscf	0.67†	0.56	0.08 gr/dscf	0.02 gr/dscf
Sulfur Dioxide (SO ₂)	3.2	1.9	1.9	4.1	2.8	—	4.95
Nitrogen Oxides (NO _x)	3.0	—	3.0	7.2	2.2	—	5.0
Carbon Monoxide (CO)	1.8	—	1.5	0.4	11.4	—	0.8
Volatile Organic Compounds (VOC)	0.2	—	0.3	0.2	0.232	—	—
Lead (Pb)	0.048	—	0.03	0.074	0.0036	—	0.018
Mercury (Hg)	0.00052	—	0.01	0.0996	0.00171	—	0.0083
Beryllium (Be) (x 10 ⁻⁶)	13.1	—	1.3	6.2	48	—	8.4
Fluorides (F ⁻)	0.06	—	0.1	0.1	—	—	0.16
Sulfuric Acid Mist (H ₂ SO ₄)	0.0768	—	—	—	—	—	0.42
Inorganic Arsenic (As) (x10 ⁻⁴)	—	—	—	—	—	—	2.8

*Multiply by 0.11 to obtain lb/10⁶ Btu based on an average heating value of 4,500 Btu/lb.

†Required LAER due to non-attainment area.

Note: Emissions given in gr/dscf are corrected to 12 percent CO₂.

Sources: Hillsborough County, Energy Recovery Facility, Case No. 83-19, Conditions of Certification, Revised 11/6/84

Pinellas County, Resource Recovery Facility, Case No. PA 78-11 and PA 83-18, Conditions of Certification.

FDER Permit AC 29-47277, McKay Bay

FDER Permits AC 03-84703 and AC03-84704, Bay County

Metropolitan Dade County Resource Recovery Facility, Case No. 77-607 Conditions of Certification

4.2.1 Particulate Matter (PM)

The proposed PM emission limit is 0.02 gr/dscf, corrected to 12 percent CO₂ (or 0.046 lb/10⁶ Btu), based upon operation of a well designed electrostatic precipitator (ESP). This level of control is substantially lower than the federal NSPS and Florida emission standards of 0.08 gr/dscf and is consistent with two recent permit approvals in Florida (Pinellas County Unit 3 and Bay County). In addition, this limitation results in emissions well below the proposed NSPS for PM of 0.1 lb/10⁶ BTU.

PM generated by the combustion of MSW will be minimized through a combination of combustion controls/boiler design and installation of an ESP. PM exiting the boilers in the exhaust gases will be controlled by use of ESPs. The combustion design will be the mass-burn type and capable of firing as-received MSW on a continuous-feed basis without auxiliary fuel firing. The combustion efficiency will yield a residue, or ash, containing not more than 4-percent combustibles and 2-percent noncombustibles. This design requirement will serve to minimize the generation of ash.

ESPs are the traditional method of controlling PM emissions from incinerators and steam-generating units. ESPs use the principle of attraction between electrostatically charged objects and an uncharged ground or an oppositely charged object. In 1907, Cottrell developed the first successful application of ESP. The first ESP used for collecting fly ash was installed 1923 and since then thousands have been installed.

Operation of a modern ESP includes the following sequence:

1. Generation of a high-voltage corona discharge;
2. Bombardment and charging of particles in the gas stream;
3. Migration of charged particles to a collection plate; and
4. Transfer of collected particles from the ESP for disposal.

The generation of a high-voltage corona discharge is accomplished with transformer-rectifiers which energize discharge and grounded electrodes. The flue gas is passed between the electrodes, and the PM in the gas stream becomes charged. The charged particles then migrate to the collecting electrodes, where they are periodically displaced and removed to collecting hoppers, and subsequently removed by the fly ash handling system.

ESP design depends on the electrical properties of the particulate being collected, flue gas volume and properties, and the desired collection efficiency. ESP efficiency is affected by the alignment of ESP electrodes, the specific collection area (SCA), the flow pattern of gas through the ESP, the rapping method, and the electrical characteristics of the corona discharge system.

The ESP will be complete with all appurtenances, structural supports, foundations, external and internal walkways, platforms, access stairways, fly-ash hoppers with discharge, air-lock valves; power and control wiring; induced-draft fan; and other accessories for a complete operation system. Each ESP will be a multi-field type with the output of each ESP flowing into a single flue. The fields will be sized adequately considering both the volume of gases and amount of excess air. The temperature of flue gases entering the ESP will be below 550°F and at least 40°F above the dew-point temperature. The maximum ESP-inlet temperature is based on operating experience from ESPs at incinerator installations (EPA, 1979) and Waste Management's preliminary design.

ESP gas distribution will be accomplished via a low-velocity, multiple-vane system or a perforated-plate system. ESP collecting surface rapping will be by shaft-driven rotary hammers. Solenoid impact or vibration rapping generally is not acceptable. ESP high-voltage systems will have stainless-steel electrodes. Weighted-wire systems generally are not

acceptable. ESP discharge electrode rapping will be accomplished by shaft-mounted rotary hammers; solenoid impact or vibrating rapping is not acceptable.

ESP fly ash hopper heaters will be the resistance type, extending two thirds of the ash-hopper height from the bottom of the hopper (to prevent blockage). The fly-ash handling systems include, but are not limited to, screw conveyors inside precipitator hoppers, rotary or double-flap air lock valves, and dry-drag-type transfer conveyors.

4.2.2 Sulfur Dioxide (SO₂)

SO₂ formation in a MSW-fired furnace is a function of the sulfur content of the fuel and the chemical form in which it occurs. Sulfur in refuse occurs in several organic forms as sulfides, sulfates, and sulfites. Only the sulfate fraction can be converted to SO₂ during combustion. Literature has suggested that a significant fraction of the total sulfur in the fuel is retained in the furnace bottom ash and in the fly ash. The form of the sulfur emitted in the flue gas exiting the ESP is predominantly SO₂, with a very small percentage as gaseous sulfur trioxide and H₂SO₄.

There are no state emission-limiting standards for SO₂ from MSW-fired boilers. NSPS have not been promulgated or proposed which would regulate SO₂ emissions from the proposed facility.

From Table 4-2, SO₂ emissions for other permitted or proposed MSW-fired facilities in Florida have ranged from 1.9 to 4.1 lb/ton MSW. According to DER, the lower factor of 1.9 lb/ton (Pinellas County Unit 3) has not been achieved based on source testing, and a revised higher emission rate of 4.1 lb/ton MSW has been requested. According to Camp, Dresser & McKee, Inc. (CDM) (1984), stack test results from six mass-burn facilities located throughout the United States showed SO₂ emissions ranging from 1.0 to 4.0 lb/ton. Three other facilities were permitted at

rates ranging from 2.0 to 4.0 lb/ton. EPA (1984a) cites an average emission factor of 2.5 lb/ton. Henningson, Durham, and Richardson (HDR) (1985b) surveyed a total of 16 incinerators throughout the world and reported SO₂ emissions ranging from 0.8 to 6.5 lb/ton. An A.D. Little (1981) literature survey found emissions to range from 0.77 to 4.6 lb/ton.

EPA (1982) has reported an average SO₂ emission rate of 0.492 lb/10⁶ Btu for overfeed stoker mass-burn facilities. California Air Resources Board (CARB) (1984) reported emission rates from mass-burn and Refuse-Derived Fuel (RDF) facilities ranging from 0.02 to 1.19 lb/10⁶ Btu, with average emissions of about 0.3 lb/10⁶ Btu.

These data illustrate that MSW is a non-homogeneous fuel and that sulfur content and SO₂ emissions can vary over a wide range. Nevertheless, SO₂ emissions from MSW firing are lower compared with other solid and liquid fuels.

By comparison, NSPS for fossil-fuel-fired boilers and electric utility steam generators firing solid fuel [40 CFR 60, Subparts D and D(a)] would allow up to 1.2 lb SO₂/10⁶ Btu. No SO₂ emission-limiting standard currently exists or are proposed for incinerators or MSW-fired boilers. In addition, BACT determination for the south Broward Resource Recovery Projects (DER, 1985) states:

Burning low sulfur fuel is one acceptable method of controlling SO₂ emissions. The installation of flue gas desulfurization to control SO₂ emissions is not warranted when burning MSW.

The proposed BACT emission limit for the north Broward Resource Recovery project is 0.55 lb/10⁶ Btu which is consistent with the upper end of available data and represents a maximum limit. This emission limit is equivalent to about 0.12 percent sulfur in fuel with no sulfur retained in the ash and is about the same as observed in 23 samples taken from the Central and Davie Landfills in 1983. Depending upon the amount of sulfur

retained in the ash, actual SO₂ emissions will vary but would likely be less than the proposed limit.

4.2.3 Nitrogen Oxides (NO_x)

Factors that influence NO_x emissions from MSW-fired furnaces include furnace design, excess air, and combustion temperatures. Formation of NO_x is due to "thermal" NO_x formation and "fuel" NO_x formation. Thermal NO_x is produced by oxidizing the nitrogen contained in the combustion air at high temperatures. Fuel NO_x is formed when the nitrogen contained in the fuel is oxidized to NO₂. Fuel NO_x is most likely the dominant formation mechanism. The level of NO_x produced, therefore, is a function of temperature and excess air (oxygen availability).

Review of Table 4-2 shows NO_x emission factors for other MSW-fired facilities in Florida have ranged from 2.2 to 7.2 lb/ton. CDM (1984) reported emission factors for five operating MSW-fired facilities in the United States ranging from 2.1 to 4.6 lb/ton. Three other facilities were permitted at a rate of about 3.0 lb/ton. EPA (1984a) also cites a factor of 3.0 lb/ton. CARB (1984), in its exhaustive study of MSW-fired facilities throughout the United States, found NO_x emissions ranging from 0.08 to 0.47 lb/10⁶ Btu for mass-burn and RDF facilities. EPA (1982) found an average emission rate of 0.308 lb/10⁶ Btu for overfeed stoker mass-burn units. HDR (1985b) surveyed 11 MSW incinerators throughout the United States and found NO_x emissions ranging between 1.1 and 4.7 lb/ton. A.D. Little's (1981) survey showed emissions to range from 0.7 to 4.4 lb/ton.

An emission limit of 0.55 lb/10⁶ Btu (approximately 5 lb/ton MSW) is proposed as BACT. Although this emission rate is consistent with the upper end of available data, it provides a reasonable, conservative safety factor for possible variations in fuel composition and furnace operation. In addition, application of NO_x control technology would tend

to create greater emissions of CO and VOC. Also, the desire to achieve combustion conditions ($\geq 1,000^{\circ}\text{C}$ for at least 1 second) that allow complete destruction of chlorinated organics could be inhibited using NO_x control technology. A proposed limit of $0.55 \text{ lb}/10^6 \text{ Btu}$ is lower than the NSPS NO_x limit for solid-fuel-fired, steam-generating facilities [i.e., NSPS for fossil-fuel-fired boilers codified in 40 CFR 60, Subparts D and D(a) limit NO_x (as NO_2) emissions to 0.7 and $0.6 \text{ lb}/10^6 \text{ Btu}$, respectively, for bituminous coal firing].

4.2.4 Carbon Monoxide (CO)

CO emissions from MSW-fired furnaces are a product of incomplete combustion conditions, and solid-waste composition is not an important factor. The quantity of CO produced is dependent upon the design and operation of the furnace. Advancements in combustion technology have resulted in a decreasing trend in CO emissions from MSW furnaces.

High excess air and proper air/fuel mixing are important factors in reducing CO emissions. Even when operated at high excess air levels, CO can be generated from localized areas of the furnace where oxygen deficiencies may exist. Modern MSW-fired furnaces are designed to maximize air and fuel mixing and complete combustion through proper design and refuse feed control.

Table 4-2 shows that CO emission factors approved for other similar facilities in Florida have ranged from 0.4 to $11.4 \text{ lb}/\text{ton}$.

CMD (1984) reported CO emission factors ranging from 0.62 to $4.3 \text{ lb}/\text{ton}$ for over eight operating or permitted MSW-fired facilities located throughout the United States. EPA (1984a) cites a factor of $35 \text{ lb}/\text{ton}$, and A.D. Little (1981) reported a range of 0.05 to $34.8 \text{ lb}/\text{ton}$ based on a literature survey. However, these higher factors are based on an old-design (prior to 1970) furnace. The CARB (1984) study found CO emissions from MSW-fired facilities ranging from 0.18 to $2.0 \text{ lb}/10^6 \text{ Btu}$ for mass-burn and RDF units.

For the north Broward Resource Recovery Project, a CO emission limit of 0.09 lb/10⁶ Btu (approximately 0.8 lb/ton) is proposed.

4.2.5 Lead (Pb)

Emissions of Pb from MSW-fired furnaces is primarily a function of the Pb content of the MSW. Pb is a trace metal found in solid waste. Pb is melted and then volatilized in the combustion process but then is deposited onto the fly ash or condensed into the solid phase after leaving the furnace. The Pb is thus susceptible for collection by an ESP or other particulate control device. Pb emission factors for Florida resource recovery facilities, shown in Table 4-2, range from 0.0036 to 0.074 lb/ton. A.D. Little (1981) reports emission rates ranging from 0.04 to 0.34 lb/ton. The CARB (1984) study showed a range of from 5,600 to 16,000 micrograms per megajoules (µg/MJ) (0.013 to 0.37 lb/10⁶ Btu) with an average of 9,531 µg/MJ (0.022 lb/10⁶ Btu).

A BACT emission limit of 0.002 lb/10⁶ Btu (approximately 0.02 lb/ton MSW) is proposed for the NBCRR facility. A high efficiency ESP will be installed to meet this limit (see section 4.2.1).

4.2.6 Mercury (Hg)

Hg is present in solid waste in trace quantities. Because of its low boiling point and high vapor pressure, it will exit MSW-fired furnace primarily in the vapor phase. As a result, Hg emissions are not generally capable of control by the PM control device. Florida MSW-fired facilities have accepted Hg emission factors ranging from 0.00171 to 0.0996 lb/ton MSW. The McKay Bay emission factor of 0.0996 lb/ton, which is considerably higher than the other values, is considered unrepresentative of Hg content in Florida MSW. CARB (1984) found rates ranging from 17 to 390 µg/MJ (0.000039 to 0.000905 lb/10⁶ Btu), with an average emission level of 157 µg/MJ (0.00036 lb/10⁶ Btu).

Based on this information, an Hg emission factor of $0.00092 \text{ lb}/10^6 \text{ Btu}$ was considered to represent a reasonable upper limit for the NBCRR facility. The NBCRR facility will not burn any sewage sludge, which may contain Hg in higher concentrations than MSW.

4.2.7 Beryllium (Be)

Be emissions from MSW-fired furnaces, like Pb emissions, are emitted primarily in the solid phase and are dependent upon trace element content of the MSW and PM control device collection efficiency.

Be emission rates for Florida MSW-fired facilities range from $1.3 \times 10^{-6} \text{ lb/ton}$ to $48 \times 10^{-6} \text{ lb/ton}$. The CARB (1984) study reported a range of from less than 0.08 to $3.0 \text{ } \mu\text{g}/\text{MJ}$ (0.19×10^{-6} to $7.0 \times 10^{-6} \text{ lb}/10^6 \text{ Btu}$). Based upon these studies and the application of a high efficiency ESP, a Be factor of $9.3 \times 10^{-7} \text{ lb}/10^6 \text{ Btu}$ (approximately $8.4 \times 10^{-6} \text{ lb/ton MSW}$) is proposed for BACT.

4.2.8 Fluorides (F^-)

F^- emissions from MSW-fired furnaces are a function of the F^- content of the MSW. Little is known about concentrations of F^- in MSW. F^- can be emitted as a gaseous product or be bound or absorbed in the fly ash. In the gaseous form, the F^- will be emitted primarily as hydrogen fluoride (HF).

Little test data is available for F^- emissions from MSW-fired furnaces. Previously permitted Florida facilities have used emission factors ranging from 0.06 to 0.1 lb/ton . A.D. Little (1981) reported HF emissions from MSW incinerators, based upon a literature survey, to range from 0.1 to 0.12 lb/ton (only two facilities reporting). The CARB (1984) study found limited test data (only one facility) and reported emissions were $0.003 \text{ lb}/10^6 \text{ Btu}$.

Sufficient data is not available on fluorine content in Broward County MSW to estimate emissions. However, limited data suggest an emission limit of 0.018 lb/10⁶ BTU (0.16 lb/ton) is appropriate as BACT.

4.2.9 Sulfuric Acid (H₂SO₄) Mist

H₂SO₄ mist emissions are expected from MSW-fired facilities due to small quantities of sulfur trioxide (SO₃) associated with the SO₂ emissions. The SO₃ reacts with water droplets in the flue gases to form H₂SO₄ mist. H₂SO₄ formation will depend upon the amount of SO₃ present and the degree of oxidation to H₂SO₄. Test data for H₂SO₄ from MSW-fired furnaces is not available from literature. Only one Florida facility is currently permitted for this pollutant (Table 4-2). This factor is 0.077 lb/ton MSW. An emission rate of 0.047 lb/10⁶ Btu (approximately 0.42 lb/ton MSW) is proposed for the Broward County Resource Recovery project.

4.2.10 Inorganic Arsenic (As)

As is another trace element present in MSW which will be emitted primarily in the solid phase and, therefore, is susceptible to collection by the PM control device. The only information available concerning As emission rates is from the A.D. Little (1981) and CARB (1984) studies. A.D. Little found four MSW facilities in the literature which had reported As emissions, which ranged from 0.0001 to 0.0014 lb/ton. The CARB study reported uncontrolled As emissions ranging from 16 to 1,763 µg/MJ (0.000037 to 0.0041 lb/10⁶ Btu), with an average of 469 µg/MJ (0.0011 lb/10⁶ Btu). Based on using a high efficiency ESP, an emission rate of 3.1 x 10⁻⁵ lb/10⁶ Btu (approximately 2.8 x 10⁻⁴ lb/ton MSW) is proposed for the Broward County project.

4.3 DESCRIPTION AND EVALUATION OF ALTERNATIVE CONTROL TECHNOLOGIES

The following subsections describe and evaluate control technologies that could provide a higher degree of control for the air-regulated pollutants. In some cases, similar control technology can remove a variety of air pollutants. For these common pollutant control applications, a variety of air pollutants will be grouped together.

The economic and energy information presented was developed from:

1. Cost of Sulfur Dioxide, Particulate Matter and Nitrogen Oxide Controls on Fossil Fuel Fired, Industrial Boilers, EPA, August 1982, EPA-450/3-82-021; and
2. Costs of Particulate Matter Controls for Non-Fossil Fuel Fired Boilers, EPA, February 1983, EPA-450/3-83-004.

These references include algorithms for calculating annualized control costs (Table 4-3) and provides the most applicable information for developing economic and energy estimates on MSW-fired steam generators. In addition, the algorithms developed in these documents have been used by EPA to assess economic impacts of various proposed emission-limiting standards. However, the costs developed from these documents are generic and should be considered as a lower level estimate of actual costs.

All costs presented in this section are adjusted to mid-1985 using the Chemical Engineering Plant Cost Index.

The alternative technologies considered are presented in Table 4-4. Tables 4-5 and 4-6 present the annualized costs and energy usage, respectively, of the alternative technologies considered in the BACT evaluation.

4.3.1 Particulate Matter (PM)

Application of a higher level of particulate control than that proposed has been permitted as either BACT or lowest achievable emission rate (LAER) in various states (EPA, 1985b). In general, these permits restricted emissions to 0.015 gr/dscf corrected to 12 percent CO₂. This level of control will be evaluated in the evaluation of alternative control technologies (see also Table 4-4).

Table 4-3. Components of Capital, Operating, and Maintenance and Total Annualized Costs.

Capital Costs

Direct Costs--Equipment and Installation

Indirect Costs

- Engineering
- Construction and Field Expenses
- Construction Fees
- Start Upcosts
- Performance Costs
- Contingencies
- Working Capital

Operating and Maintenance Costs

- Supervision
- Maintenance
- Electricity
- Water
- Solid Waste
- Chemicals
- Indirect (Overhead)

Total Annualized Costs

- Operating Costs
- Capital Charges
- Capital Charges

Source: EPA, 1982.

Table 4-4. Alternative Control Technologies Evaluated

Pollutant	Type	Alternative Control	
		Level of Control	Decrease of Pollutant Emission Over Proposed BACT (TPY)
Particulate	ESP/FF	0.015 gr/dscf (corrected to 12 percent CO ₂)	33.4
SO ₂	Dry Scrubber	70 Percent	1,114
F-	Dry Scrubber	90 Percent	122
H ₂ SO ₄ Mist	Dry Scrubber	90 Percent	47
Pb	ESP/FF	See Particulate	1.9
Be	ESP/FF	See Particulate	9 x 10 ⁻⁴
As	ESP/FF	See Particulate	0.03
Hg	Dry Scrubber	50 Percent	1.4

ESP/FF = Electrostatic Precipitator/Fabric Filter

Source: KBN, 1986.

Table 4-5. Annualized Costs of Proposed and Alternative Control Technologies Evaluated

Control	Annualized Cost	Annualized Cost Difference Over Proposed Level of Control
Proposed--ESP @ 0.02 gr/dscf corrected for 12 percent CO ₂	\$2,670,000	N.A.
ESP/Fabric Filter @ 0.015 gr/dscf corrected for 12 percent CO ₂	\$2,778,000 - 3,131,000	\$108,000 - 461,000
Dry Scrubber/Fabric Filter	\$5,548,000 - 8,827,000*	\$2,878,000 - 6,157,000*

*Includes lost revenue; based on 10-percent downtime due to dry scrubber operation.

NA = Not applicable.

Source: KBN, 1986.

Table 4-6. Energy Usage of Proposed and Alternative Control Technologies Evaluated

Control	Energy Usage (kwh/year)	Energy Usage Differance (kwh/year)
Proposed--ESP @ 0.02 gr/dscf corrected to 12 percent CO ₂	4,590,000	N.A.
ESP/Fabric Filter @ 0.015 gr/dscf	4,880,000	+290,000
Dry Scrubber/Fabric Filter	5,096,900	+506,900

NA = Not applicable.

Source: KBN, 1986.

PM control technologies for MSW firing in furnaces and boilers has been extensively examined by EPA (1979) in its review of the NSPS for incinerators, by EPA (1982) in its Background Information Document (BID) for nonfossil-fuel-fired industrial boilers, by CARB (1984), and in the several applications for MSW-fired facilities in Florida as discussed in Section 4.2. The major conclusions of these studies are summarized below:

1. Three types of control devices are potentially applicable to MSW-fueled facilities: electrostatic precipitators (ESP), fabric filters, and venturi scrubbers.
2. ESP and fabric filters can generally be designed to achieve the same level of control. However, fabric filters can generally provide a greater degree of emission reduction than ESP for particles less than 2 μm . ESPs provide a much better emission reduction than do venturi scrubbers.
3. Fabric filters and venturi scrubbers have not been extensively tested and proven on MSW boilers. Those which have been installed on MSW boilers have encountered severe operational and maintenance problems that include: fires and corrosive attack (fabric filters); plugging, severe corrosion, and wastewater treatment (venturi scrubbers).
4. The ESP is by far the most common control technique for control of PM at these facilities and are well proven.
5. Venturi scrubbers require much greater energy requirements in order to provide adequate PM control, operating and maintenance costs are high, and the liquid scrubber waste must be treated and/or disposed.
6. ESP and fabric filters have low energy requirements, and the waste by-product can be handled in a dry manner.
7. ESP have been proven capable of meeting the proposed BACT emission limit of 0.02 gr/dscf, corrected to 12 percent CO_2 . A fabric filter would also be capable of meeting the 0.02 gr/dscf limit, but this control technique has not been proven as reliable as the ESP.

8. ESP have been used on both MSW-burning facilities, and have been proven reliable.
9. All operating, permitted or proposed MSW-fired facilities in Florida have selected the ESP as the PM control device.

Based on these data, the venturi scrubber was not considered as a PM control alternative. The ESP is considered to be the most proven control device for limiting PM emissions from MSW-fired facilities. A fabric filter is also capable of achieving this level of control, and energy and environmental impacts are similar to the ESP. However, significant questions arise with the fabric filter regarding their reliability and maintenance when MSW is fired. Applications of fabric filters to MSW-fired facilities generally require flue gas quenching to insure particles still under combustion do not reach the filters and cause a fire.

Economic Impacts--The costs of the alternative control are shown in Table 4-7 and will range from \$3,240/ton of PM removed (ESP) to \$13,800/ton of PM removed (ESP). Over the proposed level of control, a 4- to 17-percent increase in annualized cost is calculated.

Environmental Impacts--The air quality impacts of the proposed facility are presented in detail in Section 7.0. Table 4-8 presents the improvement in air quality from installing a higher level of control (i.e., 0.015 gr/dscf corrected to 12 percent CO₂). As shown by Table 4-8, the maximum predicted air quality improvement for PM will be less than 1 percent of the PSD increments on AAQS.

Energy Impacts--The installation of an ESP to achieve the alternate PM control level will increase annual average energy usage by 290,000 kilowatt hours (kwh) or by about 6.3 percent. The installation of a fabric filter will be higher in overall energy usage. Although cost algorithms are not available to make an estimate, the differential in energy usage is expected to be low.

Table 4-7. Economic Evaluation for Alternative Control Technologies for BACT Pollutants

Pollutant	Annualized Cost Differential (\$)	Cost Per Ton Pollutant Removed (\$/Ton)	Difference From Proposed Control Level (%)
PM	108,000 to 461,000	3,240 to 13,800	4 to 17
SO ₂	2,878,000 to 6,157,000	2,580 to 5,530	108 to 231
F-	2,878,000 to 6,157,000	23,600 to 50,500	108 to 231
H ₂ SO ₄ Mist	2,878,000 to 6,157,000	61,200 to 131,000	108 to 231
Pb	108,000 to 461,000	56,840 to 242,600	4 to 17
Be	108,000 to 461,000	1.2×10^8 to 5×10^8	4 to 17
As	108,000 to 461,000	3.6×10^6 to 1.5×10^7	4 to 17
Hg	2,878,000 to 6,157,000	2.1×10^6 to 4.4×10^6	108 to 231

Source: KBN, 1986.

Table 4-8. Environmental Impacts of Alternative Control Technologies for BACT Pollutants Evaluation

Pollutant	Improvement in Air Quality* ($\mu\text{g}/\text{m}^3$)			Maximum Percentage of PSD Increment	Maximum Percentage or AAQS
	3-hour	24-hour	Annual		
PM	1.0	0.2	0.03	0.5	0.1
SO ₄	24.2	5.8	0.7	6.4	2.2
F-	1.0	0.3	0.03	--	--
H ₂ SO ₄ Mist	2.6	0.6	0.07	--	--
Pb	0.04	0.01	<0.01	--	<0.5
Hg	0.03	<0.01	<0.01	--	--

*Decrease in maximum predicted ground-level concentrations based on results for the proposed plant presented in Section 7.0.

Source: KBN, 1986.

4.3.2 Sulfur Dioxide (SO_2), Fluorides (F^-), and Sulfuric Acid (H_2SO_4)
Mist

Currently, there are no emission-limiting standards which apply to SO_2 , H_2SO_4 , F^- , or HCl emissions from MSW-fired boilers. NSPS have not been proposed or promulgated (nor will they be in the near future) (Burn, 1986), and there are no FDER emission-limiting standards.

Emissions of SO_2 , H_2SO_4 , and F^- can all be controlled by the same control technique. H_2SO_4 emissions are a function of SO_2 emissions; thus, controlling SO_2 also controls H_2SO_4 .

Pre- and post-combustion control technologies for SO_2 have been developed for fossil-fuel-fired boilers, but not for MSW combustion, primarily due to the low sulfur content of the MSW fuel and resultant low SO_2 emissions. Pre-combustion controls include using low sulfur fuel and physical or chemical cleaning. MSW would be classified as a low-sulfur fuel. MSW, at a maximum of 4.9 lb/ton SO_2 emissions, would yield about 0.55 lb/ 10^6 Btu. By comparison, high sulfur (2.5 percent coal and low sulfur (0.5 percent) coal would yield about 5.0 lb/ 10^6 Btu and 1.0 lb/ 10^6 Btu, respectively. Physical/chemical cleaning methods to remove sulfur from MSW fuel are not known to have been developed, primarily because there has not been a need for such methods. Consequently, pre-combustion sulfur and F^- removal from MSW is considered unnecessary and technologically infeasible at this time.

Post-combustion controls for SO_2 include wet scrubbers and dry scrubbers, the latter requiring a PM collection device to remove the dry waste material from the flue gases. Wet scrubbing systems developed to date include limestone/lime, sodium, and dual alkali scrubbing. Dry scrubbing systems are based upon calcium or sodium scrubbing and evaporation of the scrubbing medium, leaving behind a dry waste material which can be captured in an ESP or fabric filter. Because of the relative low sulfur content of MSW dry scrubbing can be less costly than wet scrubbing.

CARB (1984) presented a comprehensive review of SO_2 , H_2SO_4 and F- control technologies for MSW-fired facilities. This study concluded that both wet and dry scrubbing systems have been satisfactorily proven for application to MSW-fired facilities. Depending on scrubber technology and scrubbing media, SO_2 , H_2SO_4 , and F- (as HF) removal efficiencies can range from 70 to more than 90 percent depending upon design.

The major drawbacks of all these systems are:

1. The capital and annual operating costs of a wet or dry scrubbing system is large.
2. These systems are rarely available 100 percent of the time due to operational problems. Either costly redundancy built into the system is required to ensure 100 percent availability or loss of plant operation will occur.
3. They produce large amounts of solid and/or liquid wastes which must be treated and/or disposed. Proper disposal to avoid related environmental contamination is required.
4. Energy usage of these systems is high, typically requiring 10 to 15 percent of the energy output of the facility.
5. Large amounts of water may be required for the scrubber systems.

Much of the information in this report was developed from MSW-fired facilities in Japan and Europe with no major facilities in the United States.

Because a number of facilities have been recently permitted (but not yet operated) that use dry scrubbing, this alternative control technology was evaluated (see Table 4-4) for SO_2 , H_2SO_4 and F- removal.

Economic Impacts--The annualized cost differential between the proposed level of control (i.e., ESP) and dry scrubbers is from \$2,878,000 to \$6,157,000 or about 108 to 231 percent higher than the ESP alone (see Table 4-4). Pollutant removal costs are estimated to be \$2,580/ton to

\$5,530/ton for SO₂, \$23,600/ton to \$50,500/ton for F⁻, and \$61,200/ton to \$131,000/ton for H₂SO₄. When combined, the pollutant removal costs is \$2,240/ton without lost revenue. Including lost revenue, the costs for removal would escalate to approximately \$4,800/ton.

Environmental Impacts--The environmental impacts of the proposed level of control are presented in detail in Section 7.0. Improvements in maximum predicted impacts at the alternative control level, i.e., approximately 0.17 lb SO₂/10⁶ Btu, will not exceed 7 percent of the PSD increment and 3 percent of the AAQS (Table 4-8).

Federal or State of Florida AAQS do not exist for F⁻ or H₂SO₄. Acceptable ambient concentration (AAC) levels for toxic and hazardous pollutants are currently under development by DER (Mora and Gunn, 1985). For pollutants such as HF or H₂SO₄, AAC levels of approximately 1/300 of the Threshold Limit Value (TLV) promulgated by the American Conference of Government and Industrial Hygienist is being considered by DER for new source BACT. A comparison of these developmental AAC levels and predicted concentrations are presented below.

<u>Pollutant</u>	<u>TLV† (µg/m³)</u>	<u>AAC (µg/m³)</u>	<u>Predicted Concentration (µg/m³)</u>
HF	2,452	8.2	0.03
H ₂ SO ₄	1,000	3.3	0.3

† 8-hour, time-weighted average.

As illustrated above, even at the maximum predicted concentration level (i.e., 3-hour averaging time) the AAC currently under development will not be exceeded.

Energy Impacts--The energy associated with the alternative control is calculated to increase by approximately 506,900 kwh/year or approximately 11 percent higher.

4.3.3. Nitrogen Oxides (NO_x)

NO_x emissions from MSW combustion processes result for the oxidation of nitrogen compounds in the combustion air (thermal NO_x) and in the fuel (fuel NO_x). Thermal NO_x formation is highly dependent on temperature and design of the combustion unit (i.e., heat release rates, residence time, and oxygen availability). However, according to CARB (1984), 75 to 80 percent of the NO_x generated from refuse burners is a result of fuel NO_x. Fuel NO_x is influenced by the fuel nitrogen content, combustion air distribution, and excess air. The amount of NO_x released from a specific source, both thermal and fuel, is, therefore, a function of the design and operation of the combustion unit.

NO_x emissions from combustion sources can potentially be reduced by three methods:

1. Reduce fuel nitrogen content,
2. Combustion design, and
3. Flue gas denitrification.

Reducing fuel nitrogen content is not presently feasible. No cost-effective method has been found to separate out materials in MSW which are high in nitrogen content. Flue gas denitrification processes have not been demonstrated on MSW combustion systems on a commercial scale. One process, the selective non-catalytic reduction (SNCR) method, has been applied to four refuse burning facilities in Japan (CARB, 1984). However, operating problems are reported, which reflects the developmental status of this technology. Flue gas denitrification processes were not considered further as BACT for the NBCRR facility due to the lack of reliable, full-scale operating experience and the large costs associated with such a process.

No emission-limiting standards or NSPS exist for NO_x emissions from MSW-fired facilities. The proposed BACT for NO_x emissions due to MSW firing, and the only feasible control alternative, is combustion controls.

More extensive NO_x controls, such as low excess air firing, would tend to create greater emissions of CO and VOC and possibly chlorinated organics due to incomplete combustion; therefore, more extensive NO_x controls would be counterproductive to the design of the facility. Thus, the combustion design will attempt to limit NO_x, CO, and VOC emissions to the greatest extent possible within practical limits. As a consequence, a more detailed evaluation of NO_x control will not be performed.

The air quality impacts of the proposed NO_x emission levels are discussed in detail in Section 7.0. This analysis demonstrated minimal NO_x impacts as a result of operation of the proposed facility at the proposed BACT emission rate. This proposed BACT is also consistent with control technologies and BACT determinations for all operating and permitted MSW facilities in Florida.

4.3.4 Carbon Monoxide (CO)

CO emissions from burning are a result of incomplete combustion. High combustion temperatures, good mixing, and proper air/fuel ratios allow optimum control of CO. However, high combustion temperatures and high excess air rates can lead to greater levels of NO_x; therefore, a tradeoff must exist between NO_x and CO emissions.

No emission-limiting standards exist for CO emissions from MSW-fired facilities. Specific add-on technologies for control of CO have not been developed or incorporated into operating or permitted MSW-fired facilities designs. As a result, the selected BACT for the proposed facility is good combustion control and furnace design. This BACT is consistent with CO control techniques employed at all operating or permitted MSW-fired facilities in Florida, including four facilities located in O₃ nonattainment areas (two in Hillsborough County, one in Pinellas County, and one in Dade County). The proposed BACT emission rate for CO is 0.09 lb/Btu of MSW. The air quality impact of the proposed CO BACT emission level is predicted to be insignificant, as discussed in Section 7.0.

4.3.5 Lead (Pb), Beryllium (Be), and Arsenic (As)

As discussed in Section 4.2, small quantities of Pb, Be, and As are present in MSW, and a portion of these metals will be volatilized and then condensed or absorbed upon other particulates contained in the flue gas exhaust stream. Thus, control of PM will also control these trace metals. No emission-limiting standards have been promulgated or proposed to restrict emissions of these trace metals from MSW-fired boilers.

As discussed in Section 4.3.1, the ESP or fabric filter was chosen as an alternative control technology of PM emissions.

Economic Impacts--As shown in Table 4-7, the cost for an alternative level of control for these pollutants exceeds \$50,000/ton for Pb and \$1 million/ton for both Be and As. Even when combined with PM, the overall cost of additional control exceeds \$3,000/ton.

Environmental Impacts--The maximum predicted impact of Pb emissions at the BACT emission rate is small and well below the AAQS (see Section 7.0 and Table 4-8). No Florida AAQS exist for Be or As, although the State of New York has established an AAQS of 0.01 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), monthly average, for Be. The maximum predicted 24-hour impact of Be due to the proposed NBCRR is $0.000014 \mu\text{g}/\text{m}^3$, well below the New York State standard.

Energy Impacts--The energy impacts associated with an alternative control are presented in Table 4-6.

4.3.6 Mercury (Hg)

No emission-limiting standards for Hg emissions from MSW-fired facilities exist. As discussed in Section 4.2, emissions of Hg from MSW combustion will occur primarily in the gaseous phase and, therefore, will not be controlled by the ESP or fabric filter. Although no known technology currently exists to remove trace quantities of Hg in flue gas streams,

some type of scrubbing device may remove a fraction of the Hg emitted. Therefore, for the purpose of this analysis, it was assumed that installation of a dry scrubber system would remove 50 percent of the emitted Hg.

Economic Impacts--The economic impacts of potentially controlling 50 percent of the emitted Hg using dry scrubbing is estimated to exceed \$2 million/ton. The cost for removal including SO₂, F, and H₂SO₄ would not change by adding Hg removal.

Environmental Impacts--An AAQS has not been established for Hg. However, EPA (1984b) developed a guideline of 0.1 ug/m³, 30-day average, as part of the development of the National Emission Standards for Hazardous Pollutants (NESHAP) for Hg. (The NESHAP for Hg does not apply to the proposed NBCRR because sewage sludge will not be burned at the facility.) The predicted maximum impact of the proposed facility is 0.014 ug/m³, 24-hour average. This short-term maximum is well below the 30-day average guideline.

4.4 RATIONALE FOR PROPOSED BACT

The proposed BACT for NBCRR consists of:

1. A high efficiency ESP to control PM, as well as Pb, Be, and As, to 0.02 gr/dscf corrected to 12 percent CO₂;
2. Combustion controls to control NO_x and CO emission; and
3. Fuel content to control SO₂ and H₂SO₄ emission.

The alternative control technologies evaluated in Section 4.3 provide the basis for comparing economic, environmental, and energy impacts with the proposed BACT. The subsections that follow evaluate the significance of that information.

4.4.1 Economic Impacts

The economic information presented in Section 4.3 was, in part, presented in dollars per ton of pollutant removal. EPA, in evaluating the cost/benefits of various control technologies, uses such economic indicators.

Currently, EPA does not have a standard policy for evaluating pollutants but uses a range of values depending on the pollutant and the governmental organization performing the evaluation (Burn, 1986 and Stevenson, 1986). Recent EPA proposed regulations (EPA, 1984c) and general policy guidance (Burn, 1986 and Stevenson, 1986) indicate that the following ranges are applicable for PM and SO₂:

PM: \$2,000¹ - \$3,000²/ton pollutant removed

SO₂: \$1,250³ - \$2,000²/ton pollutant removed

1. Proposed NSPS for non-fossil fuel boilers;
2. EPA Office of Air Quality Planning and Standards; and
3. Office of Policy, Planning, and Evaluation.

As discussed in Section 4.3, the costs developed for the alternative control evaluation were based upon information developed by EPA. Sufficient experience has not been developed in the installation of dry scrubbers on MSW-fired facilities to accurately estimate costs. Costs estimated for the scrubber/fabric filter combination were adapted from fossil fuel burning technology. Using the algorithms developed for fossil fuel technology alone would tend to underestimate the costs for MSW applications since the greater variability in MSW fuel characteristics compared with fossil fuel must be considered in design. Consequently, the estimated costs for the dry scrubber/fabric filter are generic and conservative (i.e., underestimating costs). A comparison of the costs and the EPA criteria clearly indicate that the cost of the alternative control technologies evaluated are significant and above the cost which is reasonable.

4.4.2 Environmental Impacts

As discussed in Section 4.2, the improvement in air quality by applying the alternative control technologies are considered insignificant. The maximum improvement by applying alternative controls as a percentage of PSD increment is 6.4 percent for SO₂ and 0.5 percent for PM. For the

proposed control level, less than 10 percent of the PSD increments for SO₂ and 1 percent of the PSD increments for PM will be consumed at the maximum impact receptor. Clearly, the primary purpose of BACT will be met with the proposed control because sufficient PSD air quality increments are available for potential future economic growth without significantly degrading air quality.

The predicted environmental impacts as a percentage of the AAQS are also minimal with SO₂ and PM concentrations less than 5 percent of the applicable standard. Improvements in air quality with alternative technology will be less than 2.5 percent of the applicable AAQS for these pollutants. For Pb, the air quality impacts associated with the proposed BACT will be less than 1 percent of the AAQS.

The impacts associated with the non-criteria pollutants (i.e., F⁻, H₂SO₄, Be, As, and Hg) are well below the currently recognized health or impact levels.

Recent permits issued in other states (especially the northeastern United States and western United States) have required control of "acid gases" (including SO₂, F⁻, and H₂SO₄). Dry scrubbing has been the most common control technology selected in these cases. However, the controls were generally associated with LAER determinations and possibly reflect greater air quality impacts associated with the site-specific meteorology. This latter effect is illustrated in Table 4-9 which compares the environmental impacts from the proposed BACT for NBCRR with a similar-sized, MSW-fired facility (with a dry scrubber located in Connecticut). As indicated in this comparison, the impacts in Connecticut are from 3.5 to 7 times that of south Florida. Furthermore, in many cases the permitted emissions are not significantly lower (with a dry scrubber) than that proposed for NBCRR. This comparison illustrates that the application of more stringent control of MSW-fired facilities for other states is not directly comparable to that proposed for NBCRR because of site-specific conditions.

Table 4-9. Comparison of Proposed BACT Environmental Impacts with Alternative Control Technology—
Dry Scrubber Permitted in Connecticut

Pollutant	North Broward County				Bridgeport, Connecticut			
	Proposed	Air Quality Impact			Proposed	Air Quality Impact		
	Emissions* (TPY)	3-hour	24-hour	Annual	Emissions† (TPY)	3-hour	24-hour	Annual
PM	134	2.9	0.7	0.061	145	23.2	2.65	0.6
SO ₂	1,592	34.6	8.4	0.73	1,367	219	25	6
F ⁻	52	1.1	0.27	0.024	19.5	3.1	0.4	0.09
H ₂ SO ₄ Mist	136	3.0	0.72	0.062	132	21.1	2.4	0.6
Pb	5.8	0.13	0.031	0.0027	2.8	0.5	0.05	0.01
Hg	2.7	0.058	0.014	0.0012	3.9	0.6	0.07	0.02

*Based on 642,400 tons of MSW.

†Based on 821,250 tons of MSW.

**Predicted highest, second-highest 3- and 24-hour and highest annual concentrations due to proposed emissions only (see Section 7.0 for proposed NBCRR facility).

Sources: Connecticut DEP, 1985b.
ESE, 1986.

4.4.3 Energy Impacts

The increased energy usage caused by the alternative BACT control technologies is considered moderate.

4.4.4 Conclusion

Based on an evaluation of the proposed and alternative control technologies, the proposed control technology is considered the appropriate choice for BACT. This conclusion is based on the relative significance of economic impacts associated with the low air quality benefits and greater proven reliability of the proposed technology. Energy impacts do not appear to vary significantly for the technologies evaluated. The matrix illustrates the engineering conclusion drawn from the data presented in the BACT section and Table 4-10.

Table 4-10. BACT Conclusion Matrix for Alternative Control Technologies Evaluated

Summary of Impacts of Alternative Control Technologies		
Economic	Environmental	Energy
Significant - o Cost greater than EPA criteria - o Dry scrubbing will cost from \$4.5 to \$9.6/ton of MSW or approximately 16 to 34 percent of tipping fee	No significant improvement for proposed BACT - o Small percentage (<7 percent) of PSD increment consumed - o Impacts small (<3 percent) compared to AAQS	Moderate increase in energy consumption over proposed from 6.3 to 11 percent

Source: KBN, 1986.

5.0 EXISTING AMBIENT MONITORING DATA REVIEW

5.1 MONITORING REQUIREMENTS

The CAA requires that an air quality analysis be conducted for each pollutant subject to regulation under the act before a major stationary source or major modification is constructed. This analysis may be performed by the use of modeling and/or monitoring the air quality. The use of monitoring data refers to either the use of representative air quality data from existing monitoring stations or establishing a monitoring network to monitor existing air quality. In addition to establishing existing air quality, the air quality data are useful for determining background concentrations (i.e., concentrations from sources not considered in the modeling). The background concentrations can be added to the concentrations predicted for the sources considered in the modeling to estimate total air quality impacts. These total concentrations are then evaluated to determine compliance with AAQS.

For the criteria pollutants, continuous air quality monitoring data must be used to establish existing air quality concentrations in the vicinity of the proposed source or modification. However, no preconstruction monitoring data will generally be required if the ambient air quality concentration before construction is less than the de minimis impact monitoring concentrations, which are presented in Table 2-2. Also, if the maximum predicted impact of the source or modification is less than the de minimis impact monitoring concentrations, the source would generally be exempt from preconstruction monitoring.

For noncriteria pollutants, EPA recommends that an analysis based on the air quality modeling should generally be used instead of monitoring data. The permit-granting authority has discretion in requiring preconstruction monitoring data when:

1. The state has an air quality standard for the noncriteria pollutant and emissions from the source or modification pose a threat to the standard;

2. The reliability of emission data used as input to modeling existing sources is highly questionable; or
3. Air quality models have not been validated or may be suspect for certain situations, such as complex terrain or building downwash conditions.

However, before a permit-granting authority requires preconstruction monitoring, EPA recommends that an acceptable measurement method approved by EPA should be available and the maximum concentrations due to the major source or major modification are predicted to be above the significant monitoring concentrations.

As determined by the source applicability analysis, described in Section 2.5, an ambient monitoring analysis is required by PSD regulations for SO₂, PM, NO₂, CO, Pb, F⁻, H₂SO₄, Be, Hg, and As.

5.2 EXISTING MONITORING DATA

A listing of all the ambient monitoring locations in Broward County is presented in Table 5-1. There are currently 18 sites operated by Broward County and 3 sites operated by Florida Power & Light Company (FPL). Based on the PSD monitoring guidelines (EPA, 1981), for a proposed source located in an area of multisource emissions and flat terrain, existing ambient monitoring data may be acceptable if the existing monitor is within 10 km of the proposed source or 1 km of predicted maximum impacts.

The maximum concentrations measured during 1984 at existing monitoring sites located within 10 km of the NBCRR facility are presented in Table 5-2. Based on these measured maximum concentrations, pollutant concentrations within a 10-km radius from the facility are less than the national and Florida AAQS. Although Broward County Monitoring Site No. 4 is 13.5 km from the proposed facility site, concentrations from the monitor are included since it is the closest site with SO₂ and NO₂

Table 5-1. Ambient Air Monitoring Sites in Broward County During 1984

SAROAD No.	Broward County No. or Operator	Location		Pollutant Measured	Location with Respect to Proposed Facility	
		City/Division	UTM, X,Y Coordinates (km)		Dirac- tion (°)	Distance (km)
3700003G01	1	Pompano Beach	590.17, 2908.00	TSP, Pb	85	6.2
3700002G01	3	Pompano Beach	587.85, 2902.78	TSP	14	6.1
2270001G01/09	4	Lauderdale Lakes	579.55, 2894.76	TSP, NO ₂ , SO ₂ , CO	199	13.5
3640002G01	5	Plantation	575.52, 2891.27	TSP	208	18.3
1260003G01	6	Ft. Lauderdale	583.11, 2890.09	TSP, NO ₂ , SO ₂ , CO, Pb	183	17.4
4350001G01	7	Tamarac	574.44, 2897.87	TSP	225	13.6
0910002G01	8	Davie	576.19, 2884.99	TSP, NO ₂ , SO ₂	199	23.8
3530001G01	9	Pembroke Pines	575.26, 2877.44	NO ₂ , SO ₂	196	31.3
1840001G01	10	Hollywood	582.21, 2876.98	TSP, Pb	183	30.6
1640001G01	11	Hallandale	584.60, 2874.44	TSP	179	33.1
1260004G01/09	12	Ft. Lauderdale	585.20, 2887.20	TSP, NO ₂ , SO ₂	177	20.3
0420002G01	13	Hacienda Village	579.70, 2885.34	CO	191	22.6
0420003G03	14	Coral Springs	571.60, 2906.88	O ₃	267	12.4
3530002G01/09	15	Pembroke Pines	570.00, 2878.40	TSP	206	32.3

Table 5-1. Ambient Air Monitoring Sites in Broward County During 1984 (Continued, Page 2 of 2)

SAROAD No.	Broward County No. or Operator	Location		Pollutant Measured	Location with Respect to Proposed Facility	
		City/Division	UTM, X,Y Coordinates (km)		Dirac- tion (°)	Distance (km)
0420004G01	16	N. Lauderdale	577.73, 2900.11	O ₃	220	9.7
3700004G01	17	Pompano Beach	585.34, 2900.13	CO	170	7.5
1840002G01	18	Hollywood	584.00, 2875.87	CO	180	31.6
2560002G01	19	Margate	578.86, 2903.51	TSP, Pb	232	6.5
1260005J02	FP&L	Ft. Lauderdale	579.28, 2882.35	TSP, NO ₂ , SO ₂	191	25.6
1260006J02	FP&L	Ft. Lauderdale	583.05, 2883.85	TSP, NO ₂ , SO ₂	182	23.7
1260007J02	FP&L	Ft. Lauderdale	589.10, 2886.85	TSP, NO ₂ , SO ₂	166	21.3

Source: ESE, 1986.

Table 5-2. 1984 Ambient Air Quality Data for Monitoring Stations Within 10 km of the NBCRR Facility

Broward County No. or Operator	SAROAD No.	Concentration ($\mu\text{g}/\text{m}^3$)*								
		TSP		SO ₂		NO ₂	CO†		Pb	O ₃
		24-hr	Annual	24-hr	Annual	Annual	1-hr	8-hr	Quarter	1-hr
1	3700003G01	63	36	—	—	—	—	—	0.2**	—
3	3700002G01	120**	48**	—	—	—	—	—	—	—
4	2270001G01	76	38	6**	3**	33**	7	5	—	—
—	2270001G09	76	38	12**	6**	34**	—	—	—	—
16	0420003G03	—	—	—	—	—	—	—	—	202**
17	3700004G01	—	—	—	—	—	7**	5**	—	—
19	2560002G01	59	29	—	—	—	—	—	0.1**	—
Florida AAQS		150	60	260	60	100	40	10	1.5	235

*For short-term averages, second-highest concentration is shown.

†CO concentrations in mg/m^3 .

**Closest monitoring station for specified pollutant.

Source: ESE, 1986.

concentrations. It should be noted that the SO₂ and NO₂ concentrations are not measured by an acceptable technique for use in PSD applications. However, based on the data presented in Table 5-2, the measured SO₂ and NO₂ concentrations are well below AAQS. Also, based on the modeling results presented in Section 7.0, the maximum predicted concentrations due to the resource recovery facility operating at maximum capacity are expected to be below the de minimis impact levels for all pollutants except F⁻; therefore, no monitoring is required for those pollutants under those plant operating conditions.

Currently, a de minimis impact level has not been designated for As because an appropriate monitoring method has not yet been developed. As a result, no monitoring is required for that pollutant.

For F⁻, the maximum concentrations are predicted to be slightly above the de minimis monitoring levels. Because the predicted impacts are low and there are no national or state AAQS for F⁻, monitoring is not considered necessary before the facility operates at maximum capacity.

6.0 AIR QUALITY MODELING APPROACH

6.1 MODEL SELECTION

The ISC dispersion model (Cramer, 1979) was used to evaluate the proposed BCRR facility's emissions. This model is contained in EPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 5 (EPA, 1983b). The ISC model was selected primarily for the following reasons:

1. EPA and DER have approved the general use of the model for air quality dispersion analyses because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (EPA, 1978) and Regional Workshops on Air Quality Modeling (EPA, 1983a).
2. The ISC model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain.
3. The results from the ISC model are appropriate for addressing compliance with AAQS and PSD Class I and Class II increments.

The ISC model has rural and urban options which affect the plume rise formulas, wind-speed-profile exponent law, dispersion curves, and mixing-height formulations used in calculating ground-level concentrations. One criterion used to determine when the rural or urban mode is appropriate is based on land use near the proposed plant (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3-km radius circle centered on the proposed source, the urban mode should be selected. Otherwise, the rural option is more appropriate. Based on a review of the actual land use around the facility, the rural mode was selected because of the general lack of or minimal industrial and commercial development.

The ISC model consists of two model codes. The first model code, the ISC short-term (ISCST) model, is an extended version of the single-source (CRSTER) model (EPA, 1977). The ISCST model is designed to calculate

hourly concentrations based on hourly meteorological parameters (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The hourly concentrations are processed into non-overlapping, short-term averaging periods. For example, a 24-hour average concentration is based on twenty-four 1-hour averages calculated from midnight to midnight of each day. For each short-term averaging period selected, the highest and second-highest average concentrations are calculated for each receptor. As an option, a table of the 50 highest concentrations over the entire field of receptors can be produced. For the annual averaging period, the 1-hour concentrations are summed for all hours in the year for each receptor.

The second model code is the ISC long-term (ISCLT) model, which is an extension of the Air Quality Display Model (AQDM) and the CDM. The ISCLT model uses joint frequencies of wind direction, wind speed, and atmospheric stability to calculate seasonal and/or annual average ground-level concentrations. This model code was not used because the annual average concentrations were obtained from the ISCST model.

6.2 METEOROLOGICAL DATA

Meteorological data used in the ISCST model to determine air quality impacts consisted of a 5-year period (1970 to 1974) of hourly surface weather observations and twice-daily concurrent radiosonde soundings from the National Weather Service (NWS) station in Miami, Florida.

The NWS station in Miami, located approximately 55 km south-southwest of the proposed plant site, was selected for use in the study because it is the closest primary weather station to the study area with similar surrounding topographical features and land-water boundaries. This station also has the most readily available and complete data base which is representative of the proposed plant sites.

The surface observations included wind direction, wind speed, temperature, cloud cover, and cloud ceiling. The wind speed, cloud cover, and cloud ceiling values are used in the ISCST meteorological preprocessor program to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at Miami, Florida, morning and afternoon mixing heights were calculated with the radiosonde data at Miami using the Holzworth approach (1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by EPA (Holzworth, 1972). The hourly surface data and mixing heights were used to develop a sequential series of hourly meteorological data (i.e., wind direction, wind speed, temperature, stability, and mixing heights). Because the observed hourly wind directions are classified into one of thirty-six 10-degree sectors, the wind directions are randomized within each sector using an EPA preprocessing program to account for the expected variability in air flow.

6.3 EMISSION INVENTORY DATA

An emission inventory of major sources of SO₂ emissions within 50 km of the proposed plant location was conducted. Because the modeling results indicated that maximum plant concentrations will be above the significant impact level for SO₂, the inventory was prepared for only SO₂ emissions. According to EPA guidance, if a proposed source's impact is above the significant impact level, other major sources within 50 km that emit the pollutant should be considered in the analysis to ensure compliance with AAQS and PSD increments. Initial discussions with DER (1983) indicated that two major sources of SO₂ emissions should be considered: FPL Port Everglades and Fort Lauderdale facilities. Both these facilities are located more than 20 km to the south of the proposed plant location. Stack, operating, and emission data for these facilities, which were obtained from FPL (1985) are presented in Table 6-1. Flow rates for the turbines at each facility are based on standard conditions because actual flow rates were not readily available. By using flow rates at standard

Table 6-1. Stack, Operating, and SO₂ Emission Data for FPL Port Everglades and Fort Lauderdale Facilities

Facility	UTM Coordinates (km)		Maximum Heat Input Rate (10 ⁶ Btu/hr)	Stack Data (feet)		Exit Gas Conditions		SO ₂ Emissions
	East	North		Height	Diameter	Velocity	Temperature	(lb/hour)
						(feet/second)	(°F)	
<u>Port Everglades</u>								
Unit 1	587.38	2,885.25*	2,050	344	14.0	60.7	290	5,637.5
Unit 2	587.38	2,885.25	2,050	344	14.0	60.7	290	5,637.5
Unit 3	587.38	2,885.25	3,600	343	18.1	63.3	290	9,900
Unit 4	587.38	2,885.25	3,600	343	18.1	63.3	290	9,900
12 turbines	587.38	2,885.25	5,964	50	18.1†	26.3**	770	3,066
<u>Fort Lauderdale</u>								
Unit 1	580.12	2,883.30††	1,390	151	14.0	48.7	300	1,529
Unit 2	580.12	2,883.30	1,390	151	14.0	48.7	300	1,529
24 turbines	580.12	2,883.30		50	18.1†	26.3**	770	6,132

*Located 24.5 km at a direction of 189 degrees from proposed source.

†Effective diameter based on rectangular vent with sides of 20.67 by 12.46 feet.

**Flow rate at standard conditions.

††Located 22.5 km at a direction of 171 degrees from proposed source.

Sources: ESE, 1985.

FPL, 1985.

conditions, the plumes will be lower which should result in higher impacts than if the sources were modeled with the actual flow rate conditions. Also, the facilities were assumed to operate at maximum permitted emissions for every hour throughout the year. This approach will produce very conservative concentrations (i.e., higher than expected) since actual reported emissions on an annual basis are expected to be lower than that modeled.

6.4 RECEPTOR GRID

In the screening modeling analysis, concentrations were predicted for the proposed source only at 360 receptor locations in a radial grid around the facility. The radial grid consisted of 36 radials located 10 degrees apart with 10 receptors located along each radial. The downwind distances of the receptors from the proposed source were 0.3, 0.7, 1.1, 1.5, 1.9, 2.3, 2.7, 3.1, 3.5, 3.9, and 4.3 km along each radial.

Because the FPL Port Everglades and Fort Lauderdale facilities are located more than 20 km away from the proposed source, concentrations were predicted for all sources at 30 receptor locations in a radial grid only for directions which align these sources. The radial grid consisted of three radials located 10 degrees apart with 10 receptors located along each radial. The radials were 350, 360, and 10 degrees. The distances were the same used for the proposed source only.

In the refined modeling analysis, concentrations were predicted using a radial receptor grid centered on the receptor that produced the highest, second-highest concentration for the proposed source only for the short-term averaging period. The grid consisted of 49 receptors which were located along seven radials spaced at 2-degree intervals and separated by 100-m intervals along each radial. The FPL facilities were also included in this analysis. Refined modeling analysis was not performed for the annual average concentrations because their spatial distribution is not expected to vary significantly for the radial receptor grid.

For addressing compliance with PSD Class I impacts, the proposed facility was modeled to predict maximum impacts at 17 receptor locations, spaced 2 km apart, along the northeast boundary of the Everglades National Park. These receptor locations were selected along this boundary because it is the closest portion of the Class I area to the proposed source. No refined modeling analysis was performed for Class I impacts.

6.5 BACKGROUND CONCENTRATIONS

Because the proposed NBCRR facility will produce maximum concentrations for most regulated pollutants that are below the significant impact levels, the air modeling analysis did not address total air quality impacts for all pollutants (which is consistent with EPA guidance). Total impacts from the proposed facility are added to impacts due to sources not modeled. However, other sources were modeled in the analysis (see Section 6.3) for the 3- and 24-hour SO₂ concentrations because the maximum facility-related concentrations were greater than the significant impact levels. In addition, a background concentration of impacts due to non-modeled sources was included in estimating total air quality impacts. The background concentration was based on monitoring data presented in Table 5-2. The monitoring technique available for those data do not produce 3-hour concentrations. As a result, the 3-hour background concentration was assumed to equal 2.25 times the 24-hour concentration (DER, 1985). This will produce a conservative estimate of total impacts because the measured concentrations are not likely to occur coincidentally with maximum predicted concentrations.

6.6 BUILDING DOWNWASH CONSIDERATION

Under moderate to strong wind speed conditions, the effluent plume emanating from a stack on or near a building may not totally escape the aerodynamic wake region on the downwind edge of the building. This results in a downwash condition where the effluents are mixed into the wake region. Building shape and orientation to the wind affect the dimensions of the turbulent wake and the degree of downwash. The stack

height, building height and width, horizontal wind speed, plume exit velocity, and plume buoyancy determine which portion of the plume, if any, will clear the turbulent wake. Downwash of a plume into the wake is expected under conditions of low effluent velocity relative to the ambient wind speed. A highly buoyant plume would be expected to have a smaller tendency to downwash.

The criteria used to assess whether building downwash could occur were based on EPA recommendations (EPA, 1985a) for determining a Good Engineering Practice (GEP) stack height. If a stack height is less than GEP, then ground-level concentrations produced as a result of atmospheric downwash, eddies, and wakes created by the source itself and nearby structures must be addressed. As presented in Section 2.3.7, GEP stack height is defined as the highest of:

1. 65 m, or
2. A height established by applying the formula:

$$H_g = H + 1.5 L$$

where: H_g = GEP stack height,

H = height of the structure (on which the stack is located) or nearby structure, and

L = lesser dimension (height or projected width) of structure or nearby structure.

Both the height and width of the structure are determined from the frontal area of the structure projected onto a plane perpendicular to the direction of the wind. Adjacent and nearby structures whose plane projections lying upwind from the source are overlaying are considered as one structure. The downwind area in which a nearby structure was assumed to have a significant influence on the source was limited to five times the lesser dimension of the height or width of the structure. Thus, the application of GEP stack height equation was limited to structures within 5 L of the proposed source.

Based on these procedures, the buildings and structures and adjacent landfill were evaluated to determine the areal extent of their influence on the proposed stack. The landfill was eliminated from consideration since, even with a maximum height of 150 ft, the proposed stack will be outside the area of influence of potential downwash due to the landfill (i.e., located more than 750 ft away, which is 5 times 150 ft) and the landfill height would not produce a higher GEP height than that of the adjacent buildings to the stack. Based on the dimensions of the adjacent buildings (i.e., height of 98 ft and maximum projected width of 329 ft), a GEP stack height is determined to be 245 ft or 5 times the height of 98 ft, the lesser dimension. Therefore, with a proposed stack of 200 ft, there is a potential for building downwash conditions to occur.

Based on modeling workshops conducted by EPA regional meteorologists (EPA, 1983a), EPA has recommended that the approach developed by Huber and Snyder (1976) and Huber (1977) be used in a screening analysis to assess the potential for air quality problems. This approach has been incorporated in the ISC model. For purposes of this analysis, the building downwash option in the ISC model was used to assess the potential impacts of emissions for the proposed plant using the following assumptions:

- o Building height and width were equal to 98 and 329 ft, respectively.
- o Transitional plume rise option used (i.e., plume height dependent upon distance from stack).
- o Concentrations predicted for SO₂ emissions only for those 3- and 24-hour averaging periods which produced the highest, second highest concentrations without building downwash. In this manner, an actual sequence of meteorological conditions is used to assess the potential for increases in concentrations due to downwash.

There are limitations of using the building downwash features of the ISC model. The procedures used by the ISC model to account for building wake effects were developed from the results of wind tunnel experiments which used the following features and assumptions:

1. Model building with building width that was double that of the building height (i.e., squat building),
2. Turbulent intensity corresponding to slightly unstable to neutral Pasquill atmospheric stability,
3. Stack located on the model building, and
4. Wind flow perpendicular to building width.

Thus, the development of the procedures is associated with a specific stability, building shape, stack location, and building orientation with respect to the mean wind direction. Consequently, the ISC model wake-effects evaluation may not be strictly applicable to all situations.

Also, because development of the building wake procedures did not include comparisons with observational data (i.e., air quality monitoring data), the absolute values produced using this procedure may be questionable. It appears that these procedures are useful in addressing the potential for building downwash to occur and may provide a relative estimate of increases in concentrations when buildings influence air flow around a stack.

7.0 AIR QUALITY MODELING RESULTS

Predicted maximum impact concentrations for the proposed NBCRR facility at projected maximum operation, using screening and refined modeling receptor grids, are presented in Tables 7-1 and 7-2, respectively. These results are based on the plant charging 2,420 TPD or 100.8 tons per hour (TPH) of MSW at projected maximum operation. The maximum hourly emission rates are presented in Table 2-4 (see Section 2.5). The average annual concentrations have been multiplied by a factor of 0.728 to reflect the 80-percent annual availability of plant nameplate capacity.

For most of the pollutants, the predicted maximum concentrations are below the PSD significant impact levels and de minimis monitoring levels. As a result, the proposed plants' emissions do not produce a significant impact for PM, NO₂, or CO concentrations and, therefore, do not require additional modeling analyses. For SO₂, the maximum 3- and 24-hour concentrations are greater than the significant impact levels.

For F⁻, the maximum predicted 24-hour concentration is greater than the de minimis monitoring level. For the other regulated pollutants for which significant impact levels have not been established, the predicted maximum concentrations are well below the de minimis monitoring levels established for these pollutants. Based on these results and the existing low measured pollutant concentrations in Broward County (see Section 5.2), the proposed emissions from the NBCRR facility are expected to comply with the AAQS and PSD Class II increments.

The proposed emissions for the NBCRR facility also produce predicted maximum concentrations that are less than the PSD significant impact levels and de minimis monitoring levels in the PSD Class I area in the Everglades National Park (Table 7-3). These results are consistent with the predicted maximum concentrations within the near vicinity of the proposed facility. Thus, the emissions for the proposed facility are expected to comply with PSD Class I increments in the Everglades National Park.

Table 7-1. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Screening Modeling Methods

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period		
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending
SO ₂	3-hour	34.4	300	1.9	1971	126	12
	24-hour	8.1	310	1.9	1972	111	24
			270	2.3	1970	169	24
	Annual	0.73	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
TSP	24-hour	0.68	310	1.9	1972	111	24
			270	2.3	1970	169	24
	Annual	0.061	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
NO ₂	Annual	0.73	280	4.3	1970	--	--
			300	2.3, 2.7	1972, 1974	--	--
			270	2.3	1970	169	24
CO	1-hour	9.8	90	1.5	1973	191	11
	8-hour	3.6	310	1.5	1972	111	16
Pb	24-hour	0.029	310	1.9	1972	111	24
			270	2.3	1970	169	24
	(Quarterly)	0.0026††	280	4.3	(1972)	(--)	(--)
			(300)	2.3, 2.7	(1972, 1974)	(--)	(--)
F ⁻	24-hour	0.26	310	1.9	1972	111	24
			270	2.3	1970	169	24
Be	24-hour	0.000014	310	1.9	1972	111	24
			270	2.3	1970	169	24
Hg	24-hour	0.014	310	1.9	1972	111	24
			270	2.3	1970	169	24

*Annual average concentrations have been adjusted to reflect 72.8-percent annual availability factor.

†Highest, second-highest concentrations for short-term period; highest concentration for annual period. Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

**With respect to proposed facility.

††Annual average.

Table 7-2. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Refined Modeling Methods

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period			Concentrations (ug/m ³)		
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending	PSD Class II Increment	Significant Impact Level	De Minimis Monitoring Level
SO ₂	3-hour	34.6	300	1.9	1971	126	12	512	25	NA
	24-hour	8.4	312	1.9, 2.0	1972	112	24	91	5	13
	Annual	0.73	280	4.3	1970	--	--	20	1	NA
			300	2.3, 2.7	1972, 1974	--	--			
TSP	24-hour	0.71	312	1.9, 2.0	1972	112	24	37	5	10
	Annual	0.061	280	4.3	1970	--	--	19	1	NA
			300	2.3, 2.7	1972, 1974	--	--			
NO ₂	Annual	0.73	280	4.3	1970	--	--	NA	1	14
			300	2.3, 2.7	1972, 1974	--	--			
CO	1-hour	11.0	94	1.3	1973	191	11	NA	2,000	NA
	8-hour	4.0	312	1.7	1972	111	16		500	575
Pb	24-hour	0.031	312	1.9, 2.0	1972	112	24	NA	NA	0.1
	(Quarterly)	(0.0026††)	(280)	(4.3)	(1970)	--	--		(NA)	(0.1)
			(300)	(2.3, 2.7)	(1972, 1974)	--	--			
F ⁻	24-hour	0.27	312	1.9, 2.0	1972	112	24	NA	NA	0.25

Table 7-2. Predicted Maximum Concentrations for the Proposed NBCRR Facility at Projected Maximum Operation (110 Percent of Nameplate Capacity) Using Refined Modeling Methods (Continued, Page 2 of 2)

Pollutant	Averaging Time*	Maximum Concentration† (ug/m ³)	Receptor Location**		Period			Concentrations (ug/m ³)		
								PSD Class II Increment	Significant Impact Level	De Minimis Monitoring Level
			Direction (°)	Distance (km)	Year	Julian Day	Hour Ending			
Be	24-hour	0.000014	312	1.9, 2.0	1972	112	24	NA	NA	0.0005 (0.001)
Hg	24-hour	0.014	312	1.9, 2.0	1972	112	24	NA	NA	0.25

*Average annual concentrations have been adjusted to reflect 72.8-percent annual availability factor.

†Highest, second-highest concentration for short-term period; highest concentration for annual period.

Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

**With respect to proposed facility.

††Annual average.

NA = Not applicable.

Source: ESE, 1985.

Table 7-3. Predicted Maximum Concentrations at the PSD Class I Area Due to the Proposed NBCRR Facility at Maximum Projected Load (110 Percent of Nameplate Capacity)

Pollutant	Averaging Time	Maximum Concentration* ($\mu\text{g}/\text{m}^3$)	Receptor Location		Period			Concentrations ($\mu\text{g}/\text{m}^3$)		
			UTM Coordinates (km)		Year	Julian Day	Hour Ending	PSD Class I Increment	Significant Impact Level	De Minimis Monitoring Level
			x	y						
SO ₂	3-hour	3.2	532.75	2,847.4	1973	222	6	25	25	NA
	24-hour	0.61	532.75	2,847.4	1972	342	24	5	5	13
	Annual	0.0	All Receptors		1970-74	—	—	2	1	NA
TSP	24-hour	0.051	532.75	2,847.4	1972	342	24	10	5	10
	Annual	0.0	All Receptors		1970-74	—	—	5	1	NA
NO ₂	Annual	0.0	All Receptors		1970-74	—	—	NA	1	14
CO	1-hour	1.6	532.75	2,847.4	1973	222	5	NA	2,000	NA
	8-hour	0.29	532.75	2,847.4	1972	342	24		500	575
Pb	24-hour (Quarterly)	0.0022 (0.0)†	532.75	2,847.4	1972	342	24	NA	NA	0.1 (0.1)
F ⁻	24-hour	0.020	532.75	2,847.4	1972	342	24	NA	NA	0.25
Be	24-hour	0.0000010	532.75	2,847.4	1972	342	24	NA	NA	0.0005 (0.001)
Hg	24-hour	0.0010	532.75	2,847.4	1972	342	24	NA	NA	0.25

*Highest, second-highest concentration for short-term period, highest concentration for annual period. Values in parentheses represent results associated with revised de minimis monitoring levels. See Section 2.2 for details.

†Annual average.

NA = not applicable.

Source: ESE, 1986.

Because SO₂ emissions for the proposed NBCRR produced impacts greater than 3- and 24-hour SO₂ significant impact levels, additional modeling was performed for other major SO₂ sources within 50 km of the proposed facility. The other major sources considered in the analysis were FPL Port Everglades and Fort Lauderdale facilities. The predicted maximum concentrations due to the NBCRR and FPL facilities added to a background concentration are presented in Table 7-4. These results indicate that the predicted total SO₂ concentrations will comply with national and Florida AAQS. Also, the major contributors to the maximum total concentrations are the major FPL sources, with the proposed NBCRR facility producing either no or less than significant impacts.

Because results presented in Table 7-4 are based on receptors for which the NBCRR facility is aligned with the FPL facilities, modeling was also performed with the FPL facilities for those periods which produced the highest, second-highest 3- and 24-hour SO₂ concentrations for the NBCRR facility only. As shown in Table 7-5, the maximum predicted concentrations are primarily due to the NBCRR facility and are similar to results presented in Table 7-1. In all cases, the predicted total concentrations will comply with AAQS.

The results of the screening building downwash analysis for SO₂ concentrations are presented in Table 7-6. The maximum concentrations are given for conditions with and without building downwash based on the periods that produced the maximum concentrations without building downwash. These results indicate that if building downwash conditions occur, maximum concentrations could increase by approximately 7 percent from the maximum concentrations produced without building downwash. Therefore, based on this screening analysis, emissions from the proposed facility under building downwash conditions are not expected to produce concentrations that would exceed PSD increments or AAQS.

Table 7-4. Maximum Predicted Total SO₂ Concentrations Due to Proposed NBCRR Facility and Interaction Sources

Averaging Period	Year	Highest, Second-Highest Concentration (ug/m ³)				Receptor† Location		Period	
		Total	Total Due to			Direc- tion (°)	Dis- tance (km)	Julian Day	Hour Ending
			NBCRR	FPL	Back- Ground*				
3-hour	1970	345	0	318	27	350	1.1	219	6
	1971	278	0	251	27	10	1.1	38	18
	1972	248	0	221	27	10	1.1	78	6
	1973	242	0	215	27	360	2.7	186	21
	1974	221	6, 7	215, 214	27	350	3.5, 3.9	175	21
24-hour	1970	95.6	0	83.6	12	10	1.9	47	24
	1971	82.9	2.6	68.3	12	350	4.3	73	24
	1972	60.5	1.4	47.1	12	350	1.9	171	24
	1973	71.1	2.2	56.9	12	10	2.3	186	24
	1974	73.9	1.0	60.9	12	350	3.9	211	24

*Based on monitoring data. Since 3-hour concentrations are not obtained by monitoring method, 3-hour concentration was assumed to equal 2.25 times the 24-hour concentration (DER, 1985).

†With respect to NBCRR. Receptors located along radials of 350, 360, and 10 degrees.

Notes: National and Florida 3-hour AAQS: 1,300 µg/m³.
Florida 24-hour AAQS: 260 µg/m³.
National 24-hour AAQS: 365 µg/m³.
AAQS not to be exceeded more than once per year.

Source: ESE, 1986.

Table 7-5. Maximum Predicted Total SO₂ Concentrations for Periods that Produced Maximum Concentrations Due to NBCRR Facility Only

Averaging Period	Analysis	Highest, Second-Highest Concentration (ug/m ³)				Receptor† Location		Period		
		Total Due to				Direc- tion (°)	Dis- tance (km)	Julian Day	Hour Ending	Year
		Total	NBCRR	FPL	Back- Ground*					
3-hour	Screening**	--	34.4	--	--	300	1.9	126	12	1971
	Refined	61.6	34.6	0	27	300	2.0	126	12	1971
24-hour	Screening**	--	8.1	--	--	270	2.3	169	24	1970
						310	1.9	111	24	1972
	Refined	28.8	9.8	7.0	12	314	2.0	111	24	1972
		28.8	9.6	7.2	12	314	2.1	111	24	1972
		28.8	9.4	7.4	12	314	2.2	111	24	1972

*Based on monitoring data. Since 3-hour concentrations are not obtained by monitoring method, 3-hour concentration was assumed to equal 2.25 times the 24-hour concentration (DER, 1985).

†With respect to NBCRR.

**Screening analysis considered only NBCRR facility (see Table 7-1).

Notes: National and Florida 3-hour AAQS: 1,300 µg/m³.
Florida 24-hour AAQS: 260 µg/m³.
National 24-hour AAQS: 365 µg/m³.
AAQS not to be exceeded more than once per year.

Source: ESE, 1986.

Table 7-6. Screening Analysis of Maximum SO₂ Concentrations Due to Building Downwash Conditions

Averaging Period	Analysis	Maximum Concentration ($\mu\text{g}/\text{m}^3$)*		Increase in Maximum Concentration (Percent)
		Without Building Downwash	With Building Downwash	
3-hour	Refined	34.6	35.4	2.3
24-hour	Refined	8.4	9.0	7.1

*Based on periods which produced maximum concentrations without building downwash (see Table 7-2).

Source: ESE, 1986.

8.0 IMPACT ON VEGETATION, SOILS, AND VISIBILITY

8.1 IMPACTS ON VEGETATION AND SOILS

Vegetation adjacent to the facility consists of weedy species which typically occupy disturbed sites in south Florida. These species include Brazilian pepper tree (Schinus terebinthefolius), melaleuca (Melaleuca quinquenervia), castor bean (Ricinus communis), and Australian pine (Casuarina equisetifolia). Common herbaceous species on and adjacent to the site include dog fennel (Eupatorium capillifolium), white beggar tick (Bidens pilosus), and a variety of grasses. Primrose willow (Ludwigia peruviana), cattails (Typha spp.), water hyacinth (Eichhornia crassipes), and other wetland species border the canals.

The majority of north Broward County consists of urban development. Vegetation in these areas consists of landscape plants [e.g., palms, monkey trees (Araucaria spp.), and broadleaf evergreens (e.g., Ficus spp.)]. The Everglades, dominated by sawgrass (Cladium jamaicense) is approximately 7 km west. The Loxahatchee Wildlife Refuge, which is part of the Everglades, is 10 km north of the site.

Soils in the area near the facility are primarily poorly drained mineral soils that are less than 40 inches deep to hard limestone. In much of the area, the native soil has been modified with fill material.

The northeast border of the Everglades National Park, a PSD Class I area, is approximately 75 km southwest of the site. Important plant species in the park include sawgrass, Dade County slash pine (Pinus elliotti var. densa), epiphytic vascular plants, and subtropical broadleaf evergreens [e.g., Mahogany (Swietenia mahagoni)].

Generally, soils in Everglades National Park and in the south Florida region are highly calcareous sands or organic soils with high cation exchange capacity.

Plant response to atmospheric pollutants is influenced by the concentration, duration of each exposure, and the frequency of exposures. The usual pattern of pollutant exposure is that of a few episodes of relatively high concentrations for a short duration, interspersed with long periods of extremely low concentrations. Effects on most plants will be from the short-term higher doses (i.e., product of the pollutant concentration and the duration of exposure). Very little information is available on the effects of airborne pollutants on species in south Florida. Therefore, the pollutant concentrations expected as a result of each facility operation are compared with the lowest concentrations known to affect the most sensitive plants that have been tested for response to each pollutant. These concentration levels that adversely affect plants are based on a literature review for plants that may not grow in this part of the state. Thus, these concentration levels represent a conservative threshold for comparison with the maximum predicted concentrations.

The maximum predicted total concentration for each pollutant due to each facility is presented in Table 8-1. The total predicted concentration consists of the maximum predicted facility concentration added to a background concentration developed from the maximum concentration measured at the monitoring station within 10 km of the proposed plant location (see Section 5.2). The lowest concentrations known to adversely impact the most sensitive plants tested for effects of pollutants are also presented in Table 8-1.

The maximum concentrations of pollutants expected to result from operation of the proposed facilities are either orders of magnitude below concentrations known to adversely impact sensitive plants or are not known to impact vegetation at all. Since the maximum concentrations of the same pollutants that are expected in Everglades National Park are

Table 8-1. Maximum Predicted Concentrations Due to the Proposed NBCRR Facility Compared to Concentrations Known to Adversely Impact Vegetation

Pollutant	Average Period	Concentration (ug/m ³)			Lowest Concentration Known to Impact Vegetation (ug/m ³)	Reference
		Maximum Predicted Due to Facility	Background*	Total (Facility Plus Background)		
SO ₂	3-hour	34.6	27	61.6	260 for 6 hours 12 times in 12 weeks	Flagler and Younger, 1982
TSP	24-hour	0.71	63	63.7	32,000†	Thompson <u>et al.</u> , 1984
NO ₂	Annual	0.73	34	34.7	120	Thompson, 1970
	3-hour	35.2	**	35.2	188	Tingey, 1971.
CO	1-hour	11.0	7,000	7,011	Vegetation not impacted by CO	--
Pb	3-month	0.0026	0.2	0.2	Unavailable to plants in high calcium and organic soils	Zimdahl and Skogerboe, 1977
F ⁻	24-hour	0.27	**	0.27	1 to 3	McCune, 1969. Adams, 1956.
Be	24-hour	0.000014	**	0.000014	Not known to be available to plants	Gough <u>et al.</u> , 1979
Hg	24-hour	0.014	**	0.014	10 (Duration unknown)	Stahl, 1969

*Second highest 24-hour or highest annual average concentration measured within 10 km of the facility (see Section 5.2). The 3-hour concentration is not available with monitoring technique. The 3-hour background concentration was assumed equal to 2.25 times the 24-hour concentration of 12 µg/m³ (DER, 1985).

†Assumes deposition velocity of 0.18 cm/sec.

**Ambient monitoring data not available in Broward County.

Source: ESE, 1986.

even lower than those expected near the facilities, no impact on the vegetation of the Class I area due to operation of the facilities is expected.

Soils in the south Florida region have the capability of neutralizing or adsorbing acidic pollutants attributable to the proposed facility. The concentration of such pollutants expected to result from source emissions is so low that, in any event, effects on soils will be negligible.

8.2 VISIBILITY IMPACTS

CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I areas. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. The nearest Class I area to the proposed plant site is the Everglades National Park, located about 78 km from the NBCRR facility. Because the maximum predicted impacts are below the PSD significant and de minimis impact levels for all regulated pollutants, the impact on visibility in Class I areas due to the proposed plants will be insignificant. To demonstrate this conclusion, a Level-1 visibility screening analysis to determine potential adverse visibility effects was performed using the approach suggested in the Workbook for Estimating Visibility Impairment (EPA, 1980). Three plume and sky contrast parameters are estimated using the PM, SO₂, and NO₂ emissions from the facility. If the absolute values of these parameters are greater than 0.10, the emission source fails the Level-1 visibility screening test, and further analysis is required to assess potential visibility impairment. If the absolute values of the contrast parameters are all less than 0.10, the emission source would probably not cause adverse visibility impairment in Class I areas; therefore, further analysis of potential visibility impacts would be unnecessary.

The approach and assumptions used to calculate the contrast parameters are described in the following steps.

Approach

Step 1--

Compute plume dispersion parameter, p , at the minimum distance in kilometers, x , from emission source and Class I area:

$$p = \frac{2.0 \times 10^8}{\sigma_z X}$$

where: σ_z = Pasquill-Gifford F stability (very stable) dispersion parameter, m , at downwind distance, X .

Step 2--

Compute optical thicknesses, t , based on emissions of PM and NO_x as NO_2 :

$$t_{PM} = 10 \times 10^{-7} p Q_{PM}$$

$$t_{NO_x} = 1.7 \times 10^{-7} p Q_{NO_x}$$

where: t_{PM} = PM optical thickness,
 t_{NO_x} = NO_x optical thickness,
 Q_{PM} = PM emissions (metric TPD), and
 Q_{NO_x} = NO_x emissions (metric TPD).

Step 3--

Determine background visual range value (r_{V0}), in kilometers, at location of emission source and Class I area. If emission source and Class I area are in different visibility regions, use larger value of r_{V0} in subsequent calculations [see Figure 13 in EPA (1980)].

Step 4--

Calculate the optical thickness parameter for primary and secondary aerosol, t_A :

$$t_A = (1.06 \times 10^{-5}) (r_{VO}) (Q_{PM} + 1.31 Q_{SO_2})$$

where: Q_{SO_2} = sulfur dioxide emissions (metric TPD).

Step 5--

Calculate the contrast parameters:

$$C_1 = \frac{t_{NO_2}}{t_{PM} + t_{NO_2}} [1 - \exp(-t_{PM} - t_{NO_2})] \left[\exp\left(\frac{-0.78x}{r_{VO}}\right) \right]$$

$$C_2 = \left[1 - \left(\frac{1}{C_1 + 1} \right) \exp(-t_{PM} - t_{NO_2}) \right] \left[\exp\left(\frac{-1.56x}{r_{VO}}\right) \right]$$

$$C_3 = 0.368 [1 - \exp(-t_A)]$$

where: C_1 = plume contrast against the sky,
 C_2 = plume contrast against terrain, and
 C_3 = change in sky/terrain contrast caused by primary and secondary aerosol.

Assumptions

For proposed plant at maximum capacity of 2,420 TPD:

x = 78 km (minimum distance to Everglades National Park, a Class I area),

σ_z = 88 m (for stability F at 78 km),

Q_{PM} = 42.0 lb/hr or 0.46 metric TPD,

Q_{NO_x} = 508.2 lb/hr or 5.53 metric TPD, and

Q_{SO_2} = 499.1 lb/hr or 5.43 metric TPD.

Calculations

Step 1--

$$p = \frac{2.0 \times 10^8}{(88)(78)}$$

$$p = 2.9 \times 10^4$$

Step 2--

$$t_{PM} = 10 \times 10^{-7} (2.9 \times 10^4) 0.33$$

$$t_{PM} = 0.013$$

$$t_{NO_x} = 1.7 \times 10^{-7} (2.9 \times 10^4) 5.53$$

$$t_{NO_x} = 0.027$$

Step 3--

$r_{VO} = 40$ km along Florida's east coast extending to center of state.

$r_{VO} = 25$ km, remainder of state.

Use $r_{VO} = 40$ km for subsequent calculations.

Step 4--

$$t_A = (1.06 \times 10^{-5}) (40) [0.46 + 1.31 (5.43)]$$

$$t_A = 0.0032$$

Step 5--

$$C_1 = \frac{0.027}{0.013 + 0.027} [1 - \exp(-0.013 - 0.027)] [\exp(\frac{-0.78(78)}{40})]$$

$$C_1 = 0.0058$$

$$C_2 = [1 - (\frac{1}{0.0058 + 1}) \exp(-0.013 - 0.027)] [\exp(\frac{-1.56(78)}{40})]$$

$$C_2 = 0.0021$$

$$C_3 = 0.368 [1 - \exp(-0.0032)]$$

$$C_3 = 0.0012$$

Conclusion

Because the absolute values of $C_1 = 0.0058$, $C_2 = 0.0021$, and $C_3 = 0.0012$ are all less than 0.10, it would be highly unlikely that the emission source cause adverse visibility impairment in the Class I area.

8.3 INDIRECT AIR QUALITY IMPACTS

The indirect air quality impacts associated with the proposed facilities would be attributable to the increased automotive traffic generated by employee travel and solid waste delivery. It is anticipated that about 530 solid waste transport vehicles per day would deliver municipal refuse to each facility when operating at maximum projected capacity (i.e., 2,420 TPD, which is 110 percent above nameplate capacity). The impact of the exhaust emissions from the solid waste transport vehicles is expected to be minimal. In addition, the solid waste transport vehicles would largely replace the vehicles used for the existing solid waste transport pattern. Since the operation of the proposed facilities will require only about 40 full-time employees, the impacts associated with employee traffic also will be negligible.

9.0 SUMMARY AND CONCLUSIONS

The following discussions present a summary and conclusions drawn from the results of this study.

1. The proposed NBCRR facility will be a major source of emissions for PM, SO₂, NO₂, CO, and H₂SO₄ mist. The facility will also have significant emissions for Pb, F⁻, Be, Hg, and As. Therefore, these pollutants must undergo review under the new source review requirements of the PSD regulations. The other regulated pollutants are not emitted above the PSD significant emission rates and, therefore, do not require PSD review. Since VOC emissions are expected to be less than 100 TPY, nonattainment review for O₃ is not required.
2. Emission control equipment to be used at the proposed facility will be designed to remove more than 98 percent of PM. This will result in the emission of 0.02 gr/dscf of PM.
3. The proposed control systems included in the design and operational procedures for PM, SO₂, NO₂, CO, and trace pollutant emissions are considered BACT. No alternative particulate and trace pollutant control device, which would be capable of a higher degree of emission reduction, is currently considered for the proposed facilities.
4. The air quality dispersion modeling results show that the proposed emissions from the facility operating at maximum capacity will comply with the national and Florida AAQS and PSD Class I and II increments. The model results are conservative (i.e., higher than expected) because the plant was assumed to operate at 110 percent of nameplate capacity. The proposed emissions from the facility produce maximum ground-level concentrations that are below the de minimis air quality impact monitoring levels for all pollutants,

except Pb and F- near the vicinity of each facility. For F-, the maximum predicted impacts due to the facility only slightly exceed the de minimis air quality level. However, PSD monitoring is not considered necessary because the predicted pollutant concentrations due to the facility are expected to be low.

Because the maximum predicted concentrations for pollutants emitted above the PSD significant emissions rates are below the AAQS and threshold limits that cause injury to vegetation and soils, the impacts due to the facility are not expected to have a significant impact on vegetation and soils in the PSD Class I and II areas. Also, the emissions from the proposed facility are highly unlikely to cause adverse visibility impairment in the Everglades National Park.

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY
ALEX SENKEVICH
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Resource Recovery ☒ New¹ ☐ Existing¹

APPLICATION TYPE: ☒ Construction ☐ Operation ☐ Modification

Broward County Board of County Commissioners and

COMPANY NAME: North Broward County Resource Recovery Project, Inc. COUNTY: Broward

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Municipal solid waste-fired

SOURCE LOCATION: Street 2700 NW 48th Street City Pompano Beach

UTM: East 583.8 km North 2907.6 km (zone 17)

Latitude 26 ° 17' 13 "N Longitude 87 ° 9' 35 "W

APPLICANT NAME AND TITLE: Mr. Thomas Henderson, Project Director, Broward County Resource Recovery Office and Attorney-in-Fact

APPLICANT ADDRESS: Resource Recovery Office, Room 521, 115 South Andrews Avenue
Ft. Lauderdale, FL 33301

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Broward County Board of County Commissioners and North Broward County Resource Recovery Project, Inc.
I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Thomas M. Henderson

Thomas M. Henderson, Project Director

Name and Title (Please Type)

Date: 2/24/86 Telephone No. (305) 357-6458

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been ~~examined~~/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

¹ See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed Kennard F. Kosky

Kennard F. Kosky

Name (Please Type)

KBN Engineering and Applied Sciences, Inc.

Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604

Mailing Address (Please Type)

Florida Registration No. 14996 Date: 2/14/86 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

- A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

* See Power Plant Site Certification (PPSC) Application

- B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction December 1986 Completion of Construction April 1989

- C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Electrostatic Precipitator (0.02 gr/dscf corrected for 12 percent CO₂)

Approximate \$2,670,000 (Annualized)

* See PPSC Application and Technical Support Document (TSD) for Prevention of Significant Deterioration (PSD) Permit

- D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

None

E. Requested permitted equipment operating time: / ^(normal) hrs/day 24 ; days/wk 7 ; wks/yr 52 ;
if power plant, hrs/yr 8670 ; if seasonal, describe: _____
80 percent annual availability factor unit anticipated

F. If this is a new source or major modification, answer the following questions.
(Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes*
 - a. If yes, has "offset" been applied? No
 - b. If yes, has "Lowest Achievable Emission Rate" been applied? No
 - c. If yes, list non-attainment pollutants. ozones⁺
 2. Does best available control technology (BACT) apply to this source?
If yes, see Section VI. Yes*
 3. Does the State "Prevention of Significant Deterioration" (PSD)
requirement apply to this source? If yes, see Sections VI and VII. Yes*
 4. Do "Standards of Performance for New Stationary Sources" (NSPS)
apply to this source? Yes*
 5. Do "National Emission Standards for Hazardous Air Pollutants"
(NESHAP) apply to this source? No
- H. Do "Reasonably Available Control Technology" (RACT) requirements apply
to this source? No
- a. If yes, for what pollutants? _____
 - b. If yes, in addition to the information required in this form,
any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justifi-
cation for any answer of "No" that might be considered questionable.

* See TSD for PSD Permit.

+ See TSD for PSD Permit. Volatile organic compounds (VOC) emissions are less than
100 tons per year and not subject to nonattainment regulations.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable: (not applicable)

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

B. Process Rate, if applicable: (See Section V, Item 1) (not applicable)

1. Total Process Input Rate (lbs/hr): _____

2. Product Weight (lbs/hr): _____

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary) *

Name of Contaminant	Emission ¹		Allowed ² Emission Rate per Rule 17-2	Allowable ³ Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
PM	42	134	168 lb/hr	42	-		
SO ₂	499.1	1592	N/A	499.1	-		
NO _x	508.2	1620	N/A	508.2	-		
CO	81.7	260	N/A	81.7	-		
VOC	11.8	37.6	N/A	11.8	-		

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

* See PPSC Application and TSD

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Electrostatic Precipitator	PM	99.3-99.5	see Exhibit I	see Exhibit I
(name and type to be determined)	Pb	99.3-99.5	" " "	" " "
	Be	99.3-99.5	" " "	" " "
	As	99.3-99.5	" " "	" " "

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Municipal Solid Waste	-	100.8 tons/hr	907.5

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: 0.12 Percent Ash: 17.4
 Density: N/A lbs/gal Typical Percent Nitrogen: 7.2
 Heat Capacity: 4500 BTU/lb N/A BTU/gal
 Other Fuel Contaminants (which may cause air pollution): See TSD

F. If applicable, indicate the percent of fuel used for space heating. (not applicable)

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

See PPSC application

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 200 ft. Stack Diameter: 4.92 ft.
 Gas Flow Rate: 114,000 ACFM 58,200 DSCFM Gas Exit Temperature: 430 °F.
 Water Vapor Content: 14 % Velocity: 100 FPS

SECTION IV: INCINERATOR INFORMATION

(not applicable)

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: ☐ Cyclone ☐ Wet Scrubber ☐ Afterburner

☐ Other (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)] +
To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. +
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). +
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.) **
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency). **
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. *
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).*
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.*

* See PPSC Application

+ See TSD

** See Exhibit I

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY +

- A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

☒ Yes ☐ No (Base on previous EPA determinations for non-fossil fuel fired steam generators - municipal solid waste)

Contaminant	Rate or Concentration
Particulate Matter	0.08 gr/dscf corrected to 12% CO ₂

- B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) (based on proposed NSPS for non-fossil fuel steam boilers)

☐ Yes ☐ No

Contaminant	Rate or Concentration
Particulate	0.1 lb/10 ⁶ BTU or approximately equivalent to
	0.04 gr/dscf corrected to 12% CO ₂

- C. What emission levels do you propose as best available control technology? +

Contaminant	Rate or Concentration
Particulate	0.02 gr/dscf corrected to 12%CO ₂
SO ₂	low sulfur fuel (0.55 lb/10 ⁶ BTU)
NO _x	0.56 lb/10 ⁶ BTU
Pb, Be, As	99.3 to 99.5% efficiency ESP

- D. Describe the existing control and treatment technology (if any). N/A

- | | |
|---------------------------|--------------------------|
| 1. Control Device/System: | 2. Operating Principles: |
| 3. Efficiency:* | 4. Capital Costs: |

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant

Rate or Concentration

10. Stack Parameters

a. Height:

ft.

b. Diameter:

ft.

c. Flow Rate:

ACFM

d. Temperature:

°F.

e. Velocity:

FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary). See Exhibit I and TSD

1. Proposed

a. Control Device: High Efficiency ESP

b. Operating Principles: Electrostatic Attraction

c. Efficiency:¹ 99.3-99.5

d. Capital Cost:

e. Useful Life: 30 yr

f. Operating Cost: } \$2,670,000/yr

g. Energy:² 4,590,000 kwh/yr

h. Maintenance Cost: }

i. Availability of construction materials and process chemicals: see TSD

j. Applicability to manufacturing processes: see TSD

k. Ability to construct with control device, install in available space, and operate within proposed levels: see TSD

2. Alternate -1; PM Control to 0.015gr/dscf

a. Control Device: ESP/Fabric, Filter

b. Operating Principles: Electrostatic Attraction filtration

c. Efficiency:¹ 99.8%+

d. Capital Cost:

e. Useful Life: 30 yr

f. Operating Cost: } \$2,778,000-
3,131,000/yr

g. Energy:² 4,220,000 kwh/yr

h. Maintenance Cost: }

i. Availability of construction materials and process chemicals: see TSD

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

- j. Applicability to manufacturing processes: see TSD
- k. Ability to construct with control device, install in available space, and operate within proposed levels: see TSD

3. Alternate 2 - Control of SO_2 , F^- , H_2SO_4 mist (see TSD)

- a. Control Device: Dry scrubber/fabric filter
- b. Operating Principles:
- c. Efficiency:¹ 70 to 90%
- d. Capital Cost: } \$5,548,000 to 8,827,000
- e. Useful Life: 30 yrs
- f. Operating Cost: }
- g. Energy:² 5,096,900 kwh/year
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes: see TSD
- k. Ability to construct with control device, install in available space, and operate within proposed levels: see TSD

4.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:¹
- d. Capital Costs:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:²
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

- 1. Control Device: High Efficiency ESP
- 2. Efficiency:¹ 99.3 to 99.5 (see Exhibit I)
- 3. Capital Cost: }
- 4. Useful Life: 30 yrs
- 5. Operating Cost: } \$2,670,000
- 6. Energy:² 4,590,000 kwh/yr
- 7. Maintenance Cost: }
- 8. Manufacturer: to be determined
- 9. Other locations where employed on similar processes: see TSD
- a. (1) Company:
- (2) Mailing Address:
- (3) City:
- (4) State:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant

Rate or Concentration

(8) Process Rate:¹

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant

Rate or Concentration

(8) Process Rate:¹

10. Reason for selection and description of systems:

¹Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data (not applicable)

1. _____ no. sites _____ TSP () SO₂* _____ Wind spd/dir

Period of Monitoring _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

- a. Was instrumentation EPA referenced or its equivalent? ☐ Yes ☐ No
- b. Was instrumentation calibrated in accordance with Department procedures?
- ☐ Yes ☐ No ☐ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / 1 / 70 to 12 / 31 / 74
month day year month day year
2. Surface data obtained from (location) Miami - NWS Station
3. Upper air (mixing height) data obtained from (location) Miami - NWS Station
4. Stability wind rose (STAR) data obtained from (location) Miami - NWS Station

C. Computer Models Used *

1. Industrial Source Complex Short Term Modified? If yes, attach description.
2. (ISCST) Model Modified? If yes, attach description.
3. _____ Modified? If yes, attach description.
4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	<u>5.29</u>	grams/sec
SO ₂	<u>62.9</u>	grams/sec

E. Emission Data Used in Modeling *

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review. *

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources. +

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology. *

* See TSD for PSD Permits

+ See PPSC Application and TSD for PSD Permit

EXHIBIT I

Typical design parameters for ESP (Note: The Design for these units have not been completed, therefore this design information is preliminary)

General

- | | |
|--------------------------------------|---|
| 1. Number of ESP Units per Boiler | - 1 |
| 2. Inlet Grain Loading | - 1.1 to 1.4 gr/ACFM |
| 3. Gas Flow* | - 132,000 ACFM MAX. |
| 4. Velocity through ESP | - 3.05 ft/min MAX. |
| 5. Outlet Grain Loading | - 0.02 gr/dscf corrected to 12% CO ₂ |
| 6. Efficiency | - 99.3 to 99.5 |
| 7. Percent CO ₂ /Moisture | - 8.7%/14% |
| 8. Number of Fields | - 4 |
| 9. Inlet Gas Temp. | - 600°F |

ESP Design (Per ESP Unit)

- | | |
|----------------------------------|-------------------------|
| a. Electrical Length Per Plate | 0.5 meters |
| b. Wire to Plate Spacing | 150 millimeters |
| c. Wire to Wire Spacing | 180/320 millimeters |
| d. Wire Diameters | 0.7 millimeters |
| e. Wires per Section | 966 |
| f. Wire Length per Section | 3598 meters |
| g. Plate Area per Section | 1596 meter ² |
| h. Number of Electrical Sections | 4 |
| i. Duct Width | 0.3 meters |

Electrical Design

- | | |
|---|----------------------|
| a. Applied Voltage each Section | 60,000 volts |
| b. Total Current in Electrical Sections | 0.6 amperes |
| c. Roughness of Wire | 0.8 roughness factor |

*For Design of ESP only; Actual Flow Rate will be 114,000 ACFM

COASTAL ZONE MANAGEMENT CERTIFICATIONS

APPENDIX 10.1.6

COASTAL ZONE MANAGEMENT CERTIFICATIONS

APPENDIX 10.1.6

COASTAL ZONE MANAGEMENT CERTIFICATIONS

As part of Florida's Coastal Management Program (FCMP) federal consistency procedures (15 CFR 930.50) all federal permits for which there are no corresponding state permits require certification of compliance with the State Coastal Management Program. For this project two such federal permits or approvals are necessary. These are the U.S. Department of Transportation, Federal Aviation Administration (FAA) approval for stack construction (FAR Part 77) and the USEPA NPDES permit for stormwater runoff (Section 402 of the Clean Water Act).

The Federal Consistency Evaluation Procedures require these permit applications to be accompanied by a consistency certification attachment which include:

- o A written and pictorial description of the project.
- o An assessment of probable impacts relevant to applicable FCMP statutes.
- o A signed statement by the applicant regarding consistency of the project with FCMP statutes.

In accordance with FCMP consistency evaluation procedures, the certification package and permit application must be sent to the appropriate federal agencies (FAA and Coordinator of the Florida State Planning and Development Clearinghouse, DER. Copies of the permit applications and certifications are included in this appendix.

FAA

COASTAL ZONE MANAGEMENT CERTIFICATION



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 14, 1986

State Planning & Development Clearinghouse
Office of Planning and Budgets
Executive Office of the Governor
The Capital
Tallahassee, Florida 32301

Attention: Richard Smith
Federal Consistency Coordinator

Re: North Broward County Resource Recovery Project, Inc.
FAA-Coastal Zone Management Certification

Dear Mr. Smith:

In accordance with the Florida Coastal Management Program (FCMP) Federal Consistency Evaluation Procedures (15 CFR 930.50), all federal permits for which there are no analogous state permits require certification of compliance with the FCMP.

A federal permit applicable to the proposed project for which no analogous state permit exists is the U.S. Department of Transportation Federal Aviation Administration (FAA) approval (SS.14 CRF 77). In accordance with the requirements of the Federal Consistency Evaluation Procedures, this permit application must be accompanied by a consistency certification. The certification package includes:

- o A written and pictorial description of the project.
- o An assessment of probable impacts relevant to applicable FCMP statutes.
- o A signed statement by the applicant regarding consistency of the project with FCMP statutes.

As specified in 15 CFR 930.58, the certification package and notice of proposed construction (FAA Form 7460-1) must be sent to the appropriate federal agency (FAA) and 10 copies must be submitted to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse. Copies of the notice and certification are enclosed. The certification package and notice has been sent under separate cover to the FAA Regional Office in Orlando for their review.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

Mr. Richard Smith

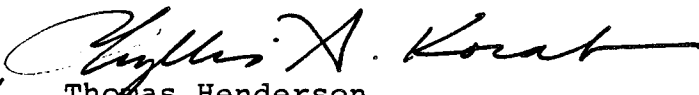
-2-

February 14, 1986

Broward County is submitting the enclosed FAA notice and the consistency certification package for the County's Resource Recovery Facility as required.

If you have any questions or require any additional information, please contact us at (305) 357-6456.

Sincerely,

for 
Thomas Henderson
Project Director
Resource Recovery Office

TH/lfc

FEDERAL AVIATION ADMINISTRATION APPLICATION
AND CORRESPONDENCE
(NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION)



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 14, 1986

U.S. Department of Transportation
Federal Aviation Administration
Orlando Airport District Office
4100 Sixth Street - Building 412
Orlando, Florida 32811

Attention: Mr. James E. Sheppard, Manager
Airports District Office

Re: North Broward County Resource Project, Inc. -
Status Update

Gentlemen:

The Broward County Board of County Commissioners, Broward County Office of Resource Recovery, and their consultants (Malcolm Pirnie, Inc.) are presently preparing a Power Plant Site Certification Application for submittal to the Florida Department of Environmental Regulation. For the purposes of the submittal the above referenced facility will have an initial installed capacity of 2,200 tons per day (tpd) and a projected estimated ultimate capacity of 3,300 tpd.

As specified in the Federal Consistency Evaluation Procedures (15 CFR 930.50) all federal permits for which there are not analogous state permits require certification of compliance with the Federal Coastal Zone Management Program. The Federal Aviation Administration Stack Height Approval has no analogous State of Florida permit. Therefore, in accordance with the requirements of the Federal Consistency Evaluation Procedures, we are submitting as an attachment to this letter the Coastal Zone Management Certification. As specified in 15 CFR 930.58, 10 copies of the FAA Form 7460-1 and the Coastal Zone Management Certification have been sent under separate cover to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

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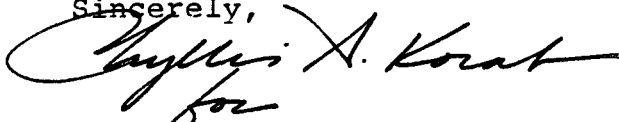
Mr. James E. Sheppard

-2-

February 14, 1986

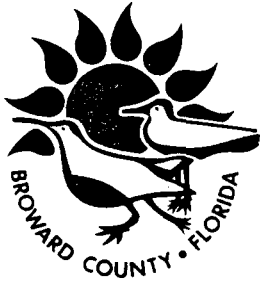
Should you have any questions concerning the above, please do not hesitate to contact us.

Sincerely,

A handwritten signature in cursive script, appearing to read "Thomas M. Henderson".

Thomas M. Henderson
Project Director
Resource Recovery Office

TMH/lfc



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 13, 1986

U.S. Department of Transportation
Federal Aviation Administration
Orlando Airport District Office
4100 Sixth Street - Building 412
Orlando, Florida 32811

Attention: Mr. James E. Sheppard, Manager
Airports District Office

Re: North Broward Resource Recovery Project, Inc.
Notice of Proposed Construction

Gentlemen:

We are submitting the following information to update our original application dated January 14, 1986. As of this date the project has not been assigned an aeronautical study for reference, however, the North Broward County Resource Recovery Project, Inc. is listed as the applicant.

Specifically, the location of the facility has been changed by moving it south 13" and east 5". The new facility location is:

Latitude $26^{\circ} 17' 13''$ N

Longitude $87^{\circ} 09' 35''$ W

Please incorporate these changes into the application where appropriate.

Should you have any questions regarding the above changes, please do not hesitate to contact us.

Sincerely,

Thomas M. Henderson
Project Director
North Broward County Resource Recovery Project, Inc.

BWS:mb

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

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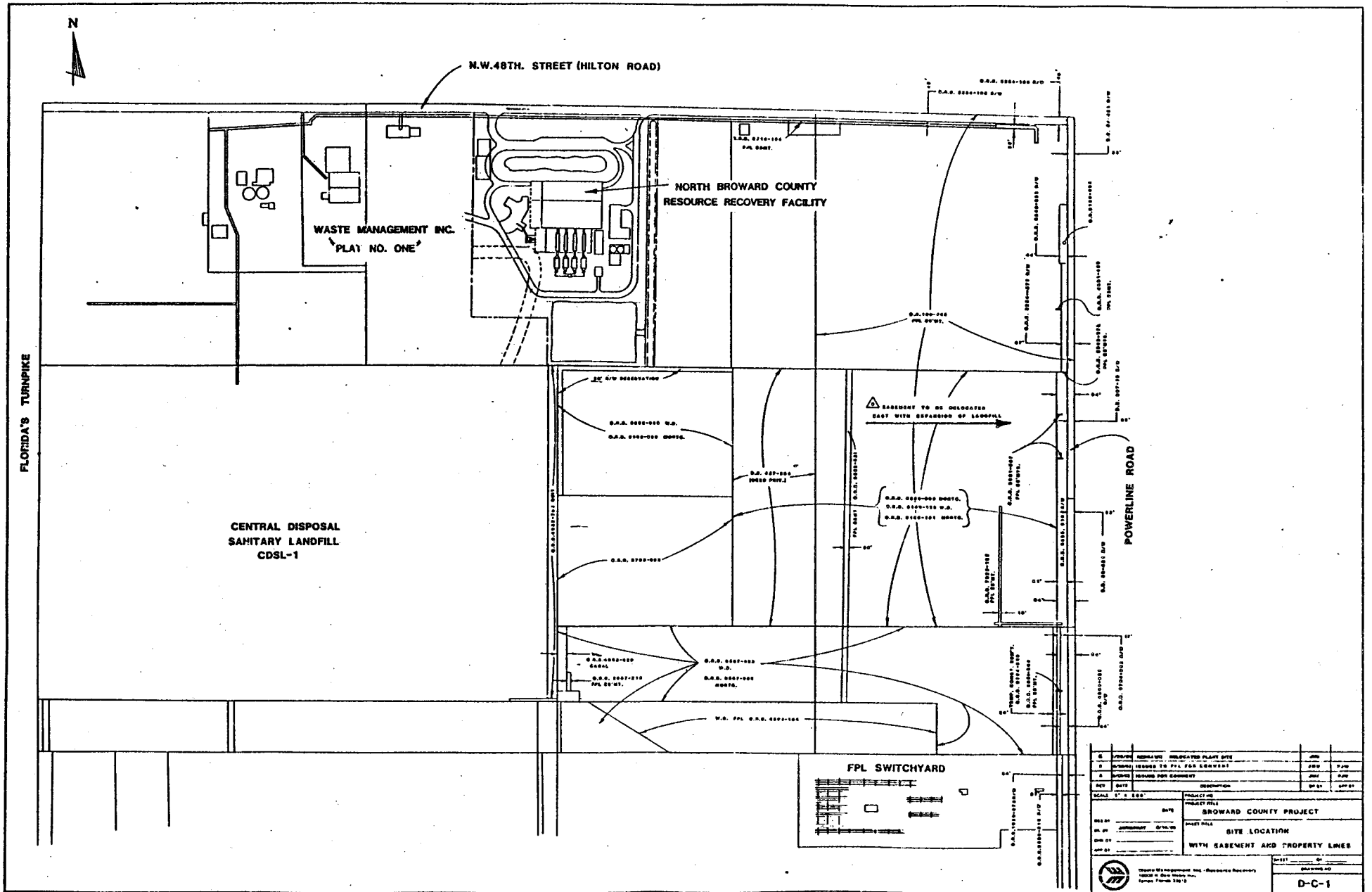


FIGURE 2



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

JAN 14 1986

U.S. Department of Transportation
Federal Aviation Administration
Orlando Airport District Office
4100 Sixth Street - Building 412
Orlando, Florida 32811

Attention: Mr. James E. Sheppard, Manager
Airports District Office

Re: North Broward Resource Recovery Project, Inc./Notice
of Proposed Construction

Gentlemen:

Please find enclosed a completed FAA form 7460-1, Notice of Proposed Construction or Alteration, prepared in accordance with FAA Regulations Part 77, Subchapter B. Because of its proposed proximity to the Pompano Beach Airpark, the subject project facility must comply with FAA construction notice requirements set forth at Section 77.13 of Subchapter B.

The facility consists of a mass-burn Vølund System resource recovery plant and will be designed to generate electricity from municipal solid waste. The location of the facility is shown in Figure 1. The height of the plant stack will be less than 200 feet above grade.

Should you have any questions concerning information presented in this submittal, please do not hesitate to contact us at your convenience.

Very truly yours,

Thomas M. Henderson
Project Director
Broward County Resource Recovery Office
and
Attorney-in-Fact
North Broward County Resource Recovery Project, Inc.

DS:vm

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

DO NOT REMOVE CARBONS

Form Approved OMB No. 2120-020

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION			Aeronautical Study Number										
U.S. Department of Transportation Federal Aviation Administration													
1. Nature of Proposal A. Type ☒ New Construction ☐ Alteration B. Class ☒ Permanent ☐ Temporary (Duration _____ months) C. Work Schedule Dates Beginning <u>6/86</u> End <u>6/89</u>			2. Complete Description of Structure A. Include effective radiated power and assigned frequency of all existing, proposed or modified AM, FM, or TV broadcast stations utilizing this structure. B. Include size and configuration of power transmission lines and their supporting towers in the vicinity of FAA facilities and public airports. C. Include information showing site orientation, dimensions, and construction materials of the proposed structure.										
3A. Name and address of individual, company, corporation, etc. proposing the construction or alteration. (Number, Street, City, State and Zip Code) () Telephone Number _____ North Broward County Resource Recovery Project, Inc. c/o CT Corporation System 8751 West Broward Boulevard Plantation, Florida 33324			(If more space is required, continue on a separate sheet.)										
B. Name, address and telephone number of proponent's representative if different than 3 above. Thomas M. Henderson (305) 357-6458 Room 521, 115 South Andrews Avenue Ft. Lauderdale, Florida 33301													
4. Location of Structure <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"> A. Coordinates (To nearest second) Latitude <u>see</u> Longitude <u>attached</u> </td> <td style="width: 20%;"> B. Nearest City or Town, and State Coconut Creek 3500 feet Miles </td> <td style="width: 60%;"> C. Name of nearest airport, heliport, flight park, or seaplane base Pompano Beach (1) Distance from structure to nearest point of nearest runway <u>3.5 Miles</u> (2) Direction from structure to airport <u>SE</u> </td> </tr> </table>			A. Coordinates (To nearest second) Latitude <u>see</u> Longitude <u>attached</u>	B. Nearest City or Town, and State Coconut Creek 3500 feet Miles	C. Name of nearest airport, heliport, flight park, or seaplane base Pompano Beach (1) Distance from structure to nearest point of nearest runway <u>3.5 Miles</u> (2) Direction from structure to airport <u>SE</u>	5. Height and Elevation (Complete to the nearest foot) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"> A. Elevation of site above mean sea level After Site Development </td> <td style="width: 50%;"> see attached </td> </tr> <tr> <td> B. Height of Structure including all appurtenances and lighting (if any) above ground, or water if so situated </td> <td> less than 200 ft </td> </tr> <tr> <td> C. Overall height above mean sea level (A + B) </td> <td> less than 215 ft </td> </tr> </table>		A. Elevation of site above mean sea level After Site Development	see attached	B. Height of Structure including all appurtenances and lighting (if any) above ground, or water if so situated	less than 200 ft	C. Overall height above mean sea level (A + B)	less than 215 ft
A. Coordinates (To nearest second) Latitude <u>see</u> Longitude <u>attached</u>	B. Nearest City or Town, and State Coconut Creek 3500 feet Miles	C. Name of nearest airport, heliport, flight park, or seaplane base Pompano Beach (1) Distance from structure to nearest point of nearest runway <u>3.5 Miles</u> (2) Direction from structure to airport <u>SE</u>											
A. Elevation of site above mean sea level After Site Development	see attached												
B. Height of Structure including all appurtenances and lighting (if any) above ground, or water if so situated	less than 200 ft												
C. Overall height above mean sea level (A + B)	less than 215 ft												
D. Description of location of site with respect to highways, streets, airports, prominent terrain features, existing structures, etc. Attach a U.S. Geological Survey quadrangle map or equivalent showing the relationship of construction site to nearest airport(s). (If more space is required, continue on a separate sheet of paper and attach to this notice.) See Attached Sheet													
Notice is required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1101). Persons who knowingly and willingly violate the Notice requirements of Part 77 are subject to a fine (criminal penalty) of not more than \$500 for the first offense and not more than \$2,000 for subsequent offenses, pursuant to Section 902(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1472(a)).													
I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & lighting standards if necessary.													
Date <u>1/14/86</u>		Typed Name/Title of Person Filing Notice <u>Thomas M. Henderson/Attorney-in-fact</u>		Signature 									
FOR FAA USE ONLY FAA will either return this form or issue a separate acknowledgement.													
The Proposal: ☐ Does not require a notice to FAA. ☐ Is not identified as an obstruction under any standard of FAR, Part 77, Subpart C, and would not be a hazard to air navigation. ☐ Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to air navigation. ☐ Should be obstruction ☐ marked, ☐ lighted per FAA Advisory Circular 70/7480-1, Chapter(s) _____ ☐ Obstruction marking and lighting are not necessary.			Supplemental Notice of Construction FAA Form 7480-2 is required any time the project is abandoned, or ☐ At least 48 hours before the start of construction. ☐ Within five days after the construction reaches its greatest height. This determination expires on _____ unless: (a) extended, revised or terminated by the issuing office; (b) the construction is subject to the licensing authority of the Federal Communications Commission and an application for a construction permit is made to the FCC on or before the above expiration date. In such case the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application. NOTE: Request for extension of the effective period of this determination must be postmarked or delivered to the issuing office at least 15 days prior to the expiration date. If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that Agency.										
Remarks: 													
Issued in 		Signature 		Date 									

ATTACHMENT TO FAA FORM 7460-1

Item 4A - Coordinates

The following are the coordinates for the resource recovery plant stack. During detailed design it may be necessary to slightly adjust the exact location of the stack (e.g., plus or minus fifty feet). Should such an adjustment prove necessary, FAA will immediately be notified and consulted to ascertain any effect on compliance status.

Stack:	Latitude:	26° 17' 00" N
	Longitude:	80° 09' 30" W

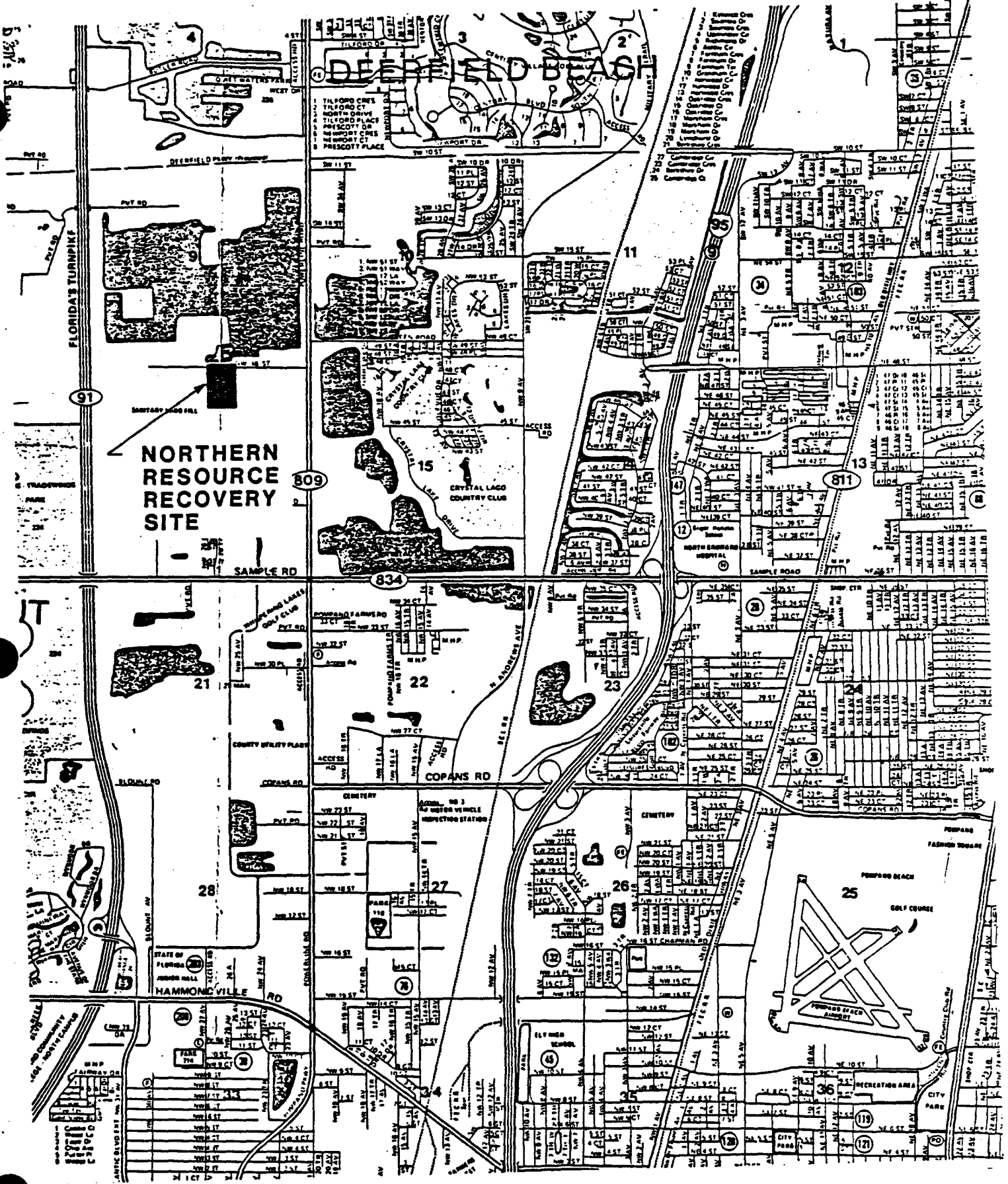
Item 4D - Description of Facilities

The Northern Resource Recovery Facility (RRF) will receive and process approximately 2,200 tpd of solid waste from northern Broward County. The site will be located on Hilton Road between Powerline Road and Florida's Turnpike (Figure 1). The site layout is presented in Figure 2.

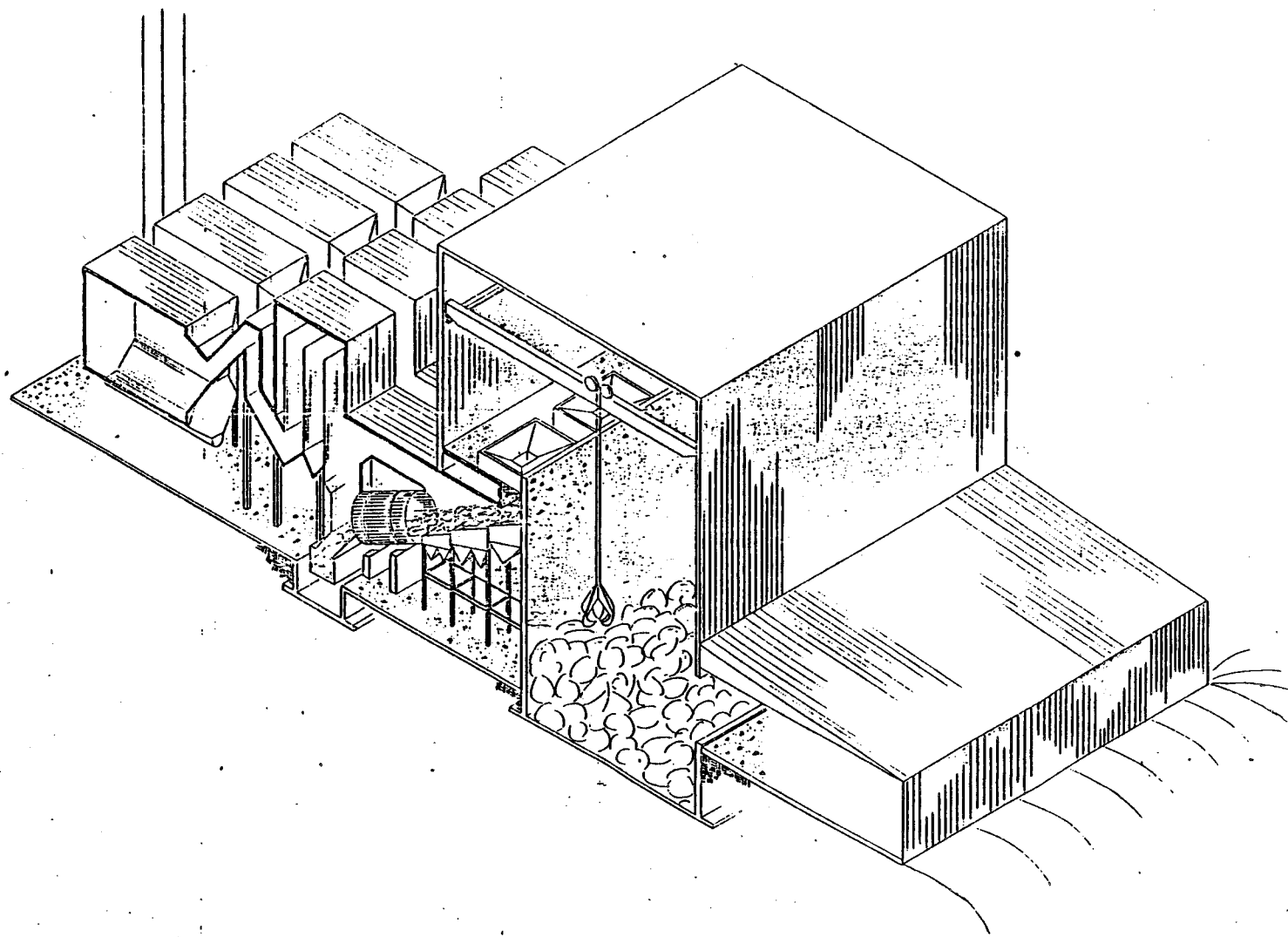
Resource Recovery Facility

The resource recovery facility will utilize a mass-burn technology. Figures 3 and 4 present a schematic drawing and cross section, respectively, of the Vølund system.

Solid waste disposal vehicles will enter an enclosed turning platform/tipping floor area and discharge their load of municipal solid waste into the refuse storage bin. This bin will be sized to accommodate a minimum of 4 days waste generation. Overhead cranes will be utilized to lift refuse from the storage bin to the charging hoppers of the incinerators. Provisions will be made at the facility to accommodate additional incinerators should future conditions dictate the need for such units.

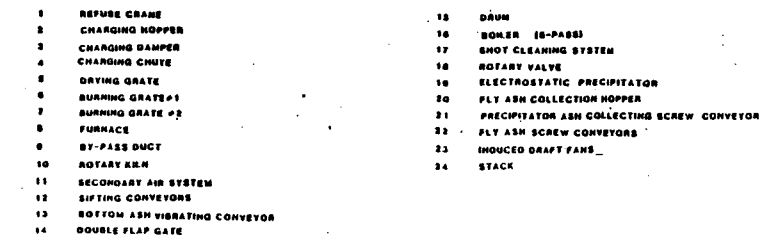


BROWARD COUNTY
LOCATION MAP
NORTHERN RESOURCE RECOVERY FACILITY



1 REFUSE CRANE
2 CHARGING HOPPER
3 CHARGING DAMPER
4 CHARGING CHUTE
5 DRYING GRATE
6 BURNING GRATE #1
7 BURNING GRATE #2
8 FURNACE
9 BY-PASS DUCT
10 ROTARY XRM
11 SECONDARY AIR SYSTEM
12 SIFTING CONVEYORS
13 BOTTOM ASH VIBRATING CONVEYOR
14 DOUBLE FLAP GATE
15 DRUM
16 BOMER (8-PASS)
17 SHOT CLEANING SYSTEM
18 ROTARY VALVE
19 ELECTROSTATIC PRECIPITATOR
20 FLY ASH COLLECTION HOPPER
21 PRECIPITATOR ASH COLLECTING SCREW CONVEYOR
22 FLY ASH SCREW CONVEYORS
23 INDUCED DRAFT FANS
24 STACK

FIGURE 1
GENERAL ARRANGEMENT SECTION



DATE	DATE	DISSEMINATION	BY	DATE
CLASS		PROJECT NO.		
	DATE	NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT		
WFO #1		Project #		
DO #	DATE/TIME	GENERAL ARRANGEMENT SECTION		
WFO #2				
DO #				
WFO #3				
DO #				



National Association of Public Health Administrators
 1800 N. W. 10th Ave.
 Fort Lauderdale, FL 33311

Project # _____
 Date/TIME _____
D-G-105

PROCESS DESCRIPTION

Combustion System

Each of the furnaces is equipped with a charging hopper into which the crane deposits waste. The hoppers are design for even flow of waste into the charging chute and are equipped with a closed circuit television system to permit close monitoring of waste feeding operations. The chute is equipped with a damper which can be used to seal the furnace. Normally the refuse in the chute provides an air seal to the furnace which is under negative pressure, thus enabling close control of furnace air flows.

From the lower section of the charging chute the waste flows evenly onto the grates. The Vølund furnace utilizes a reciprocating step-grate design comprised of three separate grate sections. The refuse is dried and partially ignited on the first grate section and as it moves forward into the furnace, the rocking motion of the grate sections cause it to tumble, thus ensuring thorough mixing and drying. From the drying grate the refuse drops down onto the first burning grate where complete ignition of the refuse takes place. The refuse then falls onto the second burning grate on which the combustible material is burned out. At the grate transitions, additional tumbling of the refuse takes place, ensuring that refuse is brought to the surface, ignited and burned. The action of the Vølund grate system also provides for an effective lifting and shearing movement, particularly of the lowest refuse layers, and ensure effective distribution of the combustion air. System Vølund employs proprietary self-cleaning grate bars which are efficiently cooled and easily interchangeable.

The heat for drying and ignition of the waste is supplied partly by the flue gases generated by the combustion of the refuse and partly by heat radiation from the hot refractory walls and brick arches of the furnace structure. No auxiliary

fuel is used at any time during operation. The temperature of the flue gases exiting the furnace are maintained between 1,700°F and 1,800°F. The furnace is refractory lined on all sides with air cooling of the refractory walls immediately above the grate line to reduce slag accumulation on the walls. The refractory lining ensures an even distribution of radiant heat over the grate and acts as a "thermal flywheel" in maintaining a stable level of combustion on the grate.

From the last burning grate the refuse passes into the refractory-lined rotary kiln. Complete combustion of all remaining unburned refuse takes place within the kiln. The rotating movement provides continual agitation and a long residence time which results in an exceptionally high degree of residue burn-out and reduction. The kiln rotational speed is variable to provide residence time corresponding to the higher heating value and moisture content of the waste being processed. Typical residence time throughout the system is two hours. This ability to control residence time of the waste is essential in an area such as Broward County where waste composition varies seasonally.

A portion of the flue gases generated by waste combustion passes through a brick-lined duct above the furnace to an afterburner chamber, while the remaining flue gases pass through the rotary kiln. The two gas currents are thoroughly mixed by the turbulences in the afterburn chamber at a temperature between 1,700°F and 1,800°F. The result is a thoroughly combusted flue gas which is essential for avoiding high temperature corrosion damage of the boiler tube walls.

Each furnace is equipped with a separate primary air fan. Combustion air is drawn from the upper pit area and fed under the grates, from where it flows up between the grate bars to be distributed evenly throughout the grate area. Primary air flow can be regulated from the control room as can the distribution of air to each individual grate section.

Each furnace is also equipped with a secondary air fan, which injects secondary air into the furnace above the grates and through the back wall of the furnace. Secondary air is required to secure effective burn-out of the flue gas and acts as control on the combustion temperature. The entire furnace volume is maintained under negative pressure by the induced draft fan which draws the generated combustion flue gases through the system.

Steam Generation System

From the afterburner chamber the hot flue gases flow through a waterwall waste heat boiler which is designed exclusively for refuse combustion service. The boiler has five vertical passes. The first three passes form the radiation section and the last two passes contain the superheater, evaporator and economizer sections. The waterwalls in the radiation section are gas-tight welded membrane walls and the alloy superheater tube banks are of two-stage in-line design. Superheated steam is generated at 950 psig/842°F (66 bar/450°C) maintained by surface attemperation in the boilers.

A feedwater system consisting of turbine and motor-driven pumps, heaters, and necessary controls, supply treated feedwater to the boiler at 280°F (138°C). In order to provide water quality sufficient to insure optimum performance of the boiler and to minimize corrosion, a make-up water treatment system is included in the design. The process water from the available water system is demineralized and inhibited by the addition of chemicals. The high temperature boiler/turbine system requires high-purity water to protect the boiler tubes and turbine surfaces from corrosion and scaling. A single bed cation/anion ion-exchanged system is provided for this purpose. The water treatment system provided in our design will produce the high quality boiler makeup water required and will thus reduce boiler blowdown requirements.

Ash Handling System

Ash from the combustion process falls from the rotary kiln into a quench trough from which it is removed by a drag chain conveyor. The makeup water required for the quench trough is supplied from boiler and cooling tower blowdown. The drag chain conveyor carries the ash up to an elevated transfer tower. The cooled ash then falls onto one of two redundancy belt conveyors for transport to the ash loadout area behind the Plant.

Fine particles which fall through the grates will be collected in hoppers below the grates and transported by enclosed vibrating conveyors to the quench trough, where it is mixed with ash from the rotary kiln. The fly ash collected in the boiler sections is conveyed by means of rotary valve and screw conveyors to this area also. The fly ash separated in the electrostatic precipitator is also transported via screw conveyors to the bottom ash collection area. The fly ash collected in the boilers and ESP's is combined with the bottom ash before leaving the Plant area. The combined ash stream is anticipated to be accepted for unrestricted landfilling. If regulations are interpreted so as to prohibit landfilling of this material, additional or alternative treatment may be required for which no provisions have been made in the proposed design or cost considerations provided in this Proposal. Generally, combustible material remaining in the ash is typically less than 2% of the total ash content, depending on the test method used. Putrescibles remaining in ash are generally less than 0.2%. The ash is approximately 4% by volume and 20% by weight of the raw waste.

Environmental Control System

Each furnace line is equipped with a three-field electrostatic precipitator (ESP) to remove the remainder of the fly ash from the flue gases. The ESP is designed to limit particu-

late matter emissions to 0.03 grains/dscf corrected to 12% CO₂, maximum. Based upon good engineering practices and experience at other waste incineration facilities, the other regulated pollutants are expected to be within an acceptable range of emissions. The flue gases flow through a duct from the boiler to the precipitator, which is essentially a gas-tight steel casing in which vertical electrodes are suspended. The electrodes are charged with high voltage electricity and the resulting field causes the dust particles within the flue gas to become charged. The particles are then attracted to the electrode plates and are periodically shaken loose by mechanical rappers. The precipitators are equipped with automatic voltage controls and environmental monitoring equipment to insure continuous optimum operation. The units are designed for outdoor installation and incorporate electric hopper, heating, and full insulation to avoid condensation.

Power Generation System

The power generating equipment shall include a turbine-generator set designed such that no loss of energy production, either thermal or electrical, occurs throughout the lifetime of the facility. The facility shall be able to process processable waste at full capacity even during scheduled and unscheduled outages of the turbine-generator sets. The turbines shall be designed for continuous operation, while the generators shall be alternate current synchronous generators, of the non-salient pole revolved type.

Item 5A - Elevation of Site

Existing elevation at the proposed site ranges from 9 to 12 feet above mean sea level. The site will be developed to a base elevation of 15 feet above mean sea level in order to raise the proposed facilities above the established 100 year flood elevation of 14 feet above mean sea level.

DESCRIPTION OF THE PROJECT

The North Broward County Resource Recovery Project has been selected as the best alternative for meeting Broward County's long-term solid waste disposal needs. This facility will:

- o dispose of garbage and trash in an environmentally sound manner;
- o reduce the need for siting and developing a raw garbage landfill;
- o recover energy by using solid waste as a fuel to produce electricity and;
- o create new opportunities for recreation and wetland habitat enhancement through extensive mitigation.

The proposed northern facility will be located in unincorporated Broward County between Route 809 and 91 on Hilton Road.

The facility is slated to have an initial installed capacity of 2,200 tons per day and an estimated projected ultimate capacity of approximately 3,300 tons per day. Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion. A schematic diagram describing the mass burn process of a typical resource recovery facility is presented in Figure 1. Solid waste will be delivered in collection trucks to the facility. It will be dumped directly into a bunker located entirely inside a building. All waste will be stored inside the building, therefore no waste will be visible from the outside. Two overhead cranes will mix the solid waste in the bunker and load the charging hoppers as required.

Waste will enter the furnace via a charging hopper and will progress through the combustion chamber by means of a stoker system that agitates the waste providing the proper air/fuel mixture to complete the combustion process. The

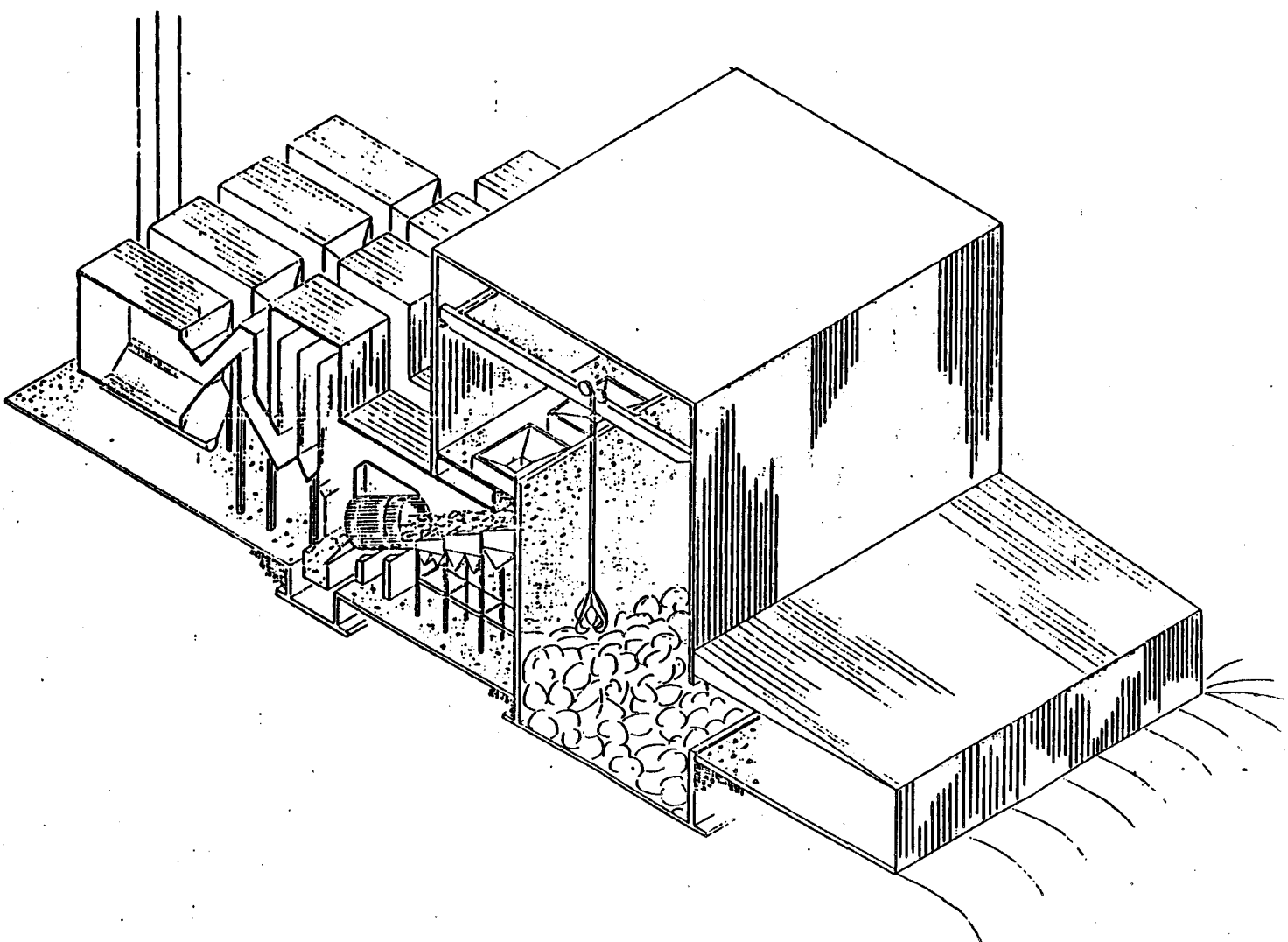


FIGURE 1

resulting ash will be deposited and quenched, and the heat from the furnace will be used to produce steam. The steam will then be transmitted to turbine generators to produce electricity for sale to Florida Power and Light, Company.

Each boiler will be equipped with an electrostatic precipitator (ESP) for particulate air emission control. An electrostatic precipitator is a pollution control device that removes small particles from exhaust gases. The gases pass through a strong electric field where the particles are charged and attracted to the opposite electrically charged collecting plates. The dust is then removed mechanically from these plates. The flue gas will be drawn through the ESPs by an induced draft fan located between the stack and the ESPs.

Bottom ash from the furnace and flyash from the precipitator will be mixed prior to removal from the facility. The combined ash will comprise 10 percent of the volume and 25 percent of the weight of the solid waste processed by the facility. The ash will be quenched with water to about 30 percent moisture prior to transport to the unprocessable waste landfill.

As noted above, while the proposed facility will have ultimate design capacity of approximately 3,300 tpd, its maximum initial installed capacity will be 2,200 tpd. Each boiler unit operates independently from the others. It will, therefore, be possible to routinely shut down units for periods of maintenance and inspection and still continuously operate the facility.

Assessment of Probable Project Impacts

As part of the Federal Consistency Evaluation Procedures, an assessment of the probable impacts of the project on the coastal zone were determined in relation to the Florida Coastal Management Program (FCMP) statutes.

Chapter 403, Environmental Control

The air and water pollution concerns will be addressed by obtaining the appropriate facility permits and using pollution control measures to abate impacts from facility construction and operations. Facility boilers will be equipped with electrostatic precipitators for particulate air emission control. Air construction and operating permits will be obtained through the Power Plant Siting Act process in accordance with requirements established in the Prevention of Significant Air Quality Deterioration (PSD) regulations and the regulation governing New Sources.

Stormwater retention basins will be used to collect runoff waters from the site. This discharge will comply with all DER requirements for protection of surface and groundwater.

Chapter 267, Archives, History and Records Management

The State of Florida Division of Archives, History and Records Management, has stated that there are no known or potential historical or archaeological resources at the site. Therefore, no significant cultural resources would be affected by the project.

Chapter 373 (Water Resources)

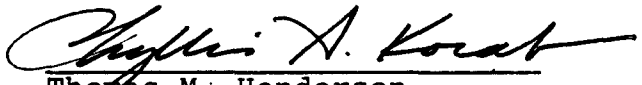
The South Florida Water Management District will review the project for water resources impacts. No consumptive use of water is anticipated therefore permits for such use do not apply. Monitoring wells will be installed to provide an early warning system of groundwater contamination and stormwater management practices will be employed to mitigate water resources impacts from runoff.

Power Plant Siting Act (PPSA)

An application is being filed with State of Florida Department of Environmental Regulation (FDER) under the Power Plant Siting Act. This application will present information discussing the conditions resulting from construction, and the anticipated impacts from facility operation in order to provide assurance that all applicable state, regional and local standards are met and that the project will be consistent with the FCMP.

Consistency Determination

The proposed project complies with Florida's Coastal Management Program and will be conducted in a manner consistent with that program.

for 
Thomas M. Henderson
Project Director

NPDES

COASTAL ZONE MANAGEMENT CERTIFICATION



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 14, 1986

State Planning & Development Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capital
Tallahassee, Florida 32301

Attention: Richard Smith
Federal Consistency Coordinator

Re: North Broward County Resource Recovery Project Inc.
NPDES - Coastal Zone Management Certification

Dear Mr. Smith:

According to Florida Coastal Management Program (FCMP) Federal Consistency Evaluation Procedures (15 CFR 930.50), all federal permits for which there are no analogous state permits require certification of compliance with the FCMP.

A federal permit applicable to the proposed project for which no analogous state permit exists is the U.S. Environmental Protection Agency NPDES Permit (SS. 302 Clean Water Act). In accordance with the requirements of the Federal Consistency Evaluation Procedures, this permit application must be accompanied by a consistency certification. The certification package includes:

- o A written and pictorial description of the project.
- o An assessment of probable impacts relevant to applicable FCMP statutes.
- o A signed statement by the applicant regarding consistency of the project with FCMP statutes.

As specified in 15 CFR 930.58, the certification package and permit application (EPA Form 3510-1 must be sent to the appropriate federal agency (EPA) and ten 10 copies must be submitted to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse. Copies of the permit application and certification are included here.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

Mr. Richard Smith

-2-

February 14, 1986

The certification package and permit application has been sent under separate cover to the EPA Regional Office in Atlanta for their review.

Broward County is submitting the enclosed NPDES application and the consistency certification package for the County's Resource Recovery Facility.

If you have any questions or require any additional information, please contact us at (305) 357-6456.

Sincerely,

A handwritten signature in cursive script, appearing to read "Thomas Henderson".

Thomas Henderson
Project Director
Resource Recovery Office

TH/lfc

ENVIRONMENTAL PROTECTION AGENCY APPLICATION
(NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM APPLICATION FOR PERMIT TO DISCHARGE)



Resource Recovery Office

Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 14, 1986

U.S. Environmental Protection Agency
EPA Region IV
Water Management Division
345 Courtland Street
Atlanta, Georgia 30365

Attention: Mr. Michael Magee

Re: North Broward County Resource Recovery Project, Inc.
NPDES - Permit Application

Gentlemen:

Enclosed please find EPA Forms 3510-1 and 3510-2C which Broward County is submitting pursuant to the Clean Water Act under the National Pollutant Discharge Elimination System (NPDES) for the construction and operation of a Resource Recovery Facility in northern Broward County. The proposed facility will have an initial installed capacity of 2,200 tons per day with a projected estimated ultimate capacity of 3,300 tons per day of solid waste.

Uncontaminated stormwater will be the only discharge to surface waters during the construction and operation of this facility. This discharge will occur only during peak storms. The sanitary and process wastewater will be discharged to the existing Broward County Utilities Division North Regional Wastewater Treatment Plant.

In accordance with the requirements of the Federal Consistency Evaluation Procedures (15 CFR 930.50), the permit application is accompanied by an "NPDES Florida Coastal Zone Management Certification". As specified in 15 CFR 930.58, 10 copies of EPA Forms 3510-1 and 3510-2C and the "NPDES Florida Coastal Zone Management Certification" have been sent under separate cover to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

Scott I. Cowan Howard Craft Howard Forman Nicki Englander Grossman Ed Kennedy Sylvia Poitier Gerald Thompson

An Equal Opportunity Employer

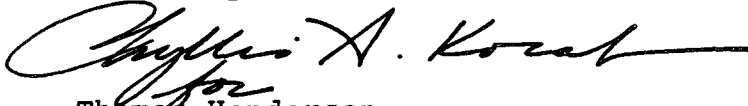
Mr. Michael Magee

-2-

February 14, 1986

Should you have any questions concerning the information presented in this submittal, please do not hesitate to contact us.

Sincerely,

A handwritten signature in cursive script, appearing to read "Chyllis A. Korat".

for
Thomas Henderson
Project Director
Resource Recovery Office

TH/lfc

FORM 1 GENERAL		U.S. ENVIRONMENTAL PROTECTION AGENCY GENERAL INFORMATION Consolidated Permits Program (Read the "General Instructions" before starting.)		I. EPA I.D. NUMBER	
LABEL ITEMS		PLEASE PLACE LABEL IN THIS SPACE		GENERAL INSTRUCTIONS	
II. EPA I.D. NUMBER				If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete items I, III, V, and VI (except VI-B which must be completed regardless). Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.	
III. FACILITY NAME					
IV. FACILITY MAILING ADDRESS					
V. FACILITY LOCATION					

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X'			SPECIFIC QUESTIONS	MARK 'X'		
	YES	NO	FORM ATTACHED		YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X		B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X		D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)	X		
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowestmost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production; inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)	X			J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1	SKIP	NO. BROWARD CO. RES. RECOVERY PROJ. INC.									
---	------	--	--	--	--	--	--	--	--	--	--

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)		B. PHONE (area code & no.)			
2	HENDERSON THOMAS PROJ. DIR.	305	357	6456	

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX		B. CITY OR TOWN	C. STATE	D. ZIP CODE
3	115 S. ANDREWS AVE. ROOM 521	FT. LAUDERDALE	FL	33301

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER		B. COUNTY NAME		C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
5	2700 HILTON RD. N.W. 48th ST.	BROWARD	POMPANO BEACH	FL	33060	10	

VII. SIC CODES (4-digit, in order of priority)

A. FIRST										B. SECOND									
7	4	9	5	3	(specify)	7				(specify)	7				(specify)				
Refuse Systems																			
C. THIRD										D. FOURTH									
7					(specify)	7				(specify)	7				(specify)				

VIII. OPERATOR INFORMATION

A. NAME										B. Is the name listed in Item VIII-A also the owner?									
N O . B R O W A R D . C O . R E S . R E C O V E R Y . P R J . I N C .										☒ YES ☐ NO									
C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)										D. PHONE (area code & no.)									
F - FEDERAL S - STATE P - PRIVATE M - PUBLIC (other than federal or state) O - OTHER (specify)										(specify) (area code) (no.)									
E. STREET OR P.O. BOX																			
1 1 5 . S . A N D R E W S . A V E . R O O M . 5 2 1																			
F. CITY OR TOWN										G. STATE									
F T . L A U D E R D A L E										F L									
										H. ZIP CODE									
										3 3 3 0 1									
										I. INDIAN LAND									
										Is the facility located on Indian lands?									
										☐ YES ☒ NO									

IX. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)										D. PSD (Air Emissions from Proposed Sources)									
9 N										9 P									
B. UIC (Underground Injection of Fluids)										E. OTHER (specify)									
9 U										(specify)									
C. RCRA (Hazardous Wastes)										F. OTHER (specify)									
9 R										(specify)									

X. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

The proposed Northern Resource Recovery Facility will receive and process initially approximately 2200 tpd of Municipal Solid Waste and ultimately approximately 3300 tpd of MSW from Northern Broward County. Processible waste received at the RRF will be burned to reduce the original volume by approximately 90 percent and Energy will be recovered from the combustion process in the form of electricity.

Items 3, 4 and 8 are subject to amendment pending initiation of final design for the facility.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)										B. SIGNATURE										C. DATE SIGNED									
Thomas Henderson Project Director										Thomas M. Henderson										1/14/86									

COMMENTS FOR OFFICIAL USE ONLY

C									
---	--	--	--	--	--	--	--	--	--



U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURAL OPERATIONS
Consolidated Permits Program

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

[illegible]

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

[illegible]

OFFICIAL USE ONLY (effluent guidelines sub-categories)

CONTINUED FROM THE FRONT

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES (complete the following table)☐ NO (go to Section III)

1. OUTFALL NUMBER (list)	2. OPERATION(s) CONTRIBUTING FLOW (list)	3. FREQUENCY		4. FLOW				C. DU ATION (in days)
		a. DAYS PER WEEK (specify average)	b. MONTHS PER YEAR (specify average)	a. FLOW RATE (in mgd)		b. TOTAL VOLUME (specify with units)		
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	

III. MAXIMUM PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES (complete Item III-B)☒ NO (to to Section IV)

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES (complete Item III-C)☐ NO (go to Section IV)

C. If you answered "Yes" to Item III-B, list the quantity which represents an actual measurement of your maximum level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. MAXIMUM QUANTITY

a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. (specify)	2. AFFECTED OUTFALLS (list outfall numbers)

IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operation of waste-water treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES (complete the following table)☒ NO (go to Item IV-B)

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COM- PLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. RE- QUIRED	b. PRO- JECTED

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs (or other environmental projects which may affect your discharges) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

V. INTAKE AND EFFLUENT CHARACTERISTICS

NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-9.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

A. Is any pollutant listed in Item V-C a substance or a component of a substance which you do or expect that you will over the next 5 years use or manufacture as an intermediate or final product or byproduct?

☐ **YES** (list all such pollutants below)

☐ **NO** (go to Item VI-B)

B. Are your operations such that your raw materials, processes, or products can reasonably be expected to vary so that your discharges of pollutants may during the next 5 years exceed two times the maximum values reported in Item V?

☐ **YES** (complete Item VI-C below)

☐ **NO (go to Section VII)**

C. If you answered "Yes" to Item VI-B, explain below and describe in detail the sources and expected levels of such pollutants which you anticipate will be discharged from each outfall over the next 5 years, to the best of your ability at this time. Continue on additional sheets if you need more space.

☐ **YES** (identify the test(s) and describe their purposes below)

☐ **NO** (go to Section VIII)

VIII. CONTRACT ANALYSIS INFORMATION

☐ YES (list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)

☐ **NO (go to Section IX)**

A. NAME	B. ADDRESS	C. TELEPHONE (area code & no.)	D. POLLUTANTS ANALYZED (list)

IX. CERTIFICATION

A. NAME & OFFICIAL TITLE (type or print)

B. PHONE NO. (area code & no.)

C. SIGNATURE

D. DATE SIGNED

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER (copy from Item 1 of Form 1)

Form Approved
OMB No. 2000-0059
Approval expires 3-31-84

V. INTAKE AND EFFLUENT CHARACTERISTICS (continued from page 3 of Form 2-C)

OUTFALL NO.

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
	(1)	(2) MASS	(1)	(2) MASS	(1)	(2) MASS				(1)	(2) MASS	
	CONCENTRATION		CONCENTRATION		CONCENTRATION					CONCENTRATION		
a. Biochemical Oxygen Demand (BOD)												
b. Chemical Oxygen Demand (COD)												
c. Total Organic Carbon (TOC)												
d. Total Suspended Solids (TSS)												
e. Ammonia (as N)												
f. Flow	VALUE		VALUE		VALUE					VALUE		
g. Temperature (winter)	VALUE		VALUE		VALUE			°C		VALUE		
h. Temperature (summer)	VALUE		VALUE		VALUE			°C		VALUE		
i. pH	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	X			STANDARD UNITS		X		

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2-a for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X'		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1)	(2) MASS	(1)	(2) MASS	(1)	(2) MASS				(1)	(2) MASS	
			CONCENTRATION		CONCENTRATION		CONCENTRATION					CONCENTRATION		
a. Bromide (24959-67-9)		X												
b. Chlorine, Total Residual		X												
c. Color		X												
d. Fecal Coliform		X												
e. Fluoride (16984-48-8)		X												
f. Nitrate-Nitrite (as N)		X												

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X'		3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. SE- LIEVED PRE- SENT	b. SE- LIEVED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENTRATION	b. MASS	b. LONG TERM AVERAGE VALUE		d. NO. OF ANAL- YSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic (as N)		X												
h. Oil and Grease		X												
i. Phosphorus (as P), Total (7723-14-0)		X												
j. Radioactivity														
(1) Alpha, Total		X												
(2) Beta, Total		X												
(3) Radium, Total		X												
(4) Radium 226, Total		X												
k. Sulfate (as SO ₄) (14808-79-8)		X												
l. Sulfide (as S)		X												
m. Sulfite (as SO ₃) (14265-45-3)		X												
n. Surfactants		X												
o. Aluminum, Total (7429-90-5)		X												
p. Barium, Total (7440-39-3)		X												
q. Boron, Total (7440-42-8)		X												
r. Cobalt, Total (7440-48-4)		X												
s. Iron, Total (7439-89-6)		X												
t. Magnesium, Total (7439-95-4)		X												
u. Molybdenum, Total (7439-98-7)		X												
v. Manganese, Total (7439-96-5)		X												
w. Tin, Total (7440-31-5)		X												
x. Titanium, Total (7440-32-6)		X												

CONTINUED FROM PAGE 3 OF FORM 2-C

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (*secondary industries, non-process wastewater outfalls, and non-required GC/MS fractions*), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe to be absent. If you mark either columns 2-a or 2-b for any pollutant, you must provide the results of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (*all seven pages*) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST- ING RE- QUIR- ED	b. BE- LIEVED PRE- SENT	c. BE- LIEVED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENT- RATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)			X												
2M. Arsenic, Total (7440-38-2)			X												
3M. Beryllium, Total, 7440-41-7)			X												
4M. Cadmium, Total (7440-43-9)			X												
5M. Chromium, Total (7440-47-3)			X												
6M. Copper, Total (7550-50-8)			X												
7M. Lead, Total (7439-97-6)			X												
8M. Mercury, Total (7439-97-6)			X												
9M. Nickel, Total (7440-02-0)			X												
10M. Selenium, Total (7782-49-2)			X												
11M. Silver, Total (7440-22-4)			X												
12M. Thallium, Total (7440-28-0)			X												
13M. Zinc, Total (7440-66-6)			X												
14M. Cyanide, Total (57-12-5)			X												
15M. Phenols, Total			X												
DIOXIN															
2,3,7,8-Tetra- chlorodibenzo-P- Dioxin (1764-01-6)			X	DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST ING RE- QUIR- ED	b. BE- LIEVED PRE- SENT	c. BE- LIEVED AB- SENT	8. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENTRATION	b. MASS	8. LONG TERM AVERAGE VALUE		d. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)			X												
2V. Acrylonitrile (107-13-1)			X												
3V. Benzene (71-43-2)			X												
4V. Bis (Chloro- methyl) Ether (542-88-1)			X												
5V. Bromoform (75-25-2)			X												
6V. Carbon Tetrachloride (56-23-5)			X												
7V. Chlorobenzene (108-90-7)			X												
8V. Chlorodi- bromomethane (124-48-1)			X												
9V. Chloroethane (75-00-3)			X												
10V. 2-Chloro- ethylvinyl Ether (110-75-8)			X												
11V. Chloroform (67-66-3)			X												
12V. Dichloro- bromomethane (75-27-4)			X												
13V. Dichloro- difluoromethane (75-71-8)			X												
14V. 1,1-Dichloro- ethane (75-34-3)			X												
15V. 1,2-Dichloro- ethane (107-06-2)			X												
16V. 1,1-Dichloro- ethylene (75-35-4)			X												
17V. 1,2-Dichloro- propane (78-87-5)			X												
18V. 1,3-Dichloro- propylene (542-75-6)			X												
19V. Ethylbenzene (100-41-4)			X												
20V. Methyl Bromide (74-83-9)			X												
21V. Methyl Chloride (74-87-3)			X												

CONTINUED FROM PAGE V-4

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CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	A. TEST ING RE- QUIR- ED	B. DE- LIVERED PRE- SENT	C. DE- LIVERED AB- SENT	B. MAXIMUM DAILY VALUE		D. MAXIMUM 30 DAY VALUE (if available)		E. LONG TERM AVRG. VALUE (if available)		F. NO. OF ANAL- YSES	B. CONCENTRATION	D. MASS	G. LONG TERM AVERAGE VALUE		H. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B. Acenaphthene (83-32-9)			X												
2B. Acenaphthylene (208-96-8)			X												
3B. Anthracene (120-12-7)			X												
4B. Benzidine (92-87-5)			X												
5B. Benzo (a) Anthracene (56-55-3)			X												
6B. Benzo (a) Pyrene (50-32-8)			X												
7B. 3,4-Benzo- fluoranthene (205-99-2)			X												
8B. Benzo (ghi) Perylene (191-24-2)			X												
9B. Benzo (k) Fluoranthene (207-08-9)			X												
10B. Bis (2-Chloro- ethoxy) Methane (111-91-1)			X												
11B. Bis (2-Chloro- ethyl) Ether (111-44-4)			X												
12B. Bis (2-Chloro- isopropyl) Ether (39638-32-9)			X												
13B. Bis (2-Ethyl- hexyl) Phthalate (117-81-7)			X												
14B. 4-Bromo- phenyl Phenyl Ether (101-55-3)			X												
15B. Butyl Benzyl Phthalate (85-68-7)			X												
16B. 2-Chloro- naphthalene (91-58-7)			X												
17B. 4-Chloro- phenyl Phenyl Ether (7005-72-3)			X												
18B. Chrysene (218-01-9)			X												
19B. Dibenzo (a,h) Anthracene (53-70-3)			X												
20B. 1,2-Dichloro- benzene (95-50-1)			X												
21B. 1,3-Dichloro- benzene (541-73-1)			X												

CONTINUED PAGE V-6

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						d. NO. OF ANAL- YSES	4. UNITS		5. INTAKE (optional)		
	a. TEST REQ- UIRED	b. DE- LIVERED PRE- SENT	c. DE- LIVERED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS (continued)															
22B. 1,4-Dichlorobenzene (106-46-7)			X												
23B. 3,3'-Dichlorobenzidine (91-94-1)			X												
24B. Diethyl Phthalate (84-66-2)			X												
25B. Dimethyl Phthalate (131-11-3)			X												
26B. Di-N-Butyl Phthalate (84-74-2)			X												
27B. 2,4-Dinitrotoluene (121-14-2)			X												
28B. 2,6-Dinitrotoluene (606-20-2)			X												
29B. Di-N-Octyl Phthalate (117-84-0)			X												
30B. 1,2-Diphenylhydrazine (as Azobenzene) (122-66-7)			X												
31B. Fluoranthene (206-44-0)			X												
32B. Fluorene (86-73-7)			X												
33B. Hexachlorobenzene (118-71-1)			X												
34B. Hexachlorobutadiene (87-68-3)			X												
35B. Hexachlorocyclopentadiene (77-47-4)			X												
36B. Hexachloroethane (67-72-1)			X												
37B. Indeno (1,2,3-cd) Pyrene (193-39-5)			X												
38B. Isophorone (78-59-1)			X												
39B. Naphthalene (91-20-3)			X												
40B. Nitrobenzene (98-95-3)			X												
41B. N-Nitrosodimethylamine (62-75-9)			X												
42B. N-Nitrosodi-N-Propylamine (621-64-7)			X												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	a. TEST ING RE- QUIR- ED	b. BE- LIEVED PRE- SENT	c. BE- LIEVED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENTRATION	b. MASS	b. LONG TERM AVERAGE VALUE		d. NO. OF ANAL- YSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (continued)															
43B. N-Nitrosodiphenylamine (86-30-6)			X												
44B. Phenanthrene (85-01-8)			X												
45B. Pyrene (129-00-0)			X												
46B. 1,2,4 - Trichlorobenzene (120-82-1)			X												
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α -BHC (319-84-6)			X												
3P. β -BHC (319-85-7)			X												
4P. γ -BHC (58-89-9)			X												
5P. δ -BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α -Endosulfan (115-29-7)			X												
12P. β -Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												
15P. Endrin Aldehyde (7421-93-4)			X												
16P. Heptachlor (76-44-8)			X												

CONTINUED FROM PAGE V-8

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT						4. UNITS		5. INTAKE (optional)			
	A. TESTING REQUIRED	B. BELIEVED PRESENT	C. BELIEVED ABSENT	8. MAXIMUM DAILY VALUE		D. MAXIMUM 30 DAY VALUE (if available)		C. LONG TERM AVRG. VALUE (if available)		D. NO. OF ANALYSES	A. CONCENTRATION	B. MASS	B. LONG TERM AVERAGE VALUE		D. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - PESTICIDES (continued)															
17P. Heptachlor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11096-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

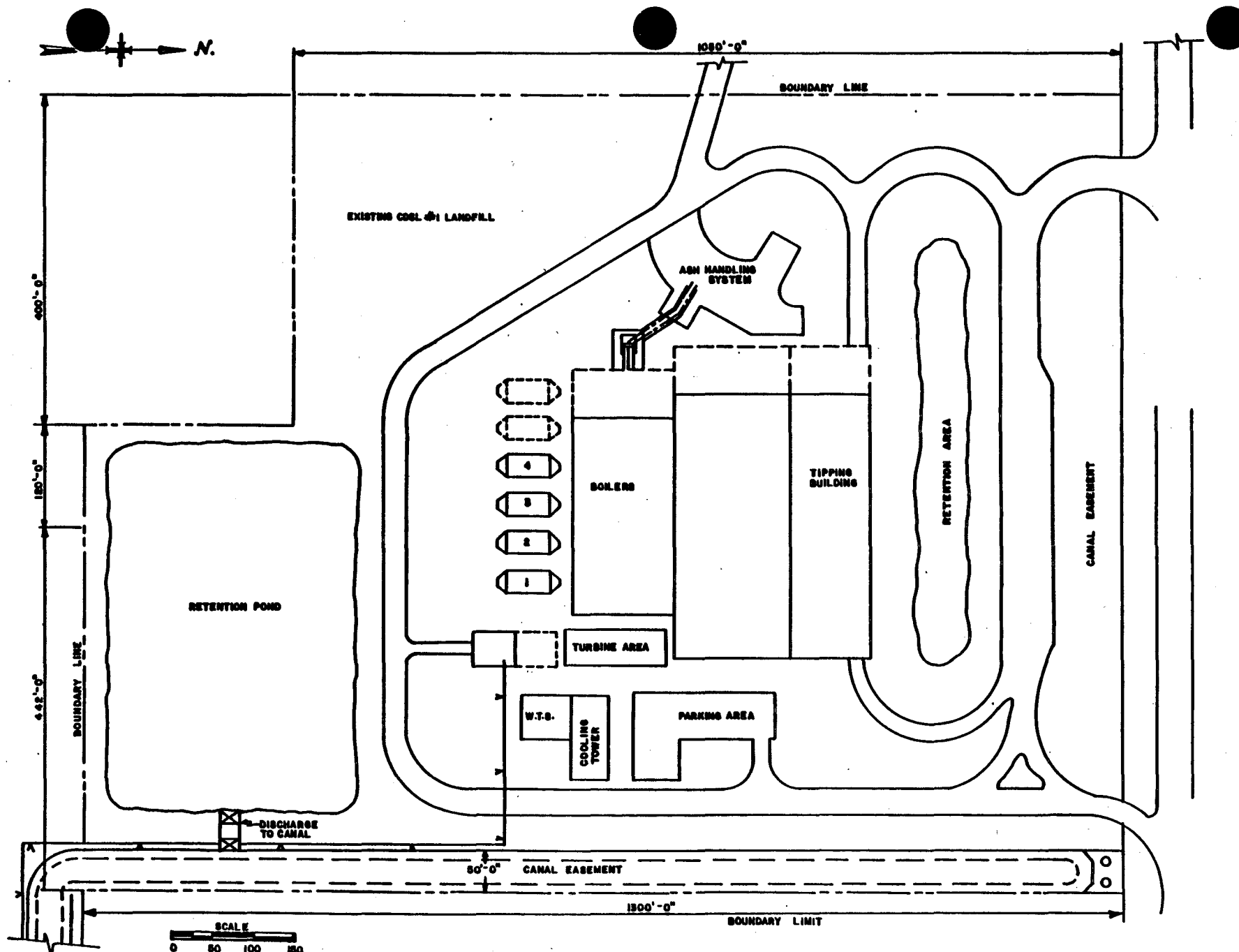
ATTACHMENT A

Resource Recovery Facility

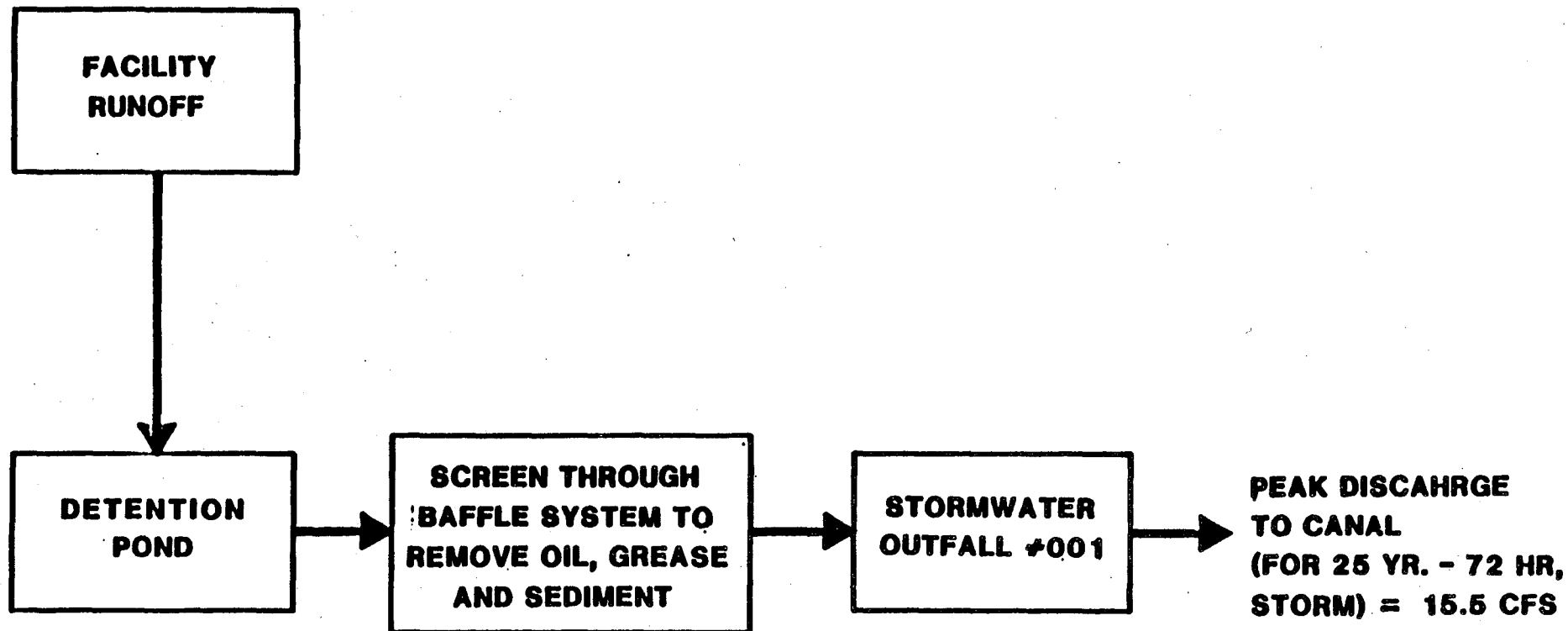
The required stormwater retention will typically be provided by on-site drainage swales and/or catch basin system. Disposal of retained water in these areas will be accomplished via precolation and evaporation processes. Excess runoff, beyond that which is retained in the retention areas will be conveyed to a wet detention pond. This pond, which is approximately 1.40 acres in area, will be constructed at the southern portions of the RRF site (Figure 1). Detained water in the pond will be released by controlled gravity discharge, via a weir/culvert structure to the C-14 canal in accordance with SFWMD discharge criteria.

The outfall structure for the site is located at the detention pond. It consists of a weir overflow structure (invert el. 10.2 ft. NGVD) with a pipe, sluice gate and a baffle for water quality and discharge control. An approximately 24-inch in diameter RCP connects the structure to the C-14 canal, which is the final discharge point for project drainage. Specifically, post development peak discharges from the resource recovery facility site, for the 25 year-72 hour design storm, will not exceed predevelopment levels. Peak discharge to the C-14 canal approximately 15.5 cubic feet per second (cfs) which is the estimated predevelopment discharge. Discharge velocities will be limited to below 4 feet per second, for erosion control purposes. The weir outfall control structure will be furnished with a baffle for oil, grease and sediment control. The invert of the weir will be set at elevation 10.2 feet NGVD. This elevation provides sufficient retention for water quality control. Elevation 9.0 feet NGVD is the established control elevation for the site. Water level in the pond will rise to elevation 13.0 ft NGVD during 25 year-72 hour storm. The pond will be constructed with a 0.5 foot freeboard.

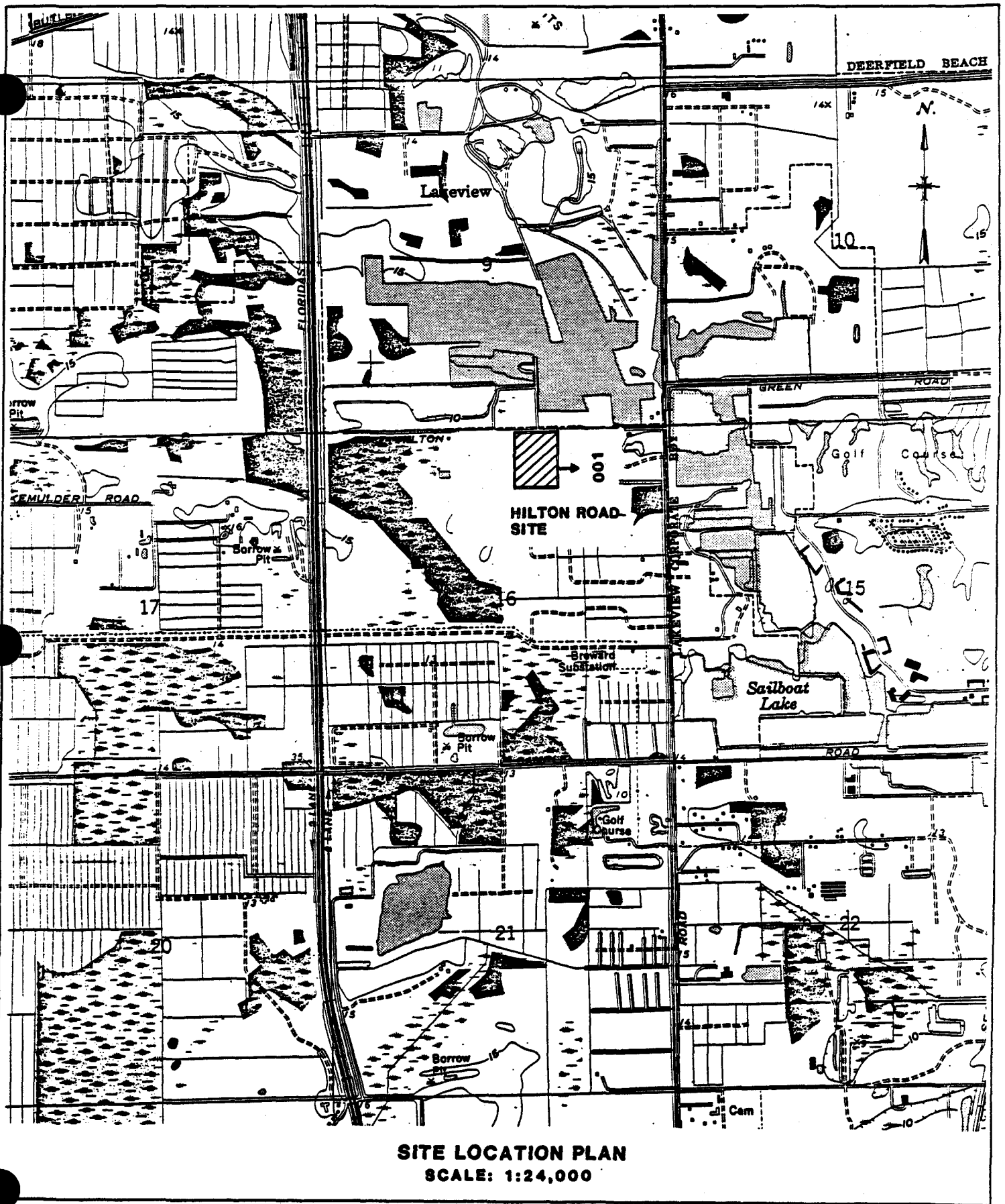
A berm will be constructed to contain water during dredging and filling. Sediment traps and screens will be strategically placed to trap runoff. All permanent berms constructed for the development will be grassed to prevent erosion.



**BROWARD COUNTY
SOUTHERN RESOURCE RECOVERY SITE
SITE DRAINAGE**



**BROWARD COUNTY
NORTHERN RESOURCE RECOVERY FACILITY
STORMWATER OUTFALL**



**BROWARD COUNTY
RESOURCE RECOVERY
HILTON ROAD SITE**

DESCRIPTION OF THE PROJECT

The North Broward County Resource Recovery Project has been selected as the best alternative for meeting Broward County's long-term solid waste disposal needs. This facility will:

- o dispose of garbage and trash in an environmentally sound manner;
- o reduce the need for siting and developing a raw garbage landfill;
- o recover energy by using solid waste as a fuel to produce electricity and;
- o create new opportunities for recreation and wetland habitat enhancement through extensive mitigation.

The proposed northern facility will be located in unincorporated Broward County between Route 809 and 91 on Hilton Road.

The facility is slated to have an initial installed capacity of 2,200 tons per day and an estimated projected ultimate capacity of approximately 3,300 tons per day. Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion. A schematic diagram describing the mass burn process of a typical resource recovery facility is presented in Figure 1. Solid waste will be delivered in collection trucks to the facility. It will be dumped directly into a bunker located entirely inside a building. All waste will be stored inside the building, therefore no waste will be visible from the outside. Two overhead cranes will mix the solid waste in the bunker and load the charging hoppers as required.

Waste will enter the furnace via a charging hopper and will progress through the combustion chamber by means of a stoker system that agitates the waste providing the proper air/fuel mixture to complete the combustion process. The

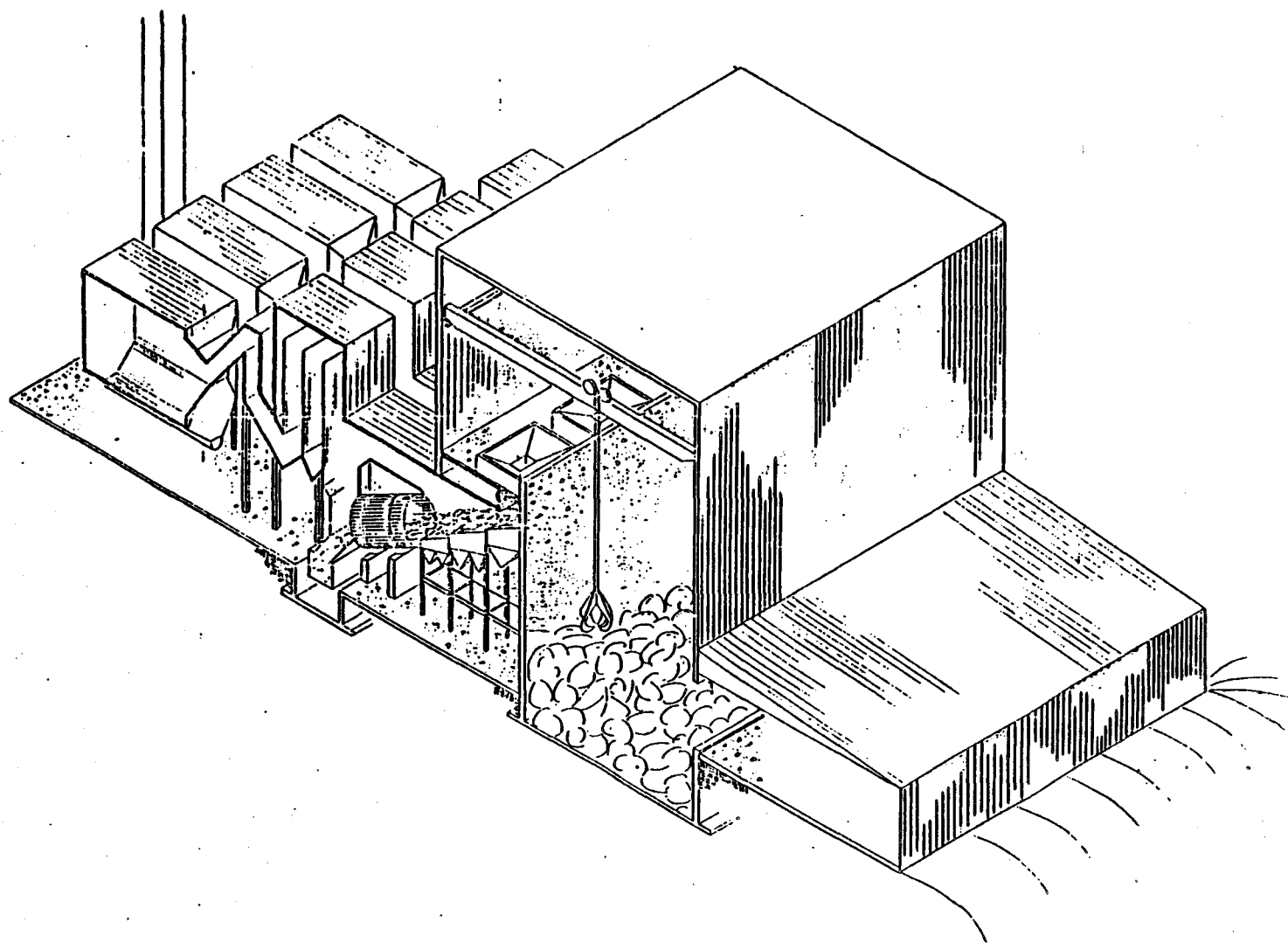


FIGURE 1

resulting ash will be deposited and quenched, and the heat from the furnace will be used to produce steam. The steam will then be transmitted to turbine generators to produce electricity for sale to Florida Power and Light, Company.

Each boiler will be equipped with an electrostatic precipitator (ESP) for particulate air emission control. An electrostatic precipitator is a pollution control device that removes small particles from exhaust gases. The gases pass through a strong electric field where the particles are charged and attracted to the opposite electrically charged collecting plates. The dust is then removed mechanically from these plates. The flue gas will be drawn through the ESPs by an induced draft fan located between the stack and the ESPs.

Bottom ash from the furnace and flyash from the precipitator will be mixed prior to removal from the facility. The combined ash will comprise 10 percent of the volume and 25 percent of the weight of the solid waste processed by the facility. The ash will be quenched with water to about 30 percent moisture prior to transport to the unprocessable waste landfill.

As noted above, while the proposed facility will have ultimate design capacity of approximately 3,300 tpd, its maximum initial installed capacity will be 2,200 tpd. Each boiler unit operates independently from the others. It will, therefore, be possible to routinely shut down units for periods of maintenance and inspection and still continuously operate the facility.

Assessment of Probable Project Impacts

As part of the Federal Consistency Evaluation Procedures, an assessment of the probable impacts of the project on the coastal zone were determined in relation to the Florida Coastal Management Program (FCMP) statutes.

Chapter 403, Environmental Control

The air and water pollution concerns will be addressed by obtaining the appropriate facility permits and using pollution control measures to abate impacts from facility construction and operations. Facility boilers will be equipped with electrostatic precipitators for particulate air emission control. Air construction and operating permits will be obtained through the Power Plant Siting Act process in accordance with requirements established in the Prevention of Significant Air Quality Deterioration (PSD) regulations and the regulation governing New Sources.

Stormwater retention basins will be used to collect runoff waters from the site. This discharge will comply with all DER requirements for protection of surface and groundwater.

Chapter 267, Archives, History and Records Management

The State of Florida Division of Archives, History and Records Management, has stated that there are no known or potential historical or archaeological resources at the site. Therefore, no significant cultural resources would be affected by the project.

Chapter 373 (Water Resources)

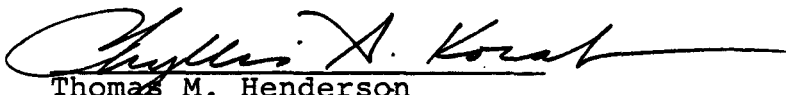
The South Florida Water Management District will review the project for water resources impacts. No consumptive use of water is anticipated therefore permits for such use do not apply. Monitoring wells will be installed to provide an early warning system of groundwater contamination and stormwater management practices will be employed to mitigate water resources impacts from runoff.

Power Plant Siting Act (PPSA)

An application is being filed with State of Florida Department of Environmental Regulation (FDER) under the Power Plant Siting Act. This application will present information discussing the conditions resulting from construction, and the anticipated impacts from facility operation in order to provide assurance that all applicable state, regional and local standards are met and that the project will be consistent with the FCMP.

Consistency Determination

The proposed project complies with Florida's Coastal Management Program and will be conducted in a manner consistent with that program.

for 
Thomas M. Henderson
Project Director

ZONING APPLICATION

BOARD OF COUNTY COMMISSIONERS
BROWARD COUNTY, FLORIDA
OFFICE OF PLANNING ROOM 329
115 SOUTH ANDREWS AVE.
FT. LAUDERDALE, FLORIDA 33301
PHONE 357-6612

APPLICATION FOR REZONING

PLEASE TYPE OR LEGIBLY PRINT ANSWERS

DATE February 3, 1986

NAME OF PETITIONER: Waste Management, Inc. of Florida
ADDRESS: 800 N.W. 62nd Street Suite 420
CITY: Ft. Lauderdale STATE Florida
ZIP CODE: 33309 TELEPHONE 305/771-9850
PETITIONERS RELATION TO SUBJECT PROPERTY Owner

LEGAL SIGNATURE OF PETITIONER: Joseph E. Jack, President

NAME OF ATTORNEY OR AUTHORIZED AGENT: Robert R. Kauth
ADDRESS: 800 N.W. 62nd Street Suite 420
CITY: Ft. Lauderdale STATE: Florida
ZIP CODE: 33309 TELEPHONE: 305/771-9850

OWNER'S CERTIFICATE:

THIS IS TO CERTIFY THAT I AM THE OWNER OF THE SUBJECT LANDS DESCRIBED
IN THIS PETITION FOR REZONING, AND THAT I HAVE AUTHORIZED THE FILING
OF THE PETITION FOR REZONING.

SWORN AND SUBSCRIBED BEFORE ME THIS 3rd
DAY OF February, 19 86

Kathleen E. Kallbach
SIGNATURE OF NOTARY PUBLIC

Notary Public, State of Florida
My Commission Expires April 9, 1989
Bounded Thus They Fail - Insurance, Inc.

Waste Management, Inc. of Florida
OWNER'S NAME (PRINT OR TYPE)

800 N.W. 62nd St. Suite 420
ADDRESS

CITY & STATE Ft. Lauderdale, FL.
TELEPHONE 305/771-9850

Joseph E. Jack
SIGNATURE OF OWNER Joseph E. Jack, President

IN THE CASE OF MORE THAN ONE OWNER (OTHER THAN HUSBAND AND WIFE),
ADDITIONAL OWNER'S CERTIFICATION MUST BE COMPLETED ON PAGE 3 OF THIS
APPLICATION.

PURPOSE OF REZONING: To allow development and operation of resource recovery facility

DOES PETITIONER OWN ANY PROPERTY CONTIGUOUS TO PETITIONED AREA?
IF SO, INDICATE IF IT IS LOCATED TO THE NORTH, SOUTH, EAST OR
WEST OF THE PETITIONED AREA: South and West

TWO SEALED SURVEYS, BY A LICENSED SURVEYOR, MUST ACCOMPANY THIS
PETITION. THE SURVEYS SHALL CONTAIN A LEGAL DESCRIPTION OF THE
PARCEL TO BE REZONED. INDICATE BELOW, AND ON THE SURVEYS, THE
FOLLOWING INFORMATION:

- (a) EXISTING ZONING: M-4 and A-6
- (b) ZONING REQUESTED: PUD for Special Complexes
- (c) SIZE OF PARCEL (BY ACRES) 25 acres

PLAT INFORMATION: THE PARCEL TO BE REZONED (CHECK ONE BOX)

- ☒ HAS BEEN PLATTED
- ☐ PLAT IN PROCESS
- ☐ UNPLATTED LAND

I DO HEREBY ATTEST THAT I HAVE CONTACTED THE COUNTY AGENCIES AS
REQUESTED IN THE GENERAL INSTRUCTIONS (LISTED ON THE COVER SHEET)
CONCERNING CONFORMITY WITH THE UNINCORPORATED BROWARD COUNTY LAND
USE PLAN, AND, THE COUNTY'S CONTINUING NEED TO ACQUIRE CERTAIN
RIGHTS-OF-WAY AND EASEMENTS WITHIN BROWARD COUNTY, FLORIDA.

Robert Kauth
(SIGNATURE OF PETITIONER)
Robert Kauth, Vice-President

TO BE COMPLETED BY THE OFFICE OF PLANNING

ACCEPTED BY: _____ SECTION NO.: _____

DATE: _____ PETITION NO.: _____

IMPACT STATEMENTS REQUIRED:

OWNER'S CERTIFICATE:

THIS IS TO CERTIFY THAT I AM ONE OF THE OWNERS OF THE SUBJECT LANDS DESCRIBED IN THIS PETITION FOR REZONING, AND THAT I HAVE AUTHORIZED THE FILING OF THE AFORESAID PETITION FOR REZONING.

SWORN AND SUBSCRIBED BEFORE ME THIS _____
DAY OF _____, 19____. OWNER'S NAME (PRINT OR TYPE) _____

SIGNATURE OF NOTARY PUBLIC

ADDRESS

CITY & STATE

SIGNATURE OF OWNER

OWNER'S CERTIFICATE:

THIS IS TO CERTIFY THAT I AM ONE OF THE OWNERS OF THE SUBJECT LANDS DESCRIBED IN THIS PETITION FOR REZONING, AND THAT I HAVE AUTHORIZED THE FILING OF THE AFORESAID PETITION FOR REZONING.

SWORN AND SUBSCRIBED BEFORE ME THIS _____
DAY _____, 19____. OWNER'S NAME (PRINT OR TYPE) _____

SIGNATURE OF NOTARY PUBLIC

ADDRESS

CITY & STATE

SIGNATURE OF OWNER

OWNER'S CERTIFICATE:

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SWORN AND SUBSCRIBED BEFORE ME THIS _____
DAY OF _____, 19____. OWNER'S NAME (PRINT OR TYPE) _____

SIGNATURE OF NOTARY PUBLIC

ADDRESS

CITY & STATE

SIGNATURE OF OWNER

DESCRIPTION OF PROPOSED SITE FOR RESOURCE RECOVERY PLANT

A PARCEL OF LAND LYING IN THE NORTH ONE-HALF (N 1/2) OF SECTION 16, TOWNSHIP 48 SOUTH, RANGE 42 EAST, A PORTION OF SAID PARCEL LIES WITHIN THE BOUNDARIES OF "WASTE MANAGEMENT INC." AS RECORDED IN PLAT BOOK 90, PAGE 32 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA, SAID PARCEL BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHEAST CORNER OF THE NORTHWEST ONE-QUARTER (NW 1/4) OF SAID SECTION 16; THENCE ON AN ASSUMED BEARING OF SOUTH 88° 38' 29" WEST ALONG THE NORTH LINE OF THE NORTHWEST ONE-QUARTER (NW 1/4) OF SAID SECTION 16, A DISTANCE OF 428.00 FEET; THENCE SOUTH 01° 21' 31" EAST, 55.00 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE SOUTH 01° 21' 31" EAST 1000.00 FEET; THENCE NORTH 88° 38' 14" EAST, 400.11 FEET; THENCE SOUTH 01° 13' 57" EAST, 288.53 FEET; THENCE NORTH 89° 28' 56" EAST ALONG THE SOUTH LINE OF THE NORTH ONE-HALF (N 1/2) OF THE NORTHEAST ONE-QUARTER (NE 1/4) OF SAID SECTION 16, A DISTANCE OF 532.86 FEET; THENCE NORTH 01° 23' 02" WEST ALONG THE WEST LINE OF THE EAST 2149.32 FEET OF THE NORTHEAST ONE-QUARTER (NE 1/4) OF SAID SECTION 16, A DISTANCE OF 1299.36 FEET; THENCE WEST ALONG A LINE 40.00 FEET SOUTH OF AND PARALLEL WITH THE NORTH LINE OF SAID NORTHEAST ONE-QUARTER (NE 1/4) OF SECTION 16, A DISTANCE OF 504.33 FEET; THENCE SOUTH 88° 38' 29" WEST ALONG A LINE BEING 40.00 FEET SOUTH OF AND PARALLEL WITH THE NORTH LINE OF THE NORTHWEST ONE-QUARTER (NW 1/4) OF SAID SECTION 16, A DISTANCE OF 49.61 FEET; THENCE SOUTH 01° 13' 57" EAST, 15.00 FEET; THENCE SOUTH 88° 38' 29" WEST ALONG A LINE BEING 55.00 FEET SOUTH OF AND PARALLEL WITH SAID NORTH LINE OF THE NORTHWEST ONE-QUARTER (NW 1/4) OF SECTION 16, A DISTANCE OF 377.89 FEET TO THE POINT OF BEGINNING;

SAID LANDS SITUATE WITHIN BROWARD COUNTY, FLORIDA, CONTAINING 25.09 ACRES, MORE OR LESS.

R-4/Resource Rec/mcb

NOTES:

1. REPRODUCTIONS OF THIS SKETCH ARE NOT VALID UNLESS SEALED WITH AN EMBOSSED SURVEYOR'S SEAL.
2. LANDS SHOWN HEREON WERE NOT ABSTRACTED FOR RIGHTS-OF-WAY, EASEMENTS, OWNERSHIP, OR OTHER INSTRUMENTS OF RECORD.
3. BEARINGS SHOWN HEREON ARE RELATIVE TO ASSUMED DATUM.
4. THE "LAND DESCRIPTION" HEREON WAS PREPARED BY THE SURVEYOR.
5. THIS SKETCH DOES NOT REPRESENT A FIELD SURVEY AS SUCH.

CERTIFICATE:

WE HEREBY CERTIFY THAT THE ATTACHED SKETCH OF DESCRIPTION OF THE HEREON DESCRIBED PROPERTY IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF AS DELINEATED UNDER OUR DIRECTION IN FEBRUARY, 1986. WE FURTHER CERTIFY THAT THIS SKETCH OF DESCRIPTION MEETS THE MINIMUM TECHNICAL STANDARDS SET FORTH IN RULE 21HH-6 ADOPTED BY THE FLORIDA BOARD OF LAND SURVEYORS, PURSUANT TO FLORIDA STATUTES 472.027.

KEITH AND SCHNARS, P. A.
ENGINEERS, PLANNERS & SURVEYORS

Michael D. Rose

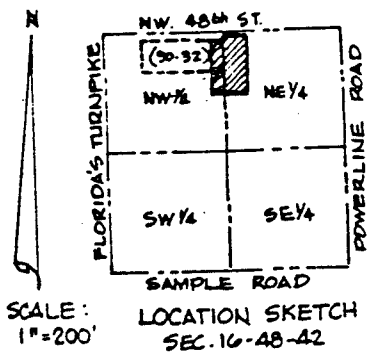
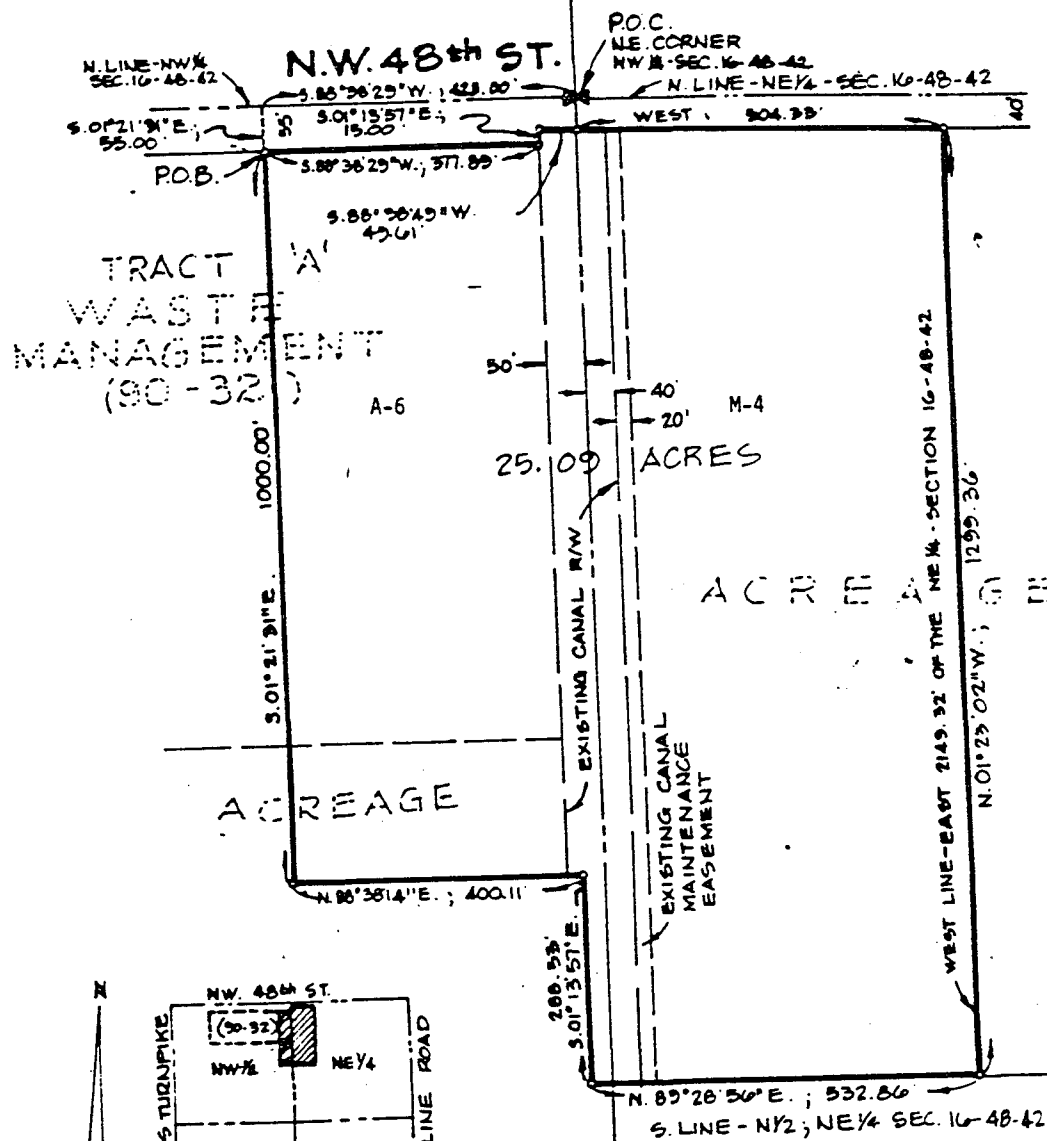
BY: MICHAEL D. ROSE, PLS
FLORIDA REGISTRATION NO. 3998

PROPOSED RESOURCE
RECOVERY PLANT
A PORTION OF N. 1/2
SEC. 16-48-42
BROWARD COUNTY, FLORIDA

DATE 2-3-86
SCALE 1"=200'
FIELD BK. -
DWNG. BY -
CHK. BY MDR

DATE	REVISIONS

Keith and Schnars, P.A.
ENGINEERS, PLANNERS & SURVEYORS
SHEET NO. 1 OF 2 SHEETS
DRAWING NO. 1156BL



ZONING REQUESTED: PUD for Special Complexes

PROPOSED RESOURCE RECOVERY PLANT A PORTION OF N 1/2 SEC. 16-48-42 BROWARD COUNTY, FLORIDA	DATE <u>2-3-86</u>	DATE	REVISIONS	Keith and Schnarrs, P.A. PLANNING ENGINEERS 1401 N. W. 10th St., Ft. Lauderdale, FL 33304 PHONE (305) 551-1111 FAX (305) 551-1112
	SCALE <u>1"=200'</u>			
	FIELD BK. <u>NA</u>			
	DWNG. BY <u>GB</u>			
	CHK. BY			
SHEET NO. <u>2</u> OF <u>2</u> SHEETS		DRAWING NO. <u>11568 L-</u>		

LAND USE PLAN DESCRIPTIONS

10.3 LAND USE PLAN DESCRIPTIONS

**BROWARD COUNTY PLANNING COUNCIL FORMAL LETTER OF
LAND USE INTERPRETATION**



BROWARD COUNTY PLANNING COUNCIL
115 SOUTH ANDREWS AVENUE, ROOM 3-307, FORT LAUDERDALE, FLORIDA, 33301
Telephone: (305) 357-6695

June 27, 1985

The Honorable Scott I. Cowan, Chairman
Board of County Commissioners
115 S. Andrews Avenue
Fort Lauderdale, FL 33301

RE: Request for Formal Letter of Interpretation Pursuant to Section 2.09
of the Broward County Land Use Plan - Proposed Resource Recovery
Facility in the City of Pompano Beach, Florida

Dear Chairman Cowan:

In response to your request of June 18, 1985 for a formal letter of interpretation by the Broward County Planning Council pursuant to Section 2.09, Chapter IV, of the Broward County Land Use Plan, please be advised that the Planning Council has acted upon your request at its June 27, 1985 regular meeting.

In direct response to the questions, which you have raised, the Planning Council responds accordingly:

1. A utility is a permitted use under the Industrial Land Use designation of the Broward County Unincorporated Land Use Plan. A resource recovery facility would be interpreted as a utility and as such would be a permitted use.

2. The Community Facilities (C.F.-1) Zoning District of the City of Pompano Beach included and permits public parks, hospitals, civic centers, fire stations, utility structures and by special exception, solid waste disposal and transfer sites (Resource Recovery Facilities) is consistent with the Industrial Land Use designation under the Broward County Unincorporated Land Use Plan.

Sincerely,

Commissioner Marcia Beach
Chairman
Broward County Planning Council



GERALD F. THOMPSON, Vice Chairman

BOARD OF COUNTY COMMISSIONERS

357-7001

June 18, 1985

The Honorable Marcia Beach
Chairperson
Broward County Planning Council
3rd Floor, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301

Dear Chairperson Beach:

Broward County is currently in the process of attempting to acquire the proper zoning to allow the construction of a resource recovery facility on a 140 acre site owned by Broward County and located in the City of Pompano Beach. The site was annexed into the City of Pompano Beach in September of 1983 by Special Act of the Florida Legislature.

To date, the City of Pompano Beach has not completed a land use plan amendment for the newly annexed area. Therefore, pursuant to state statute, the effective land use plan for the property is the Broward County Unincorporated Area Land Use Plan.

Section 2.09 of the Broward County Land Use Plan states that the Planning Council shall assist units of local government with matters of interpretation of the Broward County Land Use Plan. The section provides that whenever a question of interpretation has not been resolved on an informal basis, the governing body of the unit of local government may request in writing that the Planning Council issue a letter of interpretation on the matter.

With this provision in mind, I am writing to formally request that the Broward County Planning Council issue a letter of interpretation on the following two questions:

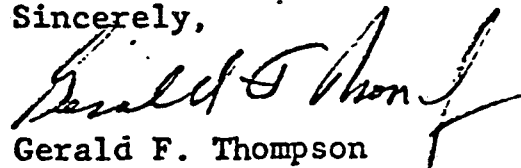
- 1) Is a utility a permitted use under the Industrial Land Use designation of the Broward County Unincorporated Land Use Plan?
- 2) The City of Pompano Beach has a Community Facilities Zoning District which permits public parks, hospitals, civic

The Honorable Marcia Beach
Chairperson
Broward County Planning Council
Page Two
June 18, 1985

centers, fire stations, utility structures and by special exception, water treatment plants and resource recovery facilities. The purpose section of the City of Pompano Beach's Community Facilities Zoning Ordinance states that it is a special purpose district for public and semi-public facilities so classified on the effective land use plan. Community Facilities are also a permitted use under the Broward County Unincorporated Industrial Land Use designation. My question is whether such a Community Facilities Zoning District is consistent with the Industrial Land Use designation under the Broward County Unincorporated Land Use Plan?

If the Planning Council needs more information, please contact Roy Groves of the Broward County Office of Planning. Thank you for your cooperation in this matter.

Sincerely,



Gerald F. Thompson
County Commission Vice Chairman

SIC/RD:eb

BROWARD COUNTY ORDINANCE NO. 77-66:
LAND USE PLANNING

10.3.2 BROWARD COUNTY ORDINANCE NO. 77-66:
LAND USE PLANNING

ORDINANCE NO. 77-66

1
2
3 AN ORDINANCE RELATING TO THE AREA OF LAND
4 USE PLANNING: PROVIDING FOR THE ADOPTION
5 OF THE BROWARD COUNTY LAND USE PLAN AS THE
6 FUTURE LAND USE PLAN ELEMENT FOR BROWARD
7 COUNTY, FLORIDA; PROVIDING FOR THE DESIG-
8 NATION OF THE PROPOSED FUTURE GENERAL DIS-
9 TRIBUTION, LOCATION AND EXTENT OF THE USES
10 OF LAND FOR HOUSING, BUSINESS, INDUSTRY,
11 AGRICULTURE, PARKS, RECREATION, CONSERVA-
12 TION, EDUCATION, PUBLIC BUILDINGS AND
13 GROUNDS, OTHER PUBLIC FACILITIES AND OTHER
14 CATEGORIES OF THE PUBLIC AND PRIVATE USES
15 OF LAND; PROVIDING STANDARDS, PROCEDURES
16 AND MINIMUM REQUIREMENTS TO BE FOLLOWED IN
17 THE CONTROL AND DISTRIBUTION OF POPULATION
18 DENSITIES AND BUILDING AND STRUCTURE IN-
19 TENSITIES OF BROWARD COUNTY; PROVIDING FOR
20 THE CERTIFICATION OF LOCAL LAND USE PLANS
21 WHICH ARE IN SUBSTANTIAL CONFORMITY WITH
22 THE COUNTY LAND USE PLAN; PROVIDING STAN-
23 DARDS, PROCEDURES AND MINIMUM REQUIREMENTS
24 FOR THE REVIEW OF APPLICATIONS FOR DEVELOP-
25 MENT PERMITS AND FOR THE ADOPTION OF DEVEL-
26 OPMENT ORDERS; PROVIDING THAT THIS ORDINANCE
27 SHALL PREVAIL OVER MUNICIPAL ORDINANCES WHEN
28 IN CONFLICT; PROVIDING FOR SEVERABILITY OF
29 INVALID PORTIONS AND PROVIDING FOR AN EF-
30 FECTIVE DATE.

31
32 WHEREAS, the Broward County Charter provides for the
33 preparation and adoption of a County Land Use Plan; and,

WHEREAS, the Broward County Charter provides that the
County Land Use Plan shall prevail over municipal ordinances when
they are in conflict; and

WHEREAS, the Broward County Charter provides that the
County Land Use Plan shall be the effective land use plan for
Broward County and shall control land uses throughout Broward
County immediately after its adoption except that zoning as to
permitted uses and densities need not comply until one (1) year
following the date of its adoption; and

WHEREAS, the passage by a municipality or other govern-
mental unit of a land use plan less restrictive than the County
Land Use Plan is an ultra vires act and as such prohibited by the
Broward County Charter; and

WHEREAS, the Local Government Comprehensive Planning Act

1 as the Broward County Land Use Plan pursuant to its authority
2 under the Broward County Charter and in compliance with the
3 requirements of the Local Government Comprehensive Planning Act
4 of 1975.

5 Section 3.

6 3.01 Pursuant to the Broward County Charter this Ordinance shall prevail in the event of conflict between this Ordinance and municipal ordinances.

7 Section 4. SEVERABILITY

8 4.01 If any section, sentence, clause or phrase of this
9 Ordinance or the attached County Land Use Plan Map or the attached
10 "Broward County Land Use Plan 1977" is held to be invalid or
11 unconstitutional by any Court of competent jurisdiction, then said
12 holding shall in no way affect the validity of the remaining portions of this Ordinance.

13 Section 5. EFFECTIVE DATE

14 5.01 This Ordinance shall become effective as provided
15 by law.

16 ENACTED this 9th day of November, A.D., 1977.

17 FILED WITH DEPARTMENT OF STATE this 17th day of November, A.D., 1977.

18 EFFECTIVE on this 22nd day of November, A.D., 1977.

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33 BL:ed
11/16/77
1086-402

EXISTING STATE PERMITS

APPENDIX 10.4

EXISTING STATE PERMITS

At present, no state permits have been issued for this project, however, all appropriate permits have been applied for.

MONITORING PROGRAMS

APPENDIX 10.5
MONITORING PROGRAMS

Information pertaining to specific monitoring programs, i.e., Data Gathering, Construction, and Operation have been addressed in their respective subsections of Volume I, Technical Submittal. In addition, specific information on monitoring capabilities are provided in Appendix 10.9, and 10.10.

**PETITION FILED WITH PUBLIC SERVICE COMMISSION
IN NOVEMBER 1985**

BEFORE THE STATE OF FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Broward)
County, Florida, for Deter-)
mination of Need for)
Solid-Waste-Fired Electrical)
Power Plant.)
_____)

Docket No. _____
Filed: November 21, 1985

**PETITION FOR DETERMINATION OF NEED FOR A
SOLID-WASTE-FIRED ELECTRICAL POWER PLANT**

Under section 403.519 of the Florida Statutes and section 25-22.80 of the Florida Administrative Code, Petitioner Broward County requests a determination of need for a solid-waste-fired electrical power plant, and in support of the request states as follows:

1. The name of Petitioner is Broward County, whose address is Resource Recovery Office, Suite 521, Governmental Center, 115 South Andrews Avenue, Fort Lauderdale, Florida 33301. The Petitioner is acting on behalf of North Broward County Resource Recovery Project, Inc., a Florida corporation, (the "Corporation"), which will be the owner and operator of the proposed solid-waste-fired electrical power plant. The names and the address of the attorneys representing Broward County are Clifford A. Schulman, Esq., and Timothy A. Smith, Esq., Greenberg, Traurig, Askew, Hoffman, Lipoff, Rosen & Quentel, P.A., 1401 Brickell Avenue, Miami, Florida 33131.

2. Broward County files this Petition as an "electric utility" as defined by section 403.503(4) of the

Florida Statutes. Broward County proposes to construct and operate a solid-waste-fired electrical generating facility that initially will generate approximately 51 megawatts, using solid waste as fuel and located as is more fully shown in paragraph 3 below. In anticipation of expected future needs, Broward County seeks certification for ultimate electrical generating capacity of 76.5 megawatts (gross) for the proposed facility. Broward County intends to file with the Florida Department of Environmental Regulation (DER) a "A Power Plant Site Certification Application" under sections 403.501-.517 of the Florida Statutes, in December 1985.

3. The utility affected will be the Florida Power and Light Company (FP&L), which owns a power substation immediately to the south of the proposed resource recovery facility (the facility), which will be located on a tract of approximately 20 acres in unincorporated Broward County immediately south of Hilton Road and West of Powerline Road. The diagram attached to this Petition as Exhibit A shows the sites of the facility and the FP&L power substation. Discussions are presently underway with FP&L concerning the details and means of providing an interconnection with FP&L's system and the rates to be paid. Based on FP&L's preliminary investigation of electrical interconnection requirements, there does not appear to be a need for new transmission line corridors or any other long narrow siting corridors (e.g., rail lines, or influent or effluent pipelines) that would

leave the area near the proposed facility. Because the site of the proposed facility lies just north of the FP&L power substation, transmission lines will not cross any land that is not the property of the Corporation, the County, or FP&L. The transmission line will be designed so as to have no adverse impact on the existing land use. FP&L will bring transmission power to the facility substation. The design and installation of all electrical interconnections, meters, plant distribution systems, and protective equipment will comply with the requirements and standards imposed by FP&L. FP&L will make the connections to the electrical substation in the facility. The electrical interconnection proposed by FP&L are shown in Exhibit B attached to this Petition. FP&L will extend a 138 KV transmission line approximately 600 feet westward from an existing transmission corridor from FP&L's Broward Transmission Substation to the substation at the proposed facility. The routing of this line will be coordinated with the development of the facility.

4. The electrical energy distribution system for the facility shall include the following features. The electric generating portion of the facility comprises a condensing turbine-generator, its ancillary equipment and electrical equipment. Steam generated in the solid waste disposal portion of the facility shall be converted to electrical energy in a turbine-generator for delivery to the purchaser at the delivery point in the switchyard. The main point of interface is at the

high voltage bushings of the main transformer, including lightning arrestors. Other interfaces occur at the protective relaying and revenue metering.

Equipment will be furnished piped, wired, insulated, and painted. All instrumentation wired and piped for control shall be provided and shall be remote or local, or both, for safe operation of the facility.

The completed electric generating portion of the facility shall further include all instrumentation piped and wired for control of critical process variables. Control shall be remote or local or both, in accordance with accepted practice for safe operation. Interconnect transformers will be sized for the full output of the facility. Complete indoor relay and control switchboards will be provided for the facility's electrical systems.

5. The electrical output of the turbine-generator will operate within the interconnection system established by FP&L. The turbine-generator will be capable of operating in the full condensing mode, at maximum steam flow, even on the hottest day of the year, and still provide an efficient and adequate quantity of electrical energy. The following power generating equipment and accessories shall be provided for the facility:

- One (1) approximately 51,000 kW, electrohydraulically controlled, 3600 RPM straight condensing, non-re-heat, single flow steam turbine shall be provided. The turbine shall be designed for initial steam conditions of 900 psig, 837°F, exhausting at 4.0 in. HgA

with three uncontrolled extraction points (two normally in service) to provide steam for feedwater heating and deaeration. The turbine shall be provided with an initial pressure governor control system.

- One (1) 65,000 kVA air cooled synchronous electric generator with four corner mounted coolers shall be provided. The generator shall be designed for operation at 3600 RPM, 3 phase, 60 Hertz, 13,800 volts with a 0.90 power factor (lagging).
- One (1) brushless type excitation voltage regulation system including separate shaft driven exciter, rectifiers and voltage regulators shall be provided. The excitation system shall be rated at 125 kW, 250 volts and 500 amperes.
- A lubrication system, shaft sealing system, turning gear, support plates, metal appearance lagging, heat retention lagging, exhaust relief diaphragm, low pressure water sprays, and furnished devices for instrumentation, monitoring and protection of turbine-generator equipment shall be provided.

Turbine-Generator specifications are as follows:

Throttle Steam Load	Normal	471,500 lbs/hour
	Maximum	542,255 lbs/hour
Design Throttle Pressure		900 psig
Design Throttle Temperature		837° F
Design Exhaust Pressure		4.0 in. HgA
Normal Extraction Pressures	1st	
	Extraction:	64.0 psia
	2nd	
	Extraction:	39.5 psia
	3rd	
	Extraction:	12.2 psia

6. The power distribution system will consist of a main single line diagram. The electrical power shall be generated at 13.8 kV and stepped up through the main transformer to feed into FP&L's 138 kV system. The point of interface shall be at the high voltage bushings of the main transformer.

Electrical power for Plant station services shall be supplied by distributing part of the generated power to the main switchgear via the 13.8/4.16 kV auxiliary transformer.

The startup power shall be supplied by FP&L's network by using the generator and synchronizing circuit breakers for isolation of the generator from the system. The generator breaker shall be used for synchronization of the generator with the FP&L's system during startup. The synchronizing breaker shall be used for resynchronizing the generator after a tie line trip and reclosure.

The major electrical equipment shall consist of the following:

- Generators;
- Line feed;
- Main step-up transformer and its high voltage switchgear;
- 4.16 kV main switchgear;
- 480 volt load centers;
- Motor control centers;

- DC system, comprising battery, charger, and control center;
- Relay panel;
- Generator bus;
- Generator and synchronizing breaker;
- Generator neutral grounding cubicle;
- Neutral grounding resistor;
- AC and DC distribution panels;
- Power, control, and instrumentation cables and raceways;
- Grounding system;
- Lighting system; and
- Communications system.

The following shall be a detailed description of the major electrical equipment that shall be furnished for operation of the Plant:

- Main Step-up Transformers and the High Voltage Circuit Breakers:
- The main step-up transformer and the HV circuit breaker at the site shall be installed adjacent to the turbine-generator complex. The transformers shall be rated 33/44/55 mVA at 65°C rise, OA/FA/FOA cooling, 3 phase, 60 hertz, 138/13.8 kV, minimum calculated impedance at 55°C base MVA. The high-voltage winding shall be connected in wye, with the neutral solidly grounded. The low-voltage winding shall be connected in delta. The transformer shall be equipped with lightning arrestors and no-load 5-position tap changers on HV side, standard accessories, and protective devices. The high voltage circuit breakers and associated structures at the site shall be compatible for interconnection with FP&L's transmission system.

- Auxiliary Transformer (Station Service):

The auxilliary transformer (station service) shall be installed adjacent to the main transformer and shall be connected through a tap from the generator nonsegregated phase bus downstream of the disconnecting link.

The transformer shall be rated 7.5/10 mVA, OA/FA, 55/65°C rise, 3 phase, 60 hertz, 13.8-4.16 kV BIL. The high voltage winding shall be connected in delta. This winding shall be equipped with a hand-operated, no-load, 5 position tap changer. The low voltage winding shall be connected in wye, and the neutral shall be grounded through a resistor. The low voltage side shall be connected to the 4,160 volt switchgear. The transformer impedance, however, shall be sufficient to limit the short circuit duty on the 4,160 volt switchgear.

- 4,160 Volt Switchgear:

The 4,160 volt switchgear assembly shall be an indoor, metal clad, horizontal drawout type. The switchgear line-up shall include incoming line breaker, feeder breakers, fused contactor starter for motors, instrument transformers and protective devices for motor and other equipment feeders. Circuit breakers shall be oilless, electrically operated and stored energy type. In general, large motors (those over 200hp) and the 480 volt load center transformers shall be supplied from this switchgear.

- Generator and Synchronizing Breaker Assembly:

The generator and synchronizing breaker assembly shall consist of two 13.8 kV, 3,000 A, 1,000 mVA class circuit breakers, surge arrestors, and current and potential transformers. Circuit breakers shall be an oilless, stored energy and horizontal drawout type.

- Generator Neutral Grounding Assembly:

The generator neutral grounding assembly shall consist of a metal enclosed generator neutral assembly consisting of a 13,800-240/120 volt, single phase, 25 kVA dry type transformer and a grounding resistor rated 0.5 ohm, 300 A, 1 minute.

- 480 Volt Motor Control Centers:

The 480 volt motor control centers shall consist of twelve 480 volt motor control centers, NEMA Class 1, Type B, with plug-in, combination, across-the-line starters with molded case breakers. The motor control centers shall supply and control the 480 volt motors, generally 200 hp and smaller, lighting and power panel transformers, and small 480 volt loads. Each combination motor starter shall be equipped with a 120 volt control transformer. The feeder circuit breakers shall be 600 volt class and shall be equipped with thermal magnetic series trip devices. Indoor motor control centers shall have NEMA enclosure Type 1, motor control centers located outdoors shall have NEMA enclosure Type 3R.

- 125 Volt DC System:

The 125 volt DC system shall provide control power for protective relays, 4,160 volt switchgear, 480 volt load centers, miscellaneous devices of the process control and instrumentation, and power for emergency motors and other emergency services. The system shall consist of a 1,000 ampere-hour, lead calcium, 100-cell storage battery, a 100 A static battery charger and one DC control center. Battery size shall be dictated by the normal and emergency Plant requirements and shall have enough capacity to permit a safe shutdown of the generating unit. The battery charger shall be sized to bring the battery from full discharge to full charge in less than 24 hours while simultaneously carrying the normal continuous load. The charger shall be supplied from a 480 volt motor control center. The 125 volt DC control center shall be connected to the battery and charger, and shall comprise DC

motor controllers, feeder breakers, protective relays, meters, and one DC distribution panel with twenty 2-pole breakers. Local DC starters shall be provided for the DC emergency oil pump motor.

- Motors:

Motors 250 horsepower and larger, in general, shall be rated 4,000 volt for use on a 4,160 volt, 3-phase, 60 hertz, resistance grounded system. Integral horsepower motors rated 3/4 through 200 horsepower, and reversing motors in general, shall be rated 460 volt for use on a 480 volt, 3-phase 60 hertz solidly grounded system. Smaller motors shall be single phase, AC or DC, as required by the function of the motor. Motors shall have Class B or other insulation as required by the application. Weather protected, NEMA Type II enclosures shall be provided for 4,000 volt motors installed outdoors. Totally enclosed fan-cooled (TEFC) or totally enclosed non-ventilated (TENV) enclosures shall be utilized on other motors installed outdoors. Motors installed indoors shall have drip-proof enclosures unless the location or application requires a different type of enclosure. Motors with a 1.0 service factor shall be provided. Special service motors shall have the manufacturer's standard service factor.

- Lighting:

Lighting shall consist of a 120/208 volt distribution system. The lighting system shall be fed from dry type, 120-208 volt, single phase transformers supplied from the 480 volt motor control centers. Normal lighting in incinerator, boiler, cooling tower, precipitator, and turbine-generator areas, and tipping building shall be provided by high pressure sodium and incandescent fixtures. Switchgear, control and battery room shall be by fluorescent fixtures. Outdoor lighting and roadway, parking areas and Plant access shall be by high pressure sodium, and flood-lighting fixtures mounted on poles. Illumination level for all areas shall be based on

recommendations of the Illuminating Engineering Society (IES). Stack lights, if required, shall be provided in accordance with FAA regulations. Emergency lighting shall be provided by battery packs for special locations such as access, egress, and critical operating areas.

- Grounding Grid:

A grounding system shall be furnished in accordance with the requirements of the National Electrical Code to ensure proper grounding of the system, structure and equipment facilities, as well as for personnel safety.

7. The County and FP&L are presently projecting the costs of this interconnection. They estimate that the cost of the basic interconnection will be approximately \$600,000, including the cost of modifications to offsite substations and transmission lines but not the transformers or the circuit breaker or other protective equipment required at the site. Moreover, the basic estimate does not include the following additional costs:

- monthly telephone company charges for the FP&L dispatcher communication channel, which has been estimated by FP&L at \$175 per month at each site;
- maintenance and operation fees to FP&L for interconnection facilities;
- metering costs;
- suitable arrangements for termination of FP&L lines, including adjustment of service points if desirable to provide suitable line terminations;
- costs of all fees and permits, if applicable.

8. FP&L has also provided the County with a preliminary schedule of the avoided fuel costs that FP&L would pay for the recovered electric energy. A copy of that schedule is attached to this Petition as Exhibit C. Although the final determination of the rates to be paid must await completion of the contract negotiations between the Corporation and FP&L, it is important to note that some savings on the cost of electricity will probably be passed on to consumers of electricity residing in Broward County, in addition to the savings to the County's taxpayers and users of the resource recovery facility for the disposal of solid waste, which will result from the offsetting of capital and other costs by FP&L's payment for the energy generated by the County's facility.

9. The proposed electrical power plant will be a resource recovery facility (the facility) that converts unprocessed solid waste (SW) into electricity through mass burning of the SW. Heat from the incineration is used to transform water into steam, which passes through steam turbines and generates electricity. The facility will receive unprocessed SW as its fuel collected primarily from the southern half of Broward County. Processible SW is simply that portion of the total incoming waste stream to the facility that can be burned in its stoker-fired furnaces and includes all forms of garbage, commercial waste, rubbish, leaves and brush, paper and cardboard, plastics, wood and lumber, rags, carpeting, a small amount of

tires, wood furniture, mattresses, stumps, wood pallets, tree limbs, railroad ties, logs, and minor amounts of pathological and biological wastes. The facility will process the SW in four incinerator units, each consisting of a charging hopper and chute, a stoker-fired incinerator, a water-walled boiler and superheater, a rotary kiln, and a turbine generator, in pertinent part. A conceptual drawing of the facility and a diagram of an individual incinerating unit appear in Composite Exhibit D attached to this Petition.

10. The facility is slated to have an initial installed capacity of 2,200 tons per day and an estimated projected ultimate capacity of approximately 3,300 tons per day, while the generating capacity will increase from approximately 51 megawatts to 76.5 megawatts (gross). Since the proposed facility will use mass-burn technology, there will be no preprocessing of wastes at the facility before combustion. SW will be truck-delivered to the facility, and ash residue will be removed by the same mode of transport. Transfer trailers and packer trucks will dump SW directly into the refuse bunker (or storage pit) inside the building. The waste storage pit will be large enough to hold a four-day volume of waste based on the County's guaranteed tonnage. The pit also provides surge capacity and waste storage for operations during periods when waste is not delivered to the Plant. Waterline volume of the pit is approximately 26,000 cubic yards. Materials in the pit that are not appropriate for

processing, such as white goods, are removed from the pit using the overhead crane. These materials are placed via a bypass bay located at one end of the hopper floor into trucks for transport to the landfill; no waste will be stored outside the main building.

Processible waste is removed from the pit and fed to the charging hopper of each individual process line. The cranes are operated from the control room from which the entire pit can be viewed. The entire tipping area is enclosed and combustion air necessary for furnace operation is drawn from this part of the building. This design configuration maintains a slight negative pressure that effectively prevents odor and dust from escaping the tipping building. No additional odor-scrubbing system is necessary, because of the multiple operating lines, at least one of which will always be operating.

Each of the furnaces is equipped with a charging hopper into which the crane deposits waste. The hoppers are designed for an even flow of waste into the charging chute and are equipped with a closed circuit television system to permit close monitoring of waste feeding operations. The chute is equipped with a damper that can be used to seal the furnace. Normally, the refuse in the chute provides an air seal to the furnace, which is under negative pressure, enabling close control of furnace air flows.

From the lower section of the charging chute the waste flows evenly onto the grates. The furnace uses a reciprocating step-grade design comprising three separate grate sections. The refuse is dried and partially ignited on the first grate section and as it moves forward into the furnace, the rocking motion of the grate sections cause it to tumble, thus ensuring thorough mixing and drying. From the drying grate the refuse drops down onto the first burning grate where complete ignition of the refuse takes place. The refuse then falls onto the second burning grate, on which the more volatile material is burned out. At the grate transitions, additional tumbling of the refuse takes place, ensuring that refuse is brought to the surface, ignited, and burned. The action of the grate system also provides for an effective lifting and shearing movement, particularly of the lowest refuse layers, and ensures effective distribution of the combustion air.

The heat for drying and igniting the waste is supplied partly by the flue gases generated by the combustion of the refuse and partly by head radiation from the hot refractory walls and brick arches of the furnace structure. No auxilliary fuel is used at any time during operation. The temperature of the flue gases exiting the furnace is maintained at approximately 1,750°F (954°C) $\pm$ 50°F. The furnace is refractory lined on all sides, with air cooling of the refractory walls immediately above the grate line to reduce slag accumulation on the walls. The

refractory lining ensures an even distribution of radiant heat over the grate and acts as a "thermal flywheel" in maintaining a stable level of combustion on the grate.

From the last burning grate the refuse passes into the refractory-lined rotary kiln. Complete combustion of all remaining unburned refuse takes place within the kiln. The rotating movement provides continual agitation and a long residence time, resulting in an exceptionally high degree of residue burn-out and reduction. The kiln rotational speed is variable to provide residence time corresponding to the higher heating value and moisture content of the waste being processed. Typical residence time throughout the system is two hours. This ability to control residence time of the waste is essential in an area such as Broward County where waste combustion varies seasonally.

A portion of the flue gases generated by waste combustion passes through a brick-lined duct above the furnace to an afterburner chamber, while the remaining flue gases pass through the rotary kiln. The two gas currents are thoroughly mixed by the turbulence in the afterburn chamber at the temperature of approximately 1,750°F (954°C). The result is a thoroughly combusted flue gas, essential for avoiding high temperature corrosion damage of the boiler tube walls.

Each furnace is equipped with a separate primary air fan. Combustion air is drawn from the upper pit area and fed under the grates, from which it flows up between the grate bars

to be distributed evenly throughout the grate area. Primary air flow can be regulated from the control room as can the distribution of air to each individual grate section. Each furnace is also equipped with a secondary air fan, which injects secondary air into the furnace above the grates and through the back wall of the furnace. Secondary air is required to secure effective burn-out of the flue gas and acts as a control on the combustion temperature. The entire furnace volume is maintained under negative pressure by the induced draft fan, which draws the generated combustion flue gases through the system.

11. The design of the power generating equipment will ensure that minimal loss of energy production (either thermal or electrical) will occur throughout the lifetime of the facility. The turbine will be designed for continuous operation, and the facility will use an alternating current synchronous generator. Each facility incinerating unit will be able to process SW at full capacity even during scheduled and unscheduled outages of the turbine-generator.

12. The projected in-service date for the facility is July 1989, with construction scheduled to begin in July 1986. The projected cost for the initial project is approximately \$264 million. Of this amount, approximately, \$18 million is the projected capital cost of the electrical generating facility.

13. The need for this facility rests on several grounds. First, construction and operation of the facility will

satisfy the state and federal policy of encouraging such plants. See Fla. Stat. § 377.709 (Supp. 1984). Second, this policy depends in turn on the goal of energy efficiency, met by this facility because it will use only SW, a nonfossil fuel. In an age of scarce resources, the efficient use of nonfossil fuel assumes great importance. Based on conservative assumptions, the proposed facility will save at least 640,000 barrels of crude oil each year and more than 12.8 million barrels over the life of the project (20 years). Third, the proposed facility will increase the reliability and total capacity of the generating system in South Florida, while avoiding the need to construct other generating facilities using fossil or nuclear fuel to achieve the same goal. The facility will generate more than 300 million kilowatt hours (kWh) of electricity per year, enough electricity to serve more than 40,000 homes. Fourth, the sale of the energy recovered by the facility will substantially offset the cost of disposing of the SW in Broward County. Because the energy revenues will offset capital, operating, and maintenance costs of the facility, the energy recovery will reduce the disposal fees that the County's residents and businesses must bear. Finally, the facility will prolong the useful life of landfills in the County by substantially reducing the volume and weight of the SW converted to energy and residue ash.

14. As for the generating or nongenerating alternatives considered by the County in arriving at the decision to

construct the proposed facility, the County first evaluated available resource recovery technologies and determined that a mass-burning facility was the best available means of disposal of SW and generation of energy for the County at the selected site. The County then evaluated the major available generating alternatives for this type of facility. The two types of available generating alternatives were steam and electricity. Because there was and still is only one viable steam customer (FP&L) in all of Broward County, electric energy generation became the only practical alternative available to the County. Based on a conservative estimate the facility will produce 6000 pounds of steam for every ton of SW processed. Thus, for each ton processed the steam (6000 lbs) produced will be converted to approximately 450 kWh of electrical energy. The only nongenerating alternative open to the facility would be to release the steam into the atmosphere. If this were done, the public would suffer a loss of one million kWh of electrical energy per day. Such a loss would require the electrical company to find another means of supplying power to approximately 40,000 homes.

15. The adverse consequences that would result if the facility could not be constructed as proposed reflect the clear need for this facility and mandate a determination recognizing that need. Preclusion of the facility would result in the loss of the enhanced capacity and reliability of the generating system, as noted in paragraph 12 above. Loss of the facility's

capacity to generate approximately one million kWh per day and serve 40,000 homes would require FP&L to find an alternative means of achieving that capacity, as noted in paragraph 14 above, probably compelling a reliance on nuclear or fossil fuels. The County's consumers of electricity would lose the savings that would result from the recovery of energy from SW. The public would also lose the potential savings of 12.8 million barrels of crude oil that would result from the operation of the facility. Finally, preclusion or delay of the facility would pose a serious threat to the public health, safety, and welfare, because the County's present means of disposing SW will no longer be adequate after 1986.

THEREFORE, Broward County respectfully requests that the Public Service Commission expeditiously review this petition and the exhibits attached to it, put this matter on the agenda for a meeting of the Commission at the earliest available date, and enter an order, which will constitute the report of the Public Service Commission required by section 403.507(1)(b) of the Florida Statutes, finding that there is a need for the pro-

posed Broward County solid-waste-fired electrical power plant as proposed.

Respectfully submitted,

Susan F. Delegal
Broward County
General Counsel, Room 423
115 South Andrews Avenue
Fort Lauderdale, Florida 33301

- and -

GREENBERG, TRAUIG, ASKEW
HOFFMAN, LIPOFF, ROSEN &
QUENTEL, P.A.
Special Counsel to Broward County
1401 Brickell Avenue
Miami, Florida 33131

By: Timothy A. Smith
Timothy A. Smith

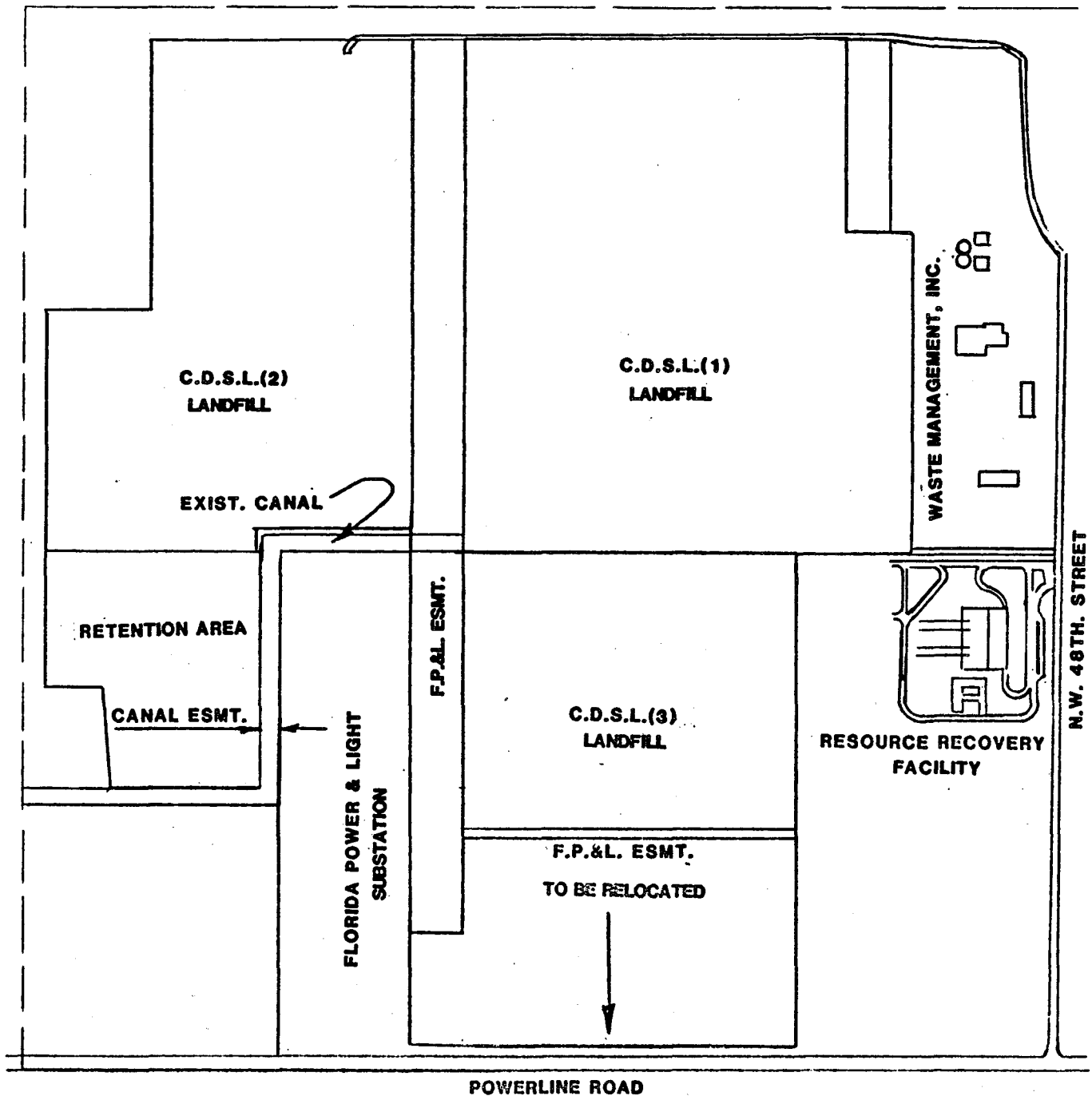
CERTIFICATE OF SERVICE

I certify that a true copy of the foregoing petition was hand delivered to William S. Bilenky, General Counsel, Public Service Commission, Fletcher Building, 101 East Gaines Street, Tallahassee, Florida 32301, on this 21st day of November 1985.

Timothy A. Smith
Timothy A. Smith



FLORIDA'S TURNPIKE



BROWARD COUNTY
RESOURCE RECOVERY SITE & UTILITY LOCATIONS

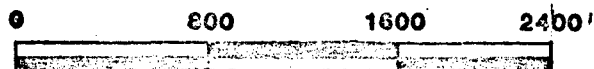


EXHIBIT A

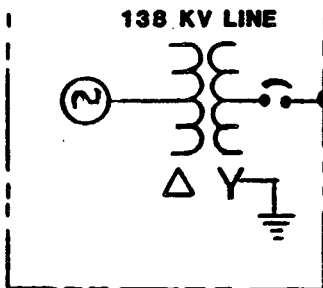


FLORIDA'S TURNPIKE

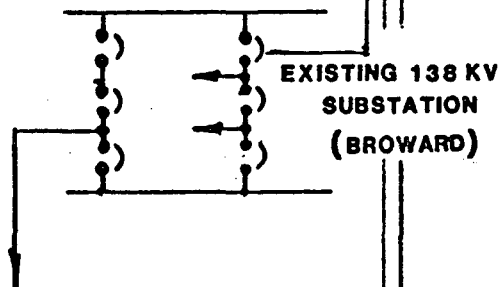
N.W. 48TH. STREET

138 KV LINE

SERVICE POINT



POWERLINE ROAD



SAMPLE ROAD

BROWARD COUNTY

RESOURCE RECOVERY ELECTRICAL INTERCONNECTION SCHEMATIC

WMI SITE

EXHIBIT B

(Continued from Sheet No. 10.100)

ESTIMATED AS-AVAILABLE AVOIDED ENERGY COST

For informational purposes only, the estimated incremental avoided energy costs for the next four semi-annual periods are as follows. These estimates include a 0.1 ¢/KWH credit pursuant to FPSC Order No. 13247 representative of an avoided variable operation and maintenance expense.

Applicable Period	On-Peak ¢/KWH	Off-Peak ¢/KWH	Average ¢/KWH
October 1, 1985 - March 31, 1986	3.882	3.511	3.601
April 1, 1986 - September 30, 1986	4.370	3.653	3.845
October 1, 1986 - March 31, 1987	4.110	3.573	3.704
April 1, 1987 - September 30, 1987	4.150	3.658	3.790

A MW block size ranging from 41 MW to 222 MW has been used to calculate the estimated avoided energy cost.

DELIVERY VOLTAGE ADJUSTMENT

The Company's actual hourly avoided energy costs shall be adjusted according to the delivery voltage by the following multipliers:

Delivery Voltage	Adjustment Factor
Transmission Voltage Delivery	1.0000
Primary Voltage Delivery	1.0118
Secondary Voltage Delivery	1.0212

For informational purposes the Company's projected annual generation mix and fuel prices are as follows:

PROJECTED ANNUAL GENERATION MIX AND FUEL PRICES

Year	Generation by Fuel Type (%)					Price by Fuel Type (\$/MMBTU)			
	Nuclear	Oil	Gas	Coal	Purchased Power	Nuclear	Oil	Gas	Coal
1985	39	9	18	-	34	0.67	4.53	3.43	-
1986	37	9	20	-	34	0.68	4.66	3.71	-
1987	36	8	18	2	36	0.67	5.12	4.03	2.40
1988	36	7	16	4	37	0.69	5.71	4.72	2.55
1989	34	9	16	6	35	0.72	6.35	5.62	2.72
1990	32	11	16	6	35	0.77	7.06	6.22	2.89
1991	33	11	16	6	34	0.83	7.60	6.71	3.08
1992	31	13	16	6	34	0.89	8.19	7.23	3.29
1993	30	14	15	6	35	0.96	8.81	7.78	3.50
1994	31	14	15	6	34	1.01	9.48	8.36	3.74

NOTE: The Company's forecasts are for illustrative purposes, and are subject to frequent revision.

(Continued on Sheet No. 10.102)

EXHIBIT C

(Continued from Sheet No. 10.102)

B. Interconnection Charge for Non-Variable Utility Expenses:

The Qualifying Facility shall bear the cost required for interconnection including the metering. The Qualifying Facility shall have the option of payment in full for interconnection or making equal monthly installment payments over a thirty-six (36) month period together with interest charged at the rate then prevailing for the thirty (30) days highest grade commercial paper rate; such rate to be determined by the Company thirty (30) days prior to the date of each payment.

C. Interconnection Charge for Variable Utility Expenses:

The Qualifying Facility shall be billed monthly for the cost of variable utility expenses associated with the operation and maintenance of the interconnection. These include (a) the Company's inspections of the interconnection and (b) maintenance of any equipment beyond that which would be required to provide normal electric service to the Qualifying Facility if no sales to the Company were involved.

In lieu of payments for actual charges, the Qualifying Facility may pay a monthly charge equal to a percentage of the installed cost of the interconnection facilities. The applicable percentages are as follows:

<u>Equipment Type</u>	<u>Charge</u>
Metering Equipment	0.436%
Distribution	0.544%
Transmission Equipment	0.193%

D. Taxes and Assessments

The Qualifying Facility shall be billed monthly an amount equal to the taxes, assessments, or other impositions, if any, for which the Company is liable as a result of its purchases of As-Available Energy produced by the Qualifying Facility.

TERMS OF SERVICE

- (1) It shall be the Qualifying Facility's responsibility to inform the Company of any change in its electric generation capability.
- (2) Any electric service delivered by the Company to the Qualifying Facility shall be metered separately and billed under the applicable retail rate schedule and the terms and conditions of the applicable rate schedule shall pertain.
- (3) A security deposit will be required in accordance with FPSC Rules 25-17.82(5) and 25-6.97, F.A.C. and the following:
 - A. In the first year of operation, the security deposit shall be based upon the singular month in which the Qualifying Facility's projected purchases from the Company exceed, by the greatest amount, the Company's estimated purchases from the Qualifying Facility. The security deposit should be equal to twice the amount of the difference estimated for that month. The deposit shall be required upon interconnection.
 - B. For each year thereafter, a review of the actual sales and purchases between the Qualifying Facility and the Company shall be conducted to determine the actual month of maximum difference. The security deposit shall be adjusted to equal twice the greatest amount by which the actual monthly purchases by the Qualifying Facility exceed the actual sales to the Company in that month.
- (4) The Company shall specify the point of interconnection and voltage level.
- (5) The Qualifying Facility must enter into an interconnection agreement with the Company which will, among other things, specify safety and reliability standards for the interconnection to the Company's system. In most instances, the Company's filed Interconnection Agreement for Qualifying Facilities will be used; however, special features of the Qualifying Facility or its interconnection to the Company's facilities may require modifications to this agreement or the safety and reliability standards contained therein.

(Continued on Sheet No. 10.104)

(Continued from Sheet No. 10.202)

B. Energy Rates**(1) Payments Prior to April 1, 1992:**

The energy rate, in cents per kilowatt-hour (¢/KWH), shall be based on the Company's actual hourly avoided energy costs which are calculated by the Company in accordance with FPSC Rule 25-17.825, F.A.C. Avoided energy costs include incremental fuel, identifiable operation and maintenance expenses, and an adjustment for line losses reflecting delivery voltage. The calculation of the Company's avoided energy costs reflects the delivery of energy to the region of the Company in which the Qualifying Facility is located. Energy payments to Qualifying Facilities located outside the Company's service territory reflect the region in which the interchange point for the delivery of energy is located. When economy transactions take place, the incremental costs are calculated after the purchase or before the sale of the economy energy.

The calculation of payments to the Qualifying Facility shall be based on the sum, over all hours of the billing period, of the product of each hour's avoided energy cost times the purchases by the Company for that hour. All purchases shall be adjusted for losses from the point of metering to the point of interconnection.

(2) Payments Starting on April 1, 1992:

The energy rate, in cents per kilowatt-hour (¢/KWH), shall be the lesser of an hour-by-hour comparison of: (a) the fuel component of the Company's avoided energy costs calculated in accordance with Rule 25-17.825 F.A.C.; and (b) the Statewide Avoided Unit fuel cost. The Statewide Avoided Unit Fuel Cost, in cents per kilowatt-hour (¢/KWH) shall be defined as the product of: (a) the average monthly inventory charge-out price of coal burned at Tampa Electric Company's Big Bend Unit No. 4, in cents per million Btu; and (b) an average annual heat rate of 10.5 million Btu per megawatt-hour.

Calculations of payments to the Qualifying Facility shall be based on the sum, over all hours of the billing period, of the product of each hour's avoided energy cost times the purchases by the Company for that hour. All purchases shall be adjusted for losses from the point of metering to the point of interconnection.

ESTIMATED FIRM ENERGY COST

For informational purposes only, the estimated incremental avoided energy costs for the next four semi-annual periods are as follows. These estimates include a 0.1 ¢/KWH credit pursuant to FPSC Order No. 13247 representative of an avoided variable operation and maintenance expense.

Applicable Period	On-Peak ¢/KWH	Off-Peak ¢/KWH	Average ¢/KWH
October 1, 1985 - March 31, 1986	3.882	3.511	3.601
April 1, 1986 - September 30, 1986	4.370	3.653	3.845
October 1, 1986 - March 31, 1987	4.110	3.573	3.704
April 1, 1987 - September 30, 1987	4.150	3.658	3.790

A MW block size ranging from 41 MW to 222 MW has been used to calculate the estimated avoided energy cost.

The estimated avoided fuel costs associated with the Statewide Avoided Unit are as follows:

¢/KWH*										
<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
3.58	3.79	4.02	4.25	4.50	4.76	5.03	5.32	5.63	5.96	6.31

* Based on current estimates of the delivered price of coal to the Tampa Electric Company, Big Bend No. 4 coal unit.

(Continued on Sheet No. 10.204)

(Continued from Sheet No. 10.203)

PERFORMANCE CRITERIA

Payments for Firm Capacity are conditioned on the Qualifying Facility's ability to maintain the following performance criteria:

A. Commercial In-Service Date

Capacity payments shall not commence until the Qualifying Facility has attained and demonstrated commercial in-service status. The commercial in-service date of a Qualifying Facility shall be defined as the first day of the month following the successful completion of the Qualifying Facility maintaining an hourly kilowatt (KW) output, as metered at the point of interconnection with the Company, equal to or greater than the Qualifying Facility's "Standard Offer Contract" committed capacity for a 24 hour period. A Qualifying Facility shall coordinate the selection of and operation of its facility during this test period with the Company to insure that the performance of its facility during this 24 hour period is reflective of the anticipated day to day operation of the Qualifying Facility.

B. Capacity Factor

Upon achieving commercial in-service status, payments for Firm Capacity shall be made monthly in accordance with the capacity payment rate option selected by the Qualifying Facility and subject to the provision that the Qualifying Facility maintains a 70% capacity factor on a 12 month rolling average basis as defined in Appendix A. Failure to achieve this capacity factor shall result in the Qualifying Facility's forfeiture of payments for Firm Capacity during the month in which such failure occurs. Where early capacity payments have been elected and starting with the month of April 1992, failure of a Qualifying Facility to maintain a 70% capacity factor on a 12 month rolling average basis shall also result in payments by the Qualifying Facility to the Company. The amount of such payments shall be equal to the difference between: (1) what the Qualifying Facility would have been paid had it elected the normal payment option starting April, 1992; and (2) what it would have been paid pursuant to the early payment option had it maintained the capacity factor performance criteria.

All capacity payments made by the Company prior to April 1, 1992 are considered "early payments". The owner or operator of the Qualifying Facility, as designated by the Company, shall secure its obligation to repay, with interest, the cumulative amount of early capacity payments in the event the Qualifying Facility defaults under the terms of its "Standard Offer Contract" with the Company. The Company will provide monthly summaries of the total outstanding balance of such security obligations. A summary of the types of security instruments which are generally acceptable to the Company is discussed in Appendix A.

C. Additional Criteria

- (1) The Qualifying Facility shall provide monthly generation estimates by October 1 for the next calendar year; and
- (2) The Qualifying Facility shall promptly update its yearly generation schedule when any changes are determined necessary; and
- (3) The Qualifying Facility shall agree to reduce generation or take other appropriate action as requested by the Company for safety reasons or to preserve system integrity; and
- (4) The Qualifying Facility shall coordinate scheduled outages with the Company; and
- (5) The Qualifying Facility shall comply with the reasonable requests of the Company regarding daily or hourly communications.

DELIVERY VOLTAGE ADJUSTMENT

Energy payments to Qualifying Facilities within the Company's service territory shall be adjusted according to the delivery voltage by the following multipliers:

<u>Delivery Voltage</u>	<u>Adjustment Factor</u>
Transmission Voltage Delivery	1.0000
Primary Voltage Delivery	1.0118
Secondary Voltage Delivery	1.0212

METERING REQUIREMENTS

Qualifying Facilities within the territory served by the Company shall be required to purchase from the Company hourly recording meters to measure their energy deliveries to the company. Energy purchases from Qualifying Facilities outside the territory served by the Company shall be measured as the quantities scheduled for interchange to the Company by the entity delivering Firm Capacity and Energy to the Company.

(Continued on Sheet No. 10.205)

(Continued from Sheet No. 10.204)

For the purpose of this schedule, the on-peak hours occur Monday through Friday except holidays, April 1 - October 31 from 12 noon to 9:00 P.M. and November 1 - March 31 from 6:00 A.M. to 10:00 A.M. and 6:00 P.M. to 10:00 P.M.. All hours mentioned above and all hours of the holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day are off-peak hours.

BILLING OPTIONS.

The Qualifying Facility may elect to make either simultaneous purchases and sales or net sales. The decision to change billing methods can be made once every twelve (12) months coinciding with the next Fuel and Purchased Power Cost Recovery Factor billing period providing the Company is given at least thirty days written notice before the change is to take place. In addition, allowance must be made for the installation or alteration of needed metering or interconnection equipment for which the qualifying facility must pay; and such purchases and/or sales must not abrogate any provisions of the tariff or contract with the Company.

A statement covering the charges and payments due the Qualifying Facility is rendered monthly, and payment normally is made by the twentieth business day following the end of the billing period.

CHARGES TO QUALIFYING FACILITY:**A. Customer Charges:**

<u>Rate Schedule</u>	<u>Customer Charge(\$)</u>	<u>Rate Schedule</u>	<u>Customer Charge(\$)</u>
GS-1	9.00	CST-1	110.00
GST-1	12.30	GSLD-2	170.00
GSD-1	35.00	GSLDT-2	170.00
GSDT-1	41.50	CS-2	170.00
RS-1	5.65	CST-2	170.00
RST-1	8.95	GSLD-3	400.00
GSLD-1	41.00	CS-3	400.00
GSLDT-1	41.00	CST-3	400.00
CS-1	110.00	GSLDT-3	400.00

B. Interconnection Charge for Non-Variable Utility Expenses

The Qualifying Facility shall bear the cost required for interconnection including the metering. The Qualifying Facility shall have the option of payment in full for interconnection or making equal monthly installment payments over a thirty-six (36) month period together with interest charged at the rate then prevailing for thirty (30) days highest grade commercial paper; such rate to be determined by the Company thirty (30) days prior to the date of each payment.

C. Interconnection Charge for Variable Utility Expenses

The Qualifying Facility shall be billed monthly for the cost of variable utility expenses associated with the operation and maintenance of the interconnection. These include (a) the Company's inspections of the interconnection and (b) maintenance of any equipment beyond that which would be required to provide normal electric service to the Qualifying Facility if no sales to the Company were involved.

In lieu of payment for actual charges, the Qualifying Facility may pay a monthly charge equal to a percentage of the installed cost of the interconnection facilities. The applicable percentages are as follows:

<u>Equipment Type</u>	<u>Charge</u>
Metering Equipment	0.436%
Distribution Equipment	0.544%
Transmission Equipment	0.193%

D. Taxes and Assessments

The Qualifying Facility shall be billed monthly an amount equal to the taxes, assessments, or other impositions, if any, for which the Company is liable as a result of its purchases of Firm Capacity and Energy produced by the Qualifying Facility.

(Continued on Sheet No. 10.206)

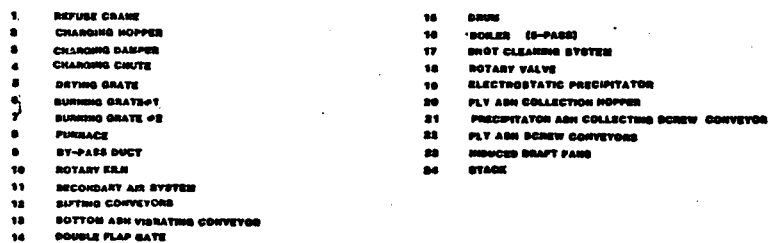


EXHIBIT D

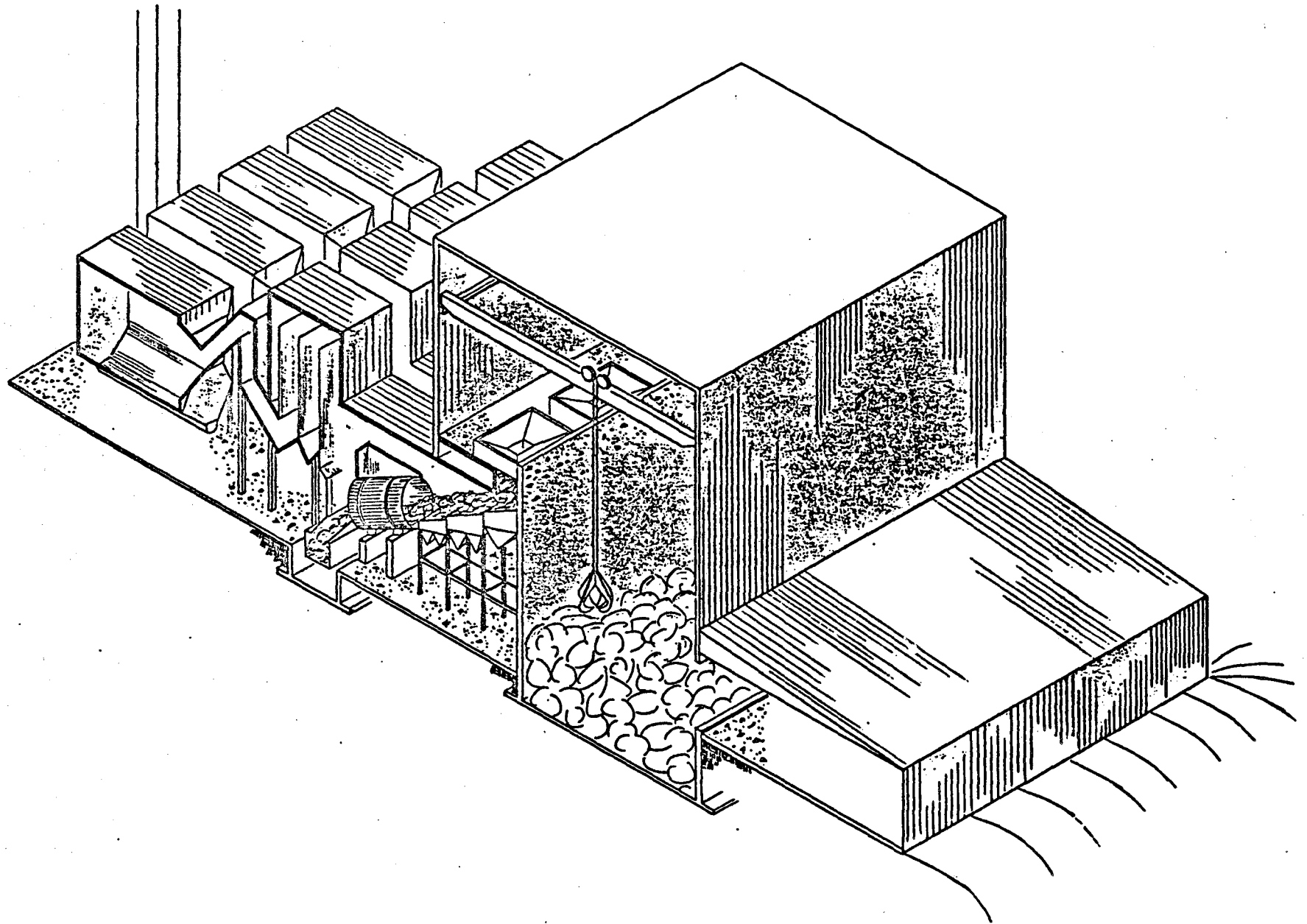


EXHIBIT D

VEGETATION SURVEY



Waste Management, Inc.
Resource Recovery
10008 North Dale Mabry Hwy.
Tampa, Florida 33618
Suite 115 • 813/963-7122

September 20, 1985

Mr. Thomas M. Henderson
Broward County Resource Recovery Office
Room 521
115 S. Andrews Avenue
Fort Lauderdale, FL 33301

Subject: Broward County Waste-to-Energy Project
Environmental Survey of 48th Street Site

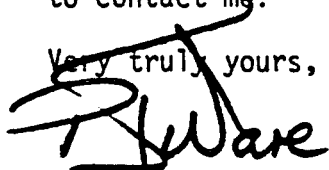
Dear Mr. Henderson:

Pursuant to your recent request, I arranged for Dr. Robin Hart of Environmental Science and Engineering, Inc. to conduct a vegetation survey of the proposed site located on N.W. 48th Street, midway between Powerline Road and Florida's Turnpike.

Ms. Hart visited the site on September 12, 1985, and a copy of her report is attached for your information.

If you should have any questions or comments, please do not hesitate to contact me.

Very truly yours,

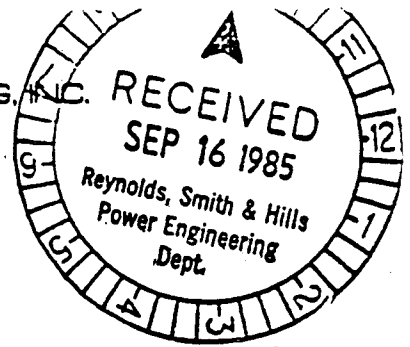

Peter J. Ware
Project Manager

PJW:cw

Attachment

cc: Ms. Phyllis Korab ✓

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.



MEMORANDUM September 13, 1985

TO: Steve Cowen

FROM: Robin Hart

SUBJECT: September 12 - Vegetation Survey of Proposed Incinerator Site
North Broward County for Waste Management, Inc.

GENERAL: The proposed site borders Greer Avenue and is located across the street and south of York Lake, a 200+ acre borrow pit. It is drained by canals which border it on the south and west. The site has been cleared, scraped, and bulldozed in the past so that the surface is irregular with low areas and dirt mounds scattered throughout. A business establishment with a fenced yard occupies the north-central section of the site. There is little vegetation in this fenced-in area which contains vehicles and vehicle parts. Concrete block walls mark off sections of the site.

No environmentally significant species (i.e. rare, unique, threatened, endangered, or indicative of significant connected wetland areas) was observed on the site. All species observed are typical of those found on disturbed sites in south Florida.

DETAILED OBSERVATIONS: Vegetation in the eastern section of the site is dominated by woody plants and is more mature than the vegetation in the western section. It is dominated primarily by Australian pine (Casuarina cfr. equisetifolia). Groundsel bush (Baccharis halimifolia) and Brazilian pepper-tree (Schinus terebinthefolius) and dog fennel (Eupatorium capillifolium) are abundant in the understory.

There is less vegetative cover in the western section than on the east. Herbaceous species, primarily grasses, dominate this portion of the site. They include Bermuda grass (Cynodon dactylon), sandspur grass (Cenchrus echinatus), blue stem grasses (Andropogon spp.), white beggar-ticks (Bidens pilosus), common ragweed (Ambrosia artemisiifolia), dog fennel, camphor weed (Heterotheca subaxillaris), wild balsam apple (Momordica charantia) and many other mostly annual weedy species.

The canals bordering the site are 4 to 5 feet below the surface in most areas and are lined by Brazilian pepper-tree and castor bean (Ricinus communis). However, there are some low spots bordering the canal on the southeast which support the following species: cattails (Typha domingensis), Carolina willow (Salix caroliniana), primrose willow (Ludwigia peruviana), camphor weed (Pucea purpurascens) and a few Melaleuca (Melaleuca quinquenervia) saplings. These are wetland species, but it is assumed that the canals and associated borders would not be affected by the proposed facilities.

GEOTECHNICAL REPORTS

APPENDIX 10.8

Florida Testing & Engineering Co.
Engineering Laboratory

6784 N.W. 17th Avenue, Fort Lauderdale, Florida 33309 (305) 971-4400

REPORT OF SUBSOIL INVESTIGATION
FOR
TAMPA WASTE MANAGEMENT RESOURCES, INC.
AT
BROWARD COUNTY RESOURCE RECOVERY
PROJECT

September, 1985



REPORT OF SUBSOIL INVESTIGATION
FOR
TAMPA WASTE MANAGEMENT RESOURCES, INC.
AT
BROWARD COUNTY RESOURCE RECOVERY
PROJECT

By
Florida Testing & Engineering Co.
September, 1985

INTRODUCTION:

The purpose of this report is to present the results of our geotechnical investigation performed at the Broward County Resource Recovery project site.

A field testing program was conducted to obtain detailed information concerning existing subsoil and ground water conditions at the site. This information was utilized in the development of recommendations for geotechnical site preparation and foundation support. Included in this report are the following:

1. The results of fifteen (15) "Standard Penetration" borings performed within the areas of proposed structures, or as near as existing obstructions would allow.
2. Brief project and site descriptions.
3. A general description of the field testing program and boring techniques.
4. A review of the boring results.
5. A boring location sketch.
6. Recommendations for soil preparation and support of proposed construction.

PROJECT DESCRIPTION:

The proposed Broward County Resource Recovery Project will consist of the following structures:

REFUSE PIT: 100' x 315' concrete structure. Bottom slab 10' below grade. Refuse Weight =2000 PSF.

PROJECT DESCRIPTION (Continued)

TIPPING FLOOR: 100' x 315' concrete slab on 20' embankment. Structural steel framing with light-weight roofing and siding.

OPERATION AREA: 35' x 315' three-story high. Includes hoppers and rotary kilns, structural steel framing, concrete floors.

BOILER AREA: Four 50' x 30' x 80' high boilers.

TURBINE AREA: 50' x 120' building.

PRECIPITATOR AREA: Four 50' x 40' x 65' high precipitators.

STACK: Steel stack with lining, 200' tall.

ASH HANDLING AREA: 100' x 200' concrete slab with two ash piles, 30' high (ash weight -1800 PSF).

GARAGE: 70' x 125' x 1 story pre-engineered building.

COOLING TOWER: 50' x 100'

In addition to the foregoing structures, associated parking facilities and roadway systems will be constructed.

SITE DESCRIPTION:

The project site consists of 25⁺ acres and lies approximately 1700' West of Powerline Road on the South side of N.W. 48 Street, (Helton Road) in Pompano Beach, Florida. The site can be legally described as a portion of the N.W. 1/4 of the N.E. 1/4 of Section 16, 48-S, 42-E, Broward County, Florida. No actual topographical information is available for this report, however there appears to be a maximum differential in grade of 5' between boring locations. Visual inspection of the site confirmed these grade variations, which included some low areas with standing water.

SITE DESCRIPTION:(continued)

Overgrowth consists primarily of low weed growth, however, there are several areas of very dense weed growth as well as some Australian pine trees. Existing structures at the site consist of a fenced-in construction yard and temporary office quarters, a concrete block wall transversing the property in a North-South direction at approximately midpoint East and West, and another concrete block wall running in a North-South direction along the East property line, beginning at the South property line and extending approximately 600' to the North. The property is bounded on the West by a small drainage canal.

FIELD INVESTIGATION:

The field investigation consisted of 15 "Standard Penetration" borings conducted in the general locations selected by the project engineer, Reynolds, Smith & Hills. No survey data or stakes were provided, therefore actual field locations were made with a 100' tape and assumed right angles. Boring numbers and depth of borings was predetermined by the project engineer.

All borings were conducted in general accordance with ASTM D-1586 and standard laboratory procedures.

A 2' long, 2" diameter, split-spoon sampler was driven continuously, in 2' increments, to a depth of 12' below existing grade. From that point, to terminal depth of the borings, sampling was done at 5' intervals. Representative samples were secured from each boring location and returned to our laboratory, where they will be stored

FIELD INVESTIGATION (continued)

for sixty (60) days. If they are not claimed by our client, or his authorized representative, in that time, they will be discarded.

BORING RESULTS:

A review of the borings reveals that a large portion of the area tested had been previously excavated, then backfilled with a mixture of sand and construction debris. The possibility also exists that silty material such as water or sewer plant sludge has been buried at the site (see Boring #15). Depth of these buried materials varied from 15' to 35' below the surface in the borings, however, this does not preclude the possibility of deeper deposits. In the locations in which debris or silt were encountered, the underlying soil was a medium to fine grained silica sand to terminal depth of the borings. These sand deposits were in a medium dense state, with occasional loose zones.

In the locations where no debris was encountered, notably the Eastern portion of the project, the material was basically sand from the surface to terminal depth of the borings.

Occasional limerock or marl inclusions were noted, generally in the upper 15' of boring. Soil bearing values in these areas varied from 1000 to 4000 p.s.f.

CONCLUSIONS & RECOMMENDATIONS

Foundation Support:

On the basis of this study, we wish to offer the following relative to support of proposed construction. A uniformity of soil profile between borings has been assumed, and a factor of safety of two (2) against failure in shear has been considered. Recommended loadings should be construed to apply only to the foundation elements discussed herein.

Due to the wide variation in depth of the debris encountered at the site and its' non-conformable horizontal pattern, we recommend that pile support be provided for foundation elements of the refuse pit, operation area, boiler area, precipitator area, stack, and ash handling area. The nature of the debris encountered indicates that it would be extremely difficult, if not impossible, to utilize driven concrete piling or augercast piling, therefore we recommend consideration be given to steel "H" piling or Pressure Injected Footings (PIFs), both of which have been successfully utilized in this type of landfill.

It is not possible to project realistic friction values thru debris sections, nor is it realistic to rely solely on calculated end bearing values, therefore, it will be necessary to install test piling at various locations to determine design depth and capacity of the pile system. We do, however, recommend a minimum penetration of 35' below existing grade for piling systems until sufficient additional information is provided that would allow for less penetration.

CONCLUSIONS & RECOMMENDATIONS

FOUNDATION SUPPORT:(Continued)

In the areas of the cooling tower, garage and turbine building, the borings conducted did not indicate the presence of buried debris, therefore it may be possible to utilize spread footings for foundation support. It will be necessary, however, to conduct a thorough test pit investigation in these areas to make that determination. It will also be necessary to conduct additional SPT borings to provide recommendations for allowable soil bearing values or recommended soil treatment.

For the lightweight steel frame structure covering the tipping floor, we recommend placing the column pads in the compacted embankment section and designing for an allowable soil bearing value of 2500 p.s.f.

It it is desired, columns along the South wall of this structure may be supported by the Refuse Pit retaining wall. Estimated differential settlement for this structure is 1.5 inches.

GROUND FLOOR SLABS:

We recommend that the ground floor slabs in all pile supported structures be designed as structural slabs supported by piling and grade-beam systems.

In the structures that do not require pile support, the ground floor slabs may be designed as slabs on grade. In these areas, we recommend that a minimum density of 95% of AASHTO T-180-74 be established to a depth of 5' below bottom of slab elevation.

GROUND FLOOR SLABS (Continued)

The concrete slab in the Tipping Floor area can be designed as a slab on grade supported by the 20 ft.⁺ embankment fill section to be constructed. The embankment fill should be placed in lifts not to exceed 12" in thickness and compacted to a minimum density of 98% of AASHTO T-180-74.

The borings are representative of the areas tested, only, and if any unusual or varying soil conditions are encountered during construction, further engineering services will be required.

The data from the boring logs is for purposes of foundation analysis, only, and is not to be used for excavating or backfilling quantities.

Respectfully Submitted,
FLORIDA TESTING & ENGINEERING CO.



J. V. Winterholler, Jr., P.E.
Registered Engineer No. 6893
State of Florida.

GENERAL QUALIFICATIONS ARE ENCLOSED.

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

GENERAL QUALIFICATIONS

This report has been prepared in order to aid in the evaluation of this property, and to assist the architect and/or engineer in the design of this project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the building as outlined in this report, are planned, we should be informed so the changes can be reviewed and the conclusions of this report modified or approved in writing by the soil and foundation engineer.

It is recommended that all construction operations dealing with earthwork and foundations be reviewed by an experienced soil engineer to provide information on which to base a decision whether the design requirements are fulfilled in the actual construction. If you wish, we would welcome the opportunity to provide field construction services for you during construction.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated on the location diagram, and from any other information discussed in this report. This report does not reflect any variations which may occur between these borings. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between boring locations, and also such situations as ground water levels vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, it will be necessary for a re-evaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.

Because of the possibility of these unanticipated subsurface conditions occurring, we recommend that a "changed condition" clause be provided in the contract, both with the general contractor and in contracts with sub-contractors involved in the foundation and earthwork construction. It is felt that the inclusion of this clause will permit contractors to give lower prices because they will not need to provide as much in contingencies as they normally would if equitable adjustment of changed conditions will minimize conflicts and litigation with the attendant delays and costs. Furthermore, by the immediate recognition and adjustment in contract price at the time any changed conditions are encountered, the immense problem of trying to recreate facts when litigation develops later is eliminated. A mediation/arbitration procedure is recommended in the event that the owner, contractor and professionals

do not agree on the changed conditions at the moment they are disclosed.
If you wish, we would be pleased to furnish additional information per-
taining to this procedure.

Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. by 270' W. of

: N.E. Property Corner

Date Started/Comp.: 9/11/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-1

Driller: Davis/Gordon/May, Rig #1

Water Level Located: 4.0' below the surface

Water Level Read on: 9/11/85, at 5:20 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
							*				
				1		5/5	4	1.0	1.0	1	[SP] TAN/BROWN MEDIUM FINE SILTCA SAND TR/LINEROCK
				2		7/8	5	1.0	2.0	2	TAN MEDIUM FINE SILICA SAND TR/MARL
						7/7	6			3	TAN/BROWN MEDIUM FINE SILICA SAND TR/LINEROCK
						9/2	9			4	
						7/6	4			5	
						6/5	5			6	
						2/2	2			7	
				3		2/1	1	6.0	8.0	8	
						1/1	1			9	[] TAN/GRAY MEDIUM FINE SILTCA SAND W/WOOD (DEBRIS)
				4		1/2	15	2.0	10.0	10	
						3/4	23			11	[SP] GRAY MEDIUM FINE SILICA SAND

Log Continued on Next Page

The above test boring was conducted in accordance with A.S.T.M. designation D-1586.
 As a mutual protection to the owners and ourselves, the engineer in the owner's behalf shall check this report with the samples submitted prior to the purchase of property, or designing of structures.

Florida Testing & Engineering Co.
 By J. V. Winterholler
 J. V. Winterholler, P.E.

As a further protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. by 270' W. of

: N.E. Property Corner

Date Started/Comp.: 9/11/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-1

Driller: Davis/Gordon/May, Rig #1

Water Level Located: 4.0' below the surface

Water Level Read on: 9/11/85, at 5:20 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						4/4	14			12	
							16			13	
							19			14	
				5			25	5.0	15.0	15	
						9/10	8			16	GRAY MEDIUM FINE SILICA SAND
						10/10	8			17	
							11			18	
							12			19	
				6			18	5.0	20.0	20	
						8/9	33			21	GRAY MEDIUM FINE SILICA SAND
						9/9	33			22	

Log Continued on Next Page

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Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 : Resource Inc.
 Project: Broward County Resource
 : Recovery Project
 Location: App. 260' S. by 270' W. of
 : N.E. Property Corner

Date Started/Comp.: 9/11/85
 Remarks: *300 lb. Hammer

Order Number: 10712
 Boring Number: B-1

Driller: Davis/Gordon/May, Rig #1
 Water Level Located: 4.0' below the surface
 Water Level Read on: 9/11/85, at 5:20 pm
 Ground Elevation : Not Given
 S.P.T.: 140 lb. Hammer; 30" Drop:
 S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								32		23	
								42		24	
				7				53	5.0	25	
						4/6		16		26	TAN MEDIUM FINE SILICA SAND
						7/8		19		27	
								15		28	
								17		29	
				8				21	5.0	30	
						8/8		25		31	BROWN MEDIUM FINE SILICA SAND
						8/9		32		32	
								45		33	

Log Continued on Next Page

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Florida Testing & Engineering Co.
 By *J. V. Winterholler*
 J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.

Engineer's Laboratory

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
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Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-1

Driller: Davis/Gordon/May, Rig #1

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Water Level Read on: 9/11/85, at 5:20 pm

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Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
							56		34	
				9			54	5.0	35.0	
						11/10	37		36	
						8/7	33		37	
							32		38	
							47		39	
				10			67	5.0	40.0	
						3/4	40		41	
						9/9	24		42	
							31		43	
							42		44	

Log Continued on Next Page

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Florida Testing & Engineering Co.
By *[Signature]*
J. V. Winterkeller, P.E.

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				11			47	5.0	45.0	LIGHT BROWN MEDIUM FINE SILICA SAND
						5/8	30		46	
						9/10	31		47	
							33		48	
							34		49	
				12			31	5.0	50.0	TAN MEDIUM FINE SILICA SAND
						6/7	24		51	
						8/8	30		52	
							31		53	
							36		54	
				13			42	5.0	55.0	

Log Continued on Next Page

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Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-1

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Water Level Located: 4.0' below the surface

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Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						4/6	20		56	TAN MEDIUM FINE SILICA SAND
						7/7	24		57	
								26	58	
								28	59	
				14				30	60	
						3/4	19		61	TAN MEDIUM FINE SILICA SAND
						4/5	25		62	
								29	63	
								31	64	
				15				34	65	
						6/9	23		66	GRAY FINE MEDIUM SILICA SAND

Log Continued on Next Page

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Florida Testing & Engineering Co.

By

J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. by 270' W. of

: N.E. Property Corner

Date Started/Comp.: 9/11/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-1

Driller: Davis/Gordon/May, Rig #1

Water Level Located: 4.0' below the surface

Water Level Read on: 9/11/85. at 5:20 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						9/10	26		67	GRAY FINE MEDIUM SILICA SAND
							29		68	
							29		69	
				16			32	5.0	70	
						7/10	25		71	
						11/11	27		72	
							28		73	
						9/12			74	
				17		11/12		5.0	75	

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By *J. V. Winterholler*

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
Project: Resource Inc.
Location: Broward County Resource
Recovery Project

Rig #: App. 270' W. & 500' S. of the
Date Started: N.E. Property Corner
Date Completed: 9/12/85
Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: B-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						8/7	4			[SP] BROWN MEDIUM FINE SILICA SAND
						7/7	5			
						7/7	7			
						8/10	10			
				1		5/4	8	5.0	5.0	
						8/8	8			TAN MEDIUM FINE SILICA SAND W/TR LINEROCK
						7/7	5			
						7/8	6			
						11/11	6			
				2		12/13	11	5.0	10.5	
						7/7	20			TAN MEDIUM FINE SILICA SAND W/TR LINEROCK

Log Continued on Next Page

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Florida Testing & Engineering Co.
Engineer's Laboratory
 6784 N.W. 17th Avenue
 Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

Project: Resource Inc.

Location: Broward County Resource

: Recovery Project

Rig #: App. 270' W. & 500' S. of the

Date Started: N.E. Property Corner

Date Completed: 9/12/85

Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: S-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						7/7	11		12	
							10		13	
							10		14	
				3			12	5.0	15	
						2/2	4		16	GRAY MEDIUM FINE SILICA SAND
						2/3	4		17	
							4		18	
							3		19	
				4			4	5.0	20	
						3/3	4		21	GRAY MEDIUM FINE SILICA SAND
						3/4	5		22	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

Project: Resource Inc.

Location: Broward County Resource

: Recovery Project

Rig #: App. 270' W. & 500' S. of the

Date Started: N.E. Property Corner

Date Completed: 9/12/85

Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: B-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								7		23	
								13		24	
				5				15	5.0	25	
						4/6		7		26	BROWN MEDIUM FINE SILICA SAND
						6/7		6		27	
								7		28	
								17		29	
				6				21	5.0	30	
						5/7		18		31	BROWN MEDIUM FINE SILICA SAND
						7/7		17		32	
								38		33	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

Project: Resource Inc.

Location: Broward County Resource

: Recovery Project

Rig #: App. 270' W. & 500' S. of the

Date Started: N.E. Property Corner

Date Completed: 9/12/85

Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: B-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
							48		34	
				7			40	5.0	35	
						4/4	20		36	BROWN MEDIUM FINE SILICA SAND
						5/6	28		37	
							20		38	
							22		39	
				8			21	5.0	40	
						5/6	18		41	TAN MEDIUM FINE SILICA SAND
						7/7	22		42	
							35		43	
							24		44	

Log Continued on Next Page

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Florida Testing & Engineering Co.
By *[Signature]*

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

Project: Resource Inc.

Location: Broward County Resource

: Recovery Project

Rig #: App. 270' W. & 500' S. of the

Date Started: N.E. Property Corner

Date Completed: 9/12/85

Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: B-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2. ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
				9			24	5.0	45.0	TAN MEDIUM FINE SILICA SAND
						5/6	24		46	
						6/7	25		47	
							26		48	
							26		49	
				10			29	5.0	50.0	TAN MEDIUM FINE SILICA SAND
						4/4	16		51	
						6/7	21		52	
							28		53	
							31		54	
				11			37	5.0	55.0	

Log Continued on Next Page

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Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 Project: Resource Inc.
 Location: Broward County Resource
 : Recovery Project

Rig #: App. 270' W. & 500' S. of the
 Date Started: N.E. Property Corner
 Date Completed: 9/12/85
 Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: A-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						8/12	15			56	BROWN MEDIUM FINE SILICA SAND
						14/14	24			57	
							31			58	
							36			59	
				12			43	5.0	60.0	60	
						5/10	24			61	BROWN MEDIUM FINE SILICA SAND
						12/13	31			62	
							35			63	
							39			64	
				13			46	5.0	65.0	65	
						7/11	29			66	BROWN MEDIUM FINE SILICA SAND

Log Continued on Next Page

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

Project: Resource Inc.

Location: Broward County Resource

: Recovery Project

Rig #: App. 270' W. & 500' S. of the

Date Started: N.E. Property Corner

Date Completed: 9/12/85

Ground Elevation: 9/12/85

Order Number: 10712

Boring Number: B-2

Driller: Suter/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read at: 9/12/85, at 4:00 pm

Water Level Read on: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						12/15	31		67	
							41		68	
							56		69	
				14			61	5.0	70.0	
						5/8	41		71	
						10/11	48		72	
							71		73	
						7/9			74	
				15		12/13		5.0	75.0	

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Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
: Resource Inc.
Project: Broward County Resource
: Recovery Project
Location: App. 260' S. & 260' E. of
: N.W. Property Corner
Date Started/Comp.: 9/13/85
Remarks: *300 lb. Hammer

Order Number: 10712
Boring Number: B-3
Driller: Watkins/Gordon, Rig #1
Water Level Located: 7.9' below the surface
Water Level Read on: 9/13/85
Ground Elevation : Not Given
S.P.T.: 140 lb. Hammer; 30" Drop;
S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev- ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thick- ness (ft)	Ending Depth (ft)	F e e t	Visual Classification
				1	13/10	12	1.0	1.0	1		(SP) BROWN MEDIUM FINE SILICA SAND TR/LIMEROCK
					7/5	8			2		TAN MEDIUM FINE SILICA SAND W/SOME LIMEROCK TR/SLUDGE
				2	8/10	15	2.0	3.0	3		
					12/14	21			4		[] DARK BROWN MEDIUM FINE SILICA SAND TR/ROOTS, WOOD & ASPHALT
					11/12	26			5		
				3	12/14	19	3.0	6.0	6		
					5/6	14			7		(SP) DARK GRAY MEDIUM FINE SILICA SAND TR/ORGANICS
					6/7	12			8		
					4/5	11			9		
					5/6	10			10		
				4	4/4	10	5.0	11.0	11		

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/13/85

Remarks: 300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

S.F.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						5/5	11			12	DARK GRAY MEDIUM FINE SILICA SAND TR/ORGANICS
				5			12	2.0	13.0	13	
							12			14	TAN MEDIUM FINE SILICA SAND TR/LIMEROCK & SHELL
				6			15	2.0	15.0	15	
						1/2	11			16	TAN MEDIUM FINE SILICA SAND TR/LIMEROCK, SHELL, SILT
						2/4	10			17	
							8			18	
							7			19	
				7			7	5.0	20.0	20	
						2/4	6			21	TAN MEDIUM FINE SILICA SAND
						4/5	8			22	

Log Continued on Next Page

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By *J. V. Winterholler, P.E.*

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/13/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								12		23	
								15		24	
				8			21	5.0	25.0	25	
						4/6	15			26	TAN MEDIUM FINE SILICA SAND
						8/8	21			27	
							30			28	
							32			29	
				9			38	5.0	30.0	30	
						8/10	15			31	BROWN MEDIUM FINE SILICA SAND
						12/15	19			32	
							24			33	

Log Continued on Next Page

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 260' S. & 260' E. of
: N.W. Property Corner

Date Started/Comp.: 9/13/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
							30		34	
							32	5.0	35.0	
					7/9	18			36	DARK BROWN MEDIUM FINE SILICA SAND
					11/11	19			37	
						23			38	
						28			39	
				11		34	5.0	40.0	40	TAN MEDIUM FINE SILICA SAND W/SOME MARL
					5/6	13			41	
					7/7	16			42	
						23			43	
						28			44	

Log Continued on Next Page

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Engineer's Laboratory
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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 260' S. & 260' E. of
 : N.W. Property Corner

Date Started/Comp.: 9/15/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

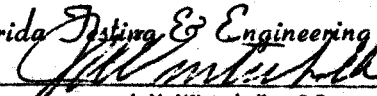
S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				12			31	5.0	45.0	45	
						3/4	12			46	TAN MEDIUM FINE SILICA SAND TR MARL
						4/6	19			47	
							28			48	
							30			49	
				13			31	5.0	50.0	50	
						4/5	21			51	BROWN TO TAN MEDIUM FINE SILICA SAND SLIGHT/TR MARL
						6/8	24			52	
							30			53	
							34			54	
				14			36	5.0	55.0	55	

Log Continued on Next Page

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Florida Testing & Engineering Co.
 By 
 J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 260' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/13/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer: 30" Drop:

S.F.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						4/5	18			56	TAN MEDIUM FINE SILICA SAND
						7/7	21			57	
							27			58	
							34			59	
				15			36	5.0	60.0	60	
						6/6	24			61	TAN MEDIUM FINE SILICA SAND
						8/8	28			62	
							36			63	
							34			64	
				16			37	5.0	65.0	65	
						6/9	25			66	TAN MEDIUM FINE SILICA SAND

Log Continued on Next Page

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Engineer's Laboratory
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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 260' S. & 260' E. of
: N.W. Property Corner

Date Started/Comp.: 9/13/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-3

Driller: Watkins/Gordon, Rig #1

Water Level Located: 7.9' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						12/12	31			67	
							34			68	
							35			69	
				17			34	5.0	70.0	70	
						4/5	27			71	TAN MEDIUM FINE SILICA SAND SLIGHT/TR SHELL
						5/6	35			72	
							39			73	
						3/4				74	
				18		7/8		5.0	75.0	75	

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 495' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkins/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation: Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						3/4	1			1	(SP) TAN MEDIUM FINE SILICA SAND TR/LIMEROCK
				1		3/3	3	2.0	2.0	2	
						8/11	4			3	() TAN MEDIUM FINE SILICA SAND W/SOME SLUDGE, TR/WOOD
				2		21/26	12	2.0	4.0	4	
						12/16	26			5	TAN TO DARK GRAY MEDIUM FINE SILICA SAND TR/LIMEROCK
						16/19	28			6	PIECES OF WOOD & CONCRETE
						12/13	12			7	
						7/7	16			8	
				3		6/6	18	5.0	9.0	9	
						6/9	21			10	DARK GRAY MEDIUM FINE SILICA SAND PIECES OF WOOD & CONCRETE
						5/6	15			11	

Log Continued on Next Page

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 495' S. & 260' E. of
 : N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkine/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation : Not Given

S.F.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Mois- ture Content (%)	Plas- ticity Index	Layer No.	Actual Elev- ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thick- ness (ft)	Ending Depth (ft)	Visual Classification
						6/8	16		12	
							8		13	
				4			14	5.0	14.0	
				5			20	1.0	15.0	DK GRAY MEDIUM FINE SILICA SAND PIECES WOOD & CONCRETE
						10/10	10		16	DARK GRAY MEDIUM FINE SILICA SAND TR/LINEROCK PIECES OF WOOD & TIN
						8/4	12		17	
							21		18	
							27		19	
				6			20	5.0	20.0	
						3/2	12		21	BROWN MEDIUM FINE SILICA SAND TR/MUCK
						2/4	15		22	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 495' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkine/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
								18	23	
								15	24	
				7				10	25	
						5/4		12	26	BROWN MEDIUM FINE SILICA SAND TR/LINEROCK & ORGANICS (MUCK & SILT)
						2/3		8	27	
								12	28	
								24	29	
				3				20	30	
						3/4		15	31	TAN MEDIUM FINE SILICA SAND TR/WOOD
						5/7		11	32	
								9	33	

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 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 495' S. & 260' E. of
 : N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkine/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								15		34	
				9			21	5.0	35.0	35	
						8/12	12			36	[SP] DARK BROWN MEDIUM FINE SILTCA SAND
						15/15	15			37	
							18			38	
							21			39	
				10			23	5.0	40.0	40	
						5/5	16			41	BROWN MEDIUM FINE SILTCA SAND
						8/9	19			42	
							21			43	
							28			44	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
 : Resource Inc.
 Project: Broward County Resource
 : Recovery Project
 Location: App. 495' S. & 260' E. of
 : N.W. Property Corner

Date Started/Comp.: 9/16/85
 Remarks: #300 lb. Hammer

Order Number: 16712
 Boring Number: B-4
 Driller: Watkins/Gordon/May, Rig #4
 Water Level Located: 5.6' below the surface
 Water Level Read on: 9/16/85
 Ground Elevation : Not Given
 S.P.T.: 140 lb. Hammer: 30" Drop:
 S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
				11			31	5.0	45.0	
						5/6	18		46	TAN MEDIUM FINE SILICA SAND W/SOME MARL
						7/7	21		47	
							22		48	
							31		49	
				12			36	5.0	50.0	
						3/5	20		51	TAN MEDIUM FINE SILICA SAND
						6/7	23		52	
							31		53	
							36		54	
				13			40	5.0	55.0	

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Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 495' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkine/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification	
						3/4	20		56	BROWN MEDIUM FINE SILICA SAND	
						4/6	24		57		
							29		58		
							34		59		
				14			37	5.0	60.0	60	BROWN MEDIUM FINE SILICA SAND
						4/5	21		61		
						6/6	26		62		
							30		63		
							34		64	TAN MEDIUM FINE SILICA SAND	
				15			39	5.0	65.0		65
						5/7	24		66		

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Project: Broward County Resource

: Recovery Project

Location: App. 495' S. & 260' E. of

: N.W. Property Corner

Date Started/Comp.: 9/16/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B-4

Driller: Watkins/Gordon/May, Rig #4

Water Level Located: 5.6' below the surface

Water Level Read on: 9/16/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						9/9	30			67	
							38			68	
							31			69	
				16			32	5.0	70.0	70	
						3/3	26			71	TAN MEDIUM FINE SILICA SAND TR/MARL & SHELL
						5/5	31			72	
							35			73	
						3/4				74	
				17		4/6		5.0	75.0	75	

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Engineer's Laboratory
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TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 415' E. & 330' S. of the

: N.W. Property Corner

Date Started: 9/12/85

Date Completed: 9/13/85

Order Number: 10712

Boring Number: B-5

Driller: Suter/May, Rig #2

Water Level Located: 5.0' below the surface

Water Level Read on: 8/13/85

Ground Elevation : Not Given

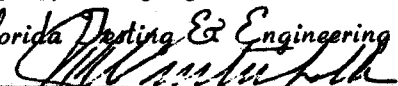
S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						5/4	3			1	[SP] BROWN MEDIUM FINE SILICA SAND
						5/7	4			2	W/TR LIMEROCK
				1		9/10	11	3.0	3.0	3	
						18/16	70			4	[] ROOTS
						10/10	60			5	
				2		13/15	40	3.0	6.0	6	
						9/7	40			7	[SP] BROWN MEDIUM FINE SILICA SAND
						6/6	30			8	& LIMEROCK
				3		4/4	20	3.0	9.0	9	
				4		4/4	20	1.0	10.0	10	BR HFSS W/TR ROOTS
						4/5	21			11	BROWN MEDIUM FINE SILICA SAND
						6/6	23			12	
							25			13	
							28			14	
				5			30	5.0	15.0	15	
						5/6	18			16	GRAY MEDIUM FINE SILICA SAND
						7/8	21			17	
							23			18	
							30			19	
				6			39	5.0	20.0	20	
						4/5	21			21	GRAY MEDIUM FINE SILICA SAND
						6/7	23			22	

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 415' E. & 330' S. of the

: N.W. Property Corner

Date Started: 9/12/85

Date Completed: 9/13/85

Order Number: 10712

Boring Number: E-5

Driller: Suter/May, Rig #2

Water Level Located: 5.0' below the surface

Water Level Read on: 8/17/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30' Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
								27	23	
								28	24	
				7				30	25	
						7/8		21	26	TAN MEDIUM FINE SILICA SAND
						8/9		32	27	
								40	28	
								60	29	
				8				90	30	
						10/11	MUD		31	BROWN MEDIUM FINE SILICA SAND
						15/21			32	
									33	
									34	
				9				5.0	35	
						7/8			36	BROWN MEDIUM FINE SILICA SAND
						10/12			37	
									38	
									39	
				10				5.0	40	
						9/9			41	BROWN MEDIUM FINE SILICA SAND
						11/11			42	
									43	
									44	

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 415' E. & 330' S. of the
 : N.W. Property Corner

Date Started: 9/12/85

Date Completed: 9/13/85

Order Number: 10712

Boring Number: E-5

Driller: Suter/May, Rig #2

Water Level Located: 5.0' below the surface

Water Level Read on: 8/13/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				11		7/7		5.0	45.0	45	
						7/7				46	TAN MEDIUM FINE SILICA SAND
										47	
										48	
										49	
				12				5.0	50.0	50	
						4/5				51	TAN MEDIUM FINE SILICA SAND
						6/8				52	
										53	
										54	
				13				5.0	55.0	55	
						4/5				56	BROWN MEDIUM FINE SILICA SAND
						5/5				57	
										58	
										59	
				14				5.0	60.0	60	
						4/5				61	BROWN MEDIUM FINE SILICA SAND
						5/6				62	
										63	
										64	
				15				5.0	65.0	65	
						4/5				66	BROWN MEDIUM FINE SILICA SAND

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Location: App. 415' E. & 330' S. of the
 : N.W. Property Corner

Date Started: 9/12/85

Date Completed: 9/13/85

Order Number: 10712

Boring Number: B-5

Driller: Suter/May, Rig #2

Water Level Located: 5.0' below the surface

Water Level Read on: 9/13/85

Ground Elevation : Not Given

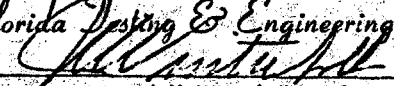
S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						5/6			67	
									68	
									69	
				16				5.0	70.0	
						4/5			71	BROWN MEDIUM FINE SILICA SAND
						6/7			72	
									73	
									74	
				17				5.0	75.0	
						4/6			76	BROWN MEDIUM FINE SILICA SAND
						6/5			77	
									78	
									79	
				18				5.0	80.0	
						6/7			81	TAN MEDIUM FINE SILICA SAND
						11/15			82	
									83	
									84	
				19				5.0	85.0	
						8/10			86	TAN MEDIUM FINE SILICA SAND
						11/13			87	W/TR LIMEROCK
									88	

Log Continued on Next Page

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Florida Testing & Engineering Co.
 By 
 J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 415' E. & 330' S. of the
 : N.W. Property Corner

Date Started: 9/12/85

Date Completed: 9/13/85

Order Number: 10712

Boring Number: B-5

Driller: Suter/May, Rig #2

Water Level Located: 5.0' below the surface

Water Level Read on: 8/13/85

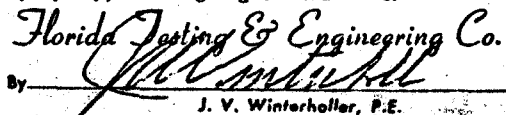
Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer: 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				20				5.0	90.0	89	
						6/7				90	
						11/19				91	TAN MEDIUM FINE SILICA SAND
										92	W/TR LIMEROCK
										93	
				21				5.0	95.0	94	
						7/10				95	
						10/10				96	TAN MEDIUM FINE SILICA SAND
							MUD			97	W/TR LIMEROCK
						9/9				98	
				22		8/11		5.0	100.0	99	
										100	

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Florida Testing & Engineering Co.

Engineer's Laboratory

Phone (305) 971-4400

6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 500' S. & 490' E. of the
: N.W. Property Corner

Date Started: 9/9/85
Date Completed: 9/9/85

Order Number: 10712

Boring Number: B-6

Driller: Gordon/May, Rig #4

Water Level Located: 3.0' below the surface

Water Level Read on: 9/9/85, at 12:45

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" drop;

S.P.T.: 2' ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						HOLLOW!				[SP] TAN/BROWN MEDIUM FINE SILICA SAND TR/LINEROCK
						3/3	AUGER!			
						10/11	"			
						16/14	"			
						10/9	"			
				1				4.5	4.5	
						5/4	"			
						4/3	"			
						3/4	"			
				2		3/4		3.5	8.0	
				3		25/24	"			
						6/5	"			
						4/4	"			
										[] CONCRETE
										WOOD & DEBRIS

Log Continued on Next Page

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 500' S. & 490' E. of the
: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: E-6

Driller: Gordon/May, Rig #4

Water Level Located: 3.0' below the surface

Water Level Read on: 9/9/85, at 2:45

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 50" drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						3/3	"			12	
							"			13	
				4			"	5.0	14.0	14	
				5			"	1.0	15.0	15	WOOD & DEBRIS
						2/3	"			16	
						3/3	"			17	
							"			18	
							"			19	
				6			"	5.0	20.0	20	
						3/4	"			21	[SP] TAN MEDIUM FINE SILICA SAND
						5/5	"			22	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 490' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: B-6

Driller: Gordon/May, Rig #4

Water Level Located: 3.0' below the surface

Water Level Read on: 9/9/85, at 2:45

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
									23	
									24	
				7				5.0	25.0	
						6/7			26	BROWN MEDIUM FINE SILICA SAND
						9/10			27	
									28	
									29	
				8				5.0	30.0	
						10/11			31	TAN/BROWN MEDIUM FINE SILICA SAND
						16/17			32	
									33	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 490' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: B-6

Driller: Gordon/May, Rig #4

Water Level Located: 3.0' below the surface

Water Level Read on: 9/9/85, at 2:45

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
				9				5.0	35.0	
						6/6				
						9/10				
				10			HOLLOW AUGER	3.0	38.0	
						11/13				
				11		15/15		2.0	40.0	

DARK BROWN MEDIUM FINE SILT SAND

[ML] TAN SANDY MARL

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Engineer's Laboratory

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resources Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 625' S. & 490' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: E-7

Driller: Shuman/Davis, Rig #1

Water Level Located: 3.5' below the surface

Water Level Read on: 9/9/85, at 3:45 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 50" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						2/2	1			1	[SP] GRAY MEDIUM FINE SILICA SAND W/SLIGHT TR/ROOTS & LINEROCK
				1		4/6	2	1.5	1.5	2	TAN MEDIUM FINE SILICA SAND
				2		7/9	3	1.5	3.0	3	BROWN MEDIUM FINE SILICA SAND W/TR MARL & ROOTS
						9/6	6			4	
				3		7/7	4	2.0	5.0	5	[] TAN LINEROCK W/SILICA SAND
						8/7	6			6	
						10/12	16			7	
						12/13	17			8	
				4		12/8	13	3.5	8.5	9	[SP] TAN MEDIUM FINE SILICA SAND W/SOME LINEROCK
						8/6	14			10	
				5		10/8	21	2.5	11.0	11	

Log Continued on Next Page

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Engineer's Laboratory
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 Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 : Resources Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 625' S. & 490' E. of the
 : N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: B-7

Driller: Shuman/Davis. Rig #1

Water Level Located: 3.5' below the surface

Water Level Read on: 9/9/85, at 3:45 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						8/5	10			12	TAN MEDIUM FINE SILICA SAND W/TR SHELL & LIMEROCK
							17			13	
							27			14	
				6			29	4.0	15.0	15	
						6/7	12			16	TAN GRAY MEDIUM FINE SILICA SAND
						9/10	17			17	
							26			18	
							30			19	
				7			36	5.0	20.0	20	TAN GRAY MEDIUM FINE SILICA SAND
						6/6	25			21	
						10/12	19			22	

Log Continued on Next Page

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Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resources Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 625' S. & 490' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 10712

Boring Number: A-7

Driller: Shuman/Davis. Rig #1

Water Level Located: 3.5' below the surface

Water Level Read on: 9/9/85, at 3:45 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
								25	23	
								25	24	
				8				40	25	
						6/7		19	26	BROWN-DARK BROWN MEDIUM FINE SILICA SAND
						13/17		24	27	
								40	28	
								56	29	
				9				100	30	
						10/14		25	31	BROWN MEDIUM FINE SILICA SAND
						20/28		32	32	
								56	33	

Log Continued on Next Page

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6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resources Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 625' S. & 490' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/9/85

Order Number: 16712

Boring Number: B-7

Driller: Shuman/Davis, Rig #1

Water Level Located: 3.5' below the surface

Water Level Read on: 9/9/85, at 3:45 pm

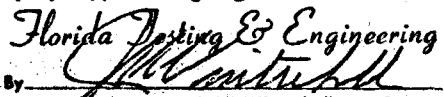
Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								66		34	
				10			99	5.0	35.0	35	
						10/10	25			36	DARK BROWN MEDIUM FINE SILIC SAND
						17/18	32			37	
				11			56	3.0	38.0	38	
						5/6				39	BROWN MEDIUM FINE SILICA SAND W/TR MARL
				12		8/8		2.0	40.0	40	

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Engineer's Laboratory

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 350' E. of the

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 0

Driller: Gordon/May, Rig #4

Water Level Located: 2.5' below the surface

Water Level Read on: 9/17/85, at 3:15 pm

Ground Elevation : Not Given

S.P.T.: 500 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						1/2	3			[SP] TAN MEDIUM FINE SILICA SAND TR/MARL
						3/4	9			
				1	13/14	21	3.0	3.0		
					26/27	83				GRAY MEDIUM FINE SILICA SAND W/LINEROCK
				2	24/23	60	1.5	4.5		
					20/20	57				
					17/14	57				TAN MEDIUM FINE SILICA SAND
					13/13	46				
					9/8	34				
				3	5/5	20	5.0	9.5		
					5/6	24				TAN MEDIUM FINE SILICA SAND

Log Continued on Next Page

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 350' E. of the

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 0

Driller: Gordon/May, Rig #4

Water Level Located: 2.5' below the surface

Water Level Read on: 9/17/85, at 3:15 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						6/6	24			12	
							48			13	
							28			14	
				4			36	5.5	15.0	15	
						8/8	11			16	TAN MEDIUM FINE SILICA SAND TR/LIMEROCK, SHELL & OOLITE
						9/10	12			17	
							14			18	
							14			19	
				5			15	5.0	20.0	20	
						5/6	6			21	GRAY MEDIUM FINE SILICA SAND
						6/6	10			22	

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 350' E. of the

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 8

Driller: Gordon/May, Rio #4

Water Level Located: 2.5' below the surface

Water Level Read on: 9/17/85, at 3:15 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								11		23	
								11		24	
				6			16	5.0	25.0	25	
						7/7	15			26	BROWN MEDIUM FINE SILICA SAND
						8/9	18			27	
							18			28	
							20			29	
				7			38	5.0	30.0	30	
						10/11	20			31	BROWN MEDIUM FINE SILICA SAND
						15/16	21			32	
							34			33	

Log Continued on Next Page

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Florida Testing & Engineering Co.
 By 
 J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 500' S. & 350' E. of the

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 8

Driller: Gordon/May, Rig #4

Water Level Located: 2.5' below the surface

Water Level Read on: 9/17/85, at 3:15 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								37		34	
				8				35	5.0	35	
						6/8	14			36	TAN MEDIUM FINE SILICA SAND
						9/10	19			37	
				9				23	3.0	38	
						9/9				39	TAN MEDIUM FINE SILICA SAND
				10		9/9		2.0	40.0	40	

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Florida Testing & Engineering Co.
By *J. V. Winterholler*

J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 295' E. & 625' S. of the

: N.W. Property Corner

Date Started/Comp.: 9/10/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-9

Driller: Gordon/May, Rig #1

Water Level Located: 5.5' below the surface

Water Level Read on: 9/10/85, at 4:00 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop

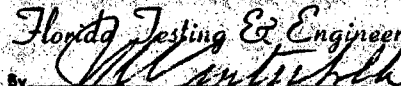
S.P.T.: 2 ft. Split-Spoon Sample

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
				1		9/7	7	1.0	1.0	[SP] BROWN MEDIUM FINE SILICA SAND
						7/6	5			GRAY MEDIUM FINE SILICA SAND W/TK SILT
				2		3/4	2	1.5	2.5	DARK GRAY MEDIUM FINE SILICA SAND W/SOME ORGANICS
				3		3/4	2	1.0	3.5	BROWN MEDIUM FINE SILICA SAND
						3/3	1			
				4		3/2	2	2.0	5.5	BROWN MEDIUM FINE SILICA SAND W/MARL
				5		2/2	4			[] GRAY LIMESTONE W/SILICA SAND
						3/7	7			
						8/9	19			
				6		11/12	17	3.0	9.5	[SP] GRAY MEDIUM FINE SILICA SAND W/SOME LIMESTONE
						8/9	26			

Log Continued on Next Page

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 295' E. & 625' S. of the

: N.W. Property Corner

Date Started/Comp.: 9/10/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-9

Driller: Gordon/May, Rig #1

Water Level Located: 5.5' below the surface

Water Level Read on: 9/10/85, at 4:00 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						12/15	40		12	
							30		13	
			7					4.0	13.5	
							24		14	LIGHT TAN MEDIUM FINE SILICA SAND
							25		15	
						5/7	7		16	
						7/8	17		17	
							17		18	
			8					5.0	18.5	
							22		19	LIGHT TAN MEDIUM FINE SILICA SAND
							25		20	
						3/5	19		21	
						5/6	17		22	

Log Continued on Next Page

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Engineer's Laboratory
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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 295' E. & 625' S. of the

: N.W. Property Corner

Date Started/Comp.: 9/10/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-9

Driller: Gordon/May, Rig #1

Water Level Located: 5.5' below the surface

Water Level Read on: 9/10/85, at 4:00 pm

Ground Elevation : Not Given

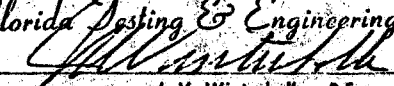
S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
					9		22	4.5	23.0	23	
							30			24	BROWN MEDIUM FINE SILICA SAND
							31			25	
						3/5	18			26	
						7/7	25			27	
				10			30	5.0	28.0	28	BROWN MEDIUM FINE SILICA SAND
							37			29	
				11			42	2.0	30.0	30	GRAY MEDIUM FINE SILICA SAND
						9/12	17			31	
						12/11	19			32	
				12			22	3.0	33.0	33	

Log Continued on Next Page

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Engineer's Laboratory

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 295' E. & 625' S. of the

: N.W. Property Corner

Date Started/Comp.: 9/10/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B-9

Driller: Gordon/May, Rig #1

Water Level Located: 5.5' below the surface

Water Level Read on: 9/10/85, at 4:00 pm.

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								32		34	DARK BROWN MEDIUM FINE SILICA SAND
								35		35	
						3/4	42			36	
						4/4	43			37	
				13			60	5.0	38.0	38	
							58			39	[ML] GRAY MARL W/SOME SILICA SAND
							59			40	
						5/9	29			41	
						9/12	24			42	
				14				4.5	42.5	43	[SP] GRAY MEDIUM FINE SILICA SAND
							37				
						4/6	38			44	

Log Continued on Next Page

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By *[Signature]*

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Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 295' E. & 625' S. of the

: N.W. Property Corner

Date Started/Comp.: 9/10/85

Remarks: 4300 lb. Hammer

Order Number: 10712

Boring Number: B-9

Driller: Gordon/May, Rig #1

Water Level Located: 5.5' below the surface

Water Level Read on: 9/10/85, at 4:00 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev- ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thick- ness (ft)	Ending Depth (ft)	Visual Classification
				15		6/8	45		45	Gray medium fine silica sand

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Florida Testing & Engineering Co.
Engineers Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 700' S. by 420' E. of
 : N.W. Property Corner

Date Started: 9/19/85
 Date Completed: 9/19/85

Order Number: 10712

Boring Number: 10

Driller: Watkins/Gordon, Rig #4

Water Level Located: +1.2' above the surface

Water Level Read on: 9/19/85, at 12:50 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						2/2	1			1	[] TAN MEDIUM FINE SILICA SAND TR/LIMESTONE & TIN
				1		1/1	1	2.0	2.0	2	TAN MEDIUM FINE SILICA SAND
						3/4	2			3	
				2		9/9	4	2.0	4.0	4	TAN MEDIUM FINE SILICA SAND
						8/12	8			5	PIECES OF CONCRETE
						12/13	14			6	
						10/11	14			7	
						9/7	19			8	
				3		4/5	18	5.0	9.0	9	DARK GRAY MEDIUM FINE SILICA SAND TR/ROOTS, WOOD, CONCRETE
						5/7	21			10	
						6/4	20			11	

Log Continued on Next Page

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 By J. V. Winterheller, P.E.
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Engineer's Laboratory

6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 700' S. by 420' E. of

: N.W. Property Corner

Date Started: 7/19/85

Date Completed: 9/19/85

Order Number: 10712

Boring Number: 10

Driller: Watkins/Gordon, Rig #4

Water Level Located: +.2' above the surface

Water Level Read on: 9/19/85, at 12:50 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						3/3	12			12	
							8			13	
				4			10	5.0	14.0	14	
							8			15	
						5/5	15			16	
						9/4	17			17	
							22			18	
				5			18	5.0	19.0	19	
							18			20	
						3/6	12			21	
						4/4	13			22	

DARK GRAY MEDIUM FINE SILICA
SAND TR/LIMESTONE PIECES OF
WOOD

TAN MEDIUM FINE SILICA SAND
TR/LIMESTONE PIECES OF WOOD

Log Continued on Next Page

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Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 700' S. by 420' E. of

: N.W. Property Corner

Date Started: 9/19/85

Date Completed: 9/19/85

Order Number: 10712

Boring Number: 10

Driller: Watkins/Gordon, Rig #4

Water Level Located: +1.2' above the surface

Water Level Read on: 9/19/85, at 12:50 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
					6		24	4.0	23.0	23	TAN MEDIUM FINE SILICA SAND
							20			24	
							23			25	
						4/5	12			26	
						7/7	15			27	BROWN MEDIUM FINE SILICA SAND
				7			15	5.0	28.0	28	
							19			29	
							25			30	
						5/7	14			31	
						8/10	15			32	
					8		19	5.0	33.0	33	

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Engineer's Laboratory
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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Phone (305) 971-4400

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 700' S. by 420' E. of

: N.W. Property Corner

Date Started: 9/19/85

Date Completed: 9/19/85

Order Number: 10712

Boring Number: 10

Driller: Watkins/Gordon, Rig #4

Water Level Located: +.2' above the surface

Water Level Read on: 9/19/85, at 12:50 pm

Ground Elevation : Not Given

S.F.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								24		34	BROWN MEDIUM FINE SILICA SAND
				9				28	2.0	35	
						8/8		15		36	BROWN TO TAN MEDIUM FINE SILICA SAND
						7/7		18		37	
								22		38	
						4/4				39	
				10		5/5		5.0	40.0	40	

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy

Resource Inc.

Project: Broward County Resource

Recovery Project

Location: App. 625' S. & 610' E. of the

N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B11

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/9/85, at 3:30 pm

Ground Elevation : Not Given

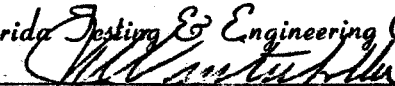
S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
							HOLLOW!				
						1/2	AUGER!			1	[SP] BROWN MEDIUM FINE SILICA SAND TR/ORGANICS
						1/2	"			2	
						3/4	"			3	
				1		6/6	"	4.0	4.0	4	
						8/9	"			5	TAN MEDIUM FINE SILICA SAND
						11/11	"			6	
						6/5	"			7	
						4/2	"			8	
				2		1/1	"	5.0	9.0	9	
						1/0	"			10	TAN MEDIUM FINE SILICA SAND
						0/1	"			11	

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 625' S. & 610' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B11

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/9/85, at 3:30 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						1/2			12		
									13		
				3				5.0	14.0	14	
				4				1.0	15.0	15	TAN MEDIUM FINE SILICA SAND
						3/4			16		
						5/5			17		
									18		
									19		
				5				5.0	20.0	20	
						6/6			21		TAN MEDIUM FINE SILICA SAND
						6/8			22		

Log Continued on Next Page

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Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 625' S. & 610' E. of the
: N.W. Property Corner

Date Started: 9/9/85
Date Completed: 9/10/85

Order Number: 10712

Boring Number: B11

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/9/85, at 3:30 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
										23	
										24	
				61				5.0	35.0	25	
						9/10				26	BROWN MEDIUM FINE SILICA SAND
						10/10				27	
										28	
										29	
				71				5.0	30.0	30	
						9/10				31	BROWN MEDIUM FINE SILICA SAND
						15/16				32	
										33	

Log Continued on Next Page

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Florida Testing & Engineering Co.
By *[Signature]*
J. V. Winterholler, P.E.

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Florida Testing & Engineering Co.

Engineer's Laboratory

Phone (305) 971-4400

6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 625' S. & 610' E. of the

: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B11

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/9/85, at 3:30 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F e e t	Visual Classification
										34	
				8				5.0	35.0	35	
						8/8				36	BROWN MEDIUM FINE SILICA SAND
						10/11				37	
										38	
										39	
				9				5.0	40.0	40	
						8/9				41	BROWN MEDIUM FINE SILICA SAND
						8/8				42	
										43	
										44	

Log Continued on Next Page

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By *J. V. Winterholler*
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TEST BORING REPORT

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Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 625' S. & 610' E. of the
: N.W. Property Corner

Date Started: 9/9/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B11

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/9/85, at 3:30 pm

Ground Elevation : Not Given

S.F.T.: 140 lb. Hammer; 30" Drop;

S.F.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
				10			"	5.0	45.0	LIGHT GRAY MEDIUM FINE SILICA SAND
						5/6	"		46	
						6/7	"		47	
				11			HOLLOW AUGER	3.0	48.0	LIGHT GRAY MEDIUM FINE SILICA SAND
						8/6			49	
				12		6/6		2.0	50.0	

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Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 410' S. & 100' W. of the

: N.E. Property Corner

Date Started: 9/10/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B12

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/10/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
							HOLLOW AUGER			[SP] TAN/BROWN MEDIUM FINE SILICA SAND
						2/2				
						3/4				
						8/8				
						6/6				
				1		4/3		5.0	5.0	
				2		2/2				[ML] BROWN SANDY MARL
						2/1				
						1/1				
						1/0				
				3		1/2		4.0	10.0	
						3/4				TAN MEDIUM FINE SILICA SAND

Log Continued on Next Page

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Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 410' S. & 100' W. of the

: N.E. Property Corner

Date Started: 9/10/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B12

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/10/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						6/6	"			12	
							"			13	
							"			14	
				4			"	5.0	15.0	15	
						3/4	"			16	TAN MEDIUM FINE SILICA SAND
						4/4	"			17	
							"			18	
							"			19	
				5			"	5.0	20.0	20	
						2/4	"			21	TAN MEDIUM FINE SILICA SAND
						4/5	"			22	

Log Continued on Next Page

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Date Started: 9/10/85

Date Completed: 9/10/85

Order Number: 10712

Boring Number: B12

Driller: Gordon/May, Rig #4

Water Level Located: 4.0' below the surface

Water Level Read on: 9/10/85

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
									23	
									24	
				6				5.0	25.0	
						5/6			26	TAN MEDIUM FINE SILICA SAND
						6/5			27	
							HOLLOW			
				7			AUGER	3.0	28.0	
						3/3			29	TAN/BROWN MEDIUM FINE SILICA SAND
				8		3/4		2.0	30.0	

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Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 690' S. & 100' W. of the

: N.E. Property Corner

Date Started/Comp.: 9/10/85

Remarks: *300 lb. Hammer

Order Number: 10712

Boring Number: B13

Driller: Gordon/May, Rig #1

Water Level Located: 5.0' below the surface

Water Level Read on: 9/10/85, at 12:15 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				1		7/9	4	0.5	0.5	1	[SP] BROWN MEDIUM FINE SILICA SAND
				2		10/10	7	1.0	1.5	2	GRAY MEDIUM FINE SILICA SAND W/TR SILT
						7/5	3			3	TAN MEDIUM FINE SILICA SAND
						5/6	2			4	
						2/2	1			5	
				3		2/3	2	4.0	5.5	6	GRAY MEDIUM FINE SILICA SAND W/SOME LIMESTONE
						4/4	4			7	
						5/7	6			8	
						4/4	5			9	
						5/8	8			10	
				4		3/4	6	5.0	10.5	11	GRAY MEDIUM FINE SILICA SAND

Log Continued on Next Page

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 690' S. & 100' W. of the

: N.E. Property Corner

Date Started/Comp.: 9/10/85

Remarks: #300 lb. Hammer

Order Number: 10712

Boring Number: B13

Driller: Gordon/May, Rig #1

Water Level Located: 5.0' below the surface

Water Level Read on: 9/10/85, at 12:15 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
						4/5	11		12	W/SOME LINEROCK
									13	
									14	
				5			18	4.5	15.0	
						3/5	6		16	LIGHT BROWN MEDIUM FINE SILICA SAND
						5/6	7		17	
									18	
				6			16	4.0	19.0	
									20	TAN MEDIUM FINE SILICA SAND
						2/4	10		21	
						5/5	11		22	

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Engineer's Laboratory
 6784 N.W. 17th Avenue
 Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
 : Resource Inc.

Project: Broward County Resource
 : Recovery Project

Location: App. 690' S. & 100' W. of the
 : N.E. Property Corner

Date Started/Comp.: 9/10/85

Remarks: *500 lb. Hammer

Order Number: 10712

Boring Number: B13

Driller: Gordon/May, Rig #1

Water Level Located: 5.0' below the surface

Water Level Read on: 9/10/85, at 12:15 pm

Ground Elevation : Not Given

S.P.T.: 140 lb. Hammer; 50" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
								16	23	
				7			20	5.0	24.0	
							26		25	TAN MEDIUM FINE SILICA SAND
				8		4/6	19	2.0	26.0	
						6/7	23		27	BROWN MEDIUM FINE SILICA SAND
							35		28	
						3/5			29	
				9		6/7		4.0	30.0	

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 690' W. & 615' S. of
: N.E. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 14

Driller: Suter/Brown, Rig #2

Water Level Located: 4.0' below the surface

Water Level Read on: 9/17/85, at 3:00 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer: 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				1		1/4	1	0.5	0.5	1	[SP] BR MFSS W/TR ORG. L.R., & MARL TAN MEDIUM FINE SILICA SAND
						4/5	1			2	
				2		14/6	6	2.5	3.0	3	
				3		9/10	11	1.0	4.0	4	[] CONCRETE
						10/8	10			5	BROWN MEDIUM FINE SILICA SAND W/TR WOOD, SHEET METAL & LIMEROCK
						10/10	17			6	
						11/13	8			7	
						8/6	8			8	
				4		7/15	7	5.0	9.0	9	
				5		7/6	10	1.0	10.0	10	BROWN MEDIUM FINE SILICA SAND TR/WOOD
						6/4	10			11	DARK GRAY MEDIUM FINE SILICA SAND W/LIMEROCK

Log Continued on Next Page

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TEST BORING REPORT

Phone (305) 971-4400

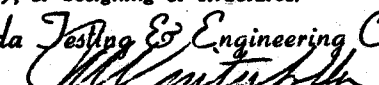
Client: Tampa Waste Mgt. Energy
: Resource Inc.
Project: Broward County Resource
: Recovery Project
Location: App. 690' W. & 615' S. of
: N.E. Property Corner
Date Started: 9/17/85
Date Completed: 9/17/85

Order Number: 10712
Boring Number: 14
Driller: Suter/Brown, Rig #2
Water Level Located: 4.0' below the surface
Water Level Read on: 9/17/85, at 3:00 pm
Ground Elevation : Not Given
S.P.T.: 300 lb. Hammer; 30" Drop;
S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						5/5	19		12		
							29		13		
							103		14		
				6			62	5.0	15		
						3/4	9		16		DARK GRAY MEDIUM FINE SILICA SAND & LIMESTONE TR/WOOD
						2/1	8		17		
							9		18		
							7		19		
				7			5	5.0	20		
						1/1	7		21		DARK GRAY MEDIUM FINE SILICA SAND & LIMESTONE TR/WOOD
						1/2	7		22		

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: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 600' W. & 615' S. of

: N.E. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 14

Driller: Suter/Brown, Rig #2

Water Level Located: 4.0' below the surface

Water Level Read on: 9/17/85, at 3:00 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer; 30"-Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
								10		23	
								10		24	
				8			9	5.0	25.0	25	
						4/5	10			26	DARK GRAY MEDIUM FINE SILICA SAND & LINEROCK TR/WOOD
						5/6	12			27	
							28			28	
							45			29	
				9			80	5.0	30.0	30	
						5/8	17			31	[SP] BROWN MEDIUM FINE SILICA SAND
						13/40	55			32	
							102			33	

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TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 690' W. & 615' S. of
: N.E. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 14

Driller: Suter/Crown, Rig #2

Water Level Located: 4.0' below the surface

Water Level Read on: 9/17/85, at 3:00 pm

Ground Elevation : Not Given

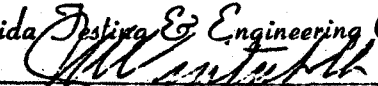
S.P.T.: 300 lb. Hammer; 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
							235		34	
				10			130	5.0	35.0	
						6/8	17		36	BROWN MEDIUM FINE SILICA SAND
						10/12	60		37	
							138		38	
							90		39	
				11			67	5.0	40.0	
						5/6	37		41	DARK BROWN MEDIUM FINE SILICA SAND
						13/30	43		42	
							36		43	
							66		44	

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TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 690' W. & 615' S. of

: N.E. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 14

Driller: Suter/Brown, Rig #2

Water Level Located: 4.0' below the surface

Water Level Read on: 9/17/85, at 3:00 pm

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer: 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
				12				5.0	45.0	45	BROWN MEDIUM FINE SILICA SAND
						4/6				46	
						6/8				47	
										48	
						5/7				49	
				13		7/9		5.0	50.0	50	

The above test boring was conducted in accordance with A.S.T.M. designation D-1586.

As a mutual protection to the owners and ourselves, the engineer in the owner's behalf shall check this report with the samples submitted prior to the purchase of property, or designing of structures.

Florida Testing & Engineering Co.

By *J. V. Winterholler, P.E.*
J. V. Winterholler, P.E.

As a further protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Florida Testing & Engineering Co.
Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
 : Resource Inc.
 Project: Broward County Resource
 : Recovery Project
 Location: App. 735' S. & 160' E. of
 : N.W. Property Corner

Date Started: 9/17/85
 Date Completed: 9/17/85

Order Number: 10712

Boring Number: 15

Driller: Watkins/Gordon, Rig #1

Water Level Located: 1.5' below the surface

Water Level Read on: 9/17/85, at 10:45 am

Ground Elevation : Not Given

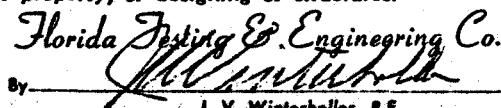
S.P.T.: 300 lb. Hammer: 30" Drop:

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev-ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						2/3	4			1	[] DARK BROWN MEDIUM FINE SILICA SAND PIECES OF WOOD, RED BRICKS & CONCRETE
				1		8/10	11	2.0	2.0	2	
						9/10	11			3	DARK GRAY MEDIUM FINE SILICA SAND TR/LIMEROCK, WOOD, ROOTS & CONCRETE
						12/12	22			4	
						10/9	18			5	
				2		5/4	15	4.0	6.0	6	
						2/2	12			7	DARK GRAY MEDIUM FINE SILICA SAND TR/TILE (BATHROOM), WOOD, ROOTS, LIMEROCK & CONCRETE
						3/3	9			8	
						2/2	4			9	
						1/2	4			10	
				3		1/2	5	5.0	11.0	11	

Log Continued on Next Page

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Fort Lauderdale, Florida 33309
TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 735' S. & 160' E. of

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 15

Driller: Watkins/Gordon, Rig #1

Water Level Located: 1.5' below the surface

Water Level Read on: 9/17/85, at 10:45 am

Ground Elevation : Not Given

S.F.T.: 300 lb. Hammer: 30" Drop;

S.F.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elev. (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	F	Visual Classification
						2/2	7			12	DARK GRAY MEDIUM FINE SILICA SAND TR/LINEROCK, ROOTS & WOOD
							4			13	
							4			14	
				4			5	4.0	15.0	15	
						2/1	5			16	[SM] BROWN SANDY SILT
						1/1	3			17	
							3			18	
							3			19	
				5			3	5.0	20.0	20	BROWN SANDY SILT
						1/1	4			21	
						1/1	4			22	

Log Continued on Next Page

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Engineer's Laboratory
6784 N.W. 17th Avenue
Fort Lauderdale, Florida 33309
TEST BORING REPORT

(305) 971-4400

Client: Tampa Waste Mgt. Energy
: Resource Inc.

Project: Broward County Resource
: Recovery Project

Location: App. 735' S. & 160' E. of
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Date Started: 9/17/85

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Order Number: 10712

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Ground Elevation : Not Given

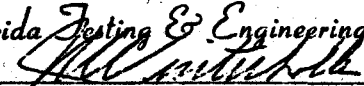
S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Mois- ture Content (%)	Plas- ticity Index	Layer No.	Actual Elev- ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thick- ness (ft)	Ending Depth (ft)	F	Visual Classification
								5		23	
								8		24	
				6			9	5.0	25.0	25	
						5/4	12			26	[SP] TAN/GRAY MEDIUM FINE SILICA SAND
						4/4	11			27	
							14			28	
							22			29	
				7			20	5.0	30.0	30	
						6/6	11			31	BROWN MEDIUM FINE SILICA SAND
						8/9	8			32	
							11			33	

Log Continued on Next Page

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 735' S. & 160' E. of

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 15

Driller: Watkins/Gordon, Rig #1

Water Level Located: 1.5' below the surface

Water Level Read on: 9/17/85, at 10:45 am

Ground Elevation : Not Given

S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specific Gravity	Moisture Content (%)	Plasticity Index	Layer No.	Actual Elevation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thickness (ft)	Ending Depth (ft)	Visual Classification
								19	34	
				8				27	35	
						5/5	12		36	TAN/GRAY MEDIUM FINE SILICA SAND
						7/7	18		37	
								22	38	
								22	39	
				9				29	40	
						8/9	21		41	TAN/GRAY MEDIUM FINE SILICA SAND
						10/11	32		42	
								42	43	
								50	44	

Log Continued on Next Page

The above test boring was conducted in accordance with A.S.T.M. designation D-1586.

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Florida Testing & Engineering Co.

By

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Florida Testing & Engineering Co.

Engineer's Laboratory

6784 N.W. 17th Avenue

Fort Lauderdale, Florida 33309

TEST BORING REPORT

Client: Tampa Waste Mgt. Energy

: Resource Inc.

Project: Broward County Resource

: Recovery Project

Location: App. 735' S. & 160' E. of

: N.W. Property Corner

Date Started: 9/17/85

Date Completed: 9/17/85

Order Number: 10712

Boring Number: 15

Driller: Watkins/Gordon, Rig #1

Water Level Located: 1.5' below the surface

Water Level Read on: 9/17/85, at 10:45 am

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S.P.T.: 300 lb. Hammer; 30" Drop;

S.P.T.: 2 ft. Split-Spoon Sampler

Liquid Limit	Specif. Gravity	Mois- ture Content (%)	Plas- ticity Index	Layer No.	Actual Elev- ation (ft)	Hammer Blows on Sampler	Hammer Blows on Casing	Layer Thick- ness (ft)	Ending Depth (ft)	F	Visual Classification
				10			50	5.0	45.0	45	
						9/10	21			46	TAN FINE TO MEDIUM SILICA SAND
						10/10	20			47	
				11			35	3.0	48.0	48	
						8/9				49	TAN FINE TO MEDIUM SILICA SAND
				12		9/9		2.0	50.0	50	

The above test boring was conducted in accordance with A.S.T.M. designation D-1586. As a mutual protection to the owners and ourselves, the engineer in the owner's behalf shall check this report with the samples submitted prior to the purchase of property, or designing of structures.

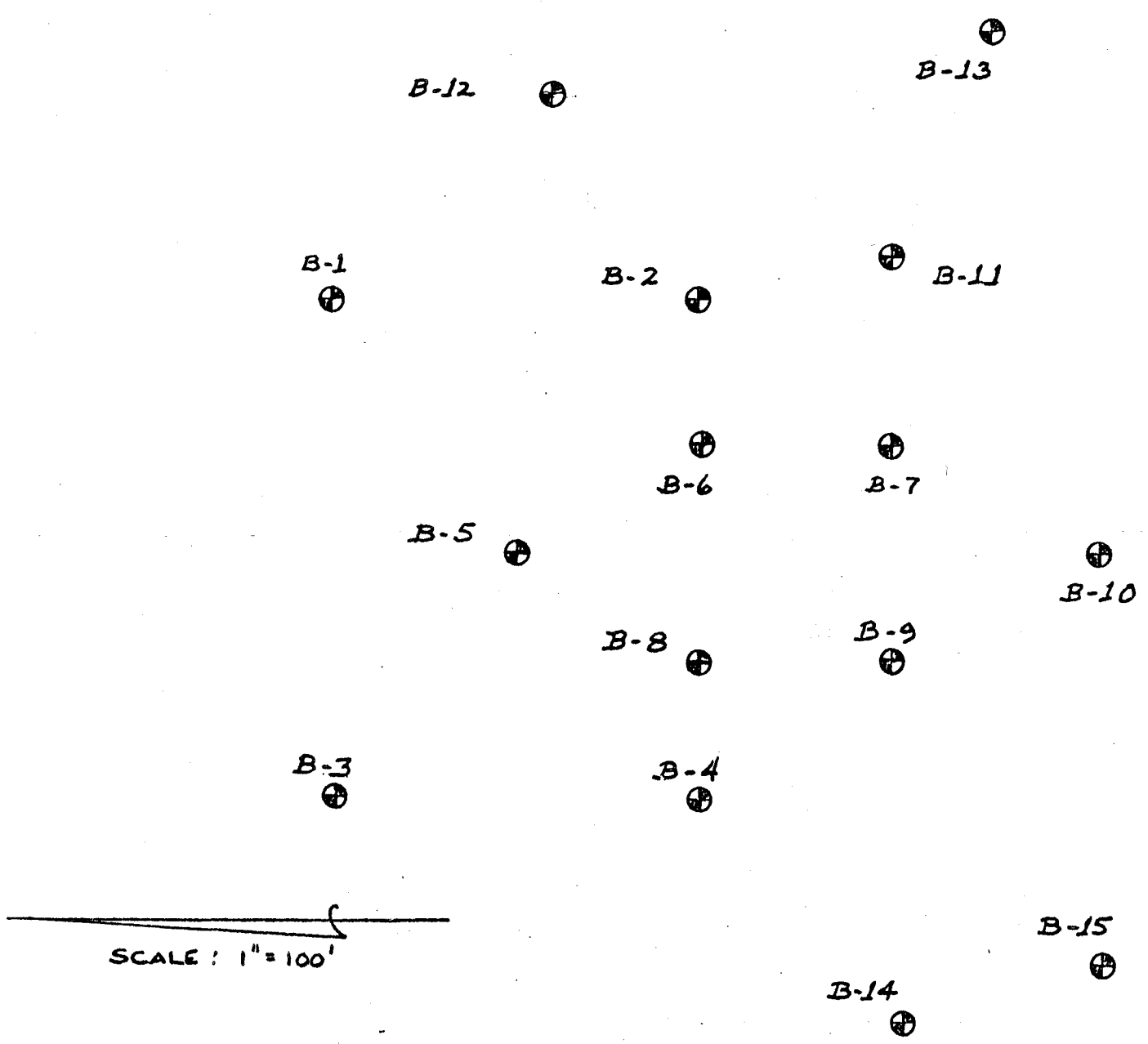
Florida Testing & Engineering Co.
By *J. V. Winterholler*

J. V. Winterholler, P.E.

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BORING LOCATION SKETCH
for
TAMPA WASTE MANAGEMENT INC.

4 NW 48 ST. (HELTON RD.)



ORI ☐ RES ☐ NG ☐
SEPT '86

SURFACE WATER QUALITY DATA

10.9 SURFACE WATER QUALITY DATA

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23341
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103

LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITE

TYPE OF SAMPLE Canal COLLECTOR F.D. HobleDATE COLLECTED 10-24-81 2:30 pm DATE COMPLETED 12-12-81FIELD INFORMATION SAMPLE DESIGNATION SW1WELL DEPTH -- pH 7.1 TEMPERATURE °C 27

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

CALCIUM 114 ALKALINITY 240CHROMIUM -0.004 BICARBONATE 146LEAD -0.003 CHLORIDE 47MAGNESIUM 4.8 DISSOLVED SOLIDS 512MERCURY -0.0001 FLUORIDE 0.11POTASSIUM 3.6 HARDNESS 296SODIUM 48 NON CARBONATE 56STRONTIUM 0.88 pH, units 7.1SILICA 3.7C.O.D. 224 SPECIFIC COND., mmho 920M.B.A.S. 0.01 SULFATE 17OIL-GREASE 7PHENOLS -0.001 TOTAL AMMONIA N 0.42TOTAL ORGANIC CARBON 6FECAL COLIFORM, /100ml 270 TOTAL ORGANIC NITROGEN 0.83TOTAL COLIFORM, /100ml 3400 TOTAL NITROGEN 1.1FECAL STREP., /100ml 25 TOTAL NITRATE N 0.725-DAY B.O.D. 5.4 TOTAL NITRITE N 0.011TOTAL ORTHO PHOSPHORUS 0.05TEMPERATURE, °C 27 TOTAL PHOSPHORUS 0.08TURBIDITY, NTU 45ANALYSTS: Frank Hoble & Richard Thelmann

REMARKS:

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23541
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103

LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITE

TYPE OF SAMPLE Monitor Well COLLECTOR F.D. Hoble
DATE COLLECTED 10/24/81 2:30 PM DATE COMPLETED 2/20/82
SAMPLE DESIGNATION Canal at Turnpike

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

ALUMINUM	-2	DIAZINON	-0.0008
ARSENIC	-0.001	DIELDRIN	-0.0005
BORON	0.24	ENDRIN	-0.0003
CADMIUM	-0.002	ETH, PARATHION	-0.0005
CHROMIUM, Cr ⁺⁶	-0.005	ETH, TRITHION	-0.001
COBALT	0.004	ETHION	-0.001
COPPER	-0.003	HEPTACHLOR EPOXIDE	-0.0004
IRON	0.06	TOXAPHENE	-0.004
MANGANESE	0.014	HEPTACHLOR	0.0002
NICKEL	0.006	LINDANE	-0.0001
VANADIUM	-0.04	MET. PARATHION	-0.0004
ZINC	0.03	MET. TRITHION	-0.003
		PCB	-0.0003
ALDRIN	-0.00006	PCNB	-0.002
CHLORODANE	-0.00009	SILVEX	-0.0003
DDD TOTAL	-0.0006	2,4,5T	-0.0003
DDE	-0.0004	2,4-D	-0.0006
DDT	-0.001	2,4-DP	-0.001

ANALYSTS: Frank Hoble & Richard Thelmenn

REMARKS:

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23541
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103

LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITE

TYPE OF SAMPLE Canal COLLECTOR F.D. Hoble
DATE COLLECTED 10-24-81 10:20 am DATE COMPLETED 12-12-81

FIELD INFORMATION SAMPLE DESIGNATION SW2

WELL DEPTH -- pH 7.5 TEMPERATURE °C 27

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

CALCIUM	152	ALKALINITY	360
CHROMIUM	-0.004	BICARBONATE	220
LEAD	0.038	CHLORIDE	62
MAGNESIUM		DISSOLVED SOLIDS	624
MERCURY	-0.0001	FLUORIDE	0.24
POTASSIUM	10	HARDNESS	388
SODIUM	42	NON CARBONATE	28
STRONTIUM	2.1	pH, units	7.5
		SILICA	4.8
C.O.D.	264	SPECIFIC COND., mmho	980
M.B.A.S.	0.09	SULFATE	12
OIL-GREASE	12		
PHENOLS	0.012	TOTAL AMMONIA N	1.7
		TOTAL ORGANIC CARBON	37
FECAL COLIFORM, /100ml	1200	TOTAL ORGANIC NITROGEN	7
TOTAL COLIFORM, /100ml	10,000	TOTAL NITROGEN	14
FECAL STREP., /100ml	60	TOTAL NITRATE N	2.7
5-DAY B.O.D.	5.7	TOTAL NITRITE N	0.012
		TOTAL ORTHO PHOSPHORUS	0.23
TEMPERATURE, °C	27	TOTAL PHOSPHORUS	0.39
TURBIDITY, NTU	45		
ANALYSTS:	Frank Hoble & Richard Thelmann		

REMARKS:

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23541
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITETYPE OF SAMPLE Monitor Well COLLECTOR F.D. Hoble
DATE COLLECTED 10/24/81 10:20 AM DATE COMPLETED 2/20/82
SAMPLE DESIGNATION Canal West of Hill

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

ALUMINUM	-2	DIAZINON	-0.0004
ARSENIC	-0.001	DIELDRIN	-0.0002
BORON	0.64	ENDRIN	-0.0002
CADMIUM	-0.002	ETH, PARATHION	-0.0003
CHROMIUM, Cr ⁺⁶	-0.005	ETH, TRITHION	-0.0006
COBALT	0.006	ETHION	-0.0006
COPPER	-0.003	HEPTACHLOR EPOXIDE	-0.0002
IRON	0.07	TOXAPHENE	-0.002
MANGANESE	0.005	HEPTACHLOR	-0.0003
NICKEL	0.008	LINDANE	-0.00006
VANADIUM	-0.04	MET. PARATHION	-0.0002
ZINC	0.07	MET. TRITHION	-0.002
		PCB	-0.0003
ALDRIN	-0.00003	PCNB	-0.0001
CHLORODANE	-0.0004	SILVEX	-0.0004
DDD TOTAL	-0.0003	2,4,5T	-0.0004
DDE	-0.0002	2,4-D	-0.0007
DDT	-0.0005	2,4-DP	-0.001

ANALYSTS: Frank D. Hoble & Richard Thelmann

REMARKS:

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23541
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITETYPE OF SAMPLE Canal COLLECTOR F.D. HobleDATE COLLECTED 10-24-81 11:00 am DATE COMPLETED 12-12-81FIELD INFORMATION SAMPLE DESIGNATION SW3WELL DEPTH -- pH 7.0 TEMPERATURE °C 27

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

CALCIUM 90 ALKALINITY 212CHROMIUM -0.004 BICARBONATE 129LEAD 0.005 CHLORIDE 63MAGNESIUM DISSOLVED SOLIDS 504MERCURY -0.0001 FLUORIDE 0.09POTASSIUM 7.9 HARDNESS 236SODIUM 50 NON CARBONATE 24STRONTIUM 0.83 pH, units 7.0SILICA 5.5C.O.D. 286 SPECIFIC COND., mmho 950M.B.A.S. 0.05 SULFATE 21OIL-GREASE 36PHENOLS 0.006 TOTAL AMMONIA N 1.2TOTAL ORGANIC CARBON 9FECAL COLIFORM, /100ml 270 TOTAL ORGANIC NITROGEN 1.2TOTAL COLIFORM, /100ml 900 TOTAL NITROGEN 1.4FECAL STREP., /100ml 12 TOTAL NITRATE N 4.75-DAY B.O.D. 4.2 TOTAL NITRITE N 0.008TOTAL ORTHO PHOSPHORUS 0.41TEMPERATURE, °C 27 TOTAL PHOSPHORUS 0.66TURBIDITY, NTU 21ANALYSTS: Frank Hoble & Richard Thelmann

REMARKS:

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

POST OFFICE BOX 23541
FORT LAUDERDALE, FLORIDA 33307
TELEPHONE 943-2103

LABORATORY ANALYSIS
WASTE MANAGEMENT HILTON ROAD
LANDFILL SITE

TYPE OF SAMPLE Monitor Well COLLECTOR F.D. Hoble
DATE COLLECTED 10/24/81 11:00 AM DATE COMPLETED 2/20/82
SAMPLE DESIGNATION Canal @ F.P.L.

RESULTS EXPRESSED IN mg/l UNLESS OTHERWISE DESIGNATED

ALUMINUM	-2	DIAZINON	-0.0003
ARSENIC	-0.001	DIELDRIN	-0.0002
BORON	0.17	ENDRIN	-0.0001
CADMIUM	-0.002	ETH, PARATHION	-0.0002
CHROMIUM, Cr ⁺⁶	-0.005	ETH, TRITHION	-0.0004
COBALT	0.005	ETHION	-0.0004
COPPER	-0.003	HEPTACHLOR EPOXIDE	-0.0002
IRON	0.05	TOXAPHENE	-0.002
MANGANESE	0.006	HEPTACHLOR	-0.00009
NICKEL	0.006	LINDANE	-0.00004
VANADIUM	-0.04	MET. PARATHION	-0.0002
ZINC	0.05	MET. TRITHION	-0.001
		PCB	-0.0002
ALDRIN	-0.00002	PCNB	-0.00007
CHLORODANE	-0.0001	SILVEX	-0.0003
DDD TOTAL	-0.0002	2,4,5T	-0.0004
DDE	-0.0002	2,4-D	-0.0009
DDT	-0.0004	2,4-DP	-0.002

ANALYSTS: Frank Hoble & Richard Thelmann

REMARKS:



Waste Management, Inc. of Florida
800 N.W. 62nd Street, Suite 420
Fort Lauderdale, Florida 33309.
305/771-9850

SAMPLE DATE

29 OCT 83

January 30, 1984

Mr. Victor Howard
Broward County Environmental
Quality Control Board
500 S.W. 14th Court
Ft. Lauderdale, FL. 33315

1/31
ROUTE
JE
H

RE: Central Disposal Sanitary Landfill (CDSL)
Water Quality Monitoring Results

Dear Mr. Howard:

Enclosed are copies of analyses from the latest monthly sampling of monitoring wells and surface waters at CDSL. Sampling and analyses were by the Broward Testing Laboratory, Inc.

Please note that Storet Code 00005, GW elevations shown are well depths rather than groundwater elevations.

Please call if you have any questions or require further information.

Sincerely,

Harvey H. Bush, Jr.

Harvey H. Bush, Jr., P.E.
Regional Engineer

HB/pc

cc: John Baker

Enclosures:

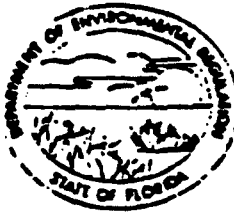
RECEIVED

JAN 31 1984

Broward County
ENVIRONMENTAL QUALITY CONTROL BOARD

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAMM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

1-1,1-2, & 1-3 QUARTERLY REPORT ON GROUND WATER MONITORING
4A1,4A-2 & 4A-3, 5-1,5-2,5-3 Rule 17-4.245(6)(k)2.

CMS # 6-1,6-2, & 6-3, 10-1, 10-2, & 10-3

DATE 10-29-83

Canal at F.P.L., Canal West of Hill, Oxidation Pond,
Canal at Turnpike

DER PERMIT # SC-06-50762

Hilton Road Landfill Site

Installation Name

N.W. 48th St. & Powerline Rd., Pompano Beach, FL. Broward
Address City State Zip County

Harvey H. Bush, Jr. Regional Engineer
Owner or Authorized Representative's Name Title

Method of Discharge Area, if any

Type of Industry Solid Waste Disposal

Report for Period October 1, 1983 to September 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Harvey H. Bush, Jr. P.E.
Owner or Authorized Representative's Signature

Date

LABORATORY CERTIFICATION NUMBER 86137

GMS # SC-06-50762
 Site Canal @ F.P.L.
 Monitoring Well # Canal
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble
 No. Casing Volumes Purged --

Sample Date 10-29-83
Sample Time 9:10 am
Well Type: () Background
() Site Boundary
() Intermediate
(x) Compliance

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS:

HILTON ROAD SITE
PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Canal @ F.P.L.
 Monitoring Well # Canal
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble
 No. Casing Volumes Purged --

Sample Date 10-29-83
 Sample Time 9:10 am
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRES VATI
01106	ALUMINUM	PUMP	202.2	0.140	mg/l	YES	N
01000	ARSENIC	PUMP	206.2	BDL	mg/l	YES	N
01020	BORON	PUMP	212.3	0.16	mg/l	YES	N
01025	CADMIUM	PUMP	213.2	BDL	mg/l	YES	N
01032	CHROMIUM, Cr +6	PUMP	218.4	BDL	mg/l	YES	N
01035	COBALT	PUMP	219.2	BDL	mg/l	YES	N
01040	COPPER	PUMP	220.2	BDL	mg/l	YES	N
01046	IRON	PUMP	336.2	0.164	mg/l	YES	N
01056	MANGANESE	PUMP	243.2	0.020	mg/l	YES	N
01065	NICKEL	PUMP	249.2	BDL	mg/l	YES	N
01085	VANADIUM	PUMP	286.2	BDL	mg/l	YES	N
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N
39330	ALDRIN	PUMP	509A	BDL	mg/l	NO	R
39350	CHLORODANE	PUMP	509A	BDL	mg/l	NO	R
39360	DDD	PUMP	509A	BDL	mg/l	NO	R
39370	DDT	PUMP	509A	BDL	mg/l	NO	R
39365	DDE	PUMP	509A	BDL	mg/l	NO	R
39570	DIAZINON	PUMP	509C	BDL	mg/l	NO	R
39380	DIELDRIN	PUMP	509A	BDL	mg/l	NO	R
39390	ENDRIN	PUMP	509A	BDL	mg/l	NO	R
39540	ETHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	ETHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39398	ETHION	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR EPOXIDE	PUMP	509A	BDL	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR	PUMP	509A	BDL	mg/l	NO	R
39410	LINDANE	PUMP	509A	0.000005	mg/l	NO	R
39540	METHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	METHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39516	PCB TOTAL	PUMP	509A	BDL	mg/l	NO	R
81316	PCNB	PUMP	509A	BDL	mg/l	NO	R
39760	SILVEX	PUMP	509B	BDL	mg/l	NO	R
39740	2,4,5T	PUMP	509B	BDL	mg/l	NO	R
39730	2,4-D	PUMP	509B	BDL	mg/l	NO	R
82356	2,4-DP	PUMP	509B	BDL	mg/l	NO	R

PRESERVITIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS:

BROWARD TESTING LABORATORY, INC.

Mailing Address:

FRANK D. HOBLE

POST OFFICE BOX 23541

FORT LAUDERDALE, FLORIDA 33307

TELEPHONE 943-2103

DETECTION LIMITS HILTON ROAD LANDFILL STUDY GMS# SC-06-50762
October 29, 1983 (Milligrams per liter)

Arsenic	0.001	Endrin	0.00009
Cadmium	0.0001	ETH., Parathion	0.0002
Chromium +6	0.0001	ETH., Trithion	0.0004
Cobalt	0.0002	Ethion	0.0004
Copper	0.05	Heptachlor Epoxide	0.0001
Nickel	0.001	Toxaphene	0.001
Vanadium	0.001	Heptachlor	0.00008
Chromium Total	0.0001	Lindane	0.000004
Lead	0.001	Met. Parathion	0.0001
Mercury	0.0001	Met. Trithion	0.001
Phenol	0.001	PCB	0.0002
Aldren	0.00002	PCNB	0.000004
Chlorodane	0.0003	Silvex	0.0002
DDD Total	0.0002	2,4,5T	0.0001
DDE	0.0001	2,4-D	0.0005
DDT	0.0003	2,4-DP	0.0009
Diazinon	0.0002		
Dieldrin	0.0001		

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

1-1,1-2, & 1-3 QUARTERLY REPORT ON GROUND WATER MONITORING
4A1,4A-2 & 4A-3, 5-1,5-2,5-3 Rule 17-4.245(6)(k)2.

CMS # 6-1,6-2, & 6-3, 10-1, 10-2, & 10-3
Canal at F.P.L., Canal West of Hill, Oxidation Pond,
Canal at Turnpike

DATE 10-29-83

DER PERMIT # SC-06-50762

Hilton Road Landfill Site

Installation Name

N.W. 48th St. & Powerline Rd., Pompano Beach,

FL.

Broward

Address

City

State Zip

County

Harvey H. Bush, Jr.

Regional Engineer

Owner or Authorized Representative's Name

Title

Method of Discharge Area, if any

Type of Industry Solid Waste Disposal

Report for Period October 1, 1983 to September 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Harvey H. Bush, Jr. P.E.
Owner or Authorized Representative's Signature

Date

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT

(Rule 17-3.402, 17-3.404 - 173.406)

GMS # SC-06-50762

Site Canal West of Hill

Monitoring Well # Canal

Classification of Groundwater G-2

Sample Taken By F.D. Hoble

No. Casing Volumes Purged --

Sample Date 10-29-83

Sample Time 10:25 am

Well Type: ☐ Background

() Site Boundry

() Intermediate

(x) Compliance

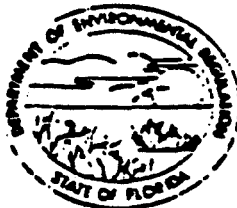
STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRES VATIO
00005	GW ELEVATION			--	FEET		
00006	TEMPERATURE	PUMP		27.6	OC	NO	
00916	CALCIUM	PUMP	215.2	48.9	mg/l	YES	N
01030	CHROMIUM	PUMP	218.2	BDL	mg/l	YES	N
01049	LEAD	PUMP	239.2	0.007	mg/l	YES	N
00925	MAGNESIUM	PUMP	242.1	5.3	mg/l	YES	N
71890	MERCURY	PUMP	245.1	BDL	mg/l	YES	N
00935	POTASSIUM	PUMP	258.1	12.6	mg/l	YES	N
00930	SODIUM	PUMP	273.1	26.1	mg/l	YES	N
01080	STRONTIUM	PUMP		2.58	mg/l	YES	N
00340	C.O.D.	PUMP	410.4	333	mg/l	NO	S
38260	M.B.A.S.	PUMP	425.1	0.25	mg/l	NO	R
00560	OIL-GREASE	PUMP	502B	9	mg/l	NO	RS
32730	PHENOL	PUMP	420.1	0.005	mg/l	NO	PC
00027	FECAL COLIFORM	PUMP	909C	60	/100ml	NO	R
00026	TOTAL COLIFORM	PUMP	909A	520	/100ml	NO	R
31674	FECAL STREP	PUMP	910B	5	/100ml	NO	R
00310	5-DAY B.O.D.	PUMP	405.1	9.6	mg/l	NO	R
82079	TURBIDITY	PUMP	214.A	65	NTU	NO	R
00410	ALKALINITY	PUMP	310.1	286	mg/l	NO	R
	BICARBONATE	PUMP		174.5	mg/l	NO	R
00940	CHLORIDE	PUMP	408A	120	mg/l	NO	R
	DISSOLVED SOLIDS	PUMP	208B	817	mg/l	YES	R
00951	FLUORIDE	PUMP	340.2	0.22	mg/l	NO	R
	HARDNESS	PUMP	309B	306	mg/l	NO	R
	NON CARBONATE	PUMP		20	mg/l	NO	R
00403	pH	PUMP	150.1	7.0	units	NO	
00955	SILICA	PUMP	370.1	6.6	mg/l	YES	R
00095	SPECIFIC COND.	PUMP	205	850	umho	NO	
00945	SULFATE	PUMP	375.4	33	mg/l	NO	R
00610	TOT. AMMONIA N	PUMP	350.3	3.2	mg/l	NO	RS
00680	TOT. ORG. CARBON	PUMP	415.1	11	mg/l	NO	RS
00625	TOT. ORG. NIT.	PUMP	351.3	6	mg/l	NO	RS
	TOTAL NITROGEN	PUMP		12.1	mg/l	NO	RS
00620	TOTAL NITRATE	PUMP	352.1	3.3	mg/l	NO	RS
00615	TOTAL NITRITE	PUMP	354.1	0.024	mg/l	NO	RS
00660	TOTAL O PHOS.	PUMP	365.1	0.12	mg/l	YES	R
00650	TOTAL PHOS.	PUMP	365.1	0.23	mg/l	YES	R

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
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REMARKS:

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TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

1-1,1-2, & 1-3 QUARTERLY REPORT ON GROUND WATER MONITORING
4A1,4A-2 & 4A-3, 5-1,5-2,5-3 Rule 17-4.245(6)(k)2.

CMS # 6-1,6-2, & 6-3, 10-1, 10-2, & 10-3
Canal at F.P.L., Canal West of Hill, Oxidation Pond,
Canal at Turnpike

DATE 10-29-83

DER PERMIT # SC-06-50762

Hilton Road Landfill Site

Installation Name

N.W. 48th St. & Powerline Rd., Pompano Beach,

FL.

Broward

Address

City

State Zip

County

Harvey H. Bush, Jr.

Regional Engineer

Owner or Authorized Representative's Name

Title

Method of Discharge Area, if any

Type of Industry Solid Waste Disposal

Report for Period October 1, 1983 to September 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

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Harvey H. Bush, Jr.
Owner or Authorized Representative

Date

BROWARD TESTING LABORATORY, INC.

Mailing Address:

FRANK D. NOBLE

POST OFFICE BOX 23541

FORT LAUDERDALE, FLORIDA 33307

TELEPHONE 943-2103

DETECTION LIMITS HILTON ROAD LANDFILL STUDY GMS# SC-06-50762
October 29, 1983 (Milligrams per liter)

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Nickel	0.001	Toxaphene	0.001
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Aldren	0.00002	PCNB	0.000004
Chlorodane	0.0003	Silvex	0.0002
DDD Total	0.0002	2,4,5T	0.0001
DDE	0.0001	2,4-D	0.0005
DDT	0.0003	2,4-DP	0.0009
Diazinon	0.0002		
Dieldrin	0.0001		

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Oxidation Pond
Monitoring Well # Pond
Classification of Groundwater G-2
Sample Taken By F.D. Hoble
No. Casing Volumes Purged -

Sample Date 10/29-83
Sample Time 10::30 am
Well Type: () Background
() Site Boundry
() Intermediate
(X) Compliance

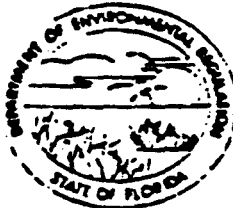
STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
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01020	BORON	PUMP	212.3	0.56	mg/l	YES	N
01025	CADMIUM	PUMP	213.2	BDL	mg/l	YES	N
01032	CHROMIUM, Cr +6	PUMP	218.4	BDL	mg/l	YES	N
01035	COBALT	PUMP	219.2	0.0006	mg/l	YES	N
01040	COPPER	PUMP	220.2	BDL	mg/l	YES	N
01046	IRON	PUMP	336.2	0.224	mg/l	YES	N
01056	MANGANESE	PUMP	243.2	0.039	mg/l	YES	N
01065	NICKEL	PUMP	249.2	0.011	mg/l	YES	N
01085	VANADIUM	PUMP	286.2	BDL	mg/l	YES	N
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N
39330	ALDRIN	PUMP	509A	BDL	mg/l	NO	R
39350	CHLORODANE	PUMP	509A	BDL	mg/l	NO	R
39360	DDD	PUMP	509A	BDL	mg/l	NO	R
39370	DDT	PUMP	509A	BDL	mg/l	NO	R
39365	DDE	PUMP	509A	BDL	mg/l	NO	R
39570	DIAZINON	PUMP	509C	BDL	mg/l	NO	R
39380	DIELDRIN	PUMP	509A	BDL	mg/l	NO	R
39390	ENDRIN	PUMP	509A	BDL	mg/l	NO	R
39540	ETHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	ETHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39398	ETHION	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR EPOXIDE	PUMP	509A	BDL	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR	PUMP	509A	BDL	mg/l	NO	R
39410	LINDANE	PUMP	509A	BDL	mg/l	NO	R
39540	METHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	METHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39516	PCB TOTAL	PUMP	509A	BDL	mg/l	NO	R
81316	PCNB	PUMP	509A	BDL	mg/l	NO	R
39760	SILVEX	PUMP	509B	BDL	mg/l	NO	R
39740	2,4,5T	PUMP	509B	BDL	mg/l	NO	R
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82356	2,4-DP	PUMP	509B	BDL	mg/l	NO	R

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE
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REMARKS:

STATE OF FLORIDA
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TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

1-1,1-2, & 1-3 QUARTERLY REPORT ON GROUND WATER MONITORING
4A1,4A-2 & 4A-3, 5-1,5-2,5-3 Rule 17-4.245(6)(k)2.

EMS # 6-1,6-2, & 6-3, 10-1, 10-2, & 10-3
Canal at F.P.L., Canal West of Hill, Oxidation Pond,
Canal at Turnpike

DATE 10-29-83

DER PERMIT # SC-06-50762

Hilton Road Landfill Site

Installation Name

N.W. 48th St. & Powerline Rd., Pompano Beach,

FL.

Broward

Address

City

State Zip

County

Harvey H. Bush, Jr.

Regional Engineer

Owner or Authorized Representative's Name

Title

Method of Discharge Area, if any

Type of Industry Solid Waste Disposal

Report for Period October 1, 1983 to September 30, 1984
date date

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Owner or Authorized Representative's Signature

Date

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT

(Rule 17-3.402, 17-3.404 - 173.406)

GMS # SC-06-50762

Site	Oxidation Pond
------	----------------

Monitoring Well # _____ Pond _____

Classification of Groundwater G-2

Sample Taken By F.D. Hohle

No. Casing Volumes Purged --

Sample Date 10-29-83

Sample Time 10:30 am

Well Type: () Background

() Site Boundary

() Intermediate

(x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
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00925	MAGNESIUM	PUMP	242.1	5.33	mg/l	YES	N
71890	MERCURY	PUMP	245.1	BDL	mg/l	YES	N
00935	POTASSIUM	PUMP	258.1	12.2	mg/l	YES	N
00930	SODIUM	PUMP	273.1	23.1	mg/l	YES	N
01080	STRONTIUM	PUMP		2.58	mg/l	YES	N
00340	C.O.D.	PUMP	410.4	329	mg/l	NO	S
38262	M.B.A.S.	PUMP	425.1	0.12	mg/l	NO	R
00560	OIL-GREASE	PUMP	502B	4	mg/l	NO	RS
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
00027	FECAL COLIFORM	PUMP	909C	10	/100ml	NO	R
00026	TOTAL COLIFORM	PUMP	909A	320	/100ml	NO	R
31674	FECAL STREP	PUMP	910B	-1	/100ml	NO	R
00310	5-DAY B.O.D.	PUMP	405.1	7.5	mg/l	NO	R
82079	TURBIDITY	PUMP	214.A	65	NTU	NO	R
00410	ALKALINITY	PUMP	310.1	254	mg/l	NO	R
	BICARBONATE	PUMP		154.9	mg/l	NO	R
00940	CHLORIDE	PUMP	408A	117	mg/l	NO	R
	DISSOLVED SOLIDS	PUMP	208B	808	mg/l	YES	R
00951	FLUORIDE	PUMP	340.2	0.14	mg/l	NO	R
	HARDNESS	PUMP	309B	296	mg/l	NO	R
	NON CARBONATE	PUMP		42	mg/l	NO	R
00403	pH	PUMP	150.1	7.1	units	NO	
00955	SILICA	PUMP	370.1	3.4	mg/l	YES	R
00095	SPECIFIC COND.	PUMP	205	920	umho	NO	
00945	SULFATE	PUMP	375.4	39	mg/l	NO	R
00610	TOT. AMMONIA N	PUMP	350.3	1.7	mg/l	NO	RS
00680	TOT. ORG. CARBON	PUMP	415.1	15	mg/l	NO	RS
00625	TOT. ORG. NIT.	PUMP	351.3	9	mg/l	NO	RS
	TOTAL NITROGEN	PUMP		12.8	mg/l	NO	RS
00620	TOTAL NITRATE	PUMP	352.1	3.7	mg/l	NO	RS
00615	TOTAL NITRITE	PUMP	354.1	0.027	mg/l	NO	RS
00660	TOTAL O PHOS.	PUMP	365.1	0.08	mg/l	YES	R
00650	TOTAL PHOS.	PUMP	365.1	0.17	mg/l	YES	R

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE
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REMARKS:

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4A1,4A-2 & 4A-3, 5-1,5-2,5-3 Rule 17-4.245(6)(k)2.

CMS # 6-1,6-2, & 6-3, 10-1, 10-2, & 10-3

DATE 10-29-83

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Canal at Turnpike

DER PERMIT # SC-06-50762

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Report for Period October 1, 1983 to September 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Harvey H. Bush, Jr. P.E.
Owner or Authorized Representative's Signature

Date

BROWARD TESTING LABORATORY, INC.

Mailing Address:

FRANK D. HOBLE

POST OFFICE BOX 23541

FORT LAUDERDALE, FLORIDA 33307

TELEPHONE 943-2103

DETECTION LIMITS HILTON ROAD LANDFILL STUDY GMS# SC-06-50762
October 29, 1983 (Milligrams per liter)

Arsenic	0.001	Endrin	0.00009
Cadmium	0.0001	ETH., Parathion	0.0002
Chromium +6	0.0001	ETH., Trithion	0.0004
Cobalt	0.0002	Ethion	0.0004
Copper	0.05	Heptachlor Epoxide	0.0001
Nickel	0.001	Toxaphene	0.001
Vanadium	0.001	Heptachlor	0.00008
Chromium Total	0.0001	Lindane	0.000004
Lead	0.001	Met. Parathion	0.0001
Mercury	0.0001	Met. Trithion	0.001
Phenol	0.001	PCB	0.0002
Aldren	0.00002	PCNB	0.000004
Chlorodane	0.0003	Silvex	0.0002
DDD Total	0.0002	2,4,5T	0.0001
DDE	0.0001	2,4-D	0.0005
DDT	0.0003	2,4-DP	0.0009
Diazinon	0.0002		
Dieldrin	0.0001		

BROWARD TESTING LABORATORY, INC.

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE
PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762Site Canal West of HillMonitoring Well # CanalClassification of Groundwater G-2Sample Taken By F.D. HobleNo. Casing Volumes Purged -Sample Date 10-29-83Sample Time 10:25 am
 Well Type: () Background
 () Site Boundary
 () Intermediate
 (x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRES VATI
01106	ALUMINUM	PUMP	202.2	0.214	mg/l	YES	N
01000	ARSENIC	PUMP	206.2	0.004	mg/l	YES	N
01020	BORON	PUMP	212.3	0.52	mg/l	YES	N
01025	CADMIUM	PUMP	213.2	BDL	mg/l	YES	N
01032	CHROMIUM, Cr +6	PUMP	218.4	BDL	mg/l	YES	N
01035	COBALT	PUMP	219.2	BDL	mg/l	YES	N
01040	COPPER	PUMP	220.2	0.030	mg/l	YES	N
01046	IRON	PUMP	336.2	0.194	mg/l	YES	N
01056	MANGANESE	PUMP	243.2	0.030	mg/l	YES	N
01065	NICKEL	PUMP	249.2	BDL	mg/l	YES	N
01085	VANADIUM	PUMP	286.2	BDL	mg/l	YES	N
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N
39330	ALDRIN	PUMP	509A	BDL	mg/l	NO	R
39350	CHLORODANE	PUMP	509A	BDL	mg/l	NO	R
39360	DDD	PUMP	509A	BDL	mg/l	NO	R
39370	DDT	PUMP	509A	BDL	mg/l	NO	R
39365	DDE	PUMP	509A	BDL	mg/l	NO	R
39570	DIAZINON	PUMP	509C	BDL	mg/l	NO	R
39380	DIELDRIN	PUMP	509A	BDL	mg/l	NO	R
39390	ENDRIN	PUMP	509A	BDL	mg/l	NO	R
39540	ETHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	ETHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39398	ETHION	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR EPOXIDE	PUMP	509A	BDL	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	BDL	mg/l	NO	R
39420	HEPTACHLOR	PUMP	509A	BDL	mg/l	NO	R
39410	LINDANE	PUMP	509A	BDL	mg/l	NO	R
39540	METHYL PARATHION	PUMP	509C	BDL	mg/l	NO	R
39786	METHYL TRITHION	PUMP	509C	BDL	mg/l	NO	R
39516	PCB TOTAL	PUMP	509A	BDL	mg/l	NO	R
81316	PCNB	PUMP	509A	BDL	mg/l	NO	R
39760	SILVEX	PUMP	509B	BDL	mg/l	NO	R
39740	2,4,5T	PUMP	509B	0.0002	mg/l	NO	R
39730	2,4-D	PUMP	509B	BDL	mg/l	NO	R
82356	2,4-DP	PUMP	509B	BDL	mg/l	NO	R

PRESERVITIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS:



Waste Management, Inc. of Florida
800 N.W. 62nd Street, Suite 420
Fort Lauderdale, Florida 33309
305/771-9850

April 3, 1984

Mr. Victor Howard
Broward County Environmental
Quality Control Board
500 S.W. 14th Court
Ft. Lauderdale, FL. 33315

RE: Groundwater Monitoring Central
Disposal Sanitary Landfill

Dear Mr. Howard:

Enclosed are analyses of the last quarterly water quality samples at the Central Disposal Sanitary Landfill and a list of detection limits.

Since WMI has implemented a centralized record keeping system, all monitoring points have been re-designated as follows:

WELL:	WAS	WELL:	NOW
	T-1		MW 1A
	1-2		1B
	1-3		1C
	4A-1		4A
	4A-2		4B
	4A-3		4C
	5-1		5A
	5-2		5A
	5-3		5C
	6-1		6A
	6-2		6B
	6-3		6C
	10-1		10A
	10-2		10B
	10-3		10C

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JUL 27 1984

Broward County
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PH 2H
PH

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APR 4 1984

Broward County
ENVIRONMENTAL QUALITY CONTROL BOARD

Page 2 continued:

April 3, 1984

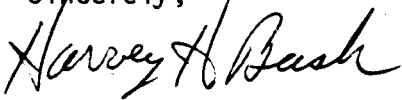
<u>WAS</u>	<u>NOW</u>
Turnpike Canal	S1
Oxidation Pond	S2
Canal W. of Hill	S3
Canal at FP&L	S4

The enclosed map shows all monitoring locations.

Sampling and analysis were by Broward Testing Laboratory personnel.

Please call if you have questions or require additional information.

Sincerely,



Harvey H. Bush, Jr., P.E.
Regional Engineer

HB/pc

cc: John Baker
Bob Oliver

Enclosures:

BROWARD TESTING LABORATORY, INC.

Mailing Address:

FRANK D. MOBLE

POST OFFICE BOX 23541

FORT LAUDERDALE, FLORIDA 33307

TELEPHONE 943-2103

DETECTION LIMITS HILTON ROAD LANDFILL STUDY GMS# SC-06-50762 (Milligrams per liter)

Arsenic	0.001	Endrin	0.00009
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Copper	0.05	Heptachlor Epoxide	0.0001
Nickel	0.001	Toxaphene	0.001
Vanadium	0.001	Heptachlor	0.00008
Chromium Total	0.0001	Lindane	0.000004
Lead	0.001	Met. Parathion	0.0001
Mercury	0.0001	Met. Trithion	0.001
Phenol	0.001	PCB	0.0002
Aldren	0.00002	PCNB	0.000004
Chlorodane	0.0003	Silvex	0.0002
DDD Total	0.0002	2,4,5T	0.0001
DDE	0.0001	2,4-D	0.0005
DDT	0.0003	2,4-DP	0.0009
Diazinon	0.0002		
Dieldrin	0.0001		

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-6261



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

MW 1A, 1B, & 1C QUARTERLY REPORT ON GROUND WATER MONITORING
Rule 17-4.245(6)(k)2.
MW 4A, 4B, 4C, MW 5A, 5B, & 5C

CMS # MW 6A, 6B, & 6C, MW 10A, 10B & 10C, Canal West of Hill, DATE March 30, 1984
Turnpike Canal, Canal at FP&L, Oxidation Pond

DER PERMIT # SC-06-50762

Central Disposal Sanitary Landfill

Installation Name

N.W. 48th St. & Powerline Rd., Pompano Beach, FL.

Broward

Address

City

State Zip

County

Harvey H. Bush, Jr.

Regional Engineer

Owner or Authorized Representative's Name

Title

Method of Discharge Area if any

Type of Industry Landfill

Report for Period _____ to Jan. 28, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Harvey H. Bush Jr.
Owner or Authorized Representative's Signature

4/2/84
Date

BROWARD TESTING LABORATORY, INC
LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site CDSL Canal West of Hill
Monitoring Well # Canal 33
Classification of Groundwater G-2
Sample Taken By F.D. Hoble
No. Casing Volumes Purged -

Sample Date 1/28/84
Sample Time 11:55 am
Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.6	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	10	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	86	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.003	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.018	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.94	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.0	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	33	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	1050	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	305	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.24	mg/l	YES	R
01090	ZINC	PUMP	289.2	0.010	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Pumpike Canal CDSL
 Monitoring Well # G-2 S1
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble
 No. Casing Volumes Purged --

Sample Date 1/28/84
 Sample Time 8:55 am
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	5.6	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	10	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	29	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.019	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3		mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.2	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	11	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	690	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	116	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.14	mg/l	YES	R
01090	ZINC	PUMP	289.2	0.042	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Canal at F.P.L. CDSL
Monitoring Well # Canal 54
Classification of Groundwater G-2
Sample Taken By F.D. Hoble
No. Casing Volumes Purged --

Sample Date 1/28/84
Sample Time 10:30 am
Well Type: () Background
() Site Boundry
() Intermediate
(*) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	3.9	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	50	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.012	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.64	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1		UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	14	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205		mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	131	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.09	mg/l	YES	R
01090	ZINC	PUMP	289.2	0.020	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site CDSL Oxidation Pond
 Monitoring Well # Pond S2
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble
 No. Casing Volumes Purged -

Sample Date 1/28/84
 Sample Time 12:05 am
 Well Type: ☐ Background
☐ Site Boundary
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	2.5	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	10	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	87	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.115	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.82	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.3	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	37	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	980	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	196	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.17	mg/l	YES	R
01090	ZINC	PUMP	289.2	0.016	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____



Waste Management, Inc. of Florida
800 N.W. 62nd Street, Suite 420
Fort Lauderdale, Florida 33309
305/771-9850

7/7
8/31
ROUTE
FH

August 29, 1984

Mr. John A. Guidry
Industrial/Waste/Solid Waste
& Air Permitting Supervisor
Dept. of Environmental Regulation
3301 Gun Club Road
West Palm Beach, FL. 33402

RE: Water Quality Analyses for Central
Disposal Sanitary Landfill

Dear Guidry:

Enclosed are the latest quarterly water quality analyses for the above mentioned landfill. Samples were collected from the following wells: 1A, B and C; 4A, B and C; 5A, B and C, 6A, B and C; 10A, B and C. In addition surface water samples were collected from the following locations: Turnpike Canal (S1), Oxidation Pond (S2), Canal West of Hill (S3), Canal at F.P.L. (S4).

These samples were collected and analyzed by Broward Testing Laboratory, Inc.

If you have any questions or require additional information, please give me a call.

Sincerely,

Scott W. McCallister
Scott W. McCallister
District Geologist

SWM/pc

cc: John Baker w/encl.
Bob Oliver
Fran Henderson w/encl.

RECEIVED

AUG 31 1984

Broward County
ENVIRONMENTAL QUALITY CONTROL BOARD



Waste Management, Inc. of Florida
800 N.W. 62nd Street, Suite 420
Fort Lauderdale, Florida 33309
305/771-9850

August 29, 1984

Mr. Victor Howard
Broward County Environmental
Quality Control Board
500 S.W. 14th Court
Ft. Lauderdale, FL. 33315

RE: Water Quality Analyses for Central
Disposal Sanitary Landfill

Dear Howard:

Enclosed are the latest quarterly water quality analyses for the above mentioned landfill. Samples were collected from the following wells: 1A, B and C; 4A, B and C; 5A, B and C, 6A, B and C; 10A, B and C. In addition surface water samples were collected from the following locations: Turnpike Canal (S1), Oxidation Pond (S2), Canal West of Hill (S3), Canal at F.P.L. (S4).

These samples were collected and analyzed by Broward Testing Laboratory, Inc.

If you have any questions or require additional information, please give me a call.

Sincerely,

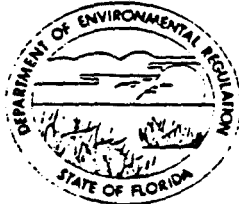
Scott W. McCallister
District Geologist

SWM/pc

cc: John Baker w/encl.
Bob Oliver
Fran Henderson w/encl.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

QUARTERLY REPORT ON GROUND WATER MONITORING
Rule 17-4.245(6)(k)2.

MW1, MW4, MW5, MW6, MW10
Canal West of hill, Turnpike canal @F.P.L.

GMS # Oxidation Pond

DATE August 24, 1984

DER PERMIT # SC-06-50762

Hilton Road Landfill Site
Installation Name

N.W. 48th St. & Powerline Road, Pompano Beach, FL. Broward
Address City State Zip County

Scott W. McCallister District Geologist
Owner or Authorized Representative's Name Title

Method of Discharge Area, if any

Type of Industry Solid Waste Disposal

Report for Period April 1, 1984 to June 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

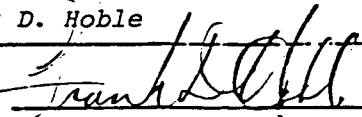
Owner or Authorized Representative's Signature August 24, 1984
Date

CERTIFICATION OF WMI
GROUNDWATER MONITORING PLAN PROCEDURES

Landfill Hilton Road (Waste Management)

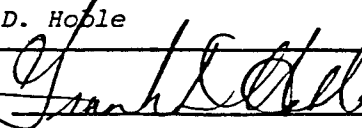
1. I certify that all wells sampled were purged in accordance with WMI procedures.

Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

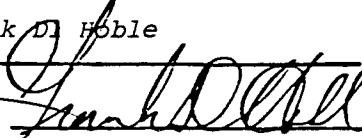
2. I certify that all groundwater monitoring sampling devices were properly cleaned before use in each well and that all wells were properly sampled in accordance with WMI procedures.

Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

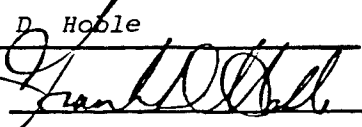
3. I certify that all sample bottles and containers were properly cleaned before use.

Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

4. I certify that all samples were properly preserved, cooled, and packed in secure containers in accordance with WMI procedures before shipping to laboratory.

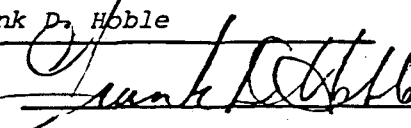
Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

FOR LABORATORY:

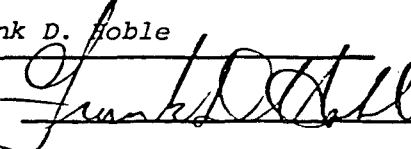
5. I certify that all samples were received in good condition and properly preserved and cooled in accordance with WMI procedures.

Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

6. I certify that all samples were analyzed in accordance with WMI procedures or equivalent procedures.

Name Frank D. Hoble Company Broward Testing Laboratory

Signature  Date April 28, 1984

NOTE: Please return form with data results.

BROWARD TESTING LABORATORY, INC.

Mailing Address:

FRANK D. HOBLE

POST OFFICE BOX 23541

FORT LAUDERDALE, FLORIDA 33307

TELEPHONE 943-2103

DETECTION LIMITS HILTON ROAD LANDFILL STUDY GMS# SC-06-50762
(Milligrams per liter)

Arsenic	0.001	Endrin	0.00009
Cadmium	0.0001	ETH., Parathion	0.0002
Chromium +6	0.0001	ETH., Trithion	0.0004
Cobalt	0.0002	Ethion	0.0004
Copper	0.05	Heptachlor Epoxide	0.0001
Nickel	0.001	Toxaphene	0.001
Vanadium	0.001	Heptachlor	0.00008
Chromium Total	0.0001	Lindane	0.000004
Lead	0.001	Met. Parathion	0.0001
Mercury	0.0001	Met. Trithion	0.001
Phenol	0.001	PCB	0.0002
Aldren	0.00002	PCNB	0.000004
Chlorodane	0.0003	Silvex	0.0002
DDD Total	0.0002	2,4,5T	0.0001
DDE	0.0001	2,4-D	0.0005
DDT	0.0003	2,4-DP	0.0009
Diazinon	0.0002		
Dieldrin	0.0001		

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Canal West of Hill
Monitoring Well # Canal
Classification of Groundwater G-2
Sample Taken By D. Hoble & P. Goodwin
No. Casing Volumes Purged ---

Sample Date 4-28-84
Sample Time 1215
Well Type: () Background
() Site Boundry
() Intermediate
(x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	2.6	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	70	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	66	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.012	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.03	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.92	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.12	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	26	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	800	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	260	mg/l	NO	S
00006	TEMPERATURE	PUMP		26.5	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.19	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Turnpike Canal
 Monitoring Well # Canal
 Classification of Groundwater G-2
 Sample Taken By D. Hoble & P. Goodwin
 No. Casing Volumes Purged --

Sample Date 4-28-84
 Sample Time 0815
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	3.7	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	20	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	32	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.02	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.42	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.33	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	9	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	550	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	97	mg/l	NO	S
00006	TEMPERATURE	PUMP		23.5	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.10	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Canal @ F. P.L.
Monitoring Well # Canal
Classification of Groundwater G-2
Sample Taken By D. Hoble & P. Goodwin
No. Casing Volumes Purged D. Hoble & P. Goodwin

Sample Date 4-28-84
Sample Time 1040
Well Type: () Background
() Site Boundry,
() Intermediate
(X) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	3.2	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	45	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.02	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.52	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	6.82	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	14	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	700	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	120	mg/l	NO	S
00006	TEMPERATURE	PUMP		26.0	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.12	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC
LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Oxidation Pond
Monitoring Well # Pond
Classification of Groundwater G-2
Sample Taken By D. Hoble & P. Goodwin
No. Casing Volumes Purged ---

Sample Date 4-28-84
Sample Time 1210
Well Type: () Background
() Site Boundry
() Intermediate
(x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESE VATIVE
01000	ARSENIC	PUMP	206.2		mc/l	YES	N
01005	BARIUM	PUMP	208.2		mc/l	YES	N
01025	CADMIUM	PUMP	213.2		mc/l	YES	N
01030	CHROMIUM	PUMP	218.2		mc/l	YES	N
01049	LEAD	PUMP	239.2		mc/l	YES	N
71890	MERCURY	PUMP	245.1		mc/l	YES	N
01145	SELENIUM	PUMP	270.2		mc/l	YES	N
01075	SILVER	PUMP	272.2		mc/l	YES	N
39390	ENDRIN	PUMP	509A		mc/l	NO	R
39410	LINDANE	PUMP	509A		mc/l	NO	R
39400	TOXAPHENE	PUMP	509A		mc/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mc/l	NO	R
39730	2,4-D	PUMP	509B		mc/l	NO	R
39740	2,4,5-TP	PUMP	509B		mc/l	NO	R
00951	FLUORIDE	PUMP	340.2		mc/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.9	mc/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mc/l	NO	R
00940	CHLORIDE	PUMP	408A	57	mc/l	NO	R
00945	SULPHATE	PUMP	375.4		mc/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mc/l	NO	PC
01056	MANGANESE	PUMP	243.2		mc/l	YES	N
01046	IRON	PUMP	236.2	0.01	mc/l	YES	N
00930	SODIUM	PUMP	273.1		mc/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.64	mc/l	NO	RS
	TOT ORG HALIDE	PUMP			mc/l	NO	R
00403	pH	PUMP	150.1	7.55	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	28	mc/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	820	umho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	177	mc/l	NO	S
00006	TEMPERATURE	PUMP		26.0	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.14	mc/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mc/l	YES	N

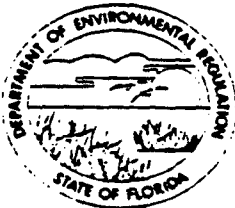
PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

QUARTERLY REPORT ON GROUND WATER MONITORING

MW1, MW4, MW5, MW6, MW10, Rule 17-4.245(6)(k)2.

GMS # Canal West of Hill, Turnpike canal @ F.P.&L
Oxidation Pond

DATE October 30, 1984

DER PERMIT # SC-06-50762

Hilton Road Landfill Site
Installation Name
N.W. 48th St. & Powerline Road, Pompano Beach, FL. Broward
Address City State Zip County
Scott McCallister District Geologist
Owner or Authorized Representative's Name Title
Method of Discharge Area if Any
Type of Industry Solid Waste Disposal
Report for Period July 1, 1984 to Sept. 30, 1984
date date

Attach monitoring data as approved in monitoring plan using parameter monitoring report forms. When applicable, attach additional sheets describing any changes in the background water quality and the discharge plume since the last reported description. Include any changes in size, direction of movement, rate of movement, and concentration changes of plume constituents in violation of the applicable standards.

NOTE: Pursuant to Rule 17-4.245(6)(k)3., at any time there is a change in the permitted volume, location or chemical, physical or microbiological composition of the discharge plume, the permittee shall notify the department and, if required by the department, submit a new report stating the volume and chemical, physical and microbiological compositions of the discharge at the point of release or contact with the ground water at the site boundary.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Scott W McCallister
Owner or Authorized Representative's Signature

10/30/84
Date

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Turnpike Canal
 Monitoring Well # Canal
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble, P. Goodwin
 No. Casing Volumes Purged -----

Sample Date 7/28/84
 Sample Time 0835
 Well Type: () Background
 () Site Boundry
 () Intermediate
 (x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.41	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	10	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	33	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.07	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.63	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.15	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	8	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	660	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	83	mg/l	NO	S
00006	TEMPERATURE	PUMP		24	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.08	mg/l	YES	R
01090	ZINC	PUMP	289.2		mg/l	YES	N
				BDL			

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC
LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
Site Canal at FPL
Monitoring Well # Canal
Classification of Groundwater G-2
Sample Taken By F.D. Hoble, P. Goodwin
No. Casing Volumes Purged ---

Sample Date 7/28/84
Sample Time 1105
Well Type: () Background
() Site Boundary
() Intermediate
(x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.72	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	42	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.72	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	1.09	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	6.90	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	14	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	610	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	87	mg/l	NO	S
00006	TEMPERATURE	PUMP		25	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.10	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
"N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
"S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
GROSS BETA COUNT ERROR pCi/l _____
RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Oxidation Pond
 Monitoring Well # Pond
 Classification of Groundwater G-2
 Sample Taken By F.D. Hoble, P. Goodwin
 No. Casing Volumes Purged ---

Sample Date 7/28/84
 Sample Time 1225
 Well Type: () Background
 () Site Boundry
 () Intermediate
 (x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.29	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	74	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	BDL	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	1.31	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.28	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	6.85	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	22	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	870	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	208	mg/l	NO	S
00006	TEMPERATURE	PUMP		26.5	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.17	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-60-50762
 Site Canal west of Hill
 Monitoring Well # Canal
 Classification of Groundwater G-2
 Sample Taken By F.D. Hobble, P. Goodwin
 No. Casing Volumes Purged ---

Sample Date 7/28/84
 Sample Time 1235
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	1.07	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	40	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	78	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.021	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	4.66	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	12	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.45	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	37	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	880	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	317	mg/l	NO	S
00006	TEMPERATURE	PUMP		27.0	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.21	mg/l	YES	R
01090	ZINC	PUMP	289.2	BDL	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site FPL Canal
 Monitoring Well # Canal (54)
 Classification of Groundwater G-2
 Sample Taken By P. Goodwin & F. Hoble
 No. Casing Volumes Purged N/A

Sample Date 10/27/84
 Sample Time 1145
 Well Type: () Background
 () Site Boundry
 () Intermediate
 (X) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A	-0.00007	mg/l	NO	R
39410	LINDANE	PUMP	509A	-0.0002	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	-0.001	mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A	-0.005	mg/l	NO	R
39730	2,4-D	PUMP	509B	-0.02	mg/l	NO	R
39740	2,4,5-TP	PUMP	509B	-0.002	mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	0.05	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	-1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		pCi/l	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	79	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.012	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	1.51	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	15.2	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	6.9	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	7	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	1000	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	147	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.09	mg/l	YES	R
01090	ZINC	PUMP	289.2	-0.02	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site Turnpike Canal
 Monitoring Well # Canal (S1)
 Classification of Groundwater G-2
 Sample Taken By P. Goodwin & F. Hoble
 No. Casing Volumes Purged N/A

Sample Date 10/27/84
 Sample Time 0825
 Well Type: ☐ Background
☐ Site Boundary
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A	-0.00007	mg/l	NO	R
39410	LINDANE	PUMP	509A	-0.0002	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	-0.001	mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A	-0.005	mg/l	NO	R
39730	2,4-D	PUMP	509B	-0.02	mg/l	NO	R
39740	2,4,5-TP	PUMP	509B	-0.002	mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	0.06	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	10	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		pCi/l	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	45	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.008	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.51	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.058	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.51	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	5	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	625	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	43	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.12	mg/l	YES	R
01090	ZINC	PUMP	289.2	-0.02	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-507
 Site Canal West of Hill
 Monitoring Well # Canal (S3)
 Classification of Groundwater _____
 Sample Taken By P. Goodwin & F. Hoble
 No. Casing Volumes Purged 3

Sample Date 10/27/84
 Sample Time 1250
 Well Type: () Background
 () Site Boundry
 () Intermediate
 (x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A	-0.00007	mg/l	NO	R
39410	LINDANE	PUMP	509A	-0.0002	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	-0.001	mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A	-0.005	mg/l	NO	R
39730	2,4-D	PUMP	509B	-0.02	mg/l	NO	R
39740	2,4,5-TP	PUMP	509B	-0.002	mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	0.07	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	20	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		pCi/l	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	110	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.006	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.24	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	0.1	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.1	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	14	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	680	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	317	mg/l	NO	S
00006	TEMPERATURE	PUMP			°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.17	mg/l	YES	R
01090	ZINC	PUMP	289.2	-0.02	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site FPL CANAL
 Monitoring Well # CANAL
 Classification of Groundwater G-2
 Sample Taken By F.HOBLE-P.GOODWIN
 No. Casing Volumes Purged --

Sample Date 1/26/85
 Sample Time 1250
 Well Type: () Background
 () Site Boundry
 () Intermediate
 (x) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESE- VATIVE
01000	ARSENIC	PUMP	206.2		mq/l	YES	N
01005	BARIUM	PUMP	208.2		mq/l	YES	N
01025	CADMIUM	PUMP	213.2		mq/l	YES	N
01030	CHROMIUM	PUMP	218.2		mq/l	YES	N
01049	LEAD	PUMP	239.2		mq/l	YES	N
01090	MERCURY	PUMP	245.1		mq/l	YES	N
01145	SELENIUM	PUMP	270.2		mq/l	YES	N
01075	SILVER	PUMP	272.2		mq/l	YES	N
09390	ENDRIN	PUMP	509A		mq/l	NO	R
09410	LINDANE	PUMP	509A		mq/l	NO	R
09400	TOXAPHENE	PUMP	509A		mq/l	NO	R
09420	METHOXYCHLOR	PUMP	509A		mq/l	NO	R
09730	2,4-D	PUMP	509B		mq/l	NO	R
09740	2,4,5-TP	PUMP	509B		mq/l	NO	R
00951	FLUORIDE	PUMP	340.2		mq/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	0.21	mq/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	<1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
01503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mq/l	NO	R
00940	CHLORIDE	PUMP	408A	72	mq/l	NO	R
00945	SULPHATE	PUMP	375.4		mq/l	NO	R
02730	PHENOL	PUMP	420.1	<0.001	mq/l	NO	PC
01056	MANGANESE	PUMP	243.2		mq/l	YES	N
01046	IRON	PUMP	236.2	0.39	mq/l	YES	N
00930	SODIUM	PUMP	273.1		mq/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	3.7	mq/l	NO	RS
	TOT ORG HALIDE	PUMP			mq/l	NO	R
00403	pH	PUMP	150.1	6.9	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	110	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	970	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	380	mg/l	NO	S
00006	TEMPERATURE	PUMP		25	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.11	mq/l	YES	R
01090	ZINC	PUMP	289.2	0.036	mq/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

SC-06-50762
 TURNPIKE CANAL
 ng Well # CANAL
 cation of Groundwater G-2
 aken By F.HOBLE-P.GOODWIN
 ng Volumes Purged --

Sample Date 1/27/85
 Sample Time 0745
 Well Type: () Background
 () Site Boundary
 () Intermediate
 (X) Compliance

PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
ARSENIC	PUMP	206.2		mg/l	YES	N
ARIUM	PUMP	208.2		mg/l	YES	N
ADMIUM	PUMP	213.2		mg/l	YES	N
HRONIUM	PUMP	218.2		mg/l	YES	N
EAD	PUMP	239.2		mg/l	YES	N
ERCURY	PUMP	245.1		mg/l	YES	N
ELENIUM	PUMP	270.2		mg/l	YES	N
ILVER	PUMP	272.2		mg/l	YES	N
NDRIN	PUMP	509A		mg/l	NO	R
INDANE	PUMP	509A		mg/l	NO	R
OXAPHENE	PUMP	509A		mg/l	NO	R
ETHOXYCHLOR	PUMP	509A		mg/l	NO	R
,4-D	PUMP	509B		mg/l	NO	R
,4,5-TP	PUMP	509B		mg/l	NO	R
LUORIDE	PUMP	340.2		mg/l	NO	R
ITRATE NITROGEN	PUMP	352.1	0.10	mg/l	NO	RS
ECAL COLIFORM	PUMP	909C	47	/100m	NO	R
OTAL COLIFORM	PUMP	909A		/100m	NO	R
ROSS ALPHA	PUMP	900.0		pCi/l	NO	R
ROSS BETA	PUMP	900.0		mRm/y	NO	R
ADIUM	PUMP	903.0		pCi/l	NO	R
ZANIDE	PUMP	335.2		mg/l	NO	R
HLORIDE	PUMP	408A	47	mg/l	NO	R
PLPHATE	PUMP	375.4		mg/l	NO	R
ENOL	PUMP	420.1	<0.001	mg/l	NO	PC
ANGANESE	PUMP	243.2		mg/l	YES	N
RON	PUMP	236.2	0.26	mg/l	YES	N
ODIUM	PUMP	273.1		mg/l	YES	N
AMONIA NITROGEN	PUMP	350.3	0.09	mg/l	NO	RS
OT ORG HALIDE	PUMP			mg/l	NO	R
I	PUMP	150.1	7.5	UNITS	NO	
OT ORG CARBON	PUMP	415.1	16	mg/l	NO	RS
PECIFIC COND.	PUMP	205	610	mmho	NO	
HEM. OX. DEMAND	PUMP	410.4	66	mg/l	NO	S
EMPERATURE	PUMP		25	°C	NO	
V ELEVATION				FEET		
EPH TO GW				FEET		
OTAL PHOS., P	PUMP	365.1	0.10	mg/l	YES	R
INC	PUMP	289.2	<0.02	mg/l	YES	N

IVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

PHA COUNT ERROR pCi/l _____
 A COUNT ERROR pCi/l _____
 UNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site TURNPIKE
 Monitoring Well # CANAL
 Classification of Groundwater C-2
 Sample Taken By F.HOBLE, P.GOODWIN
 No. Casing Volumes Purged -

Sample Date 4/18/85
 Sample Time 1800
 Well Type: ☐ Background
☐ Site Boundary
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESERVATIVE
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	3.6	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	<1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		mRm/y	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	37	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	<0.001	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.04	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	1.1	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.06	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	14.14	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	620	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	35	mg/l	NO	S
00006	TEMPERATURE	PUMP		24	°C	NO	
00005	GW ELEVATION			-	FEET		
	DEPTH TO GW			-	FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.08	mg/l	YES	R
01090	ZINC	PUMP	289.2	<0.02	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site F.P.L.
 Monitoring Well # CANAL
 Classification of Groundwater C-2
 Sample Taken By F.HOBLE, P. GOODWIN
 No. Casing Volumes Purged -

Sample Date 4/18/85
 Sample Time 1710
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESEV VATIVE
01000	ARSENIC	PUMP	206.2		mc/l	YES	N
01005	BARIUM	PUMP	208.2		mc/l	YES	N
01025	CADMIUM	PUMP	213.2		mc/l	YES	N
01030	CHROMIUM	PUMP	218.2		mc/l	YES	N
01049	LEAD	PUMP	239.2		mc/l	YES	N
71890	MERCURY	PUMP	245.1		mc/l	YES	N
01145	SELENIUM	PUMP	270.2		mc/l	YES	N
01075	SILVER	PUMP	272.2		mc/l	YES	N
39390	ENDRIN	PUMP	509A		mc/l	NO	R
39410	LINDANE	PUMP	509A		mc/l	NO	R
39400	TOXAPHENE	PUMP	509A		mc/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mc/l	NO	R
39730	2,4-D	PUMP	509B		mc/l	NO	R
39740	2,4,5-TP	PUMP	509B		mc/l	NO	R
00951	FLUORIDE	PUMP	340.2		mc/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	5.1	mc/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	<1	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		pCi/l	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mc/l	NO	R
00940	CHLORIDE	PUMP	408A	50.0	mc/l	NO	R
00945	SULPHATE	PUMP	375.4		mc/l	NO	R
32730	PHENOL	PUMP	420.1	0.038	mc/l	NO	PC
01056	MANGANESE	PUMP	243.2		mc/l	YES	N
01046	IRON	PUMP	236.2	0.58	mc/l	YES	N
00930	SODIUM	PUMP	273.1		mc/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	2.20	mc/l	NO	RS
	TOT ORG HALIDE	PUMP			mc/l	NO	R
00403	pH	PUMP	150.1	6.63	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	20.03	mc/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	640	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	80	mc/l	NO	S
00006	TEMPERATURE	PUMP		24	°C	NO	
00005	GW ELEVATION			-	FEET		
	DEPTH TO GW			-	FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.09	mc/l	YES	R
01090	ZINC	PUMP	289.2	<0.02	mc/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site FPL CANAL
 Monitoring Well # CANAL
 Classification of Groundwater G-2
 Sample Taken By F.HOBLE & P.GOODWIN
 No. Casing Volumes Purged 3

Sample Date 7/11/85
 Sample Time 1200
 Well Type: ☐ Background
☐ Site Boundry
☐ Intermediate
☒ Compliance

PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PR
01000	ARSENIC	PUMP	208.2	mg/l	YES	N
01005	BARIUM	PUMP	208.2	mg/l	YES	N
01025	CADMIUM	PUMP	213.2	mg/l	YES	N
01030	CHROMIUM	PUMP	218.2	mg/l	YES	N
01049	LEAD	PUMP	239.2	mg/l	YES	N
71890	MERCURY	PUMP	245.1	mg/l	YES	N
01145	SELENIUM	PUMP	270.2	mg/l	YES	N
01075	SILVER	PUMP	272.2	mg/l	YES	N
39390	ENDRIN	PUMP	509A	mg/l	NO	R
39410	LINDANE	PUMP	509A	mg/l	NO	R
39400	TOXAPHENE	PUMP	509A	mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A	mg/l	NO	R
39730	2,4-D	PUMP	509B	mg/l	NO	R
39740	2,4,5-TP	PUMP	509B	mg/l	NO	R
00951	FLUORIDE	PUMP	340.2	mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	13.2 mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	60 /100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A	/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0	pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0	pCi/l	NO	R
11503	RADIUM	PUMP	903.0	pCi/l	NO	R
00720	CYANIDE	PUMP	335.2	mg/l	NO	R
00940	CHLORIDE	PUMP	408A	62.0 mg/l	NO	R
00945	SULPHATE	PUMP	375.4	mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.017 mg/l	NO	PC
01056	MANGANESE	PUMP	243.2	mg/l	YES	N
01046	IRON	PUMP	236.2	1.943 mg/l	YES	N
00930	SODIUM	PUMP	273.1	mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	1.85 mg/l	NO	RS
	TOT ORG HALIDE	PUMP		mg/l	NO	R
00403	pH	PUMP	150.1	7.8 UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	28.3 mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	620 umho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	75 mg/l	NO	S
00006	TEMPERATURE	PUMP		32 °C	NO	
00005	GW ELEVATION			FEET		
	DEPTH TO GW			FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.7 mg/l	YES	R
01090	ZINC	PUMP	289.2	-0.02 mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

BROWARD TESTING LABORATORY, INC

LABORATORY CERTIFICATION NUMBER 86137

HILTON ROAD SITE

PARAMETER MONITORING REPORT (Rule 17-3.402, 17-3.404 - 17-3.406)

GMS # SC-06-50762
 Site TURNPIKE CANAL
 Monitoring Well # CANAL
 Classification of Groundwater G-L
 Sample Taken By F. HOBLE & P. GOODWIN
 No. Casing Volumes Purged -

Sample Date 7/11/85
 Sample Time 1730
 Well Type: () Background
 () Site Boundary
 () Intermediate
 (X) Compliance

STORET CODE	PARAMETER MONITORED	SAMPLING METHOD	ANALYSIS METHOD	ANALYSIS RESULT	UNITS	SAMPLE FILTERED	PRESE. VATIV.
01000	ARSENIC	PUMP	206.2		mg/l	YES	N
01005	BARIUM	PUMP	208.2		mg/l	YES	N
01025	CADMIUM	PUMP	213.2		mg/l	YES	N
01030	CHROMIUM	PUMP	218.2		mg/l	YES	N
01049	LEAD	PUMP	239.2		mg/l	YES	N
71890	MERCURY	PUMP	245.1		mg/l	YES	N
01145	SELENIUM	PUMP	270.2		mg/l	YES	N
01075	SILVER	PUMP	272.2		mg/l	YES	N
39390	ENDRIN	PUMP	509A		mg/l	NO	R
39410	LINDANE	PUMP	509A		mg/l	NO	R
39400	TOXAPHENE	PUMP	509A		mg/l	NO	R
39420	METHOXYCHLOR	PUMP	509A		mg/l	NO	R
39730	2,4-D	PUMP	509B		mg/l	NO	R
39740	2,4,5-TP	PUMP	509B		mg/l	NO	R
00951	FLUORIDE	PUMP	340.2		mg/l	NO	R
00620	NITRATE NITROGEN	PUMP	352.1	6.4	mg/l	NO	RS
00027	FECAL COLIFORM	PUMP	909C	120	/100m	NO	R
00026	TOTAL COLIFORM	PUMP	909A		/100m	NO	R
01501	GROSS ALPHA	PUMP	900.0		pCi/l	NO	R
03501	GROSS BETA	PUMP	900.0		pCi/l	NO	R
11503	RADIUM	PUMP	903.0		pCi/l	NO	R
00720	CYANIDE	PUMP	335.2		mg/l	NO	R
00940	CHLORIDE	PUMP	408A	55	mg/l	NO	R
00945	SULPHATE	PUMP	375.4		mg/l	NO	R
32730	PHENOL	PUMP	420.1	0.015	mg/l	NO	PC
01056	MANGANESE	PUMP	243.2		mg/l	YES	N
01046	IRON	PUMP	236.2	0.42	mg/l	YES	N
00930	SODIUM	PUMP	273.1		mg/l	YES	N
00610	AMMONIA NITROGEN	PUMP	350.3	1.11	mg/l	NO	RS
	TOT ORG HALIDE	PUMP			mg/l	NO	R
00403	pH	PUMP	150.1	7.5	UNITS	NO	
00680	TOT ORG CARBON	PUMP	415.1	28.8	mg/l	NO	RS
00095	SPECIFIC COND.	PUMP	205	680	mmho	NO	
00340	CHEM. OX. DEMAND	PUMP	410.4	75	mg/l	NO	S
00006	TEMPERATURE	PUMP		32	°C	NO	
00005	GW ELEVATION				FEET		
	DEPTH TO GW				FEET		
00650	TOTAL PHOS., P	PUMP	365.1	0.4	mg/l	YES	R
01090	ZINC	PUMP	289.2	-0.02	mg/l	YES	N

PRESERVATIVES: "C" COPPER SULPHATE; "F" FILTRATION; "H" SODIUM HYDROXIDE;
 "N" NITRIC ACID; "P" PHOSPHORIC ACID; "R" REFRIGERATE;
 "S" SULPHURIC ACID; "Z" ZINC ACETATE

REMARKS

GROSS ALPHA COUNT ERROR pCi/l _____
 GROSS BETA COUNT ERROR pCi/l _____
 RADIUM COUNT ERROR pCi/l _____

SURFACE WATER QUALITY STANDARDS^a

<u>Constituent</u>	<u>Standard</u>
Arsenic	Not to exceed 0.05 mg/l
BOD ₅	Not to exceed 5.0 mg/l
Cadmium	Not to exceed 0.001 mg/l
Chlorinated Hydrocarbons (not otherwise identified by name)	Not to exceed 0.01 mg/l
Chlorine (free residual)	Not to exceed 0.01 mg/l
Chromium (total)	Not to exceed 0.05 mg/l
COD	No unnatural discoloration shall be apparent except for that resulting from scientific investigation or environmental monitoring.
Coliform (Fecal)	(a) Not to exceed 200 per 100 ml for monthly average. (b) Not to exceed 400 per 100 ml for 100% of samples. (c) Not to exceed 800 per 100 ml in any sample.
Coliform (Total)	Not to exceed 1000/100 ml
Copper	Not to exceed 0.03 mg/l
Cyanide	Not to exceed 0.005 mg/l
Detergent (as MBAS)	Not to exceed 0.5 mg/l
Lead	Not to exceed 0.03 mg/l
Mercury	Not to exceed 0.05 ug/l
Nickel	Not to exceed 0.1 mg/l
Nitrogen	Total nitrogen as N (from Nitrate, Nitrite, NH ₃ , and organic) not to exceed 1.5 mg/l
Odors	None shall be detectable due to sewage or industrial waste.
Oil and Grease	Dissolved or emulsified oil or grease shall not exceed 1.0 ppm. No undissolved or visible oil as iridescence shall be present.
Oxygen, dissolved	Daily average not less than 5 mg/l; single reading never less than 4 mg/l.
Pathogens (excluding coliform)	Less than 1 per 10 gallons.
pH	Not less than 6.5 nor more than 8.5 units.
Phenolic Compounds	Total not to exceed 0.001 mg/l.
Phosphorus (total)	Not to exceed 0.02 mg/l
Polychlorinated biphenyls (PCB's)	Total not to exceed 0.001 ug/l
Radioactivity	Gross beta not to exceed 1000 pc/l. Radium 226 not to exceed 3 pc/l, Strontium 90 not to exceed 10 pc/l.
Selenium	Not to exceed 0.25 mg/l
Silver	Not to exceed 0.5 mg/l
Solids Floating, (Suspended or Settleable)	Industrial or other wastes.

SURFACE WATER QUALITY STANDARDS^a

<u>Constituent</u>	<u>Standard</u>
Temperature	Not to be above 90°F (32.2°C)
Turbidity	Not to exceed 10 Jackson Units.
Zinc	Not to exceed 0.03 mg/l
Pesticides and Herbicides	
Aldrin/Dieldrin	Not to exceed 0.003 ug/l Total
Chlordane	Not to exceed 0.01 ug/l
DDT	Not to exceed 0.001 ug/l
Demeton	Not to exceed 0.1 ug/l
Endosulfan	Not to exceed 0.003 ug/l
Endrin	Not to exceed 0.004 ug/l
Guthion	Not to exceed 0.01 ug/l
Heptachlor	Not to exceed 0.001 ug/l
Lindane	Not to exceed 0.01 ug/l
Malathion	Not to exceed 0.1 ug/l
Methoxychlor	Not to exceed 0.03 ug/l
Mirex	Not to exceed 0.001 ug/l
Parathion	Not to exceed 0.04 ug/l
Silvex (2-4-5 TP)	Not to exceed 1.0 ug/l
2-4 D	Not to exceed 1.0 ug/l
Toxaphene	Not to exceed 0.005 ug/l

^a Broward County Code, Chapter 27, Section 5.072

SAMPLING FREQUENCY BY PARAMETER

Parameter	Sampling Frequency ^a			
	Monthly	Quarterly	Semiannually	Annually ^c
Physical				
Hardness (mg/l)	N/A	N/A	N/A	X
pH (S.U.)	X	X	X	X
Temperature (°C)	N/A	N/A	N/A	X
Turbidity (NTU)	N/A	N/A	N/A	X
Specific Conductance (umhos/cm)	X	X	X	X
Inorganics (mg/l)				
Alkalinity	N/A	N/A	N/A	X
Aluminum	N/A	N/A	N/A	X
Arsenic	N/A	N/A	N/A	X
Bicarbonate	N/A	N/A	N/A	X
Boron	N/A	N/A	N/A	X
Cadmium	N/A	X	N/A	X
Calcium	N/A	N/A	N/A	X
Chloride	N/A	N/A	N/A	X
Chromium	N/A	N/A	X	X
Chromium (CR ⁺⁶)	N/A	N/A	X	X
Cobalt	N/A	N/A	N/A	X
COD	N/A	X	X	X
Copper	N/A	N/A	X	X
Dissolved Solids	N/A	N/A	N/A	X
Fluoride	N/A	N/A	N/A	X
Iron	N/A	X	X	X
Lead	N/A	X	X	X
Magnesium	N/A	N/A	N/A	X
Manganese	N/A	N/A	N/A	X
Mercury	N/A	N/A	N/A	X
Nickel	N/A	N/A	N/A	X

SAMPLING FREQUENCY BY PARAMETER (continued)

Parameter	Sampling Frequency ^a			
	Monthly	Quarterly	Semiannually	Annually ^c
Noncarbonate Hardness	N/A	N/A	N/A	X
Silica	N/A	N/A	N/A	X
Sodium	N/A	N/A	N/A	X
Strontium	N/A	N/A	N/A	X
Sulfate	N/A	N/A	N/A	X
Total Nitrogen	N/A	N/A	N/A	X
Total Nitrate N	N/A	X	X	X
Total Nitrite N	N/A	N/A	N/A	X
Total Ortho Phosphorus	N/A	N/A	N/A	X
Total Phosphorus	N/A	N/A	N/A	X
Vanadium	N/A	N/A	N/A	X
Zinc	N/A	N/A	N/A	X
Organics (mg/l)				
Aldrin	N/A	N/A	X ^b	X
Chlorodane	N/A	N/A	X ^b	X
DDD Total	N/A	N/A	X ^b	X
DDE	N/A	N/A	X ^b	X
DDT	N/A	N/A	X ^b	X
Diazinon	N/A	N/A	X ^b	X
Dieldrin	N/A	N/A	X ^b	X
Endrin	N/A	N/A	X ^b	X
ETH, Parathion	N/A	N/A	X ^b	X
ETH, Trithion	N/A	N/A	X ^b	X
Ethion	N/A	N/A	X ^b	X
Heptachlor Epoxide	N/A	N/A	X ^b	X
Heptachlor	N/A	N/A	X ^b	X
Lindane	N/A	N/A	X ^b	X
M.B.A.S.	N/A	N/A	N/A	X
Met. Parathion	N/A	N/A	X ^b	X

SAMPLING FREQUENCY BY PARAMETER (concluded)

Parameter	Sampling Frequency ^a			
	Monthly	Quarterly	Semiannually	Annually ^c
Met. Trithion	N/A	N/A	X ^b	X
Oil and Grease	N/A	N/A	X ^b	X
PCB	N/A	N/A	X	X
PCNB	N/A	N/A	X	X
Phenols	N/A	N/A	N/A	X
Silvex	N/A	N/A	X ^b	X
Total Ammonia	N/A	N/A	N/A	X
Total Organic Carbon	N/A	N/A	N/A	X
Total Organic Nitrogen	N/A	N/A	N/A	X
Toxaphene	N/A	N/A	X ^b	X
2,4,5-T	N/A	N/A	X ^b	X
2,4-D	N/A	N/A	X ^b	X
2,4-DP	N/A	N/A	X ^b	X
Bacteria (mg/l)				
Fecal Coliform	N/A	N/A	N/A	X
Total Coliform	N/A	X	X	X
Fecal Strep	N/A	N/A	N/A	X
5-Day BOD	N/A	N/A	X	X

^a Parameter analysis frequency data is taken from the Engineering and Operational Report for Central Disposal Sanitary Landfill, 1981. Prepared by Post, Buckley, Schuh and Jernigan, Inc. for Waste Management, Inc.

^b Semiannual sampling occurs in April and October. At the request of Boward County EQCB, the noted parameters are released from semiannual analysis. EQCB now requires only annual analysis of the chlorinated organic compounds.

^c All listed parameters are sampled in October and fulfill the annual analysis requirement by EQCB.

N/A = not applicable

TECHNICAL NOISE ANALYSIS

NORTH BROWARD RESOURCE RECOVERY FACILITY NOISE SURVEY
NOVEMBER 26 & 27, 1985

Noise Analysis

Regulation:

The Broward County Environmental Quality Control Board, under regulation "Chapter 27-7", requires any person causing a device, process or service to be operated or constructed which may be a source of noise pollution to submit appropriate plans and application for approval prior to construction, installation or operation. The regulation established a Sound Level Limit for the following classifications:

<u>Zone</u>	<u>Time</u>	<u>Sound Level Limit dBA</u>
o Residential	At all times	55
o Recreational or)	7 a.m. - 10 p.m.	60
Institutional)	10 p.m. - 7 a.m.	55
o Commercial or Business	At all times	65
o Manufacturing)		
Industrial)	At all times	70
Agricultural)		

Attachment A in the Appendix contains excerpts from Chapter 27-7 pertaining to sound level limits used for comparison in this analysis.

Present Site Usage

The proposed site for the North Broward Resource Recovery Facility is located by Figure 1. The tract contains approximately 25 acres and is partially developed. The site is relatively flat with some scrub growth and grass. Partial access is available into the interior by unpaved roads. A drainage canal crosses the site. There is a concrete block wall that runs along the eastern property line and is approximately 10 feet.



LAND USE LEGEND

- I - INDUSTRIAL
- C - COMMERCIAL
- LD - LOW DENSITY RESIDENTIAL
- U - UTILITIES
- O - PARKS AND RECREATION

POWERLINE ROAD (209)

NORTH BROWARD
RESOURCE RECOVERY
SITE

NW - 48 st.

WM
PLAT NO.1

WM
CDSL - 1

FLORIDA'S TURNPIKE 91

SUNNY BOLE ROAD (193)

FLORIDA STATE
TURNPIKE
AUTHORITY

LD2

LD1

C1

C2

BROWARD COUNTY

RELATIVE LOCATION OF RECEPTOR ZONES

Site Zoning and Surrounding Properties

The land use designation for the Project site and the surrounding area is industrial. There are two low density residential areas located some distance from the site; one directly south at a distance of approximately 3,137 feet; and the second, west of Florida's Turnpike at a distance of approximately 2,617 feet. Neither location is expected to receive any perceptable increase in noise level resulting from plant operation.

In the easterly direction adjacent industries include a truck wash, a used truck and auto part dealer, and a concrete product and asphalt manufacturer.

Waste Management Plant No. 1 and the Central Disposal Sanitary Landfill are west of the site. Location of various land use zones and the site are shown in Figure 1.

Existing Conditions

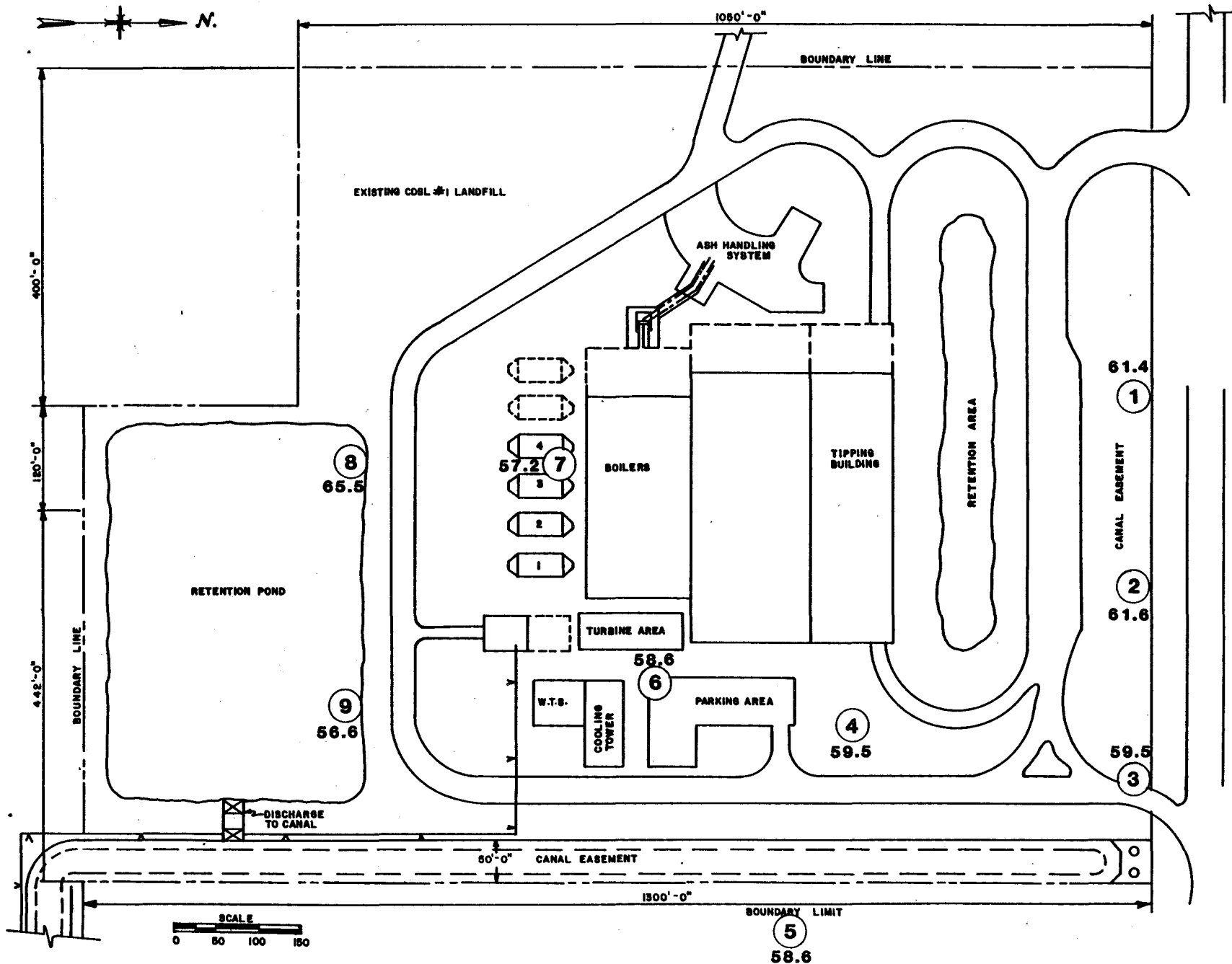
A noise survey of the site taken on November 25 and 26, 1985 indicates present ambient noise levels emanated from activity from adjacent industries, occasional aircraft, and trucks and automobiles traveling to and from Waste Management's disposal facility along N.W. 48th Street (Hilton Road).

For the survey, noise measurements were recorded at nine separate locations along the perimeter and within the site itself. Figure 2 identifies the approximate location of the sampling points.

A brief description of the measurement procedure used and a table of the collected field data is presented in Appendix A.

The Broward County regulation limits sound levels at the property line to 70 dBA regardless of specific time periods. As a conservative approach, the maximum (x), and the minimum (y) noise levels recorded at each location were combined according to the following:

$$SPL = 10 \log (10^{x/10} + 10^{y/10})$$



BROWARD COUNTY
NOISE MEASUREMENT LOCATIONS
dBA

Table 1 presents the maximum dBA level recorded during the survey and the added combined noise level for each location.

TABLE 1
 AMBIENT NOISE
 MAXIMUM RECORDED AND COMBINED, dBA

Point:	1	2	3	4	5	6	7	8	9
Max.	61	61	59	59	58	58	56	65	56
Comb:	61.4	61.6	59.5	59.5	58.6	58.6	57.2	65.5	56.6

With one exception, noise levels along NW 48th Street were greater than those measured around the remainder of the property. The exception, Location 8, measured the sound of operating equipment located on adjacent property.

Predicted Noise Levels at Boundaries
Sensitive Receptor Zones

A review of Figure 1 shows that:

- a. The area immediately surrounding the proposed site is zoned industrial. Limit of 70 dBA.
- b. Two commercial zones border Sample Road to the south and are approximately 3,357' and 3,557' distant. Limit of 65 dBA.
- c. One residential zone also borders Sample Road and is approximately 3,137' from the site. Limit of 55 dBA.
- d. One residential zone located to the west is approximately 2,617'. This parcel is on the opposite side of Florida's Turnpike. Limit of 55 dBA.
- e. A recreational zone is located to the west at approximately 2,617'. This zone is also on the opposite side of Florida's Turnpike. Limit of 60 to 55 dBA.

Expected Noise Generation

Noise generation will develop during the relative short-term construction activity and long-term plant operation.

Construction Activity

Facility construction will involve the actual building and equipping of the required structures. Such work will include: site development, pile driving concrete foundations, steel erection, installation of process equipment and systems.

Noise from operating the required construction equipment during construction will be occasional and intermittent, not constant or continuous. It is anticipated that construction activity will be limited to daylight hours on weekdays. Most of the noise generated will be relatively localized at a specific location.

Table 2 indicates noise level estimates in dBAs for typical construction equipment at distances of 50 feet.

During facility construction, property line noise will emanate from the use of various construction equipment around the site. The noise limitations per the EQCB regulations at the immediate receiving property lines around the site are 70 dBA. For this analysis, mid range noise values were used.

It is possible that at some time during the construction phase noise levels at the property line (see Figure 2) will exceed 70 dBA. Attenuation by distance may not be sufficient to reduce the noise to acceptable limits. The potential effectiveness of temporary barriers, installed along the perimeter to act as attenuators, will be examined for possible use during construction.

Further analysis indicated that at certain locations where concentrated construction will take place noise levels

TABLE 2
CONSTRUCTION EQUIPMENT NOISE LEVEL
dBA

	<u>Low</u>	<u>Mid Range</u>	<u>High</u>
Backhoe	72	85	93
Compressor, Stationary	68	80	87
Compactors	72	80	88
Concrete Mixer	72	80	90
Concrete Pump	75	80	85
Crane, Movable	75	80	85
Crane, Stationary	80	85	90
Front Loader	72	80	96
Generator, Stationary	70	75	85
Jack Hammer	75	90	98
Paver	82	85	92
Pile Driver, Peak	90	100	105
Pneumatic Wrench	82	86	90
Pump, Stationary	69	70	80
Rock Drill	80	85	95
Saws	67	80	94
Scraper or Grader	76	85	95
Tractor	73	85	96
Trucks	70	85	96
Vibrators	70	75	82

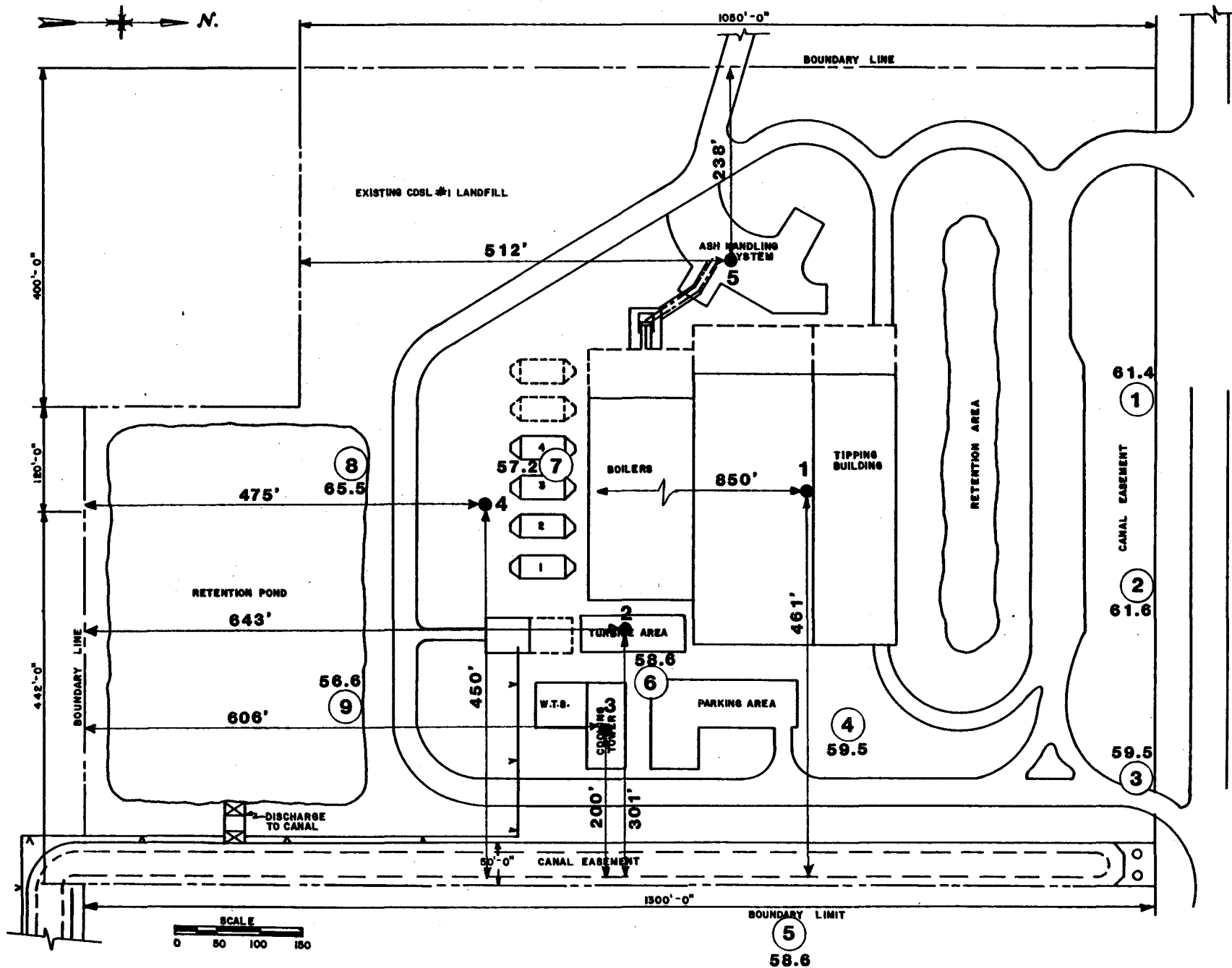
Sources:

1. "Industrial Noise and Vibration Control"; by Irwin and Graf. Prentice-Hall, Inc., 1979
2. "Handbook of Noise Control." 2nd Edition, Edited by Cyril M. Lewis, Ph.D., McGraw-Hill Book Co., 1979

will be increased by equipment or combination of equipment use. Figure 3 identifies the selected points and indicates their distances from the property line.

Analysis included determination and location of key receptor points as identified in Table 3. Table 4 projects the combined allowable noise limits at specific locations at the construction site which would comply with Broward County EQCB limits at the receptor.

Other potential noise impacts during facility construction would be associated with travel to and from the site by



**BROWARD COUNTY
NOISE CONCENTRATION LOCATION**

the construction work force, transport of construction equipment, and deliveries of construction materials. These impacts would be of temporary duration and are not expected to be significant relative to existing noise from NW 48th Street.

Examination of Table 2 indicates that much of the equipment type list can in fact be used either separately or in combination and still achieve the dBA limit imposed in Table 4.

TABLE 3

DISTANCE FROM PLANT CONSTRUCTION TO SENSITIVE ZONES
FEET

<u>Point</u>	<u>C1</u>	<u>C2</u>	<u>Ld1</u>	<u>Ld2</u>	<u>0</u>	<u>I</u>
1	4200	4100	3450	3097	3275	391
2	3945	3946	3226	3264	3384	234
3	3906	3985	3205	3356	3477	141
4	3820	3775	3105	3117	3244	206
5	4048	3802	3220	2857	3002	223

TABLE 4

Allowable dBA Limit from Site to Sensitive Zones

<u>Point</u>	<u>C1</u>	<u>C2</u>	<u>Ld1</u>	<u>Ld2</u>	<u>0</u>	<u>I</u>
1	102	103	91	91	96	87
2	102	103	90	92	97	83
3	102	103	90	92	97	78
4	102	102	90	91	96	82
5	102	102	90	91	96	82
6	102	102	90	90	96	80

However, based on monitoring conducted during the construction of other resource recovery facilities, noise levels ranged from about 94 to 96 dBA at a distance of fifty feet from the combined source.

Plant Operation

Noise generated by operation of the proposed facility would be from various complex sources that operate both continuously and intermittently. Although it is difficult to predict noise patterns when final site conditions and equipment layout are unavailable, it is possible to estimate the generated noise levels associated with major equipment use in generic terms. For this analysis, it was assumed that all 5 areas operated on a continuous basis.

Table 5 presents noise levels, measured and estimated, on existing or similar resource recovery facilities.

Other noise generators such as exciters, motors, pumps, various auxiliary equipment, cooling systems, transformers, air compressors, safety valves, vents, fans, boilers, soot blowers, etc. will be suitably muffled and contained within the facility itself and are not expected to contribute significantly to noise levels at the property line. Procedures for selecting appropriate noise abatement devices are described in Electric Power Plant Environmental Noise Guide (Edison Electric Institute, 1978). Depending on the building design, material used, and equipment position, further noise transmission loss due to the plant building can range from 25 to 65 dBA (Greenburg, et al 1979).

TABLE 5

ESTIMATED TYPICAL NOISE LEVELS FROM PROPOSED FACILITY COMPONENTS

<u>Equipment Area</u>	<u>Location(a)</u>	<u>dBA(b)</u>
Refuse Handling	1	66
Turbine Generator	2	51
Cooling Tower	3	68(c)
APC System	4	64
Residue Handling	5	61

(a) Approximate location per Figure 3

(b) Estimated outdoor noise at 50' including transmission loss

(c) Noise level at source

The results of noise impact at key receptors from individual equipment use and combined operation are shown in Table 6. Assuming the plant to emit a pure tone during operation, the Broward County EQCB allowable noise limit is reduced 5 dBA. Distances were estimated to emanate from the approximate center of the equipment area to the closest point on the receptor. It should be noted that the noise regulation is not exceeded when the equipment was considered separately or in combination except along NW 48th Street and location 10.

Mitigation Measures

Various noise abatement and mitigating measures will be required during construction and operation of the facility. It appears that noises generated during construction will govern; that they cannot, in all practicality, be air attenuated adequately by distance and that receiving noise levels will exceed the 70 dBA industrial limit at times.

Site preparation, usually the noisiest phase of construction, will proceed rapidly so that relative high noise levels will cause disturbance for the shortest possible time. As heavy construction is completed and activity becomes concentrated indoors, it is expected that noise levels will be attained.

There are a number of control and abatement measures that reflect standard engineering practices, guidelines, and requirements for construction-related activities which can be utilized to mitigate potential noise impacts during construction. The following steps can be taken as appropriate to control sound levels generated during plant construction:

- o Maintain exhaust silencers on mobile equipment (such as bulldozers, trucks, and cranes) in working condition.
- o Operate noisy equipment during periods when ambient sound levels are high (e.g., during daytime on weekdays).

- o Maintain mechanical equipment such as trucks, bulldozer and cranes in good working condition and shut down when not in use, instead of idling.
- o Keep noisy equipment as far from site boundaries as possible.
- o Utilize noise attenuated air compressors.

Various noise abatement and mitigating measures will be required and incorporated into the facility design to minimize noise impacts due to operation of the proposed facility. Different forms of noise control measures include equipment enclosures, absorption materials, barriers, mufflers, logging and vibration damping and insulation. Steam vents and safety valve vents must be muffled. Systems which generate pure tones are to be considered as prime items for noise abatement control.

TABLE 6
OPERATING dBA PROJECTED NOISE LEVELS AT RECEPTORS

<u>Equipment</u>	<u>On Site</u>	<u>C1</u>	<u>C2</u>	<u>LD1</u>	<u>LD2</u>	<u>0</u>	<u>I</u>
Refuse Handling	66	24.0	25.0	31.5	35.0	33.3	48.2
Turbine	51	11.6	11.5	18.7	18.4	17.2	37.7
Cooling Tower	68	28.9	28.2	36.0	34.4	33.2	59.0
APC System	64	25.8	26.3	33.0	32.8	31.6	51.8
Residue Handling	61	20.5	23.0	28.8	32.4	31.0	48.1
Distance, Feet		3835	4059	3796	3076	3476	478
Combined level	71.5	31.9	32.1	39.1	39.8	38.4	60.3

Special consideration will also be required in the refuse handling and preparation area, since this area is generally open for refuse trucks to unload. Additional consideration may be required to mitigate potential noise levels near property boundary measurement site 8.

From field data taken, it is obvious that the high ambient noise level at sampling point 8 was due to generators external to the site. Considering the plant to emit a continuous tone would automatically reduce the allowable limit from 70 dBA to 65 dBA and result in a technical violation. Facility noise contribution and noise levels are shown in Table 7.

There will be little change in vehicular traffic on NW 48th Street as a result of the facility. Traffic presently using the adjacent landfill will be directed to the facility instead.

There are a few measures available to mitigate on-site and off-site potential traffic-related noise impacts which can be utilized during design and operation of the proposed facility. The include the following:

- o Maintain trucks and especially exhaust silencer systems
- o Design and operate facility such that traffic flows will be facilitated to minimize trucks stopping and queuing
- o Use of sound barriers near property boundary site 8.

TABLE 7

dBA OPERATING NOISE LEVELS

<u>Site</u>	<u>Facility</u>	<u>Present Ambient</u>	<u>Allowable*</u>	<u>Combined</u>
8	52.9	65.5	65	65.7

*70 dBA reduced to emitting of pure tones

There are additional attenuation factors which though difficult to quantify will undoubtedly reduce noise level through absorption. These factors include vegetation and the structures on the site. Direction and dispersion of the sound

also has an affect on ambient noise levels. Sounds produced at ground level are generally absorbed at a far greater rate than sounds produced in the air. For the purpose of this survey, these factors are not taken into account. As a result, the projections of noise levels are conservative and true levels can be expected to be somewhat lower than concluded.

APPENDIX A

Sampling Procedure

Ambient noise level data was collected at nine separate locations along the perimeter and within the site itself. Figure 2 identifies the approximate location of the sampling points.

The survey consisted of three series of readings taken at various time periods on November 25 and 26, 1985; early evening, early morning and midday.

Sampling was taken with a Simpson 886 Type 2 sound level meter. The meter is a portable, battery powered, general purpose sound level instrument capable of accurate sound measurements over a range of 40 to 140 dB. The meter was held and positioned approximately 45 to 70 degrees with respect to the horizontal position and at a height of approximately 6 feet. The microphone was oriented at an angle of 70 degrees to account for the operator's position. Six readings at each point per period were taken at various compass headings at 60 degree increments.

During the period in which measurements were taken, the temperature at the site averaged in the 70s, skies were clear to partly cloudy and virtually no evidence of wind in the evening and early morning period. The midday period had a light variable easterly breeze which did not require the use of a windscreen.

The instrument was calibrated in a prescribed manner prior to the initial survey and midday period. Calibration was made using the Simpson 890 Sound Level Calibrator which provides a constant sound pressure level at 114 dB and a frequency of 1000 Hz.

The instrument was set to meter data at the "A" frequency response scale. This scale most closely corresponds to the human ear and is commonly used when making noise surveys and

for comparison with governmental codes and standards. The instrument performs in accordance with the weighing requirements of ANSI Standard Specification S1.4-1971 for a Type 2 sound level meter.

The instrument was also set in the "slow" mode in order to decrease the degree of meter fluctuation due to continual background noise changes. This is a common setting when making noise surveys.

Finally, the range switch was continuously adjusted to provide scale readings in the more accurate range, i.e. zero to plus 10.

CODE OF REGULATIONS
EXCERPTS FROM
CHAPTER 27-7 NOISE

Section 27-7.04 MAXIMUM PERMISSIBLE SOUND LEVELS BY RECEIVING LAND USE

.041 SOUND LEVELS BY RECEIVING LAND USE

No person shall operate or cause to be operated any source of sound arising from those activities set forth in Section 27-7.05, in such manner as to create a sound level which exceeds the limits set forth for the receiving land use district in Table 1 for more than 50% of any measurement period which shall not be less than 10 minutes, when measured at or within the boundary of a property within the receiving land use district and as a result of a source of sound being located on some other property.

TABLE 1
SOUND LEVELS BY RECEIVING LAND USE

<u>Receiving Land Use District</u>	<u>Time</u>	<u>Sound Level Limit dBA</u>
Residential	At all times	55
Recreational or Institutional	7 A.M. - 10 P.M.	60
Recreational or Institutional	10 P.M. - 7 A.M.	55
Commercial or Business	At all Times	65
Manufacturing, Industrial, or Agricultural	At all Times	70

.042 MAXIMUM SOUND LEVEL

For any source of sound during the measurement period as defined in Section 27-7.041, the maximum sound level shall not exceed the sound level limits in Table 1 by:

1. 10 dBA from 7 a.m. to 10 p.m. for all receiving land use districts except manufacturing, industrial, or agricultural;
2. 5 dBA from 10 p.m. to 7 a.m. for all receiving land use districts except manufacturing, industrial, or agricultural;
3. 10 dBA at all times in a manufacturing, industrial or agricultural receiving land use district.

.043 SOUND LIMITS - PURE TONE

For any source of sound which emits a pure tone, the sound level limits set forth in Section 27-7.041 and Section 27-7.042 shall be reduced by 5 dBA.

DRAINAGE DESIGN CALCULATIONS

10.11 DRAINAGE DESIGN CALCULATIONS



CALCULATION COVER SHEET

ASSIGNMENT INFORMATION

Project: NORTH BEAVERD RESOURCE RECOVERY

Calc. No. _____

Client: _____

Dept. _____

Project No.: _____

System _____

Work Package No.: _____

No. of Sheets 14

Title: SITE DRAINAGE

	NAME	INITIAL
Designed/Calculated By:	<u>Greggitt</u>	<u>DRC</u>
Checked By:	<u>H.G. McNamEE</u>	<u>HGM</u>
Approved and Released By:	_____	_____
Code Related: ☐ YES ☐ NO		
Reviewed By:	_____	_____

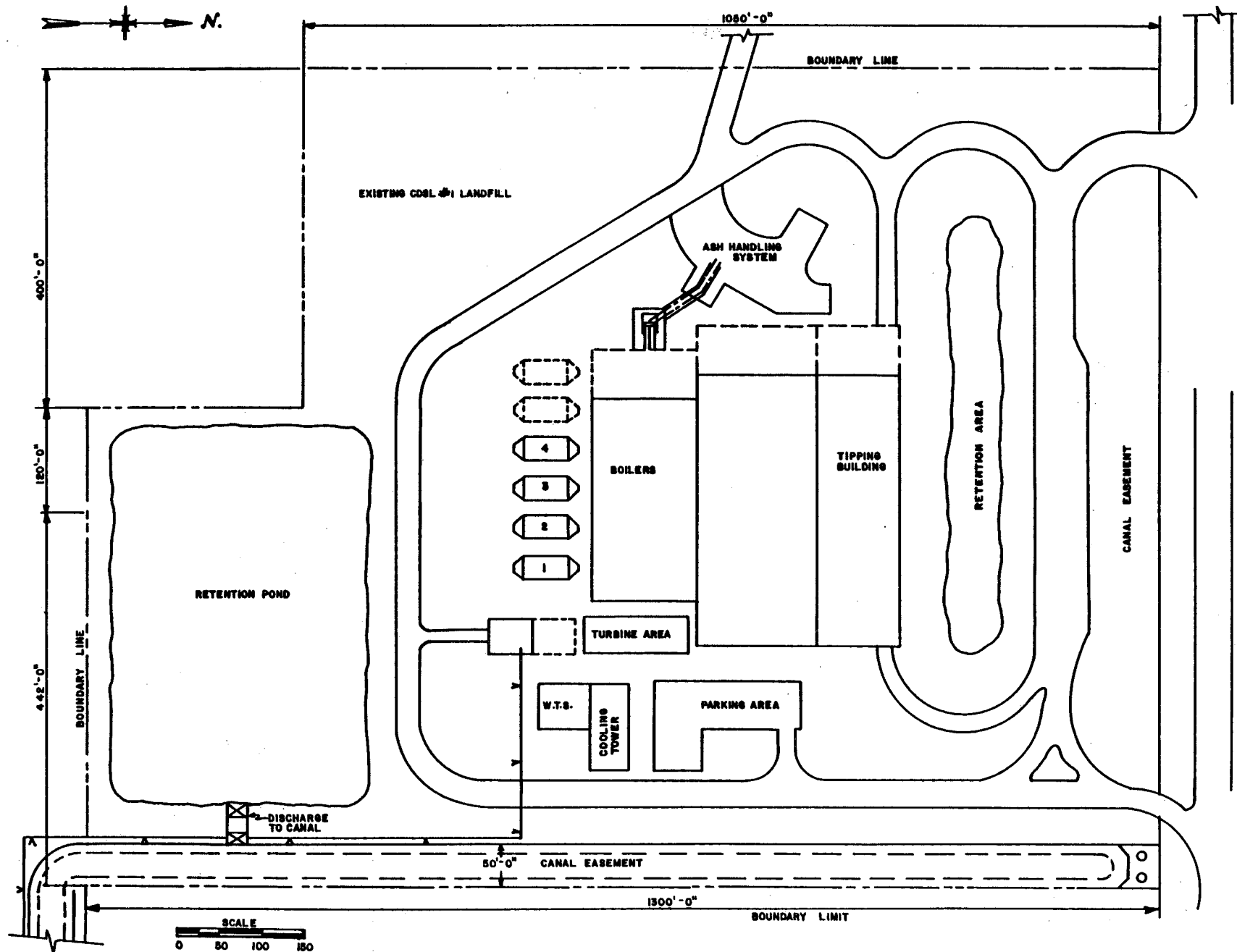
Professional Engineer's Seal No. _____ State of _____
(If Required)

RECORD OF ISSUES

REV.	DESCRIPTION	BY	DATE	CHKD	DATE	APPRD	DATE	QA/QC
	For SITE PERMITTING	DEC	12-4-85	HGM	12-4-85			

PRELIMINARY CALC. ☐ FINAL CALC. ☐ SUPERSEDES CALC. NO. _____
SUPERSEDED CALC. ☐ BY CALC. NO. _____

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BROWARD COUNTY
SOUTHERN RESOURCE RECOVERY SITE
SITE DRAINAGE



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. RG07
DESCRIPTION SITE DRAINAGE
SHEET NO. 2
MADE BY CROCKETT CHECKED BY HLM DATE 12-4-85

THE SITE CONSISTS OF A 20.2 ACRE AREA LOCATED
IN NORTH BROWARD COUNTY APPROXIMATELY 5 MILES
NORTHWEST OF POMPANO BEACH, FLORIDA

THE SITE PRESENTLY DRAINS INTO CANAL C-14 OF THE
SOUTH FLORIDA WATER MANAGEMENT DISTRICT (SFWMD)
DRAINAGE CALCULATIONS WILL BE IN ACCORDANCE WITH
THE DESIGN CRITERIA AND METHODS OF THE SFWMD.
AS PER DATA OF THE SFWMD THE MAXIMUM
WET SEASON ELEVATION FOR CANAL C-14 IS EL 7.0 NGVD.

THE SITE WILL BE DEVELOPED USING A WET DETENTION
BASIN SYSTEM CONTAINING THE 3yr 1hr STORM
FOR WATER QUALITY AND LIMITING THE MAXIMUM DISCHARGE
FOR THE 25 YEAR 72 HOUR STORM.

THE FOLLOWING CALCULATIONS ARE BASED UPON
FORMULA AND DESIGN CHARTS PROVIDED IN THE
"PERMIT INFORMATION MANUAL VOLUME II" OF
THE RESOURCE CONTROL DEPARTMENT, SOUTH
FLORIDA WATER MANAGEMENT DISTRICT, P.O. BOX V
WEST PALM BEACH, FLORIDA 33402



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. R607
DESCRIPTION SITE DRAINAGE
MADE BY CROCKETT CHECKED BY NGM SHEET NO. 3
DATE 12-4-85

SITE DESCRIPTION

PAVED AREAS	3.4 ACRES
ROOF AREAS	3.2 ACRES
POND AREA	1.4 ACRES
	<u>8.0 ACRES</u>

2
* TOTAL SITE ACREAGE = 20.2 ACRES

$$\% \text{ IMPERVIOUS} = \frac{8}{20.2} = 40\%$$

PERVIOUS = $20.2 - 8 = 12.2$ ACRES
TOTAL AREA FOR CATCH BASIN PONDING = 3.0 ACRES

Compute SCS CURVE NUMBER

WET SEASON WATER TABLE ELEVATION = 9'0" NGVD
(REFER TO ADJACENT CENTRAL DISPOSAL LANDFILL SITE PERMIT WITH
DESIGN WET SEASON WATER TABLE ELEVATION = 9'0")
NGVD = NATIONAL GEODETIC VERTICAL DATUM

HIGH FINISHED GRADE = 14.0 NGVD
LOW FINISHED GRADE (CATCH BASINS) = 11.0 NGVD

$$\text{AVE FINISHED GRADE} = \frac{14 + 11}{2} = 12.5$$

$$\text{AVERAGE DEPTH TO WATER TABLE} = 12.5 - 9.0 = 3.5 \text{ FEET}$$

$$\text{CONSIDERING 25\% COMPACTION}^* \text{ THE SOIL CAN STORE } d = \frac{4.95 + 8.18}{2} = 6.56 \text{ IN}$$

$$\text{GROUND STORAGE UNDER PERVIOUS AREAS} = \frac{6.56}{12} \times 12.2 = 6.67 \text{ ACRE-FEET}$$

* (REDUCTION IN SOIL VOIDS NOT TO BE CONFUSED WITH PROCTOR COMPACTION)



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. R607
DESCRIPTION SITE DRAINAGE
MADE BY CROCKETT CHECKED BY HGM SHEET NO. 4
DATE 12-4-85

EQUIVALENT SOIL STORAGE

$$S = \frac{6.67 \text{ ACRE-FEET}}{20.2 \text{ ACRES}} \times \frac{12 \text{ IN}}{\text{FT}} = 3.96 \text{ IN}$$

$$\text{SCS CURVE NUMBER CN} = \frac{1000}{S+10} = \frac{1000}{13.96} = 72$$

COMPUTE OPEN SURFACE STAGE VERSUS STORAGE

MIN. STAGE FOR DETENTION POND = 9.0 NGVD (CONTROL EL)
MIN STAGE FOR PONDING = 11.0 NGVD (CATCH BASIN EL)
MAX STAGE (ROADWAY ELEVATION) = 14.0 NGVD

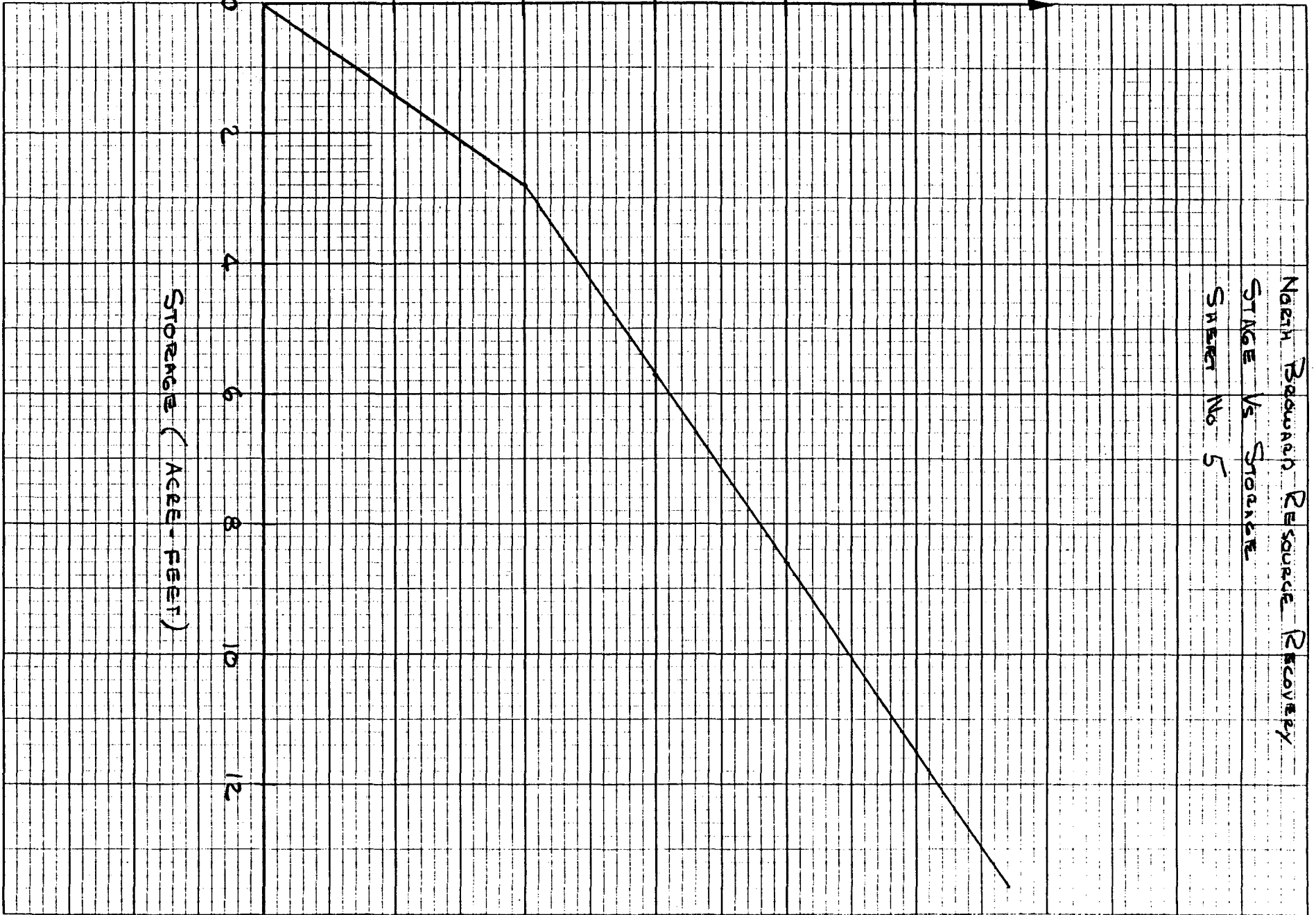
VOLUME FOR DETENTION POND = 1.4 ACRES X DEPTH
VOLUME FOR CATCH BASIN PONDING = 3.0 ACRES X $\frac{1}{2}$ X DEPTH

STAGE (FT.)	POND STORAGE ACRE-FT	CATCH BASIN STORAGE ACRE-FT	TOTAL ACRE-FT
9.0	0	0	0
10.0	$1.4 \times 1.0 = 1.4$	0	1.4
11.0	$1.4 \times 2 = 2.8$	0	2.8
12.0	$1.4 \times 3 = 4.2$	$3 \times \frac{1}{2} \times 1.0 = 1.5$	5.7
13.0	$1.4 \times 4 = 5.6$	$3 \times \frac{1}{2} \times 2.0 = 3.0$	8.6
14.0	$1.4 \times 5 = 7.0$	$3 \times \frac{1}{2} \times 3.0 = 4.5$	11.5

STAGE (FEET - NGVD)

NORTH BRANSON RESERVOIR RECOVERY
STAGE VS STORAGE
SHEET NO. 5

STORAGE (ACRE-Feet)



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. 2607
 DESCRIPTION SITE DRAINAGE
 SHEET NO. 6
 MADE BY C. G. ST CHECKED BY H. M. DATE 12-4-85

DETERMINE PEAK ALLOWABLE DISCHARGE

SITE DRAINAGE WILL DISCHARGE INTO CANAL C-14

$$\text{MAXIMUM ALLOWABLE DISCHARGE INTO CANAL C-14} = Q = \left[\frac{78}{\sqrt{A}} + 54 \right] A$$

WHERE Q = CFS & A = DRAINAGE AREA IN SQ. MILES

$$A = \frac{20.2 \text{ ACRES}}{640 \text{ ACRES/SM}} = .032 \text{ SM}$$

$$Q_{\text{max}} = \left[\frac{78}{(.032)^{1/2}} + 54 \right] .032 = 15.68 \text{ CFS}$$

DETERMINE WEIR CREST ELEVATION FOR THE GREATER OF THE FOLLOWING CONDITIONS:

- ① FIRST ONE INCH OF RUNOFF

$$T = \frac{1}{12} \times 20.2 = 1.68 \text{ ACRE FEET}$$

- ② TOTAL RUNOFF FROM 3 yr - 1 hr STORM

$$2 \text{ yr - 1 hr rainfall} = 2.6 \quad 5 \text{ yr - 1 hr rainfall} = 3.2$$

$$3 \text{ yr - 1 hr} = \left(\frac{3.2 - 2.6}{3} \right) + 2.6 = 2.8 \text{ IN}$$

$$Q = \frac{(P - 1.25)^2}{P + 1.85} = \frac{(2.8 - 1.2(3.96))^2}{2.8 + 1.8(3.96)} = .68" < 1" \quad \text{① GOVERNS}$$

FROM STAGE VS STORAGE GRAPH ON PAGE 5

SET WEIR CREST AT ELEVATION 10.20 NGVD



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. 12607
DESCRIPTION SITE DRAINAGE
SHEET NO. 7
MADE BY CROCKETT CHECKED BY HM DATE 12-4-85

SIZE WEIR TO LIMIT PEAK DISCHARGE FROM THE
25 YEAR 3 DAY STORM TO 15.68 CFS

RUNOFF FROM THE 25YR 3 DAY STORM

$$\text{RAINFALL} = 13.2 \text{ IN} \times 1.359 = 17.94 \text{ IN}$$

$$Q = \frac{[P - 0.25]^2}{P + 1.85} = \frac{(17.94 - 0.2(3.96))^2}{P + .8(3.96)} = 13.93 \text{ IN.}$$

$$\text{VOLUME OF RUNOFF} = \frac{13.93}{12} \times 20.2 \text{ ACRES} = 23.45 \text{ ACRE-FT}$$

$$\text{MAXIMUM VOLUME AT MAXIMUM STAGE (EL 14.0)} = 11.5 \text{ ACRE-FT}$$

∴ STORAGE POND WILL RISE TO MAXIMUM STAGE

SET MAXIMUM DISCHARGE HEAD TO EL 14.0 MINUS 0.5 FOR FREEBOARD = 13.5

LENGTH OF WEIR

$$L = \frac{Q}{3.13 H^{1.5}}$$

$$Q = 15.68 \text{ CFS}$$

$$H = 13.5 - 10.2 = 3.3$$

$$L = \frac{15.68}{(3.13)(3.3)^{1.5}} = .83 \text{ FEET}$$

SET WEIR LENGTH TO 10 INCHES



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. 2607
DESCRIPTION SITE DRAINAGE
SHEET NO. 8
MADE BY C. G. K. R. T. I. CHECKED BY H. G. M. DATE 12-4-85

DEVELOP INFLOW/OUTFLOW VS STORAGE TABULATION

TO DETERMINE MAXIMUM STAGE FOR 25 YEAR 3 DAY EVENT.

INFLOW WILL BE MEASURED AS DIRECT RUNOFF OVER A GIVEN TIME PERIOD $T_0 \rightarrow T_1$

OUTFLOW WILL BE MEASURED AS DIRECT DISCHARGE THROUGH THE WEIR FOR THE SAME TIME PERIOD. FOR A CONSERVATIVE DISCHARGE VALUE THE DESIGN HEAD WILL USE THE COMPUTED STAGE ELEVATION AT (T_0) FOR THE DISCHARGE PERIOD $T_0 \rightarrow T_1$

$$\text{INFLOW } Q_{\text{IN}} = \left[\frac{(P_1 - .25)^2}{P_1 + .85} - \frac{(P_0 - .25)^2}{P_0 + .85} \right] \times \frac{20.2 \text{ ACRES}}{12 \text{ IN/FT}} \times \frac{1}{T(\text{HRS})}$$

$$\text{OUTFLOW } Q_{\text{OUT}} = 3.13 L(H)^{1.5} = (3.13)(.83) \times H^{1.5} \times \left(60 \frac{\text{S}}{\text{MIN}} \right) \times \left(60 \frac{\text{MIN}}{\text{HR}} \right) \times \left(\frac{1 \text{ ACRE}}{43,560 \text{ FT}^2} \right)$$

$H = \text{STAGE @ } P_0 \text{ MINUS WEIR CREST ELEVATION}$

BOTH Q_{IN} & Q_{OUT} WILL BE IN $\frac{\text{ACRE-FERT}}{\text{HR}}$



JOB TITLE NORTH BIRNWARD RESOURCE RECOVERY CONTRACT NO. R607
DESCRIPTION SITE DRAINAGE
MADE BY CROCKETT CHECKED BY AGM SHEET NO. 9
DATE 12-4-85

BEGIN INFLOW/OUTFLOW STORAGE CHART AT TIME WHEN STORAGE
STAGE IS A WEIR CREST ELEVATION 10.2 THIS CORRESPONDS
TO 1" OF RUNOFF

DETERMINE RAINFALL $Q = \frac{(P - 1.25)^2}{P + 1.85}$ $Q = 1"$
 $S = 3.96$

$$[P - 1.2(3.96)]^2 = 1[P + 1.8(3.96)]$$

$$(P - .79)^2 = P + 3.17$$

$$P^2 - 1.58P + .62 = P + 3.17$$

$$P^2 - 2.58P = 2.55$$

$$(P - 1.29)^2 = 4.21$$

$$P = 3.34 \text{ IN}$$

$$\frac{P}{P_{24}} = \frac{3.34}{13.20} = .253$$

THIS CORRESPONDS TO $T = 36$ HOURS FOR THE 25yr
3 DAY EVENT



JOB TITLE NORTH BOWARD RESOURCE RECOVERY CONTRACT NO. R607
DESCRIPTION SITE DRAINAGE
MADE BY CROCKETT CHECKED BY HGM SHEET NO. 10
DATE 12-4-85

TIME (HRS)	STAGE (FT)	TOTAL RAINFALL (IN)	Q _{IN} ($\frac{\text{ACRE-FT}}{\text{HR}}$)	Q _{OUT} ($\frac{\text{ACRE-FT}}{\text{HR}}$)	$\Delta Q \times T$ (ACRE-FT)	ACCUM STORAGE (ACRE-FT)	STAGE (FT)
36	10.20	3.33				1.680	10.20
			.074	0	.148	1.828	10.31
33	10.31	3.56					
			.080	.008	.144	1.972	10.41
40	10.41	3.80					
			.082	.021	.122	2.094	10.50
42	10.50	4.04					
			.085	.035	.100	2.194	10.57
44	10.57	4.28					
			.080	.048	.064	2.258	10.61
46	10.61	4.50					
			.089	.056	.066	2.324	10.66
48	10.66	4.74					
			.098	.067	.062	2.386	10.70
50	10.70	5.00					
			.128	.076	.104	2.490	10.78
52	10.78	5.33					
			.199	.095	.208	2.698	10.93
54	10.93	5.83					
			.295	.134	.322	3.020	11.08
56	11.08	6.55					
			.425	.177	.496	3.516	11.25
58	11.25	7.55					
			.555	.231	.162	3.678	11.30
58.5	11.30	7.87					
			.736	.248	.244	3.922	11.39
59.0	11.39	8.29					



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. R607
DESCRIPTION SITE DRAINAGE
SHEET NO. 11
MADE BY CRACKETT CHECKED BY ALM DATE 12-4-85

TIME (HRS)	STAGE (FT)	TOTAL RAINFALL (IN)	Q_{IN} $\left(\frac{ACRE-FT}{HR}\right)$	Q_{OUT} $\left(\frac{ACRE-FT}{HR}\right)$	$\Delta Q \times T$ (ACRE-FT)	ACCUM STORAGE (ACRE-FT)	STAGE (FT)
59.0	11.39	8.29				3.922	11.39
			1.171	.279	.446	4.368	11.54
59.50	11.54	8.95					
			8.115	.333	1.946	6.314	12.21
59.75	12.21	11.18					
			8.294	.612	1.920	8.234	12.87
60.00	12.87	13.40					
			1.851	.937	.228	8.462	12.95
60.25	12.95	13.89					
			1.781	.979	.200	8.662	13.02
60.50	13.02	14.36					
			0.950	1.017	-.034	8.628	13.01
61	13.01	14.86					
			.648	1.011	-.363	8.265	12.88
62	12.88	15.54					
			.388	.942	-1.108	7.157	12.50
64	12.50	16.35					
			.230	.749	-1.038	6.119	12.14
66	12.14	16.83					
			.226	.580	-.708	5.411	11.90
68	11.90	17.30					
			.154	.476	-.644	4.767	11.68
70	11.68	17.62					
			.154	.387	-.466	4.301	11.52
72		17.94					



JOB TITLE NORTH BROADLAND RESOURCES RECOVERY CONTRACT NO. R607
 DESCRIPTION SITE DRAINAGE
 MADE BY C. ROBERT CHECKED BY H. H. H. SHEET NO. 12
 DATE 12-4-85

MAXIMUM STAGE ELEVATION = 13.02 FEET NGVD @ T = 60.5 HRS

MAXIMUM DISCHARGE = 1.017 $\frac{\text{ACRE-FT}}{\text{HR}}$

$$Q_{\text{max}} = \left(1.017 \frac{\text{AC-FT}}{\text{HR}} \right) \left(\frac{43,560 \text{ FT}^2}{\text{HR}} \right) \left(\frac{\text{HR}}{3600 \text{ S}} \right) = 12.31 \text{ CFS} < 15.68 \text{ CFS ALLOWED}$$

DESIGN A BLEED DOWN NOTCH TO BRING WATER STORAGE DOWN TO THE CONTROL ELEVATION OF 9.0 NGVD

FROM SFWMD DESIGN CRITERIA THE BLEED DOWN MECHANISM MUST LIMIT THE DISCHARGE TO ONE HALF OF THE DETENTION VOLUME IN 24 HOURS

SFWMD FORMULA FOR THIS CRITERIA IS:

$$\Theta = 2 \tan^{-1} \left[0.246 \frac{V_{\text{DET}}}{H^{2.5}} \right]$$

Θ = V-NOTCH ANGLE IN DEG.

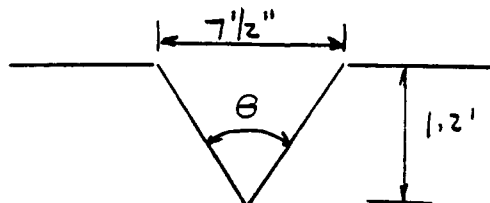
V_{DET} = DETENTION VOLUME (ACRE-FT)

H = VERT DIST FROM WEIR CREST TO VERTEX OF ANGLE

$$\Theta = 2 \tan^{-1} \left[\frac{0.246 (1.68)}{(1.2)^{2.5}} \right]$$

$$\Theta = 29.36^\circ$$

USE THE FOLLOWING WEIR



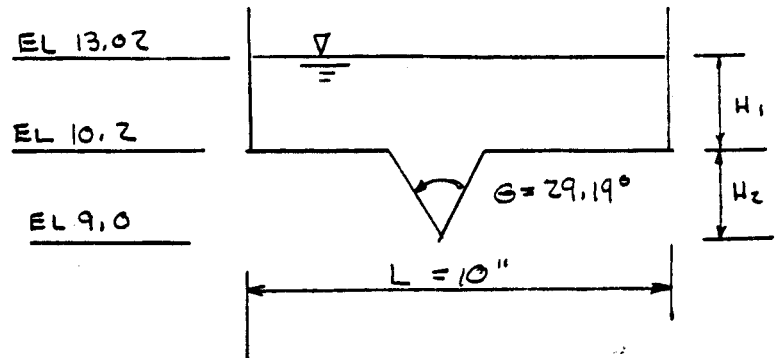
$$\Theta_{\text{ACTUAL}} = 2 \tan^{-1} \left[\frac{7.5}{(12)(12)(1.2)} \right]$$

$$\Theta_{\text{ACTUAL}} = 29.19^\circ < 29.36^\circ \text{ OK} //$$



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. 2607
DESCRIPTION SHE DRAINAGE
SHEET NO. 13
MADE BY CROCKETT CHECKED BY HGM DATE 12-4-85

CHECK MAXIMUM DISCHARGE WITH V-NOTCH BLEEDIER SLOT



$$Q_{max} = 3.13 L H_1^{1.5} + 4.8 (H_2^2 \tan \frac{\theta}{2}) (H_1 + H_2/3)^{1/2}$$

$$= (3.13)(83)(2.82)^{1.5} + 4.8 ((1.2)^2 \tan \frac{29.19}{2}) (2.82 + 1.2/3)^{1/2}$$

$$Q_{max} = 12.30 + 3.23$$

$$Q_{max} = 15.53 \text{ cfs} < 15.68 \text{ ALLOWED OK} //$$



JOB TITLE NORTH BROWARD RESOURCE RECOVERY CONTRACT NO. 2607
DESCRIPTION SITE DRAINAGE
MADE BY CROCKETT CHECKED BY HL SHEET NO. 14
DATE 12-4-85

SIZE OUTLET PIPE

TO AVOID CULVERT CONTROL SIZE PIPE TO PASS 15 cfs
AT $\frac{1}{2}$ THE DESIGN HEAD

DH = 3.3' SET DESIGN HEAD @ 1.6'

FROM DESIGN CHARTS

for $K_c = 0.5$ AND 200 LFOF PIPE USE 24" ϕ

MASS BURN RESOURCE RECOVERY FACILITIES

10.12 MASS BURN RESOURCE RECOVERY FACILITIES
IN THE UNITED STATES

MASS BURN RESOURCE RECOVERY FACILITIES
IN THE UNITED STATES

The following is a list of mass burn resource recovery facilities that have demonstrated operational success in the United States followed by a list of agency contacts:

Norfolk, Virginia (Norfolk Naval Shipyard)

The Norfolk Naval Shipyard resource recovery facility began operations in 1967. The facility is owned and operated by the Federal government. The facility processes waste generated within the Norfolk Naval Shipyard and does not accept waste generated elsewhere.

Primary fuel production from the facility is steam. The steam is used on site for heating and industrial purposes and not sold to the private sector.

Chicago, Illinois (Northwest Incinerator)

The Northwest Incinerator began operations in 1970 and has remained in service for 14 years. The facility will include the production of electricity for sale to Tennessee Valley Authority.

Saugus, Massachusetts

The Saugus resource recovery facility began operations in 1975. The facility has completed nine years of successful operation providing waste disposal service to several cities.

The facility is owned and operated by Signal Environmental Systems. It incorporates von Roll technology in its design and is able to process up to 1,500 tons of municipal solid waste each day. The facility processes an average of 1,200 tpd or 80 percent of its design capacity.

Steam is produced and sold to a nearby industry. In addition, the facility utilizes magnetic separators to recover

ferrous metal from the incinerator residue for recycling for sale to a private company.

Portsmouth, Virginia, Norfolk Naval Shipyard

The Portsmouth resource recovery facility began operations in 1976. The facility has been operational for eight years. It is reported that over the course of its eight years of successful operation, the facility has been only closed twice. Each period of shutdown lasted approximately two weeks. Corrections to the emission control system and to the boiler equipment were reported to be responsible for each of the shutdowns, respectively.

The facility is owned by the U.S. Navy and operated by the Public Works Center, Norfolk Naval Shipyard. This facility is similar to the Norfolk resource recovery facility in system processes and design. The design capacity of this facility is 160 tpd with two boilers operated alternately at 80 tpd. Steam produced in the plant is utilized by facilities at the Naval Shipyard.

Hampton-NASA Project Recoup, Hampton, Virginia

The Hampton, VA resource recovery facility has been in operation since 1980. It is reported that the facility has completed four years of successful operation without ever being shutdown for reasons other than routine maintenance. The design technology utilized in the facility is Clark-Kenith.

The United States government owns the facility and the City of Hampton maintains operations. The facility was designed to process 200 tpd of municipal solid wastes. It has been able to realize its full potential by receiving and processing 200 tpd of solid waste from both the public and private sector. The steam produced at the facility is used by the NASA, Langley Research Center.

Pinellas County, Florida

The Clearwater resource recovery facility in Pinellas County, Florida has been in operation since 1983. The facility processes municipal solid wastes utilizing Martin technology and generates electricity for on-site use and sale to an investor owned electric utility. In addition, aluminum and ferrous metals from incinerator residue are recovered and sold to a private company.

Signal Environmental Systems operates the County owned facility, which provides waste disposal service for both private and municipal haulers in Pinellas County. The resource recovery facility has had only one major shut-down since start-up while processing up to 100 percent of its design capacity of 2,000 tpd. The facility is currently undergoing a 50 percent expansion with the construction of a third 1,000 tpd unit.

Glen Cove, New York

The resource recovery facility located in Glen Cove, NY has been operational since 1983. The facility processes approximately 225 tpd of municipal solid waste and an additional 25 tpd of sludge from a sewage treatment plant located on the same site. The facility is owned by the City and is operated by a private firm. It provides disposal service for both private and municipal haulers from the surrounding area.

Presently, the facility produces electricity for on-site use and for sale to an electric utility. Thus far, it is reported that the facility has experienced no unscheduled shutdowns and is currently processing approximately 100 percent of design capacity (250 tpd).

Westchester County, New York

The Westchester County resource recovery facility, located in Peekskill, NY, completed start-up and acceptance

testing during the summer of 1984 and is presently accepting solid waste on a commercial basis. The facility utilizes the von Roll technology and provides waste disposal service for cities and towns within Westchester County. It is owned and operated by Signal Environmental Systems.

The facility is designed to process 2,250 tpd. Presently, it is processing at least 80 percent of its daily design capacity. Waste burned is converted into electricity for sale to Consolidated Edison. Ferrous metals are recovered from the incinerator residue, and a contract with a scrap metal dealer is anticipated for the near future.

New Hanover County, North Carolina

The New Hanover County resource recovery facility began accepting waste in June 1984. The facility is currently undergoing air quality and performance standards testing. The facility has been designed utilizing the Clark-Kenith technology and has the capacity to process 200 tpd of municipal solid wastes. The facility has been designed for cogeneration. Steam generated by the facility will be sold to W.R. Grace Company. In addition, electricity generated by the facility will be sold to Carolina Power & Light.

The following is a list of State Agencies that can be contacted concerning the above facilities:

1. Council on the Environment
903 Ninth Street, Office Building
Richmond, Virginia 23219
2. Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62764
3. Department of Environmental Resources
9th Floor, Fulton Building
Box 2063
Harrisburg, Pennsylvania 17120
4. Department of Conservation
701 Broadway, Custom House
Nashville, Tennessee 37203

5. Executive Office of Environmental Affairs
Leverett Saltonstall Building
100 Cambridge Street
Boston, Massachusetts 02202
6. Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233
7. Department of Natural Resources and
Community Development
P.O. Box 27687
Raleigh, North Carolina 27611

**NORTH DISTRICT REGIONAL WASTEWATER TREATMENT
PLANT DATA**

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

DATE	WEATHER			PLANT		INFLUENT		PH		DO		BOD MG		SS - MG/L		SPRAY		CHLORINE			AERATORS		WASTE SLUD									
	CHLORIDES MG/L	RAINFALL IN	TEMP °F	TEMP °F	H ₂ S - MG/L	FLOW - MGD		PLANT INF	PLANT EFF	AERATORS MG/L	PLANT EFF MG/L	PLANT INF	PLANT EFF	% REM.	PLANT - INF	PLANT - EFF	% REM.	CHLORINE RES.	DISSOLVED O ₂	DOSE MG/L	LBS/DAY EFFLUENT	TOTAL RES MG/L	SVI	EM. RATIO	30 MIN. SETTLABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %				
						A	B																						C	TOTAL		
1	340	0.10	84	78	8	2	2	51.62	7.2	7.4	1.0	4.2	131	2	98	110	2	99	0.7	0.99	420	520	0.6	1.53	140	.35	214	1299	.697	1.31	70	
2	330	2.60	86	-	5	2	2	57.65	7.3	7.3	1.0	4.6	107	4	96	140	7	95	0.6	1.63	701	870	0.6	1.54	141	.34	187	1309	.697	1.42	76	
3	383	0.70	86	-	6	3	2	57.46	7.1	7.6	1.5	3.5	131	6	85	184	11	94	0.7	1.07	574	712	0.6	1.82	140	.45	167	1199	.697	1.58	90	
4	357	-	-	-	9	3	2	56.69	7.2	7.6	1.5	4.3	89	3	97	112	3	97	0.7	1.14	538	740	0.6	2.17	105	.23	146	1370	.719	1.82	101	
5	367	0.00	84	82	6	2	2	57.86	7.1	7.7	1.4	4.3	123	3	98	154	6	96	0.7	1.24	600	820	0.6	1.75	110	.39	148	1315	.764	1.60	10	
6	760	0.00	84	-	1	2	2	60.25	7.2	7.5	1.7	5.2	128	4	97	136	6	96	1.0	0.97	490	780	0.6	1.51	122	.35	179	1404	.779	1.45	9	
7	363	0.40	84	-	8	2	2	62.04	7.2	7.7	-	-	200	5	98	146	9	94	-	1.17	610	830	0.6	0.82	144	.60	229	1476	.779	1.30	8	
8	367	0.30	86	-	7	2	2	63.60	7.1	7.5	1.3	4.5	103	4	96	126	7	94	0.8	1.00	570	690	0.5	1.67	137	.34	237	1393	.729	1.38	8	
9	350	0.15	84	-	7	2	3	64.09	7.2	7.4	1.3	4.3	115	3	97	122	5	96	2.0	0.97	440	690	0.6	1.36	207	.35	250	1316	.729	1.28	8	
10	327	0.25	85	82	7	2	3	62.95	7.2	7.2	1.8	4.7	122	5	96	196	8	96	2.0	0.87	457	702	0.6	1.30	169	.34	232	1428	.779	1.33	7	
11	343	0.20	82	80	8	2	3	60.16	7.2	7.5	1.7	4.7	89	3	97	90	3	97	1.8	1.45	428	728	0.6	1.75	140	.25	183	1353	.779	1.29	7	
12	327	0.00	84	80	8	2	3	59.71	7.1	7.4	1.4	4.3	81	7	91	86	10	88	1.9	0.86	427	700	0.6	2.38	174	0.27	203	1140	.779	1.30	84	
13	320	0.30	80	-	7	2	3	58.52	7.2	7.5	1.4	4.8	126	4	97	182	17	91	1.8	0.62	302	720	0.6	1.27	188	0.41	226	1150	.754	1.24	75	
14	337	0.20	84	84	8	2	3	58.45	7.2	7.5	1.3	4.3	122	3	98	128	4	97	1.5	0.92	450	750	0.5	1.17	197	0.40	232	1107	.653	1.24	6	
15	334	0.00	84	84	6	2	3	58.55	6.9	7.2	1.7	5.3	107	3	97	104	4	96	1.4	0.84	445	670	0.5	1.11	188	0.33	254	1206	.557	1.23	5	
16	343	-	84	84	8	2	3	57.97	7.1	7.4	1.6	4.3	86	1	99	82	7	92	1.5	0.79	381	670	0.6	1.02	217	0.25	301	1239	.462	1.09	4	
17	-	0.00	88	-	7	2	3	58.58	7.1	7.4	1.2	4.3	80	3	96	84	4	95	1.2	0.65	333	648	0.6	1.34	167	0.21	261	1413	.468	1.29	5	
18	317	0.80	82	82	8	2	3	58.51	7.3	7.4	1.1	4.3	137	3	98	164	8	95	1.2	0.63	372	772	0.6	0.58	213	0.36	330	1399	.408	1.11	7	
19	337	0.00	84	84	8	2	3	58.33	7.2	7.4	1.1	4.1	131	3	96	124	5	96	1.2	0.92	449	720	0.6	0.95	248	0.34	356	1403	.575	1.02	4	
20	340	0.00	84	84	8	2	3	54.42	7.2	7.5	-	-	117	3	97	100	8	92	-	0.95	433	830	0.6	1.05	222	0.30	303	1335	.624	1.04	5	
21	333	0.00	84	84	9	2	3	52.89	7.2	7.6	1.2	5.3	79	4	95	88	8	91	1.4	0.83	368	760	0.6	1.45	236	.21	303	1237	.624	0.95	49	
22	390	0.10	84	84	9	2	3	51.56	7.4	7.3	0.9	5.0	114	4	96	126	8	94	2.0	0.63	271	570	0.6	0.98	194	.28	274	1308	.442	0.97	41	
23	337	0.00	84	84	9	2	3	54.22	7.1	7.3	0.9	4.3	105	2	98	128	6	95	1.5	1.00	457	680	0.6	1.19	180	.25	288	1420	.645	1.03	5	
24	363	0.00	82	82	8	2	3	51.77	7.1	7.5	1.4	5.3	120	4	97	170	7	96	1.5	1.44	340	620	0.5	0.94	207	.26	341	1508	.590	0.96	4	
25	373	0.00	88	88	8	2	3	50.44	7.1	7.5	1.0	4.3	98	4	96	100	6	94	2.1	1.09	385	770	0.6	1.63	147	.17	274	1814	.665	1.16	6	
26	367	0.00	84	84	8	2	3	49.43	7.1	7.5	1.0	4.3	107	4	96	112	5	96	1.2	1.09	443	860	0.6	1.66	189	.22	299	1520	.773	1.09	7	
27	350	3.40	82	84	8	2	3	57.94	7.2	7.5	-	-	115	5	96	134	13	90	-	-	840	0.5	1.50	199	.27	300	1543	.777	1.16	7		
28	310	0.10	84	84	8	2	3	57.60	7.2	7.4	-	-	-	-	90	4	96	1.1	1.00	402	990	0.5	-	-	-	241	1588	.922	1.02	6		
29	335	0.60	84	84	8	2	3	55.79	7.2	7.5	1.2	5.0	-	-	98	3	97	0.5	1.40	657	910	0.6	-	-	-	145	-	216	1443	.785	1.13	7
30	303	0.20	84	84	8	2	3	54.46	7.2	7.6	1.4	5.1	-	-	104	4	96	0.4	1.40	642	960	0.5	-	-	-	137	-	199	1443	.688	1.25	5
31	333	0.00	84	84	6	2	3	63.96	7.3	7.8	1.6	4.3	-	-	148	5	97	1.4	0.98	441	750	0.6	-	-	-	-	-	202	1348	.583	1.35	5
TOT	10360	9.1	2298	1820	228	840	88	1768	222	232	35.9	125	-	-	203	2132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	336	0.29	83	83	8.0	2.7	3	5703	7.2	7.4	1.3	4.6	-	-	65	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1 NORTH DISTRICT REGIONAL WASTEWATER TREATMENT PLANT - MONTHLY OPERATION REPORT

JULY 1985	WEATHER		PLANT INFLUENT				PH		DO		BOD MG/L		SS - MG/L		SPRAY IRRIGATION		POST CHLORINATION			AERATORS			WASTE SLUDGE									
	RAINFALL	TEMP °F	TEMP °F	H ₂ S - MG/L	FLOW - MGD		PLANT INF	PLANT EFF	AERATORS % MG/L	PLANT EFF % MG/L	PLANT INF	PLANT EFF	% REM.	PLANT- INF	PLANT- EFF	% REM.	CHLORINE RES.	DISSOLVED OZ	DOSAGE MG/L	CALCINATION			SVI	F/M RATIO	30 MIN. SETTLEABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %	SOLIDS WASTED THOU LBS			
					AER. BASIN IN SERVICE															TOTAL												
					B	C																										
1	0.40	98	70	82	10	2 4	2	50.68	7.0	7.5	1.8	4.3	126	3	98	136	4	97	13.2	0.9	1.77	750	900	0.7	1.56	255	.32	331	1248	.701	1.38	80679
0	1.00	102	74	82	11	2 4	2	49.69	7.2	7.5	1.1	4.3	172	3	98	156	8	95	16.5	0.6	1.76	730	880	0.7	1.07	252	.47	293	1140	.742	1.21	74878
3	0.60	96	72	92	10	2 4	2	50.54	7.2	7.3	1.7	5.1	157	3	98	120	5	96	8.9	0.7	1.58	670	820	0.6	1.03	289	.46	311	1084	.754	1.06	66657
3	0.00	96	74	82	8	2 4	2	49.83	7.2	7.4	1.7	4.9	104	2	98	176	10	94	11.7	0.5	1.59	660	810	0.5	1.89	300	.29	351	1089	.755	1.27	79968
7	0.20	92	76	82	8	2 4	2	49.95	7.2	7.6	1.6	4.6	126	2	98	152	5	97	16.6	0.5	1.61	670	820	0.7	1.28	294	.42	288	942	.676	1.17	65963
5	0.00	92	76	84	8	2 4	2	50.83	7.2	7.7	1.5	3.9	138	5	96	102	5	95	17.0	0.5	1.85	770	920	0.6	1.24	278	.47	280	910	.579	1.42	68570
3	0.00	95	83	85	8	2 4	2	48.08	7.2	7.5	1.2	3.8	108	3	97	92	5	95	10.5	0.6	2.07	830	980	0.7	1.59	264	.38	250	859	.606	1.32	66713
0	0.00	98	78	82	12	2 4	2	47.80	7.1	7.5	1.4	3.5	116	3	97	116	5	96	12.0	0.4	1.88	750	900	0.6	1.18	236	.39	237	899	.407	1.36	58309
7	0.80	102	70	82	10	2 4	2	48.13	7.2	7.3	1.3	3.7	100	5	95	112	5	96	11.2	0.5	1.73	690	840	0.6	1.01	322	.33	309	913	.525	0.88	38531
0	0.80	102	70	84	12	2 4	2	49.05	7.1	7.2	1.4	3.8	113	5	97	112	6	95	11.9	0.6	1.76	720	920	0.5	1.20	279	.31	335	1111	.533	1.12	49796
3	0.20	102	74	84	10	2 4	2	48.32	7.2	7.3	1.2	4.0	116	2	98	120	5	96	12.0	0.7	1.96	790	940	0.5	1.31	292	.33	341	1052	.618	1.34	69065
7	0.20	102	74	84	10	2 4	2	48.59	7.3	7.4	1.5	4.3	110	2	98	136	6	96	11.7	0.7	1.55	630	780	0.6	1.69	220	.31	221	1084	.619	1.43	73704
12	0.20	102	74	84	8	2 4	2	50.93	7.1	7.5	1.4	4.3	92	4	96	158	7	96	17.0	0.7	1.72	730	880	0.6	2.30	171	.29	167	1003	.618	1.68	86589
16	1.00	93	72	78	10	2 4	2	51.28	7.2	7.6	—	4.2	84	3	96	116	4	97	14.9	0.7	1.71	730	880	0.6	2.39	138	.26	144	1063	.609	1.86	94470
17	0.02	98	71	84	10	2 4	2	51.35	7.3	7.5	—	3.8	160	3	98	280	4	99	13.4	0.8	1.42	610	760	0.6	1.24	138	.55	120	939	.487	2.18	89543
17	1.50	100	74	84	8	2 4	2	53.11	7.3	7.5	1.3	4.0	161	3	98	128	8	94	15.7	0.6	1.20	530	680	0.5	1.11	142	.45	150	1193	.487	1.91	77576
23	1.90	89	72	82	8	2 4	2	55.76	7.2	7.4	—	4.7	127	2	98	190	5	97	10.7	0.6	1.14	530	680	0.4	1.68	145	.33	196	1323	.510	2.28	96988
07	1.70	100	70	82	8	2 4	2	56.23	7.1	7.5	1.1	4.6	126	4	97	154	14	91	13.1	0.8	0.90	420	520	0.3	1.47	161	.32	229	1388	.430	2.21	79255
87	1.40	94	72	82	8	2 4	2	56.13	7.4	7.5	—	3.9	144	3	98	174	12	93	14.9	0.7	1.03	440	580	0.5	0.89	151	.32	247	1574	.591	1.19	58654
7	0.30	94	71	82	8	2 3	3	57.58	7.2	7.6	1.2	3.8	137	5	96	142	13	91	16.0	0.7	0.92	440	540	0.4	1.31	150	.32	240	1527	.618	1.60	82465
17	0.35	94	85	82	2	2 3	3	56.87	7.1	7.5	1.4	3.7	99	5	95	96	8	92	14.9	0.7	0.81	350	480	0.5	1.86	151	.27	206	1307	.618	1.22	83496
10	1.20	96	72	82	8	2 3	3	56.98	7.2	7.7	1.3	3.9	115	6	95	100	11	89	12.7	0.7	0.61	292	392	0.3	1.53	174	.32	245	1296	.688	1.70	90331
17	2.50	80	70	82	6	2 3	3	67.90	7.2	7.6	1.2	3.8	108	6	94	156	13	92	10.7	0.7	0.44	250	350	0.3	1.54	190	.36	255	1258	.726	1.46	88401
—	1.10	100	74	82	7	2 3	3	74.26	7.7	7.4	—	—	126	7	84	128	13	90	—	—	0.68	420	520	0.3	1.19	178	.45	247	1289	.726	1.44	97189
2	0.00	94	80	82	7	2 3	3	66.30	7.2	7.5	1.2	3.7	112	3	97	154	5	97	13.3	0.7	0.46	250	330	0.2	1.38	199	.34	271	1347	.726	1.37	92951
7	0.00	90	78	82	9	2 3	2	61.85	7.2	7.5	1.3	3.8	93	3	97	130	4	97	12.4	0.7	0.52	270	420	0.3	1.63	194	.27	292	1350	.726	1.25	78686
—	0.2	11	76	80	—	3 3	3	55.70	7.6	7.3	1.3	3.6	143	2	99	134	3	98	13.3	0.7	1.04	530	66	0.5	1.34	182	.33	280	1411	.726	1.54	110272
20	0.00	95	76	82	10.0	3 3	3	54.56	7.5	7.5	1.4	4.2	91	2	97	122	5	96	14.1	0.7	1.07	489	638	0.5	2.72	201	.22	298	1252	.726	1.41	85378
13	0.00	94	84	78	8	3 3	3	53.19	7.2	7.4	0.8	3.7	108	2	98	120	5	96	10.5	0.8	1.03	462	612	0.6	1.73	176	.32	267	1279	.738	1.34	82476
97	0.00	98	82	82	8	3 3	3	52.43	7.2	7.4	0.8	4.0	129	2	98	128	3	98	13.9	0.7	1.19	520	720	0.6	1.46	146	.30	201	1238	.736	1.31	81111
33	0.10	96	72	82	—	3 2	2	52.50	7.3	7.4	0.9	4.3	108	3	97	120	4	98	12.9	0.5	1.71	750	800	0.6	1.71	159	.33	213	1223	.697	1.35	81111

DRWN-01 NORTH DISTRICT REGIONAL WASTEWATER TREATMENT PLANT - MONTHLY OPERATIO REPORT

DATE	CHLORIDES MG/L	RAINFALL	THER		PLANT INFLUENT		PH		DO		BOD MG/L		S- MG/L		SPRAY IRRIGATION		CHLORINE			AERATORS			ASTE SLUDGE									
			TEMP °F	H ₂ S- MG/L	FLOW- MGD		PLANT INF	PLANT EFF	AERATORS MG/L	PLANT EFF MG/L	PLANT INF	PLANT EFF	% REM.	PLANT- INF	PLANT- EFF	% REM.	CHLORINE RES.	DISSOLVED O ₂	POST		SVI	FM RATIO	30 MIN. SETTLABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %	SOLIDS WASTED					
					LACER- BASIN IN SERVICE MODULE	TOTAL													DOSAGE MG/L	LBS/DAY EFFLUENT								TOTAL RES MG/L	LBS/DAY TOTAL			
																														A	B	C
1	457	0.00	71	83	6	3	2	51.28	7.1	7.3	1.4	4.5	183	6	97	170	9	95	11.3	0.8	1.43	610	0.8	760	210	.59	226	1001	.583	1.23	5980	
2	447	0.00	72	82	9	3	2	49.25	7.1	7.2	1.3	4.5	121	3	96	96	5	95	14.3	0.5	1.68	690	1.0	840	530	.40	172	930	.583	1.29	6272	
3	480	0.00	74	84	8	3	2	49.34	7.1	7.4	1.5	4.4	144	4	97	154	6	96	17.4	0.4	1.58	650	0.9	800	166	.52	145	847	.583	1.35	6564	
4	443	0.30	79	84	10	2	4	49.46	7.0	7.3	1.1	4.5	180	5	97	268	8	97	15.4	0.5	1.53	630	0.9	780	142	.54	147	1022	.631	1.18	6209	
5	460	0.00	76	84	10	2	4	48.99	7.1	7.3	1.0	5.0	167	6	96	168	7	96	16.1	0.5	0.95	390	0.8	540	201	.40	294	1283	.687	1.21	6932	
6	493	0.00	78	82	10	2	4	48.93	7.1	7.1	1.1	4.3	139	3	98	136	7	95	16.9	0.8	1.45	590	0.8	740	196	.31	300	1356	.713	1.57	9335	
7	487	0.00	80	82	8	2	4	47.03	7.1	7.3	1.2	4.1	175	2	99	184	5	97	17.6	0.5	1.65	650	1.0	800	210	.42	274	1226	.791	1.09	7190	
8	477	0.00	77	84	8	2	4	47.49	7.1	7.4	1.2	4.3	163	5	97	128	4	97	15.9	0.5	1.54	610	0.8	760	206	.35	298	1380	.791	1.03	6794	
9	433	0.00	72	86	8	2	4	46.58	7.2	7.4	1.1	4.1	111	7	94	112	12	89	17.6	—	1.72	670	0.8	820	225	.25	275	1209	.791	1.03	6794	
0	—	0.30	76	84	9	2	4	48.37	7.1	7.4	1.5	3.9	151	5	97	132	4	97	15.7	0.8	1.51	610	0.8	760	274	.45	268	1019	.786	1.12	7341	
1	—	0.00	78	84	10	2	4	47.36	7.2	7.3	1.4	4.7	143	3	98	150	7	95	18.7	1.0	3.09	1220	1.8	1370	246	.42	312	997	.782	1.15	7500	
2	483	0.60	74	82	11	2	4	47.80	7.1	7.3	—	—	162	4	98	128	10	92	15.9	—	1.68	670	0.7	820	348	.50	361	975	.776	1.10	7119	
3	—	1.40	72	82	9	2	4	50.92	7.0	7.1	1.0	4.2	113	3	97	110	9	92	17.6	0.7	1.53	650	0.8	800	376	.33	442	1106	.791	1.04	6860	
4	493	0.40	70	82	8	2	4	51.65	7.0	7.1	1.0	4.8	104	3	97	101	7	94	13.4	0.4	1.51	650	0.7	800	352	.28	435	1190	.812	1.14	7370	
5	393	0.40	70	84	8	2	4	51.93	7.1	7.3	1.2	4.3	144	5	97	102	7	93	15.2	0.5	1.29	558	0.8	708	306	.45	326	1041	.812	1.13	7652	
6	367	0.00	78	84	8	2	4	49.67	7.0	7.2	1.5	3.4	115	4	97	110	5	95	16.0	0.7	1.37	614	0.7	764	222	.38	206	927	.812	1.19	8058	
7	487	0.00	76	82	8	2	4	49.68	7.1	7.3	0.8	4.2	110	3	97	128	6	95	15.3	0.7	1.64	678	0.8	828	247	.42	209	813	.730	1.14	6940	
8	500	0.00	76	84	10	2	4	48.75	7.1	7.4	1.5	5.0	128	3	98	124	6	95	8.7	0.4	1.60	650	0.7	800	261	.45	239	853	.626	1.16	6056	
9	503	0.00	78	84	10	2	4	47.42	7.1	7.3	1.4	5.1	142	4	97	124	5	96	12.1	0.8	1.90	750	0.7	900	247	.47	243	882	.583	1.05	5105	
0	477	0.00	76	84	11	2	4	46.42	7.0	7.4	1.5	4.5	143	3	98	120	4	97	14.9	0.6	1.68	650	0.8	800	246	.47	250	878	.621	1.25	6473	
1	487	0.00	80	84	10	2	4	46.17	7.0	7.4	1.4	4.5	138	3	98	150	5	97	18.7	0.7	1.53	590	0.7	740	192	.39	227	1019	.695	0.93	5390	
2	423	2.40	70	84	8	2	4	48.39	7.1	7.3	1.4	4.1	125	6	95	140	12	91	17.9	0.6	1.49	602	0.8	752	199	.38	218	983	.686	1.18	6751	
3	406	0.00	74	84	8	2	4	49.78	7.1	7.3	1.7	4.2	89	4	96	86	5	94	16.2	0.6	1.72	718	0.7	868	234	.30	244	924	.651	1.08	5872	
4	487	0.10	74	82	10	2	4	50.21	7.0	7.3	1.2	3.5	157	5	97	222	6	97	14.9	0.6	1.50	630	0.7	780	219	.59	193	834	.622	1.12	5810	
5	467	0.60	72	84	10	2	4	51.96	7.0	7.2	1.8	4.3	164	5	97	140	8	94	17.8	0.9	1.82	790	0.7	940	231	.56	224	949	.622	1.18	6121	
6	480	0.20	74	84	8	2	4	52.29	7.0	7.1	1.5	3.7	193	6	97	176	10	94	13.1	0.5	1.53	670	0.7	820	273	.62	268	914	.622	1.11	5758	
7	483	0.60	70	84	10	2	4	52.68	6.9	7.0	—	—	130	4	97	132	10	92	10.0	—	1.56	690	0.8	840	269	.44	265	898	.622	1.25	6484	
8	483	0.00	70	82	10	2	4	52.13	7.2	7.8	1.8	4.3	153	4	97	150	7	95	14.3	0.8	1.49	650	0.8	800	283	.57	272	880	.542	1.15	5198	
9	405	0.00	76	84	6	2	4	50.05	7.2	7.6	1.8	4.4	146	5	97	152	10	93	16.0	0.9	1.48	620	0.8	770	323	.45	348	1014	.622	1.05	5428	
0	425	0.00	70	84	8	2	4	48.48	7.2	7.7	1.5	3.9	94	3	97	176	10	94	12.7	0.4	1.85	750	0.8	900	330	.26	380	1113	.622	1.19	6173	
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21	12446	7.30	2503	267	—	—	—	14803	2053	2123	328	113	—	—	—	4271	216	2839	4576	16.8	4830	19900	24.6	24400	7814	—	8061	30462	20.59	34.49	107440	

DATE	CHLORIDES MG/L	RAINFALL	OTHER		PLANT		INFLUENT		PH		DO		BOD MG/L		SS - MG/L		SPRAY		CHLORINE			AERATORS			WASTE SLUDGE																														
			TEMP °F	°C	TEMP °F	H ₂ S - MG/L	FLOW - MGD		PLANT INF	PLANT EFF	AERATORS AVG. MG/L	PLANT EFF AVG. MG/L	PLANT INF	PLANT EFF	% REM.	PLANT - INF.	PLANT - EFF.	% REM.	CHLORINE RES.	DISSOLVED O ₂	DOSAGE MG/L	LBS/DAY EFFLUENTS	TOTAL RES MG/L	LBS/DAY TOTAL	SVI	FM RATIO	30-MIN. SETTLABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %	SOLIDS WASTED.																								
							A	B																																															
1	443	0.00	72	78	10	3	2	49.16	7.1	7.2	1.8	4.5	180	5	97	216	7	97	12.6	0.5	1.85	760	0.6	910	142	.66	117	843	.527	1.78	7823																								
2	437	0.00	74	78	10	3	2	48.15	7.0	6.9	1.6	4.9	188	3	98	184	6	97	8.0	4.8	1.99	800	0.7	950	137	.60	121	937	.432	2.13	7674																								
3	447	0.00	78	78	8	3	2	46.90	6.9	7.3	1.4	5.0	112	3	97	130	5	96	9.4	0.5	1.74	680	0.8	830	124	.35	117	938	.473	2.10	8284																								
4	437	0.20	73	82	8	3	2	47.68	7.1	7.2	1.4	4.6	171	6	96	124	14	89	17.6	0.7	1.58	630	0.8	780	131	.53	128	956	.480	2.15	8606																								
5	423	0.25	70	82	7	3	2	46.79	7.0	7.3	1.8	4.5	143	3	98	164	7	96	13.4	0.5	2.05	800	0.8	950	140	.51	118	815	.436	1.58	574																								
6	430	0.00	73	78	6	3	2	48.60	7.0	7.3	1.6	4.9	274	4	99	244	9	97	13.7	0.5	1.91	772	0.8	922	140	.90	131	918	.471	2.19	8602																								
7	437	0.00	71	78	8	3	2	48.62	7.0	7.2	1.4	5.1	245	4	98	284	6	98	15.7	0.4	1.55	640	0.8	790	154	.73	160	1038	.503	2.09	8767																								
8	487	0.00	76	78	9	3	2	49.07	7.1	7.3	1.5	4.8	200	4	98	170	8	95	11.5	0.8	1.61	660	0.8	810	159	.54	181	1132	.561	2.14	1001																								
9	497	0.50	78	78	8	3	2	49.09	7.1	7.1	1.0	5.1	166	3	98	154	8	95	13.4	0.5	1.76	720	0.7	870	164	.43	192	1177	.635	1.68	883																								
10	453	0.00	72	78	8	3	2	48.21	6.9	7.1	1.3	4.8	167	3	98	158	7	96	16.7	0.8	1.69	690	0.8	840	160	.49	172	1050	.619	1.67	862																								
11	410	0.00	78	83	8	3	2	48.57	7.1	7.4	1.1	4.4	160	4	98	118	10	92	14.8	0.4	1.57	638	0.9	788	143	.45	155	1092	.570	1.46	694																								
12	433	0.00	70	83	9	3	2	47.03	7.1	7.4	1.3	4.3	101	10	90	112	6	95	17.5	0.5	1.84	722	0.8	872	144	.28	119	1046	.557	1.66	7711																								
13	463	0.00	74	78	8	3	2	48.30	7.1	7.3	0.9	4.9	175	3	98	150	6	96	17.5	0.7	1.71	690	0.8	840	156	.54	148	970	.523	1.47	6411																								
14	497	0.00	72	78	9	3	2	47.80	6.9	7.2	1.4	4.7	173	4	98	160	10	94	14.4	0.5	1.68	670	0.7	820	159	.48	172	1083	.562	1.53	7171																								
15	498	0.00	73	81	10	3	2	47.91	7.0	7.2	1.5	4.7	165	3	98	166	6	96	10.4	0.6	1.83	730	0.7	880	168	.43	190	1140	.570	1.53	727																								
16	497	0.00	72	83	10	3	2	47.24	7.1	7.3	1.3	4.6	141	3	98	176	4	98	10.4	0.6	1.55	610	0.7	760	187	.38	201	1087	.634	1.81	9576																								
17	517	0.00	77	83	10	3	2	46.77	7.0	7.3	—	—	156	4	97	126	5	96	16.5	—	1.62	630	0.7	780	201	.45	203	1010	.700	1.44	8401																								
18	497	0.00	70	84	8	3	2	47.10	7.0	7.2	1.3	3.9	170	5	97	186	7	96	12.7	0.4	1.69	662	0.9	812	162	.47	172	1067	.700	1.34	7822																								
19	510	0.00	72	82	10	3	2	45.53	—	7.2	1.9	4.8	136	3	98	176	13	93	10.6	0.5	1.89	718	0.9	868	167	.42	153	921	.647	1.46	787																								
20	507	1.90	78	80	9	3	2	47.17	7.1	7.3	1.0	4.8	148	4	97	142	7	95	14.5	0.6	1.91	750	0.8	900	168	.50	148	879	.544	1.72	780																								
21	527	0.00	73	83	11	3	2	50.00	6.9	7.2	1.2	4.5	217	3	99	284	8	97	13.5	0.4	1.51	630	0.7	780	197	.74	174	913	.505	1.72	724																								
22	463	0.00	74	83	8	3	2	50.01	7.1	7.3	1.2	4.5	164	3	98	168	4	98	16.0	0.5	1.80	750	0.8	900	196	.54	185	955	.505	1.76	741																								
23	470	0.50	74	84	10	3	2	51.20	7.1	7.2	0.8	4.4	145	5	97	150	8	95	16.3	0.5	1.69	720	0.9	870	207	.46	210	1010	.502	1.44	602																								
24	477	0.10	70	84	8	3	2	52.82	7.0	7.2	1.2	3.9	149	3	98	132	5	96	18.6	0.5	1.51	660	0.8	810	247	.47	261	1039	.525	1.63	713																								
25	410	0.40	74	84	8	3	2	53.06	7.2	7.3	1.3	4.3	157	4	98	118	11	91	21.2	0.7	1.57	694	0.9	844	220	.44	262	1191	.562	1.57	7351																								
26	410	0.25	72	82	8	3	2	51.66	7.1	7.4	1.3	3.7	130	5	96	100	5	95	16.2	0.5	1.31	566	0.9	716	251	.37	275	1127	.534	1.53	681																								
27	500	1.05	72	81	10	3	2	52.09	7.2	7.3	1.3	4.3	113	3	97	132	8	94	17.2	0.5	1.68	732	0.7	852	259	.36	264	1027	.505	1.35	568																								
28	447	0.00	70	83	4	3	2	53.13	6.8	7.0	1.2	4.9	144	3	98	154	8	95	14.4	0.6	1.51	670	0.8	820	230	.50	220	948	.505	1.39	585																								
29	470	0.00	74	83	10	3	2	52.39	7.1	7.2	1.3	4.7	158	4	97	154	5	97	11.7	0.5	1.53	670	0.6	820	219	.50	234	1040	.522	1.37	596																								
30	477	0.00	72	82	8	3	2	50.90	7.0	7.2	1.1	4.3	157	2	99	160	3	98	11.0	0.5	1.63	690	0.7	840	234	.54	228	932	.539	1.38	626																								
31	470	0.00	76	82	8	3	2	50.57	7.0	7.2	1.6	4.5	105	2	98	124	5	96	14.7	0.5	1.59	670	0.7	820	234	.36	223	929	.553	1.30	598																								
TOT	14441	5.15	77	81	27	93	62	1524.00	71.1	72.4	40.0	35.5	5010	118	2021	5066	221	2959	437.1	20.5	52.35	21424	24.0	26074	5600	15.42	6664	31210	16.901	51.37	2317																								

DATE	CHLORIDES MG/L	RAINF	TEMP °F	TEMP °F	H ₂ S - MG/L	FLOW - MGD		PH	PLANT INF	PLANT EFF	AERATORS MG/L	PLANT EFF MG/L	PLANT INF	PLANT EFF	% REV	PLANT- INF	PLANT- EFF	% REM.	SPRAY IRRIGATION		CHLORINE			AERATORS				WASTE SLUDGE			
						MAINTENANCE SERVICE MODULE	TOTAL												CHLORINE RES.	DISSOLVED O ₂	DOSAGE MG/L	LBS/DAY EFFLUENT	TOTAL RES MG/L	LBS/DAY TOTAL	SVI	FM RATIO	30 MIN. SETTLABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %	SOLIDS
1	460	0.00	78	78	8	3	3	48.71	7.2	7.4	1.4	44	164	8	95	174	16	89	11.5	0.9	1.53	620	0.8	770	235	47	262	1066	794	1.26	83
2	423	0.10	78	78	8	3	3	48.35	7.1	7.4	2.5	53	175	7	96	168	13	92	11.0	3.0	1.64	660	0.8	810	209	49	234	1069	784	1.29	84
3	437	0.00	78	78	9	3	3	49.07	7.1	7.2	2.0	63	157	7	96	146	10	93	15.2	3.0	1.74	710	0.6	860	206	45	235	1081	821	1.27	86
4	433	0.00	78	78	7	3	3	49.51	7.1	7.1	2.0	61	158	7	96	118	15	87	14.0		1.91	790	0.7	940	203	45	237	1097	850	1.17	82
5	440	0.00	78	78	8	3	3	52.41	7.1	7.2	1.8	60	191	7	96	150	15	90	13.5	2.1	1.76	770	0.7	920	187	62	196	1012	791	1.20	79
6	457	0.00	78	78	8	3	3	52.18	7.1	7.3	1.0	54	149	9	95	168	17	90	13.9	2.0	1.70	738	0.7	888	213	50	242	1108	573	1.29	63
7	440	0.00	78	78	8	3	3	49.58	7.1	7.2	1.6	51	181	7	96	238	21	91	13.0	2.7	1.43	598	0.8	748	258	54	248	969	720	1.24	74
8	437	0.10	78	78	6	3	3	51.58	7.1	7.2	1.6	54	155	6	96	172	13	92	8.1	2.4	2.03	874	0.7	1024	247	47	267	1061	858	1.34	75
9	453	0.00	78	78	6	3	3	51.26	7.0	7.1	1.9	50	198	6	97	220	9	96	13.8	2.6	1.71	730	0.7	880	242	63	254	1014	868	1.20	86
0	443	0.00	78	78	6	3	3	51.00	7.0	7.2	1.6	51	209	7	97	184	14	92	13.7	2.6	1.80	770	0.5	920	240	62	260	1083	868	1.34	87
1	453	0.00	78	78	6	3	3	51.78	6.9	7.2	1.5	47	166	6	96	114	12	89	12.6	2.9	1.74	750	0.7	900	252	48	299	1121	899	1.21	90
2	450	0.40	78	78	10	3	3	50.93	7.2	7.5	1.7	43	174	5	97	120	13	89	8.7	1.8	1.86	790	0.7	940	229	57	234	979	910	1.37	103
3	473	0.90	78	78	8	3	3	55.35	7.1	7.3	1.6	47	209	10	95	152	14	91	13.7	3.5	3.02	1393	0.7	1543	173	65	194	1109	894	1.20	89
4	437	0.70	78	78	7	3	3	55.94	7.0	7.2	2.0	43	131	6	95	106	14	87	15.4	3.2	1.72	802	0.8	952	198	53	164	868	894	1.15	85
5	422	3.60	78	78	8	3	3	61.56	7.1	7.4	1.7	46	141	6	96	148	13	91	15.8	3.1	2.52	1294	0.7	1444	196	71	154	763	830	1.23	85
6	433	0.00	78	78	6	3	3	61.65	7.1	7.3	1.6	47	187	7	96	188	8	96	17.5	0.6	1.66	855	0.7	980	151	76	145	952	773	1.25	80
7	443	0.00	78	78	8	3	3	58.18	7.0	7.2	2.2	53	163	5	97	172	13	92	13.3	0.4	1.51	735	0.6	860	156	61	151	968	765	1.47	93
8	465	0.01	78	78	8	3	3	57.12	7.0	7.2	2.1	47	130	7	95	164	13	92	13.1	0.5	1.55	736	0.6	861	169	53	146	878	742	1.44	89
9	470	0.00	78	78	8	3	3	56.08	7.1	7.5	2.3	56	137	4	97	128	7	95	10.7	0.6	1.61	755	0.7	880	171	64	131	755	683	1.36	77
0	417	0.00	78	78	8	3	3	55.95	7.1	7.4	2.3	47	163	6	96	134	8	94	13.9	0.7	1.54	720	0.7	870	152	74	116	774	577	1.69	81
1	377	0.00	78	78	7	3	3	54.23	7.1	7.1	2.2	49	119	4	97	126	5	96	14.1	1.2	1.79	810	0.8	960	153	48	132	845	534	1.44	64
2	453	0.00	78	78	10	3	3	54.08	7.0	7.3	1.4	37	158	5	97	226	10	96	13.2	0.7	1.80	810	0.8	960	171	66	141	814	604	1.37	69
3	450	0.00	78	78	8	3	3	53.12	7.0	7.3	1.3	37	218	5	98	180	10	94	11.5	0.4	1.56	690	0.6	840	174	77	163	941	632	1.61	84
4	390	0.00	78	78	8	3	3	52.63	7.0	7.2	1.4	51	222	5	98	214	8	96	10.3	1.0	1.62	710	0.6	860	160	72	164	1020	672	1.39	77
5	383	0.00	78	78	8	3	3	51.70	7.1	7.0	1.0	47	176	3	98	166	7	96	12.3	0.5	1.76	760	0.7	910	161	55	165	1040	697	1.27	73
6	417	0.00	78	78	10	3	3	51.04	7.2	7.0	1.3	40	216	3	99	200	10	85	9.2	0.5	1.46	620	0.8	770	172	69	170	1001	724	1.47	88
7	407	0.00	78	78	8	3	3	51.36	6.9	7.3	1.3	37	184	7	96	128	9	93	13.6	0.5	1.55	662	0.8	812	156	58	156	1015	644	1.56	83
8	430	0.00	78	78	10	3	3	47.62	7.1	7.3	1.9	38	131	3	98	160	6	96	13.6	0.4	1.56	618	0.8	768	153	46	130	854	596	1.47	73
9	443	0.50	78	78	10	3	3	50.20	7.0	7.2	2.1	51	163	9	94	150	8	95	15.2	0.6	1.96	820	1.0	970	116	56	106	912	637	1.23	65
0	437	0.00	78	78	8	3	3	50.54	7.0	7.3	2.2	54	203	7	97	252	6	98	11.1	1.3	1.66	700	0.7	850	134	79	109	808	564	1.65	77
1																															
BT	13071	6.31	78	78	2364	240	90	15846	212.0	217.5	52.5	140.4	5148	184	2892	4936	337	2783	386.5	45.70	52.7	23240	21.5	27690	5637	17.77	5605	28977	22218	40.43	2470
VG	436	0.28	78	78	8	3	3	52.82	7.1	7.3	1.8	49	172	6	96	165	11	93	12.88	1.58	1.76	776	0.72	923	188	59	187	966	741	1.35	82

March

CHLORIDES MG/L	WEATHER		PLANT INFLUENT				PH		DO		BOD MG/L			SS - MG/L			SPRAY IRRIGATION		CHLORINE				AERATORS				WASTE SLUDGE					
	RAINFALL	TEMP °F	TEMP °F	H ₂ S - MG/L	FLOW - MGD			PLANT INF	PLANT EFF	AERATORS MG/L	PLANT EFF MG/L	PLANT INF	PLANT EFF	% REM.	PLANT - I	PLANT - EFF	% REM.	CHLORINE RES.	DISSOLVED O ₂	DOSAGE MG/L	LBS/DAY EFFLUENTS	TOTAL RES MG/L	LBS/DAY TOTAL	SVI	FM RATIO	30 MIN. SETTLABLE	MLSS	THOUSAND GLS / L	SOLIDS %	SOLIDS WASTED THOU LBS		
					REACT. BASIN IN SERVICE MODULE	TOTAL	CHLORINE POST																								TOTAL RES	
445	0.00	76	68	80	10	2	3	3	45.18	6.9	7.3	2.0	196	6	97	180	13	93	12.4	3.0	2.01	770	0.8	920	250	.37	391	1529	.925	1.28	98746	
460	0.03	80	71		8	2	3	3	47.39	6.8	7.0	2.0	130	11	92	132	10	92	14.0	2.9	1.80	710	0.8	860	266	.28	380	1383	.975	1.17	95139	
460	0.05	74	64		12	2	3	3	45.96	7.0	7.1	1.7	142	5	96	130	11	92	13.1	2.8	2.48	950	0.8	1100	264	.31	372	1334	.949	1.19	94185	
445	0.00	72	72	78	11	2	3	3	47.14	6.9	7.2	1.8	198	6	97	160	11	93	10.7	3.8	2.11	830	0.7	980	266	.50	322	1159	.934	1.07	83348	
459	0.00	76	70	79	7	2	3	3	47.00	7.1	7.3	1.9	198	5	97	212	13	94	12.1	3.4	3.29	1290	1.4	1440	227	.55	255	1060	.920	1.11	85168	
445	0.00	76	66	78	8	2	3	3	46.29	7.0	7.2	1.8	186	6	97	158	9	94	11.0	3.7	2.33	900	0.7	1050	206	.52	217	1043	.895	1.29	96289	
460	0.02	72	64	78	8	2	3	3	47.02	7.1	7.3	1.7	191	6	97	178	11	94	11.2	2.6	1.96	770	0.6	920	178	.55	184	1029	.816	1.23	83707	
465	0.00	74	70	78	7	2	3	3	47.28	6.9	7.2	1.9	225	5	98	218	12	94	10.1	2.9	2.05	810	0.8	960	176	.66	178	1003	.771	1.37	88093	
443	0.00	74	70		10	2	3	3	47.80	7.0	7.0	1.9	168	8	95	166	15	91	11.2	2.9	1.83	730	0.7	880	198	.50	201	996	.711	1.51	89539	
425	0.30	76	68		9	2	3	3	47.07	6.9	7.0	2.0	147	8	95	140	11	92	11.7	3.6	2.08	820	0.7	970	237	.46	234	952	.603	1.23	61857	
455	0.26	85	60	78	8	2	3	3	47.61	7.0	7.2	1.7	165	8	95	154	10	94	11.6	2.5	1.96	780	0.6	930	256	.50	259	984	.519	1.25	54106	
448	0.00	80	64	78	12	2	3	3	47.95	6.9	7.2	2.1	206	7	97	180	10	94	11.3	2.0	1.88	750	0.7	900	228	.54	278	1052	.693	1.18	68200	
443	0.00	82	62	80	8	2	3	3	47.73	7.0	7.1	2.2	180	8	96	220	15	93	9.4	2.8	1.68	670	0.7	820	285	.45	364	1200	.790	1.38	90923	
457	0.00	78	68	80	10	2	3	3	47.95	7.0	7.2	1.7	202	7	97	206	12	94	8.2	2.8	1.73	690	0.7	840	277	.46	382	1308	.861	1.35	96940	
462	0.00	84	68	80	10	2	3	3	48.19	7.2	7.4	1.7	182	4	98	170	11	90	10.8	1.9	1.74	700	0.8	850	271	.44	351	1250	.922	1.16	89198	
438	0.00	80	68		9	2	3	3	48.04	7.0	7.1	1.7	175	9	95	180	18	90	10.9	1.8	1.62	650	0.8	800	239	.44	284	1190	.922	1.12	86123	
450	0.90	86	68		8	2	3	3	46.97	7.0	7.4	1.9	106	7	93	110	13	88	11.6	1.9	1.51	590	0.7	740	261	.30	277	1043	.922	1.21	93043	
453	0.02	68	58	78	9	2	3	3	48.16	7.2	7.4	2.1	157	7	96	160	13	92	12.3	2.4	1.71	690	0.7	840	217	.44	234	1072	.848	0.99	70016	
475	0.00	66	52	78	9	2	3	3	48.28	7.1	7.3	2.0	196	6	97	170	11	94	11.4	2.2	1.66	670	0.6	820	194	.56	209	1059	.804	1.04	69736	
450	0.00	80	70	78	8	2	3	3	47.20	7.1	7.3	1.7	191	6	97	182	11	94	11.1	3.3	1.85	730	0.6	880	191	.50	220	1126	.836	1.23	85759	
443	0.80	74	70	78	8	2	3	3	48.28	7.2	7.4	2.0	191	8	96	180	12	93	14.5	3.6	1.97	795	0.9	920	216	.53	240	1085	.862	1.12	80518	
447	0.01	81	66	78	6	2	3	3	49.66	7.1	7.3	1.7	173	8	95	190	18	90	10.2	3.3	1.60	650	0.8	800	202	.53	206	1010	.881	1.23	94048	
440	0.00	82	62		8	2	3	3	49.00	7.1	7.4	1.8	170	10	94	180	18	90	0.0	0.7	1.18	480	0.8	630	206	.52	207	1006	.826	1.31	90244	
445	0.00	84	60		8	2	3	3	46.65	7.0	7.4	2.3	135	7	95	124	12	90	0.0	0.4	1.36	530	0.7	680	243	.41	237	971	.773	1.26	81230	
438	0.00	84	60	78	7	2	3	3	47.87	7.1	7.1	2.6	169	6	96	160	10	94	9.1	1.7	1.60	640	0.7	790	265	.52	257	968	.749	1.11	69338	
482	0.00	78	68	78	6	2	3	3	49.31	7.1	7.3	2.1	228	7	97	204	16	92	13.6	2.3	1.90	780	0.9	930	277	.68	270	1033	.700	1.23	71807	
450	0.00	80	68	78	6	2	3	3	49.38	7.1	7.4	1.8	179	9	95	192	11	94	12.8	3.6	1.58	650	0.7	800	332	.48	382	1143	.661	1.33	73319	
447	0.00	82	70	78	6	2	3	3	50.16	7.2	7.4	1.6	196	7	96	170	15	91	11.9	1.2	1.46	610	0.7	760	379	.50	475	1232	.747	1.18	73514	
453	0.00	82	68	78	8	2	3	3	49.61	7.2	7.4	1.4	163	5	97	171	17	90	10.3	1.5	1.76	730	0.8	880	353	.43	419	1173	.808	1.08	72778	
423	0.00	82	68		6	2	3	3	50.29	7.0	7.4	1.4	174	8	95	160	33	79	11.7	1.9	1.60	670	0.7	820	250	.44	314	1247	.808	1.17	78844	
430	0.00	84	69		8	2	3	3	48.45	7.0	7.4	1.7	113	6	95	92	10	89	16.0	2.3	1.01	410	0.7	560	261	.32	238	1075	.808	1.18	79517	
13936	2.39	2433	2050	1647	256	62	52	73	185.77	218	225	579	146.16	5432	216	2376	5229	412	2844	336.2	727	56.30	22445	23.3	27070	7671	14.69	8887	34815	25.239	37.61	2545272
450	0.09	73	71	79	8	2	3	3	47.93	7.0	7.2	1.9	175	7	96	129	13	92	11.6	2.5	1.82	729	0.7	873	247	.47	286	1123	0.814	1.21	82106	

Fe b.	CHLORIDES MG/L	RAINFAL MG/L	HI TEMP °F	LO TEMP °F	TEMP °F	H ₂ S - MG/L	FLOW - MGD			PH	PLANT INF	PLANT EFF	AERATORS AVG. MG/L	DO PLANT EFF MG/L	BOD MG/L			MG/L	SPRAY IRRIGATION	CHLORINE				AERATORS				SLUDGE							
							PLANT INF	PLANT EFF	TOTAL						CHLORINE RES.	DISSOLVED O ₂	DOSAGE MG/L			LBS/DAY EFFLUENTS	TOTAL RES MG/L	LBS/DAY TOTAL	SVI	FM RATIO	30 MIN. SETTLABLE	MLSS	THOUSAND GLS / DAY	SOLIDS %	SOLIDS WASTED						
1	445	0.00	70	62	80	9	2	3	3	46.25	7.0	7.0	2.7	6.1	3.7	171	7	96	152	14	91	10.7	3.3	2.64	870	0.7	1020	199	.41	245	1203	.755	1.42	894	
2	433	0.00	70	64	78	9	2	3	3	47.27	7.1	7.2	2.7	6.4	3.5	171	7	96	158	14	91	12.8	3.1	1.90	750	0.9	900	205	.39	270	1289	.785	1.35	8838	
3	463	0.00	74	78	79	9	2	3	3	45.36	7.0	7.0	2.4	6.0	3.0	135	5	96	120	10	92	10.4	3.1	1.96	740	0.8	890	238	.37	237	1040	.782	1.29	8413	
4	442	0.00	80	70	80	8	2	3	3	46.42	7.0	7.1	1.8	5.8	3.2	120	5	96	116	9	92	9.9	2.2	1.96	760	0.9	910	215	.30	245	1143	.696	1.29	7488	
5	460	0.00	77	68	80	7	2	3	3	45.76	7.0	7.1	1.7	5.6	3.3	241	6	98	228	9	96	8.4	2.0	1.68	640	0.7	790	233	.61	270	1131	.784	1.28	8369	
6	400	0.00	82	70	80	9	2	3	3	46.36	7.1	7.0	1.6	6.9	4.5	168	10	94	216	12	94	7.7	4.5	1.58	610	1.0	760	226	.37	298	1308	.810	1.38	9322	
7	417	0.00	76	66	80	7	2	3	3	44.44	6.8	6.8	1.5	6.0	3.4	184	5	97	268	10	96	10.1	2.0	1.86	690	0.6	1690	173	.35	251	1455	.874	1.39	10131	
8	477	0.04	74	52	80	8	2	3	3	43.65	6.9	7.0	1.7	6.1	3.4	197	6	97	164	10	94	11.7	2.1	1.87	680	0.8	1380	158	.36	231	1474	.954	1.62	12889	
9	458	0.00	82	63		9	2	3	3	45.72	7.0	7.2	1.6	6.9	3.3	162	8	95	162	10	94	12.0	2.7	1.68	640	0.7	790	165	.34	225	1366	.970	1.47	11892	
0	490	0.00	80	62		9	2	3	3	43.53	6.9	7.0	2.1	5.8	4.0	148	7	95	132	13	90	9.2	2.2	2.12	770	0.7	920	184	.34	213	1170	.877	1.30	9508	
1	488	0.02	68	62	80	7	2	3	3	44.78	7.0	7.0	2.1	5.8	4.7	183	8	96	192	17	91	7.5	2.8	2.25	840	0.8	910	174	.43	205	1193	.794	1.56	10330	
2	493	0.00	46	50	80	10	2	3	3	43.21	7.0	7.3	3.2	5.6	5.5	189	11	94	194	15	92	7.6	2.8	1.41	510	0.7	660	178	.42	212	1209	.766	1.54	98382	
3	470	0.00	56	42	79	9	2	3	3	43.85	7.1	7.2	2.2	5.4	2.2	182	9	95	196	20	90	6.2	2.5	2.52	920	0.7	1070	196	.40	236	1233	.766	1.50	9582	
4	460	0.00	66	36	78	6	2	3	3	43.60	7.0	7.1	2.2	6.4	3.7	190	7	96	180	11	94	10.0	2.7	2.47	900	0.6	1050	201	.39	259	1324	.766	1.43	91355	
5	455	0.00	62	42	78	9	2	3	3	44.23	6.9	7.3	2.1	5.8	4.9	183	6	97	162	14	91	12.8	3.9	1.95	720	0.7	870	164	.39	210	1302	.766	1.53	97615	
6	445	0.00	76	42		7	2	3	3	44.58	7.0	7.3	2.1	5.8	5.1	225	11	95	128	21	84	10.9	2.8	1.83	680	0.7	830	165	.52	206	1208	.750	1.56	9757	
7	450	0.00	75	50		10	2	3	3	43.69	7.0	7.2	2.1	6.0	3.2	154	8	95	186	14	92	9.4	3.0	2.22	810	0.8	960	171	.38	199	1104	.643	1.68	9009	
8	453	0.00	70	60	79	6	2	3	3	45.50	7.1	7.3	1.9	5.6	4.5	181	7	96	216	13	94	9.3	2.5	2.15	840	0.9	990	170	.46	205	1154	.694	1.71	9897	
9	448	0.00	74	65	78	8	2	3	3	45.26	7.0	7.1	1.5	4.5	4.2	199	9	95	220	12	95	9.3	2.9	1.93	730	0.7	880	167	.45	217	1249	.761	1.48	9393	
0	435	0.00	73	66	78	7	2	3	3	46.00	7.0	7.2	1.5	5.5	3.8	206	5	98	232	12	95	10.1	3.4	1.88	720	0.6	870	166	.45	223	1306	.700	1.45	8465	
1	437	0.00	70	64	78	8	2	3	3	46.38	7.0	6.9	1.5	5.7	3.7	225	7	97	212	8	96	11.0	2.5	2.12	820	0.7	970	169	.46	244	1414	.772	1.40	90139	
2	445	0.00	70	68	78	7	2	3	3	46.56	7.0	7.0	2.1	6.1	5.7	244	7	97	212	14	93	13.3	3.1	2.03	790	0.8	940	165	.53	223	1339	.812	1.41	9548	
3	405	0.00	73	51		8	2	3	3	47.34	6.9	7.2	1.3	5.8	4.0	194	7	96	168	10	94	11.0	2.5	3.44	1360	0.7	1510	176	.47	231	1219	.812	1.33	9005	
4	455	0.00	75	54		10	2	3	3	45.36	7.0	7.1	2.1	5.3	3.3	173	8	92	136	11	92	10.3	3.0	3.94	1490	0.7	1640	171	.42	202	1155	.751	1.18	7390	
5	465	0.00	72	70	78	10	2	3	3	46.04	7.0	7.1	2.1	6.1	3.7	178	5	97	190	12	94	10.2	2.9	4.54	1780	0.6	1930	186	.47	209	1085	.786	1.15	7538	
6	463	0.00	73	70	78	10	2	3	3	45.62	7.1	7.1	2.9	6.4	2.8	187	8	96	192	13	93	12.0	2.8	3.05	1160	0.5	1310	174	.49	195	1086	.855	1.22	8699	
7	463	0.00	78	64	78	9	2	3	3	44.67	7.0	7.1	1.6	6.2	2.7	214	5	98	216	12	94	9.8	3.2	2.39	890	0.5	1040	197	.53	224	1136	.527	2.04	8966	
8	427	0.00	74	60	80	9	2	3	3	46.36	7.0	6.9	1.4	5.4	3.7	235	6	97	270	15	94	9.0	2.3	2.25	870	0.7	1020	233	.48	329	1415	.583	1.42	6904	
9																																			
10																																			
1																																			
QT	12642	0.06	70.3	71.3	1736	234	56	84	84	126.79	195.9	198.8	55.7	14.4	14.2	5238	260	2687	5218	355	2598	283.1	78.8	6362	23980	20.2	29580	521	11.98	6514	34710	21.59	40.38	258033	
WT	442		73	71	8	2	3	4	44.0	7.0	7.1	2.0	5.8	3.1	187	7	96	186	11	93	10.1	2.8	2.27	856	0.7	1056	186	.43	233	1240	.771	1.44	97156		

Jan. 85

DATE	CHLORIDES MG/L	RAINFALL	TEMP °F		TEMP °F	H ₂ S - MG/L	FLOW - MGD			PH	DO	BOD MG/L			S - MG/L			SPRAY IRRIGATION		CHLORINE				AERATORS				WASTE SLUDGE					
			H	D			A	B	C			PLANT INF	PLANT EFF	% REM.	PLANT- IN.	PLANT- EFF.	% REM.	CHLORINE RES.	DISSOLVED O ₂	DOSAGE MG/L	LBS/DAY EFFLUENTS	TOTAL RES MG/L	LBS/DAY TOTAL	SVI	FM RATIO	30 MIN. SETTLEABLE	MLSS	THOUSAN GLS / DAY	SOLIDS %	SOLIDS WASTED THOU LBS			
1	440	0.00	74	68	80	7	2	3	3	47.16	7.0	7.2	1.9	45.21	145	10	93	108	16	85	8.3	2.8	0.78	310	0.4	460	297	.30	437	1435	.766	1.22	17735
2	460	0.00	74	74	82	11	2	3	3	47.25	7.0	7.2	1.4	45.27	175	7	96	170	18	89	7.7	4.2	1.36	536	0.5	686	319	.37	459	1395	.805	1.22	87902
3	457	0.00	70	70	82	9	2	3	3	48.32	7.0	7.0	1.5	58.23	198	7	96	180	16	91	12.6	2.6	1.63	655	0.7	780	313	.43	453	1395	.805	1.22	87902
4	450	0.26	66	56	82	8	2	3	3	48.02	7.0	7.2	1.8	62.25	167	8	95	144	34	76	10.7	2.8	1.81	725	0.7	850	343	.37	484	1367	.805	1.10	73857
5	420	0.00	58	48	80	8	2	3	3	48.27	7.1	7.1	2.2	64.26	160	9	94	172	17	90	9.6	3.4	1.85	745	0.6	870	366	.36	528	1358	.805	1.39	93324
6	420	0.00	64	42	79	12	2	3	3	46.82	7.0	7.4	1.9	63.24	158	6	96	132	12	91	9.1	3.1	1.71	668	0.7	793	461	.36	619	1291	.778	1.34	86941
7	457	0.00	64	44	80	11	2	3	3	46.02	6.8	7.3	2.7	62.29	155	16	96	150	17	89	7.5	2.8	1.76	677	0.8	802	328	.37	417	1209	.738	1.29	79391
8	470	0.00	70	54	81	8	2	3	3	45.05	7.0	7.3	2.7	57.48	166	11	93	164	13	92	9.0	3.3	2.52	945	2.0	1070	308	.40	367	1159	.699	1.47	85691
9	450	0.00	76	52	81	9	2	3	3	45.32	7.0	7.0	2.5	55.47	203	9	96	210	15	93	8.2	4.2	1.89	695	0.7	820	281	.54	295	1029	.641	1.43	76444
0	457	0.00	76	50	81	10	2	3	3	45.16	7.1	7.1	2.6	50.51	175	11	94	142	11	92	11.4	2.7	1.54	555	0.8	680	231	.45	272	1047	.576	1.36	6533
1	453	0.00	66	54	81	10	2	3	3	44.86	7.0	7.2	2.6	54.48	161	10	94	142	12	92	11.4	4.2	1.86	680	0.6	830	260	.43	273	1035	.431	1.64	55915
2	458	0.00	71	52		8	2	3	3	46.19	7.0	7.2	2.5	55.58	137	7	95	144	13	91	16.5	2.6	1.61	620	0.7	770	247	.37	264	1067	.391	1.56	5100
3	463	0.00	71	44		10	2	3	3	45.74	6.9	7.2	2.6	56.50	133	7	95	128	18	86	11.3	2.8	2.12	810	0.8	960	291	.33	338	1168	.410	1.62	5525
4	498	0.00	70	54	82	8	2	3	3	44.72	7.0	7.4	2.1	56.53	147	10	93	124	29	77	11.5	2.7	2.09	780	0.8	930	315	.33	384	1229	.447	1.71	6374
5	512	0.00	66	48	81	9	2	3	3	45.66	6.8	7.2	2.1	56.43	206	6	97	198	12	94	11.9	3.3	1.97	750	0.7	900	331	.45	430	1315	.533	1.97	8757
6	553	0.00	70	44	82	7	2	3	3	46.25	7.0	7.1	2.5	56.22	150	7	95	172	13	92	8.5	3.6	2.10	810	0.6	960	358	.31	499	1377	.617	1.75	9006
7	470	0.00	76	68	81	10	2	3	3	46.72	6.7	7.0	1.5	52.42	191	7	96	282	14	95	12.8	1.9	1.67	650	0.6	800	251	.41	417	1371	.711	1.51	8953
8	500	0.25	70	56	82	9	2	3	3	47.08	6.8	6.8	2.2	58.40	152	5	97	124	12	90	13.7	2.7	1.99	780	0.6	930	308	.32	434	1384	.830	1.50	10383
9	478	0.02	73	59	79	9	2	3	3	47.97	6.9	7.1	1.9	59.40	167	7	96	162	14	91	13.3	2.7	1.72	690	0.6	840	291	.37	410	1357	.912	1.33	10116
10	493	0.00	70	52		9	2	3	3	47.34	7.0	7.0	2.0	54.39	145	5	97	128	11	91	12.6	2.6	2.46	970	0.7	1120	286	.35	387	1241	.858	1.32	9445
11	467	0.00	48	30	79	8	2	3	3	46.66	6.9	6.9	1.3	52.45	148	7	96	176	12	93	13.2	3.0	2.34	910	0.7	1060	291	.37	379	1160	.828	1.36	9391
12	463	0.00	48	30		6	2	3	3	48.44	6.9	7.0	2.9	55.42	197	8	96	198	17	91	13.1	2.2	2.00	810	0.6	960	298	.54	372	1111	.855	1.32	9412
13	433	0.00	58	32		9	2	3	3	47.00	6.9	6.9	2.2	56.42	163	7	96	184	17	91	14.1	2.8	2.07	810	0.6	960	267	.37	329	1292	.842	1.41	9901
14	465	0.00	70	44	80	10	2	3	3	47.56	6.9	7.0	2.4	66.45	280	6	98	206	14	93	13.1	3.7	1.94	770	0.7	920	232	.76	276	1090	.842	1.36	9550
15	465	0.02	74	56	80	8	2	3	3	46.54	7.1	7.3	2.4	51.29	174	6	97	154	13	92	11.9	3.0	1.98	770	0.6	920	226	.46	265	1107	.839	1.33	9306
16	423	0.00	76	56		7	2	3	3	47.89	7.0	7.2	2.4	58.28	133	6	95	144	12	92	12.3	3.2	2.13	850	0.7	1000	201	.38	213	1038	.768	1.53	9799
17	458	0.00	79	46		9	2	3	3	46.08	7.1	7.2	2.8	61.48	133	7	95	120	14	88	10.1	3.1	2.55	980	0.6	1130	217	.40	217	964	.739	1.38	8505
18	435	0.02	74	58	77	7	2	3	3	46.36	6.9	6.9	2.7	62.32	179	9	95	186	10	95	11.5	2.7	2.61	1010	0.7	1160	197	.53	202	986	.692	1.49	8599
19	452	0.02	74	58	78	7	2	3	3	46.26	7.1	7.2	2.8	67.37	190	10	95	174	12	93	13.0	3.2	2.70	890	0.6	1040	206	.55	213	1002	.622	1.46	7573
20	435	0.00	70	56	78	10	2	3	3	46.24	7.0	7.2	2.4	55.35	188	10	95	180	11	94	12.3	3.3	2.75	910	0.5	1060	209	.48	253	1137	.664	1.38	7642
21	433	0.00	70	61	79	10	2	3	3	46.76	7.0	7.2	2.7	63.36	172	7	96	190	11	94	11.5	3.2	2.46	810	0.8	960	212	.44	249	1154	.737	1.44	8851
TOT	4288	0.59	71.3	61.0	127	272	62	93	93	445.91	205.9	221.0	70.2	116.4	5248	248	2958	5088	460	2803	353.7	94.4	61.97	23571	21.7	28021	8741	12.40	11135	37270	21.986	44.41	25854
11/1	441	0.00	74	68	80	11	2	3	3	47.12	7.0	7.1	2.3	52.21	169	8	95	164	15	90	11.4	3.1	2.00	760	0.7	904	282	.42	359	1202	.709	1.43	8331

CLIMATOLOGICAL DATA

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FLORIDA
1984

STATION	JAN		FEB		MAR		APR		MAY		JUN	
	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
LOWER EAST COAST 06												
FORT LAUDERDALE	.97	-1.18	1.33	-1.16	4.73	2.57	5.68	2.24	10.22	3.86	8.18	-.91
HIALEAH	.30	-2.09	1.23	-.83	6.98	5.07	3.32	-.23	13.99	7.32	9.51	-.61
HOMESTEAD EXP STN	.37	-1.34										
LOXAHATCHEE	1.02	-1.66	3.38	.92	5.12	2.26	3.81	.72	10.55	4.96	3.47	-6.15
MIAMI BEACH	.11	-1.87	1.55	-.43	4.07	2.62	3.08	.46	17.45	12.29	7.81	1.05
MIAMI WSCMO AP	.18	-1.90	.70	-1.35	6.12	4.23	4.51	1.44	10.91	4.38	7.24	-1.91
MIAMI 12 SSW	.19	-1.83	1.10	-1.23	3.73	2.05	7.16	4.35	11.64	4.53	9.12	-.50
POMPANO BEACH	1.22	-1.33	2.52	-.08	5.28	2.70	5.35	1.99	17.57	11.43	7.61	-.66
ROYAL PALM RANGER STN	.20	-1.50	1.15	-.72	2.98	1.46	.33	-2.51	10.09	3.64	3.62	-6.66
STUART 1 N	.88	-1.70	5.77	3.13	3.59	.40	1.07	-1.61	11.13	6.16	4.80	-2.19
WEST PALM BEACH WSO AP	1.36	-1.35	4.49	1.87	5.06	2.37	5.99	2.78	8.44	2.42	5.84	-2.08
--DIVISIONAL DATA-->	.62	-1.63	2.32	.00	4.77	2.60	4.03	.93	12.20	6.02	6.72	-1.99
KEYS 07												
CONCH KEY	1.02		1.61		2.02		3.74		5.57		3.79	
KEY WEST WSO AP	.10	-1.64	4.07	2.15	2.18	.87	4.16	2.67	5.79	2.57	7.09	2.05
TAVERNIER	.53	-1.41	1.87	-.16	3.56	2.23	1.50	-.67	2.90	-2.06		
--DIVISIONAL DATA-->	.55	-1.31	2.52	.54	2.59	1.15	3.13	1.44	4.75	.93	5.44	-.37

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TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL (INCHES)

FLORIDA
1984

STATION	JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
LOWER EAST COAST 06														
FORT LAUDERDALE	3.07	-2.97	4.48	-2.40	13.35	5.26	1.03	-6.63	5.81	2.00	.55	-2.11	59.40	-1.43
HIALEAH	7.23	.26	3.50	-4.36	11.82	2.81	1.55	-6.35	2.66	-.40	1.98	-.01	64.07	.60
HOMESTEAD EXP STN	M		M		M		M		1.93	-.10	.38	-1.00		
LOXAHATCHEE	5.15	-2.93	4.06	-2.94	13.88	4.99	2.57	-3.94	5.57	2.98	.02	-2.19	58.60	-2.98
MIAMI BEACH	5.09	.78	3.11	-1.40	9.84	3.02	1.09	-4.87	2.93	.10	.32	-1.35	56.45	10.40
MIAMI HSCMO AP	R								4.04	1.33	.70	-1.16	60.02	2.47
MIAMI 12 SSW	4.72	-.82	2.74	-3.15	12.34	4.54	.94	-6.90	4.50	1.67	.27	-1.44	58.45	2.27
POMPANO BEACH	4.27	-1.50	5.86	-.62	8.43	-.14	.72	-8.52	8.09	4.69	1.99	-.43	68.91	7.53
ROYAL PALM RANGER STN	9.43	2.45	7.87	.35	8.30	-.42	.46	-5.66	1.69	-.41	.28	-1.08	46.40	-11.06
STUART 1 N	3.98	-2.48	4.39	-1.39	13.80	6.17	1.65	-5.13	11.01	8.48	.42	-2.22	62.49	7.62
WEST PALM BEACH WSO AP	R								14.39	11.00	.13	-2.13	69.79	10.07
--DIVISIONAL DATA----->	5.77	-.48	4.78	-1.81	11.09	2.70	1.40	-5.91	5.69	2.74	.64	-1.42	60.03	1.75
KEYS 07														
CONCH KEY	3.11		3.27		8.77		1.11		1.67		1.08		36.76	
KEY WEST WSO AP	3.29	-.39	2.59	-2.21	8.11	1.61	1.32	-3.44	1.15	-2.08	.10	-1.63	39.95	.53
TAVERNIER	M		M		M		M		M		M			
--DIVISIONAL DATA----->	3.20	-.49	2.93	-1.66	8.44	1.98	1.22	-4.55	1.41	-1.09	.59	-1.12	36.77	-4.55

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FLORIDA
1983

STATION	JAN		FEB		MAR		APR		MAY		JUN	
	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
MIAMI 12 SSW	5.84	3.82	6.76	4.43	3.61	1.93	5.95	3.14	1.59	-5.52	11.96	3.34
POMPANO BEACH	5.80	3.25	15.46	12.86	3.01	2.43	2.87	- .49	1.29	-4.85	7.69	- .84
ROYAL PALM RANGER STN	9.46	7.76	7.69	5.82	3.62	2.10	2.91	.07	.72	-5.73	10.89	.61
STUART 1 N	3.83	1.25	13.47	10.83	5.72	2.53	2.85	.17	2.32	-2.65	6.79	- .20
WEST PALM BEACH WSO AP R	11.01	8.30	8.71	6.09	3.42	.73	3.27	.06	5.30	-.72	9.39	1.47
--DIVISIONAL DATA----->	6.54	4.29	9.78	7.46	3.64	1.47	2.95	-.15	2.52	-3.66	10.29	1.58
KEYS 07	16.76		3.60		7.03		3.85		1.17		9.28	
CONCH KEY	17.64	15.90	3.48	1.56	6.57	5.26	1.88	.39	2.24	-.98	3.82	-1.22
KEY WEST WSO AP	15.35	13.41	5.07	3.04	6.57	5.26	4.37	2.20	1.52	-3.44	6.05	-1.18
TAVERNIER	15.35	13.41	5.07	3.04	6.57	5.26	4.37	2.20	1.52	-3.44	6.05	-1.18
--DIVISIONAL DATA----->	16.58	14.72	4.05	2.07	6.80	5.36	3.37	1.68	1.64	-2.18	6.38	.57

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TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL (INCHES)

FLORIDA
1982

STATION	JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
MIAMI 12 SSW	3.60	-1.94	3.76	-2.13	6.54	-1.26	5.96	-1.88	2.22		2.93	1.22	60.72	
POMPANO BEACH	7.45	1.68	11.75	5.27	9.07	.50	9.35	.11	1.65	-1.75	9.64	7.22	85.03	23.65
ROYAL PALM RANGER STN	4.88	-2.10	10.32	2.80	12.15	3.43	3.08	-3.04	4.83	2.73	3.01	1.65	73.56	16.10
STUART 1 N	6.89	.43	9.97	4.19	6.73	-.90	12.69	5.91	2.20	-.33	5.49	2.85	78.95	24.08
WEST PALM BEACH WSO AP R	4.71	-1.35	8.21	2.43	9.62	.33	7.80	.03	4.24	.85	7.03	4.77	82.71	22.99
--DIVISIONAL DATA----->	5.21	-1.04	8.10	1.51	8.32	-.07	4.63	-2.68	2.94	-.01	5.09	3.03	70.01	11.73
KEYS														
CONCH KEY	4.21		7.71		2.96		1.49		3.09		2.17		63.32	
KEY WEST WSO AP	4.64	.96	2.79	-2.01	2.25	-4.25	1.20	-3.56	.91	-2.32	4.97	3.24	52.39	12.97
TAVERNIER	3.87	-.46	4.16	-.38	4.47	-2.45	6.78	-.23	2.78	.73	2.51	.63		
--DIVISIONAL DATA----->	4.24	.55	4.89	.30	3.23	-3.23	3.16	-2.61	2.26	-.24	3.22	1.51	59.82	18.50

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APPENDIX 2.3.3-B

OBSERVATIONS AT 3-HOUR INTERVALS

JAN 1984 12844
WEST PALM BEACH, FLORIDA

OBSERVATIONS AT 5 HOUR INTERVALS														WEST PALM BEACH, FLORIDA																																							
HOUR LST	VISI-BILITY				TEMPERATURE				WIND		HOUR LST	VISI-BILITY				TEMPERATURE				WIND																																	
	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WIND DIRECTION	WIND SPEED (KNOTS)	AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET		WIND DIRECTION	WIND SPEED (KNOTS)	AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %																																				
JAN 1st																		JAN 2nd																		JAN 3rd																	
01	0	UNL	10		49	46	90	33	13		8	35	10		54	51	90	31	10		8	32	10		53	54	87	32	9																								
04	0	UNL	10		47	44	89	33	9		3	UNL	10		52	50	93	31	5		0	UNL	10		53	51	93	30	5																								
07	8	40	10		47	45	93	34	9		2	UNL	10		53	50	90	33	10		8	UNL	10		54	51	90	33	8																								
10	9	35	12		53	49	86	33	9		0	UNL	12		62	54	75	35	12		4	UNL	12		62	52	70	34	13																								
13	8	45	12		65	54	68	35	15		1	UNL	12		72	59	64	01	13		1	UNL	12		70	54	57	35	13																								
16	8	40	12		66	52	61	01	15		2	UNL	12		70	59	68	36	14		6	UNL	12		68	53	59	02	10																								
19	5	UNL	12		64	51	63	01	10		8	50	10		62	57	84	35	12		6	300	10		59	51	75	35	8																								
22	3	UNL	10		56	52	87	33	10		1	UNL	10		58	55	90	35	11		0	UNL	10		54	52	93	35	7																								
JAN 4th																		JAN 5th																		JAN 6th																	
01	0	UNL	10		52	43	72	33	6		4	UNL	10		52	45	77	31	6		0	UNL	8		51	50	96	26	6																								
04	0	UNL	10		50	46	86	30	6		0	UNL	10		47	43	86	30	7		0	UNL	3		48	48	100	28	4																								
07	0	UNL	10		48	41	77	30	8		0	UNL	10		42	40	93	29	8		0	UNL	2		46	45	96	29	5																								
10	1	UNL	12		59	46	62	31	8		0	UNL	10		54	39	57	32	7		0	UNL	7		57	50	78	29	5																								
13	2	UNL	12		66	51	59	32	10		0	UNL	10		64	34	33	27	12		0	UNL	10		67	40	37	33	8																								
16	8	UNL	12		68	52	57	33	7		0	UNL	10		65	44	47	30	10		4	UNL	12		69	34	28	28	9																								
19	10	300	10		61	51	70	35	6		3	UNL	10		60	47	62	25	5		5	UNL	10		56	42	60	27	4																								
22	8	28	10		58	47	67	34	10		0	UNL	10		56	51	83	24	8		8	UNL	10		55	45	69	25	6																								
JAN 7th																		JAN 8th																		JAN 9th																	
01	0	UNL	10		50	46	86	28	6		0	UNL	8		53	50	90	32	5		2	UNL	10		55	53	93	00	0																								
04	0	UNL	10		50	48	93	21	4		0	UNL	8		51	48	90	32	5		3	UNL	10		63	53	70	11	6																								
07	2	UNL	2		48	47	96	23	4		1	UNL	10		50	46	86	34	5		4	UNL	10		63	53	70	08	8																								
10	6	UNL	7		61	59	93	28	10		1	UNL	12		63	54	73	36	10		7	300	12		71	57	61	09	15																								
13	7	UNL	10		70	58	66	30	8		7	UNL	12		73	52	48	05	10		9	30	12		73	58	60	10	18																								
16	9	UNL	10		70	52	53	33	13		10	300	12		70	53	55	04	8		9	300	12		71	60	68	11	16																								
19	10	300	10		61	51	70	00	0		10	140	10		62	55	78	35	7		10	35	10		71	62	73	10	17																								
22	2	UNL	10		55	50	83	26	3		2	UNL	10		57	54	90	33	4		9	35	7		70	65	84	12	12																								
JAN 10th																		JAN 11th																		JAN 12th																	
01	9	300	7		71	64	79	14	11		9	25	7		68	67	97	22	4		9	17	10		49	43	80	32	7																								
04	10	32	7		71	64	79	13	12		10	5	7		67	66	97	25	10		3	UNL	10		46	41	83	28	5																								
07	9	30	7		72	66	82	14	16		9	40	10		64	63	97	26	10		8	250	10		46	42	86	27	5																								
10	10	90	10		73	68	84	17	12		10	21	10		65	60	84	28	11		9	UNL	10		53	49	86	32	8																								
13	10	90	10		76	67	74	17	14		10	17	10		64	57	78	29	11		7	UNL	12		65	55	70	36	5																								
16	10	90	7		74	68	82	18	6		9	UNL	10		64	54	70	29	13		10	UNL	12		65	57	76	01	7																								
19	9	90	10		73	69	87	18	7		9	250	10		58	50	75	29	10		10	250	8		61	56	84	30	8																								
22	10	15	2		70	68	93	24	7		9	UNL	10		52	45	77	32	12		6	UNL	8		58	55	90	34	7																								
JAN 13th																		JAN 14th																		JAN 15th																	
01	6	UNL	7		57	54	90	33	5		10	2	7		59	58	97	01	12		10	2	4		59	97	01	12																									
04	7	250	7		55	53	93	34	7		10	2	4		59	58	97	36	12		10	1	0		58	58	100	34	9																								
07	9	250	7		54	52	93	36	5		10	3	4		59	59	100	34	11		10	2	2		58	58	100	34	9																								
10	6	UNL	3		64	62	93	01	9		5	UNL	8		65	60	84	34	13		10	5	3		60	59	97	35	10																								
13	7	17	8		72	63	73	02	10		5	UNL	10		75	64	69	36	15		10	250	8		69	63	81	36	9																								
16	3	UNL	12		69	62	79	03	9		0	UNL	10		70	63	79	01	12		8	UNL	10		72	64	76	03	12																								
19	0	UNL	10		63	59	87	36	11		6	6	7		62	60	93	36	9		5	UNL	7		64	62	93	01	6																								
22	10	2	7		60	59	97	36	9		10	4	5		61	59	93	35	12		10	1	0		62	62	100	01	8																								
JAN 16th																		JAN 17th																		JAN 18th																	
01	10	1	0		62	62	100	34	6		3	UNL	7		63	63	100	00	0		2	UNL	10		74	71	90	14	7																								
04	10	0	0		61	61	100	36	6		9	35	7		64	64	100	32	3		0	UNL	10		73	69	87	15	7																								
07	10	0	0		60	60	100	36	5		9	30	5		64	64	100	00	0		3	UNL	10		73	69	87	16	7																								
10	10	2	0		62	62	100	35	5		9	16	10		75	70	85	14	11		5	UNL	12		77	70	79	17	13																								
13	4	UNL	10		77	65	67	13	6		8	23	10		77	70	79	16	11		7	300	12		80	70	72	18	12																								
16	3	UNL	12		75	64	69	14	7		8	300	12		77	70	79	12	8		5	UNL	12		80	70	72	17	13																								
19	3	UNL	10		71	63	76	14	5		7	100	10		74	70	87	16	9		2	UNL	10		74	70	87	16	7																								
22	2	UNL	8		66	64	93	00	0		3	UNL	10		74	70	87	14	7		2	UNL	10		72	70	94	18	7																								

OBSERVATIONS AT 3-HOUR INTERVALS

JAN 1984 12844
WEST PALM BEACH, FLORIDA

WEST PALM BEACH, FLORIDA																																																								
HOUR L.S.T.	VISIBILITY			WEATHER	TEMPERATURE			WIND		HOUR L.S.T.	VISIBILITY			WEATHER	TEMPERATURE			WIND																																						
	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	WINDS MILES		AIR OF	WET BULB OF	DEW POINT OF	REL. HUMIDITY %	DIRECTION		SPEED (KNOTS)	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET		WINDS MILES	AIR OF	WET BULB OF	DEW POINT OF	REL. HUMIDITY %	DIRECTION	SPEED (KNOTS)																																			
JAN 19th																			JAN 20th																			JAN 21st																		
01	7	35	10			68	67	97	23	3		10	13	6	RM	60	58	93	35	10		10	6	8			64	62	93	29	7																									
04	10	14	6		F	68	68	100	21	3		10	5	5	H	61	60	97	36	7		10	2	4			61	61	100	27	5																									
07	10	17	0		F	68	68	100	21	3		10	13	5	FH	61	60	97	35	7		10	2	2			55	55	100	34	9																									
10	10	3	5		F	73	73	100	23	7		10	5	3	RF	63	62	97	34	7		10	7	10			51	48	90	33	15																									
13	9	80	10			80	71	74	27	6		10	25	5		69	68	97	35	5		10	8	10			51	48	90	30	10																									
16	10	22	8		RM	77	71	82	33	12		10	12	8		73	68	84	35	7		10	8	10			56	52	87	33	15																									
19	10	6	5		RF	66	65	97	36	14		10	5	5	F	66	64	93	33	10		10	6	5			55	54	97	35	17																									
22	10	6	5		RF	62	61	97	36	12		10	5	8		64	62	93	34	8		10	4	5			56	55	97	34	13																									
JAN 22nd																			JAN 23rd																			JAN 24th																		
01	9	4	7			56	55	97	33	9		3	UNL	10		70	60	71	07	18		3	UNL	10			71	62	73	09	13																									
04	10	17	4		R	56	55	97	34	9		8	70	10		70	61	73	08	18		0	UNL	10			70	63	79	11	10																									
07	9	26	10			66	59	78	04	18		4	UNL	10		70	61	73	08	18		3	UNL	10			71	65	81	11	12																									
10	9	30	10			70	60	71	05	17		7	300	10		74	62	66	10	20		4	UNL	10			76	67	74	12	12																									
13	6	300	12			76	60	58	06	17		2	UNL	10		76	61	60	09	18		7	30	12			78	66	67	15	12																									
16	10	30	12			72	59	64	05	19		5	UNL	10		74	63	69	09	18		3	UNL	12			78	67	69	14	8																									
19	9	300	10			70	59	68	07	18		9	22	10		71	63	76	07	17		2	UNL	10			72	67	84	14	4																									
22	4	UNL	10			70	58	66	08	19		8	20	10		71	63	76	07	16		0	UNL	10			68	65	90	15	3																									
JAN 25th																			JAN 26th																			JAN 27th																		
01	0	UNL	10			66	64	93	00	0		3	UNL	8		68	67	97	25	4		2	UNL	3		F	69	68	97	00	0																									
04	1	UNL	10			65	64	97	28	3		0	UNL	7		66	65	97	00	0		3	UNL	7			70	69	97	19	5																									
07	1	UNL	10			63	62	97	00	0		10	13	7		64	63	97	33	6		1	UNL	7			70	69	97	18	8																									
10	5	UNL	10			76	69	79	15	12		4	UNL	10		76	70	82	06	4		8	250	10			77	72	85	19	13																									
13	5	UNL	10			80	69	69	16	11		5	UNL	12		80	71	74	12	9		9	250	10			83	69	63	19	13																									
16	1	UNL	12			79	69	72	16	11		4	UNL	10		80	70	72	16	10		9	250	10			84	64	51	23	12																									
19	0	UNL	10			74	69	85	18	8		8	250	10		75	71	87	18	7		9	100	10			72	69	90	21	7																									
22	0	UNL	10			71	69	93	19	5		3	UNL	10		73	71	94	20	4		3	UNL	10			72	69	90	25	9																									
JAN 28th																			JAN 29th																			JAN 30th																		
01	3	55	10			66	61	84	27	7		0	UNL	10		54	49	83	25	5		0	UNL	10			55	50	83	32	4																									
04	9	70	10			63	60	90	27	9		0	UNL	10		49	46	90	23	3		0	UNL	10			52	47	69	00	0																									
07	5	UNL	10			61	58	90	29	6		6	UNL	7		46	44	93	21	4		0	UNL	10			50	42	74	32	7																									
10	8	180	10			65	58	78	28	12		4	UNL	12		61	51	70	26	6		0	UNL	12			64	46	52	27	8																									
13	5	UNL	10			71	58	64	30	16		1	UNL	12		71	53	53	30	12		1	UNL	12			72	48	43	29	8																									
16	7	250	10			70	57	64	29	9		9	UNL	12		71	51	49	32	12		8	UNL	12			74	52	46	24	7																									
19	7	UNL	10			64	55	73	31	5		0	UNL	10		63	50	63	32	5		3	UNL	10			62	45	54	24	3																									
22	2	UNL	10			59	54	84	31	7		0	UNL	10		55	50	83	00	0		0	UNL	10			55	47	75	26	4																									
JAN 31st																																																								
01	0	UNL	10			53	49	86	28	7																																														
04	0	UNL	9			52	49	90	23	5																																														
07	3	UNL	8			51	48	90	27	3																																														
10	10	UNL	8			61	55	81	34	5																																														
13	10	UNL	10			69	55	61	30	7																																														
16	9	250	10			69	49	49	28	7																																														
19	10	250	10			60	49	67	35	6																																														
22	9	75	10			58	48	70	35	9																																														

SUMMARY BY HOURS

HOUR L.S.T	AVERAGES							RESULTANT WIND	
	SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	TEMPERATURE			REL HUMIDITY %	WIND SPEED (MPH)	DIRECTION	SPEED (MPH)
			AIR TEMP of	WET BULB of	DEW POINT of				
01	5	30.090	60	58	56	89	7.9	33	3.6
04	4	30.070	59	57	56	91	7.5	32	1.9
07	6	30.090	58	56	55	90	8.5	34	2.6
10	6	30.130	65	61	58	80	11.7	34	2.6
13	6	30.090	72	64	59	65	12.8	35	2.4
16	7	30.050	72	64	59	66	12.5	36	3.5
19	7	30.070	65	61	58	79	9.7	01	3.1
22	5	30.100	62	60	58	85	9.2	35	3.7

OBSERVATIONS AT 3-HOUR INTERVALS

FEB 1984 12844
WEST PALM BEACH, FLORIDA

WEST PALM BEACH, FLORIDA																															
HOUR LOCAL TIME	SAT. CLOUD TENTH-51	CEILING IN HUNDREDS OF FEET	VISI- BILITY	WEATHER	TEMPERATURE					WIND DIRECTION SPEED (KNOTS)	VISI- BILITY	WEATHER	TEMPERATURE					WIND DIRECTION SPEED (KNOTS)													
					AIR OF	WET B.B. OF	DEW POINT OF	REL. HUMIDITY %	AIR OF				WET B.B. OF	DEW POINT OF	REL. HUMIDITY %																
FEB 1st																															
01	9	250	10		54	46	37	53	32	9	6	35	10		56	53	51	83	34	9	10	35	5	RN	66	64	63	90	10	7	
04	0	UNL	10		48	41	32	54	33	8	9	35	10		53	52	51	93	31	4	9	41	7		67	65	63	87	09	6	
07	4	UNL	10		44	41	36	74	32	9	10	45	10		62	56	50	65	08	10	3	UNL	7		62	60	59	90	24	6	
10	8	90	10		58	51	44	60	31	12	7	130	12		70	58	49	47	08	13	8	30	8		71	67	64	79	21	5	
13	6	250	12		66	58	51	59	36	11	9	38	12		72	63	54	53	09	14	8	50	10		76	68	64	67	15	12	
16	1	UNL	12		66	58	51	59	01	13	8	45	12		71	61	54	55	08	13	10	140	10		76	68	64	67	16	13	
19	4	UNL	10		61	56	51	70	34	9	6	45	10		68	60	54	61	08	9	10	90	10		72	68	65	79	19	7	
22	4	UNL	10		57	54	51	81	34	7	3	UNL	10		69	62	57	66	11	12	10	30	8		67	66	66	97	26	3	
FEB 2nd																															
FEB 3rd																															
FEB 4th																															
01	10	75	8		66	65	64	93	27	4	3	UNL	10		61	59	58	90	26	10	0	UNL	10		50	49	47	90	23	3	
04	9	75	7		67	66	65	93	25	7	0	UNL	10		58	56	55	90	29	14	0	UNL	10		49	49	48	96	00	0	
07	10	80	8		67	66	66	97	15	3	0	UNL	7		55	54	53	93	27	6	10	32	10		53	52	51	93	22	6	
10	5	UNL	12		72	69	67	84	20	5	2	UNL	10		61	55	50	67	31	10	9	100	10		60	56	53	78	24	7	
13	3	UNL	12		78	70	65	64	22	16	5	UNL	10		68	55	43	41	30	10	9	300	10		65	56	49	56	31	13	
16	6	300	12		79	70	65	62	22	11	2	UNL	10		67	55	45	45	28	10	10	80	10		62	52	41	46	32	12	
19	4	UNL	10		73	68	65	76	22	12	3	UNL	10		62	54	46	56	31	4	9	300	10		55	43	26	33	32	12	
22	9	90	10		67	62	59	76	25	10	0	UNL	10		54	51	48	80	00	0	8	300	10		51	41	27	40	33	7	
FEB 5th																															
FEB 6th																															
FEB 7th																															
01	9	300	10		48	39	26	42	31	9	2	UNL	10		51	48	44	77	31	7	6	45	10		65	57	51	61	07	14	
04	8	300	10		46	37	24	42	32	10	1	UNL	10		50	48	46	86	34	10	1	UNL	10		64	58	53	68	07	15	
07	0	UNL	10		41	34	21	45	32	10	7	35	10		49	48	46	90	33	5	6	140	10		64	57	51	63	08	10	
10	0	UNL	10		51	41	26	38	33	14	8	38	10		61	56	51	70	04	13	7	50	12		69	59	51	53	08	12	
13	0	UNL	10		62	49	37	40	36	10	4	UNL	12		69	58	49	49	04	16	9	35	12		70	60	52	53	09	13	
16	0	UNL	10		59	49	37	44	01	10	8	45	12		68	57	47	47	04	13	5	UNL	10		71	61	53	53	08	10	
19	0	UNL	10		53	46	39	59	36	7	10	32	10		66	58	52	61	06	14	8	50	15		68	61	55	63	07	13	
22	4	UNL	10		51	48	45	80	33	8	10	32	10		65	57	50	59	07	14	4	UNL	10		67	60	55	66	08	16	
FEB 8th																															
FEB 9th																															
FEB 10th																															
01	7	45	10		67	59	53	61	08	12	6	38	10		70	65	62	76	08	13	10	23	7		RN	67	66	65	93	13	13
04	4	UNL	10		66	59	54	65	10	10	7	26	7		68	66	64	87	11	9	10	38	10		70	67	65	84	11	10	
07	6	50	10		66	60	55	68	08	10	9	170	7		69	64	61	76	11	7	10	32	7		71	68	67	87	11	12	
10	0	UNL	10		72	62	55	55	08	17	9	UNL	12		72	66	62	71	08	12	10	16	9		71	70	69	93	08	15	
13	5	UNL	10		74	63	55	52	09	15	10	250	12		75	68	64	69	08	13	10	10	3		69	68	68	97	07	11	
16	9	45	10		72	64	59	64	08	12	10	120	12		72	66	62	71	12	12	10	25	7		69	68	67	93	11	8	
19	3	UNL	12		70	63	59	68	08	14	10	45	12		70	65	62	76	07	11	10	50	10		70	68	67	90	12	12	
22	2	UNL	10		70	64	60	71	08	13	10	30	7		68	66	65	90	11	6	9	55	10		71	69	68	90	13	11	
FEB 11th																															
FEB 12th																															
FEB 13th																															
01	9	100	10		72	70	69	90	12	10	10	100	9		69	69	69	100	19	4	1	UNL	7		65	65	65	100	00	0	
04	9	250	10		72	70	69	90	14	11	10	100	2		69	69	69	100	32	6	1	UNL	7		65	64	64	97	28	3	
07	8	UNL	10		72	69	68	87	14	9	3	UNL	4		68	68	68	100	33	6	1	UNL	7		64	63	63	97	34	5	
10	10	100	10		75	72	70	85	13	8	1	UNL	10		72	70	69	90	29	7	3	UNL	8		72	69	67	84	36	5	
13	10	30	10		75	71	69	82	13	8	4	UNL	12		79	71	67	67	01	12	9	80	10		77	68	62	60	04	9	
16	10	90	10		75	72	70	85	15	7	4	UNL	12		77	72	69	76	04	5	4	UNL	10		76	67	62	62	05	10	
19	10	55	8		72	70	69	90	16	8	3	UNL	10		72	69	67	84	36	4	4	UNL	10		72	65	61	69	06	7	
22	10	55	6		71	70	70	97	10	7	0	UNL	10		68	67	67	97	35	4	5	UNL	10		70	64	60	71	05	9	
FEB 14th																															
FEB 15th																															
FEB 16th																															
01	8	30	10		69	64	61	76	06	8	0	UNL	10		60	59	58	93	29	3	6	UNL	10		62	61	61	97	33	3	
04	9	30	10		64	63	62	93	28	4	0	UNL	10		60	59	59	97	33	5	7	UNL	10		60	60	60	100	30	4	
07	4	UNL	10		62	61	61	97	31	4	0	UNL	10		60	59	58	93	34	7	5	UNL	10		61	61	61	100	31	3	
10	5	UNL	12		74	65	60	62	02	6	0	UNL	10		73	67	63	71	36	8	5	UNL	10		75	69	66	74	07	12	
13	6	300	12		76	66	60	58	09	7	1	UNL	12		77	68	62	60	06	9	7	20	10		77	74	72	85	06	15	
16	5	UNL	12		75	65	59	56	06	12	0	UNL	12		76	68	64	67	04	11	7	UNL	12		79	73	70	74	07	12	
19	7	50	10		70	65	61	73	02	8	0	UNL	12		71	66	63	76	02	9	5	UNL	12		74	71	70	87	07	12	
22	3	UNL	10		64	62	60	87	31	6	0	UNL	10		66	64	62	87	35	5	0	UNL	10		73	71	70	90	08	9	
FEB 17th																															
FEB 18th																															

WEATHER CODES

* TORNAADO	ZL FREEZING DRIZZLE	IPW ICE PELLET SHOWERS	BN BLOWING SAND
T THUNDERSTORM	S SNOW	A HAIL	BS BLOWING SNOW
Q SQUALL	SW SNOW SHOWERS	F FOG	BY BLOWING SPRAY
R RAIN	SG SNOW GRAINS	IF ICE FOG	K SMOKE
RW RAIN SHOWERS	SP SNOW PELLETS	GF GROUND FOG	H HAZE
ZR FREEZING RAIN	IC ICE CRYSTALS	BD BLOWING DUST	D DUST
L DRIZZLE	IP ICE PELLETS		

CEILING: UNL INDICATES UNLIMITED

WIND DIRECTION: DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS, INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. AN ENTRY OF 00 INDICATES CALM

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

OBSERVATIONS AT 3-HOUR INTERVALS

FEB 1984 12844
WEST PALM BEACH, FLORIDA

OBSERVATIONS AT 3 HOUR INTERVALS														WEST PALM BEACH, FLORIDA																																																																																	
HOUR L.S.T.	SKY COVER (TENTHS)		CEILING IN HUNDREDS OF FEET	VISIBILITY		WEATHER	TEMPERATURE				WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET		VISIBILITY		WEATHER	TEMPERATURE				WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET		VISIBILITY		WEATHER	TEMPERATURE				WIND																																																												
				AIR OF	WET BULB OF		DEW POINT OF	REL. HUMIDITY %	DIRECTION	SPEED (MPH)				AIR OF	WET BULB OF	DEW POINT OF	REL. HUMIDITY %		DIRECTION	SPEED (MPH)			AIR OF	WET BULB OF		DEW POINT OF	REL. HUMIDITY %	DIRECTION	SPEED (MPH)				AIR OF	WET BULB OF	DEW POINT OF	REL. HUMIDITY %	DIRECTION	SPEED (MPH)																																																									
FEB 19th																																FEB 20th																																FEB 21st																															
01	0	UNL	10			72	69	68	87	12	5	9	25	10					71	71	71	100	28	5	10	90	7			73	72	71	94	22	7																																																												
04	2	UNL	10			71	70	69	93	13	4	5	UNL	5				F	69	69	69	100	00	0	10	70	5	RF		71	71	71	100	22	6																																																												
07	9	UNL	10			65	64	64	97	21	3	1	UNL	1				F	66	66	66	100	00	0	10	250	4			71	70	70	97	25	3																																																												
10	9	250	12			78	75	73	85	15	10	2	UNL	10					78	74	72	82	20	8	10	80	7			75	72	70	85	21	10																																																												
13	9	UNL	12			81	75	72	74	16	13	8	25	10					83	76	73	72	21	6	10	80	8			78	73	70	77	19	10																																																												
16	5	UNL	12			80	74	71	74	16	9	8	90	10					81	76	73	77	17	6	10	80	8			77	72	70	79	20	10																																																												
19	3	UNL	10			76	73	71	85	15	7	9	90	10					78	74	72	82	17	9	9	140	10			73	69	67	82	22	7																																																												
22	4	UNL	10			75	73	72	90	17	5	10	90	7					73	72	71	94	19	4	9	140	10			69	68	67	93	30	7																																																												
FEB 22nd																																FEB 23rd																																FEB 24th																															
01	9	70	10			70	68	66	87	35	8	10	30	8					75	74	73	94	20	8	0	UNL	8			54	53	52	93	27	6																																																												
04	4	UNL	10			66	65	65	97	23	3	10	35	7					71	70	69	93	24	7	0	UNL	8			50	49	47	90	32	6																																																												
07	8	80	10			65	64	64	97	17	3	10	35	10					69	67	65	87	26	8	1	UNL	10			51	48	45	80	36	4																																																												
10	8	250	10			80	75	72	77	17	10	10	50	10					68	63	60	76	30	16	0	UNL	10			67	59	53	61	36	9																																																												
13	9	120	10			80	75	73	79	14	11	10	250	10					70	62	56	61	30	13	0	UNL	12			74	64	57	56	07	9																																																												
16	9	25	10			79	76	74	85	18	9	9	250	10					69	60	53	57	29	10	7	120	12			74	66	61	64	16	7																																																												
19	10	100	8			77	76	75	94	19	11	6	250	10					64	58	53	68	27	4	6	UNL	10			71	66	63	76	19	5																																																												
22	5	UNL	10			76	74	73	91	21	10	0	UNL	10					58	56	54	87	23	4	9	250	10			67	60	55	66	00	0																																																												
FEB 25th																																FEB 26th																																FEB 27th																															
01	10	160	10			64	59	55	73	27	8	0	UNL	10					56	55	54	93	00	0	9	32	10			73	69	67	82	12	15																																																												
04	10	100	10			63	60	57	81	29	7	0	UNL	10					54	53	52	93	28	4	10	32	10			74	71	69	85	13	13																																																												
07	10	140	10			62	57	52	70	31	5	3	UNL	7					52	52	51	96	00	0	10	15	8	RM		73	72	71	94	15	14																																																												
10	10	100	10			63	59	55	75	32	5	0	UNL	10					73	63	56	55	08	12	8	20	8			76	73	72	88	17	16																																																												
13	10	100	10			67	60	54	63	36	9	1	UNL	12					75	64	57	54	09	15	9	20	10			80	75	72	77	17	15																																																												
16	5	UNL	10			73	61	52	48	02	4	3	UNL	12					75	65	59	58	10	14	9	300	10			80	76	74	82	18	10																																																												
19	0	UNL	10			67	60	54	63	05	5	9	30	10					73	66	62	69	08	15	10	300	7			77	74	73	88	18	10																																																												
22	0	UNL	10			58	56	55	90	00	0	10	35	10					73	67	64	74	10	15	10	100	7	RM		76	75	74	94	19	12																																																												
FEB 28th																																FEB 29th																																																															
01	10	5	4			66	65	65	97	25	18	7	250	10					54	49	44	69	26	11																																																																							
04	10	12	4		RM	61	61	61	100	23	9	5	UNL	10					51	48	45	80	29	13																																																																							
07	10	7	5		RM	62	61	61	97	27	17	7	45	10					50	45	40	69	32	16																																																																							
10	6	80	10			62	56	50	65	26	17	0	UNL	12					51	44	35	55	32	14																																																																							
13	8	90	10			67	58	50	55	27	22	5	UNL	12					58	48	36	44	28	23																																																																							
16	9	100	10			64	54	45	50	27	20	2	UNL	12					60	49	36	41	31	20																																																																							
19	9	100	10			59	52	46	62	26	13	4	UNL	12					53	46	37	55	28	11																																																																							
22	10	250	10			55	50	46	72	30	12	0	UNL	12					47	43	38	71	27	8																																																																							

SUMMARY BY HOURS

HOUR L.S.T.	SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	AVERAGES				RESULTANT WIND	
			TEMPERATURE			WIND SPEED (MPH)	DIRECTION	SPEED (MPH)
			AIR TEMP OF	WET BULB OF	DEW POINT OF			
01	6	30.020	64	61	58	84	9.1	26
04	6	29.990	62	60	58	87	8.2	30
07	6	30.020	61	59	57	86	7.9	32
10	6	30.060	69	63	59	71	2.2	04
13	7	30.030	73	65	59	63	4.3	07
16	6	29.990	72	65	59	63	2.4	08
19	6	30.010	69	63	59	72	10.7	08
22	5	30.040	65	62	59	81	8.8	08

OBSERVATIONS AT 3-HOUR INTERVALS

MAR 1984 12844
WEST PALM BEACH, FLORIDA

MAR 1st														MAR 2nd														MAR 3rd													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
0	0	UNL	10					43	40	36	76	33	8			0	UNL	10						0	UNL	10					54	52	51	90	25	3					
								42	39	35	76	32	7											0	UNL	10					51	50	49	90	00	0					
								36	35	33	89	29	6											0	UNL	10					49	48	47	93	29	4					
								50	40	24	36	36	14											0	UNL	10					64	56	49	58	34	7					
								56	44	28	34	34	10											0	UNL	12					71	60	52	51	05	10					
								60	47	30	32	03	10											0	UNL	12					71	61	53	53	06	11					
								53	46	37	55	34	5											0	UNL	10					67	61	56	68	03	7					
								46	43	40	80	29	5											1	UNL	10					61	58	56	84	35	3					
MAR 4th														MAR 5th														MAR 6th													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
0	0	UNL	10					57	56	55	93	34	4			0	UNL	10						8	30	10					73	71	70	90	16	8					
								55	55	54	97	00	0			5	UNL	10						3	UNL	10					73	71	70	90	18	10					
								55	55	54	97	34	4			4	UNL	10						4	UNL	10					73	72	71	94	18	8					
								74	65	59	60	09	11			8	UNL	10						7	17	12					80	75	72	77	19	14					
								75	66	60	60	07	16			8	300	10						6	22	12					84	76	73	70	17	14					
								74	65	60	62	11	9			9	300	10						7	23	12					82	75	71	69	16	12					
								71	64	59	66	12	12			7	300	10						7	UNL	10					81	71	66	60	21	10					
								71	62	56	59	11	12			5	UNL	10						7	250	10					73	70	69	84	19	14					
MAR 7th														MAR 8th														MAR 9th													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
8	7	300	10					72	71	70	94	19	7			8	90	10						0	UNL	10					55	54	53	93	34	3					
								73	72	72	97	20	7			10	90	10						0	UNL	10					52	52	52	100	32	5					
								73	72	72	97	22	8			5	UNL	10						0	UNL	10					52	50	47	83	34	7					
								78	74	72	82	23	13			0	UNL	12						0	UNL	12					64	54	44	48	32	9					
								75	69	66	74	27	10			0	UNL	12						0	UNL	12					71	54	37	29	03	13					
								75	69	66	74	29	12			1	UNL	12						0	UNL	12					70	56	43	38	03	14					
								68	66	64	87	29	10			0	UNL	12						1	UNL	10					65	59	54	68	02	7					
								64	59	55	73	29	11			0	UNL	10						0	UNL	10					58	56	54	87	00	0					
MAR 10th														MAR 11th														MAR 12th													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
1	0	UNL	10					55	54	53	93	27	5			3	UNL	10						0	UNL	10					69	64	60	73	10	6					
								55	53	52	90	00	0			5	UNL	10						5	UNL	10					70	66	63	79	08	8					
								54	53	52	93	35	5			8	UNL	10						3	UNL	10					70	66	63	79	08	12					
								69	60	54	59	34	8			9	250	12						6	100	10					76	68	64	67	09	16					
								72	63	56	57	07	10			8	30	12						9	30	10					77	70	66	69	10	15					
								72	62	55	55	08	10			10	50	10						10	32	10					76	70	67	74	12	15					
								69	62	57	66	13	5			10	45	10						10	30	7					73	70	69	87	14	12					
								67	61	57	70	12	4			4	UNL	10						10	11	4					71	71	71	100	29	6					
MAR 13th														MAR 14th														MAR 15th													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
10	10	10	4					70	70	70	100	36	6			8	UNL	7						0	UNL	10					69	63	59	71	04	15					
								69	69	69	100	21	3			5	UNL	10						3	UNL	10					69	63	58	68	04	18					
								70	69	69	97	10	7			9	80	10						4	UNL	10					69	63	58	68	06	17					
								73	71	70	90	16	6			9	140	10						2	UNL	10					74	63	56	54	07	18					
								77	74	72	85	17	12			7	UNL	12						4	UNL	10					76	65	57	52	07	17					
								79	75	73	82	16	13			8	26	12						4	UNL	10					74	63	55	52	07	10					
								75	74	73	94	17	7			8	300	10						5	UNL	10					70	61	55	59	04	13					
								74	73	73	97	19	3			1	UNL	10						5	UNL	10					69	59	52	55	06	13					
MAR 16th														MAR 17th														MAR 18th													
01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22	01	04	07	10	13	16	19	22										
10	9	35	10					70	62	56	61	07	11			1	UNL	10						0	UNL	10					61	59	57	87	00	0					
								69	60	54	59	10	10			0	UNL	10						0	UNL	10					60	58	57	90	28	3					
								69	61	56	63	11	7			0	UNL	10						0	UNL	10					60	58	57	90	25	3					
								74	62	53	48	08	11			0	UNL	12						0	UNL	12					74	65	59	60	36	8					
								75	63	55	50	05	9			0	UNL	12						5	UNL	12					79	70	65	62	02	10					
								73	61	53	50	04	11			0	UNL	12						6	55	10					79	68	62	56	03	10					
								69	59	52	55	06	9			0	UNL	12						1	UNL	10					74	68	64	71	04	8					
								67	59	53	61	04	6			0	UNL	10						0	UNL	10					72	67	64	76	07	10					

OBSERVATIONS AT 3-HOUR INTERVALS

MAR 1984 12844
WEST PALM BEACH, FLORIDA

OBSERVATIONS AT 5 HOUR INTERVALS														WEST PALM BEACH, FLORIDA																			
HOUR U.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI-BILITY		WEATHER	TEMPERATURE				WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI-BILITY		WEATHER	TEMPERATURE				WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI-BILITY		WEATHER	TEMPERATURE				WIND	
			WHOLE MILES	TENTHS MILE		AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)			AIR OF	WET BULB OF		DEW POINT OF	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)	AIR OF	WET BULB OF			DEW POINT OF	REL HUMIDITY %		DIRECTION	SPEED (KNOTS)				
MAR 19th																																	
01	0	UNL	10			70	66	63	79	08	7	0	UNL	10			69	65	62	79	13	8	10	250	10			73	70	68	84	17	10
04	2	UNL	10			69	65	63	81	10	5	2	UNL	10			70	64	60	71	13	10	10	50	7	RM	66	65	65	97	27	13	
07	1	UNL	10			69	65	62	79	11	6	0	UNL	10			69	63	58	68	14	7	0	UNL	10		61	58	56	84	29	13	
10	2	UNL	10			75	67	63	66	11	10	5	UNL	10			75	67	62	64	16	13	4	UNL	10		66	59	53	63	30	14	
13	7	25	10			76	68	63	64	10	12	5	UNL	10			79	69	64	60	16	13	3	UNL	12		69	60	54	59	29	12	
16	4	UNL	10			76	67	62	62	11	9	10	300	10			76	70	66	71	16	13	0	UNL	12		72	61	52	50	30	7	
19	0	UNL	10			71	65	61	71	11	6	9	250	8			74	68	64	71	18	14	0	UNL	12		64	55	46	52	26	6	
22	0	UNL	10			69	63	58	68	13	7	3	UNL	10			72	68	66	82	16	7	0	UNL	10		57	53	50	78	20	4	
MAR 20th																																	
MAR 21st																																	
MAR 22nd																																	
01	0	UNL	10			53	51	49	86	24	5	8	UNL	8			70	62	56	61	11	6	9	40	10		69	67	66	90	09	17	
04	0	UNL	10			51	50	48	90	00	0	10	250	7			71	66	63	76	12	7	10	17	10		70	68	67	90	07	11	
07	0	UNL	10			51	50	48	90	36	5	10	41	7			72	68	65	79	11	9	9	32	8		70	69	68	93	11	5	
10	0	UNL	12			68	56	45	44	36	8	10	8	5	F	71	71	71	100	08	13	8	17	12		76	72	70	82	08	11		
13	6	UNL	12			73	63	56	55	04	9	10	11	3	FRW	66	65	65	97	04	12	5	UNL	12		78	73	70	77	08	10		
16	8	UNL	12			73	63	56	55	07	10	10	7	2	RM	64	63	63	97	36	15	5	UNL	12		76	71	69	79	09	12		
19	9	UNL	12			70	61	55	59	13	4	10	35	10			67	65	64	90	06	19	1	UNL	10		74	71	69	85	10	10	
22	9	300	10			69	61	56	63	11	6	4	UNL	10			69	67	65	87	07	20	3	UNL	12		73	70	69	87	11	5	
MAR 23rd																																	
MAR 24th																																	
MAR 25th																																	
01	9	32	10			70	69	68	93	04	7	0	UNL	10			68	67	67	97	24	8	4	UNL	7		73	72	72	97	23	5	
04	5	UNL	10			70	69	69	97	12	5	0	UNL	10			68	68	68	100	24	7	0	UNL	7		68	67	67	97	18	4	
07	2	UNL	10			67	67	67	100	00	0	10	4	7			69	69	69	100	25	9	0	UNL	7		70	69	69	97	18	4	
10	2	UNL	10			76	72	70	82	20	6	5	UNL	10			76	72	70	82	30	11	8	UNL	9		81	74	70	69	20	11	
13	3	UNL	12			80	74	71	74	17	11	4	UNL	10			84	74	69	61	27	11	8	300	10		86	76	71	61	21	8	
16	2	UNL	12			85	71	64	50	22	8	4	UNL	10			84	73	67	57	27	10	3	UNL	10		87	74	68	53	21	10	
19	7	UNL	12			76	72	70	82	17	9	8	35	10			80	71	67	65	23	3	6	300	10		79	75	73	82	16	5	
22	3	UNL	10			72	69	67	84	26	5	1	UNL	7			75	73	72	90	19	5	2	UNL	10		76	73	72	88	18	6	
MAR 26th																																	
MAR 27th																																	
MAR 28th																																	
01	0	UNL	10			75	74	74	97	18	7	6	20	7			79	75	73	82	22	19	7	32	7		61	56	52	72	28	12	
04	0	UNL	10			75	74	73	94	18	7	8	17	7			74	70	68	82	27	21	0	UNL	7		57	53	49	75	32		
07	5	UNL	8			74	73	72	94	18	11	1	UNL	7			67	63	60	78	24	16	1	UNL	10		54	52	51	90	32		
10	5	UNL	10			83	76	73	72	19	14	2	UNL	10			73	62	54	52	26	26	0	UNL	10		66	55	46	49	31		
13	7	300	10			86	75	70	59	19	15	4	UNL	10			75	63	55	50	26	30	0	UNL	10		70	57	45	41	29		
16	7	30	10			87	75	70	57	21	13	2	UNL	10			74	60	50	43	26	18	0	UNL	10		74	58	45	36	26	15	
19	4	UNL	10			82	75	71	69	21	16	1	UNL	10			67	58	50	55	28	17	1	UNL	10		67	55	44	44	28	5	
22	9	26	10			80	75	72	77	21	17	2	UNL	10			63	56	51	65	28	12	0	UNL	10		60	54	49	67	28	4	
MAR 29th																																	
MAR 30th																																	
MAR 31st																																	
01	0	UNL	10			58	52	46	65	32	8																						
04	0	UNL	10			55	50	46	72	32	7																						
07	3	UNL	10			55	51	48	77	34	9																						
10	5	UNL	10			67	61	56	68	34	7																						
13	0	UNL	10			71	62	56	59	02	8																						
16	4	UNL	12			72	62	55	55	04	11																						
19	0	UNL	12			68	61	55	63	02	8																						
22	0	UNL	10			62	59	57	84	34	5																						

APR 1984 12844
WEST PALM BEACH, FLORIDA

WEATHER CODES

BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

OBSERVATIONS AT 3-HOUR INTERVALS

APR 1984 12844
WEST PALM BEACH, FLORIDA

PORT OF NEW YORK & NASSAU														WEST PALM BEACH, FLORIDA																																																						
HOUR L.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY IN WHOLE MILES	16THS MILE	WEATHER	TEMPERATURE				WIND DIRECTION	SPEED (KNOTS)	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY IN WHOLE MILES	16THS MILE	WEATHER	TEMPERATURE				WIND DIRECTION	SPEED (KNOTS)																																														
						AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %								AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %																																																
APR 19th																							APR 20th																							APR 21st																						
01	0	UNL	10			60	56	53	78	24	5	10	250	10			67	63	60	78	00	0	0	UNL	10				70	66	64	81	13	6																																		
04	0	UNL	10			55	54	53	93	00	0	4	UNL	10			63	61	59	87	00	0	1	UNL	10				71	69	68	90	00	0																																		
07	0	UNL	10			58	56	55	90	00	0	5	UNL	10			62	61	60	93	36	3	4	UNL	8				67	66	66	97	00	0																																		
10	0	UNL	12			75	61	51	43	15	5	0	UNL	12			77	65	58	52	13	11	7	300	8				80	74	71	74	14	10																																		
13	1	UNL	12			77	66	59	54	13	7	0	UNL	12			79	68	62	56	12	10	7	300	10				81	74	71	72	12	11																																		
16	5	UNL	12			77	65	57	50	14	9	0	UNL	12			77	67	60	56	10	8	5	UNL	12				81	75	72	74	15	10																																		
19	9	UNL	10			71	62	55	57	16	8	0	UNL	12			72	65	60	66	14	5	3	UNL	12				77	73	71	82	13	8																																		
22	9	UNL	10			70	63	59	68	00	0	1	UNL	12			70	65	61	73	13	4	0	UNL	10				75	73	72	90	12	8																																		
APR 22nd																							APR 23rd																							APR 24th																						
01	0	UNL	10			75	73	72	90	14	10	0	UNL	10			75	73	72	90	16	8	10	80	10				75	74	73	94	19	9																																		
04	1	UNL	10			74	72	71	90	16	5	0	UNL	10			74	73	72	94	18	5	7	22	10				74	72	71	90	26	10																																		
07	8	UNL	10			74	73	72	94	14	6	9	300	10			74	73	72	94	18	6	3	UNL	10				71	67	64	79	32	9																																		
10	8	26	12			81	74	71	72	16	10	9	300	12			82	75	71	69	17	12	1	UNL	10				75	63	55	50	33	11																																		
13	9	UNL	12			82	75	71	69	15	13	9	300	12			88	75	69	53	21	9	5	UNL	10				80	66	58	47	01	7																																		
16	9	UNL	12			82	75	71	69	14	12	9	250	10			80	75	73	79	16	10	7	50	10				75	66	60	60	10	8																																		
19	10	300	10			77	72	70	79	17	6	10	180	10			76	72	70	82	18	6	0	UNL	10				73	66	61	66	09	6																																		
22	0	UNL	10			76	73	72	88	15	9	10	90	10			76	74	73	91	22	8	0	UNL	10				69	65	63	81	00	0																																		
APR 25th																							APR 26th																							APR 27th																						
01	0	UNL	10			64	62	61	90	00	0	0	UNL	10			73	67	63	71	13	7	0	UNL	10				72	65	61	69	11	9																																		
04	3	UNL	10			61	56	52	72	35	8	4	UNL	10			73	69	66	79	14	5	1	UNL	10				72	66	62	71	12	8																																		
07	3	UNL	10			60	57	54	81	36	7	3	UNL	10			74	69	66	76	14	7	1	UNL	10				72	66	62	71	13	10																																		
10	1	UNL	10			77	69	64	64	05	9	3	UNL	10			80	70	64	58	13	12	1	UNL	12				79	70	65	64	15	9																																		
13	6	35	10			80	70	65	60	10	10	1	UNL	12			81	72	67	63	13	10	0	UNL	12				80	70	64	58	14	12																																		
16	4	UNL	10			79	70	65	62	12	8	0	UNL	12			79	70	65	62	09	14	0	UNL	12				80	70	65	60	15	10																																		
19	0	UNL	10			75	67	63	66	11	9	0	UNL	10			75	67	62	64	11	11	0	UNL	10				75	68	64	69	13	7																																		
22	0	UNL	10			73	67	63	71	13	6	0	UNL	10			74	67	62	66	12	10	0	UNL	10				74	66	61	64	13	6																																		
APR 28th																							APR 29th																							APR 30th																						
01	1	UNL	10			74	68	64	71	14	7	0	UNL	10			69	68	67	93	00	0	2	UNL	7				71	68	66	84	12	3																																		
04	0	UNL	10			71	67	64	79	00	0	0	UNL	10			66	65	65	97	00	0	1	UNL	7				68	67	66	93	00	0																																		
07	0	UNL	10			69	67	65	87	00	0	3	UNL	7			66	65	65	97	33	8	7	UNL	7				70	69	69	97	00	0																																		
10	0	UNL	10			80	71	66	63	17	7	0	UNL	8			80	72	68	67	18	3	4	UNL	10				82	73	69	65	12	12																																		
13	0	UNL	12			82	72	67	61	15	8	5	UNL	8			82	73	68	63	10	12	6	UNL	10				85	72	66	53	11	9																																		
16	0	UNL	12			91	71	66	60	11	12	3	UNL	10			82	72	66	59	09	6	10	UNL	10				82	73	68	63	15	10																																		
19	0	UNL	12			76	70	67	74	12	8	4	UNL	7			78	70	66	67	08	6	6	UNL	10				78	70	66	67	14	8																																		
22	0	UNL	10			73	70	68	84	14	3	3	UNL	7			75	70	68	79	08	5	5	UNL	10				75	70	67	76	14	3																																		

OBSERVATIONS AT 3-HOUR INTERVALS

MAY 1984 12844
WEST PALM BEACH, FLORIDA

HOUR U.S.T.	WEST PALM BEACH, FLORIDA					MAY 1st					MAY 2nd					MAY 3rd					MAY 4th					MAY 5th					MAY 6th					MAY 7th					MAY 8th					MAY 9th					MAY 10th					MAY 11th					MAY 12th					MAY 13th					MAY 14th					MAY 15th					MAY 16th					MAY 17th					MAY 18th																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)	SKY COVER (ITEMS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	VISI-BILITY 1/16TH MILE	WEATHER	TEMPERATURE					WIND DIRECTION	SPEED (KNOTS)

OBSERVATIONS AT 3-HOUR INTERVALS

MAY 1984 12844
WEST PALM BEACH, FLORIDA

OBSERVATIONS AT 3 HOUR INTERVALS																												WEST PALM BEACH, FLORIDA																			
HOUR L.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI-BILITY	WHOLE MILES	16THS MILE	WEATHER	TEMPERATURE					REL HUMIDITY %	WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI-BILITY	WHOLE MILES	16THS MILE	WEATHER	TEMPERATURE					REL HUMIDITY %	WIND																				
							AIR of	WET BULB of	DEW POINT of	DIRECTION	SPEED (KNOTS)		AIR of	WET BULB of							DEW POINT of	AIR of	WET BULB of	DEW POINT of	DIRECTION		SPEED (KNOTS)																				
MAY 19th																												MAY 20th										MAY 21st									
01	1	UNL	10				72	62	54	53	08	10		7	45	10				74	67	62	66	13	3		2	UNL	10				76	71	68	76	13	9									
04	1	UNL	10				71	61	54	55	08	10		1	UNL	10				67	63	61	81	00	0		1	UNL	10				75	71	69	82	14	7									
07	2	UNL	10				73	62	55	53	11	10		1	UNL	10				72	67	64	76	00	0		1	UNL	10				78	73	70	77	10	8									
10	7	45	12				77	65	57	50	07	15		8	300	12				81	70	64	56	11	11		5	UNL	12				82	74	70	67	12	13									
13	3	UNL	12				79	67	59	51	10	11		8	300	12				82	72	67	61	13	13		4	UNL	12				85	75	70	61	13	12									
16	7	100	12				77	67	60	56	12	10		6	55	12				82	72	67	61	13	13		5	UNL	12				83	74	70	65	12	13									
19	4	UNL	10				76	67	61	60	09	9		7	300	10				78	71	67	69	13	14		8	UNL	12				80	75	72	77	10	12									
22	4	UNL	10				73	65	60	64	13	5		6	300	10				77	71	67	71	13	9		6	UNL	10				78	73	71	79	12	10									
MAY 22nd																												MAY 23rd										MAY 24th									
01	5	UNL	10				78	74	72	82	13	9		10	16	7				76	74	73	91	21	4		10	10	10				73	72	72	97	08	8									
04	2	UNL	10				78	74	72	82	13	7		5	UNL	7				77	75	74	91	15	7		9	15	10				72	71	71	97	00	0									
07	4	UNL	10				77	74	73	88	13	5		9	100	8				78	75	73	85	16	9		8	UNL	8				73	73	73	100	00	0									
10	8	22	10				82	76	73	74	10	16		9	32	10				82	76	74	77	14	13		9	250	10				82	76	73	74	20	7									
13	9	22	10				85	77	73	67	13	14		9	250	10				80	75	72	77	15	16		9	250	10				81	76	73	77	14	6									
16	9	22	10				83	76	73	72	12	14		10	16	5				72	71	70	94	16	7		9	80	10				81	76	73	77	14	7									
19	10	220	10				80	75	73	79	13	10		10	110	10				77	76	75	94	00	0		10	20	2				76	74	73	79	11	12									
22	10	15	10				80	75	73	79	13	14		10	25	7				74	73	72	94	00	0		10	80	7				72	71	70	94	26	6									
MAY 25th																												MAY 26th										MAY 27th									
01	9	250	10				72	71	71	97	36	4		2	UNL	10				73	70	69	87	12	4		10	20	7				75	74	74	97	16	6									
04	6	300	10				71	70	70	97	35	4		4	UNL	10				74	71	70	87	10	4		10	20	7				76	73	72	88	13	9									
07	9	90	10				74	73	72	94	00	0		9	100	10				74	71	69	85	15	9		9	23	10				78	74	72	82	13	10									
10	10	30	10				81	76	73	77	14	7		8	80	10				82	75	72	72	09	11		10	250	10				81	75	72	74	09	16									
13	10	25	7			TRW	72	70	69	90	24	6		8	300	10				80	74	71	74	10	11		10	18	8				76	75	74	94	18	5									
16	10	25	8			RM	74	73	73	97	06	6		10	80	12				80	75	72	77	14	8		10	18	7				80	75	73	79	11	12									
19	10	140	10			R	72	70	69	90	11	4		9	80	10				79	75	73	82	14	9		9	300	10				79	76	74	85	12	11									
22	9	140	7				73	70	69	87	12	3		6	80	7				77	74	72	85	09	6		8	300	10				79	75	73	82	13	13									
MAY 28th																												MAY 29th										MAY 30th									
01	10	100	10				77	74	72	85	12	11		10	41	7				74	72	71	90	14	7		9	11	10				74	73	73	97	18	3									
04	10	100	7			RM	75	74	73	94	12	10		10	14	2				71	71	71	80	18	9		7	4	7				74	73	72	94	20	5									
07	10	80	6			R	74	73	72	94	10	8		10	5	3				71	70	70	97	07	6		10	5	5				74	73	73	97	22	5									
10	10	8	2			TRWF	73	72	72	97	16	10		10	8	1				72	71	71	97	12	13		5	UNL	10				81	76	73	77	22	8									
13	10	90	5			R	75	74	74	97	15	4		10	30	8				76	75	74	94	15	9		10	70	10				82	76	73	74	22	9									
16	10	80	7			R	77	75	74	91	13	8		10	45	10				77	73	71	82	14	8		10	18	7				78	77	76	94	23	5									
19	10	45	7				75	72	71	87	12	7		10	30	5				74	73	72	94	14	6		10	16	10				75	73	72	90	03	8									
22	10	20	7			RM	76	73	72	89	13	7		10	12	10				74	73	73	97	13	6		10	22	7				73	72	71	94	01	8									
MAY 31st																																															
01	10	90	7			RM	71	69	68	90	01	8																																			
04	10	32	10				70	67	65	84	36	10																																			
07	10	100	7				70	67	65	84	36	10																																			
10	10	100	10				75	70	67	76	36	12																																			
13	10	250	10				76	68	64	67	36	14																																			
16	10	250	10				74	67	62	66	36	18																																			
19	7	250	10				69	62	57	66	36	15																																			
22	0	UNL	10				64	59	56	75	36	10																																			

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WEST PALM BEACH, FLORIDA

WEATHER CODES

BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

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WEST PALM BEACH, FLORIDA

SUMMARY BY HOURS

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WEST PALM BEACH, FLORIDA

WEATHER CODES

BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

OBSERVATIONS AT 3-HOUR INTERVALS

JUL 1984 12844
WEST PALM BEACH, FLORIDA

WEST PALM BEACH, FLORIDA											WEST PALM BEACH, FLORIDA																																																						
HOUR U.S.T.	VISIBILITY				TEMPERATURE				WIND			HOUR U.S.T.	VISIBILITY				TEMPERATURE				WIND																																												
	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	WHOLE MILES	16THS MILE	AIR °F	WET BULB °F	DEW POINT °F	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)	SKY COVER (TENTHS)		CEILING IN HUNDREDS OF FEET	WHOLE MILES	16THS MILE	AIR °F	WET BULB °F	DEW POINT °F	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)																																												
JUL 19th																						JUL 20th																						JUL 21st																					
01	8	21	7		77	76	76	97	30	5	7	300	10		80	77	75	85	12	9	9	300	10		74	74	74	100	02	4																																			
04	8	UNL	7		76	76	76	100	00	0	8	UNL	8		78	76	75	91	00	0	9	UNL	10		74	74	74	100	00	0																																			
07	8	UNL	7		80	77	76	88	18	3	8	300	10		77	75	74	91	12	8	8	100	10		76	75	75	97	00	0																																			
10	6	UNL	7		86	79	75	70	14	12	10	300	10		83	77	75	77	14	10	9	100	10		76	75	74	94	08	3																																			
13	5	UNL	7		89	79	75	63	13	11	10	300	10		84	78	75	75	13	12	10	45	7		75	74	74	97	00	0																																			
16	9	300	10		86	78	75	70	12	11	9	300	10		85	77	73	67	17	9	10	100	10		77	76	76	97	00	0																																			
19	9	300	10		82	77	75	79	13	8	10	300	10		81	76	74	79	25	4	10	250	10		74	73	73	97	31	3																																			
22	7	300	10		81	76	74	79	13	7	10	18	7		72	71	71	97	05	3	10	120	10		74	73	73	97	24	7																																			
JUL 22nd																						JUL 23rd																						JUL 24th																					
01	7	250	10		74	72	71	90	36	3	6	250	10		74	73	72	94	00	0	3	UNL	10		80	77	75	85	12	6																																			
04	8	80	10		70	69	69	97	00	0	2	UNL	10		72	71	71	97	00	0	5	UNL	8		78	77	76	94	11	8																																			
07	9	80	10		73	73	73	100	00	0	9	100	7		75	73	72	90	18	7	4	UNL	10		81	77	75	82	11	10																																			
10	8	55	10		82	78	76	82	12	8	9	100	10		81	78	76	85	20	3	5	UNL	12		83	77	74	74	11	12																																			
13	9	100	8		80	78	77	91	17	8	8	100	10		84	78	75	75	13	15	4	UNL	12		88	77	72	59	11	12																																			
16	10	100	10		79	77	76	91	21	6	9	UNL	12		84	78	76	77	13	13	7	300	12		85	78	75	72	10	11																																			
19	10	250	10		77	75	74	91	21	3	9	UNL	12		82	75	72	72	13	10	9	300	10		81	78	76	85	12	7																																			
22	9	100	10		77	74	73	88	14	7	3	UNL	10		80	77	76	88	12	7	8	300	10		80	77	75	85	07	10																																			
JUL 25th																						JUL 26th																						JUL 27th																					
01	9	300	10		79	76	74	85	06	5	10	22	10		75	72	71	87	11	6	10	100	7		81	77	75	82	12	7																																			
04	10	300	10		78	76	75	91	08	10	10	250	10		74	73	73	97	00	0	10	100	7		80	77	75	85	12	8																																			
07	6	UNL	10		79	76	75	88	09	10	10	120	10		78	75	74	88	00	0	10	100	8		80	77	75	85	12	5																																			
10	6	UNL	10		85	78	75	72	09	12	8	120	10		85	78	75	72	08	11	10	100	8		85	78	75	72	14	10																																			
13	5	UNL	10		87	79	75	68	11	12	10	120	10		82	78	76	82	10	10	10	28	8		84	78	75	75	15	8																																			
16	7	300	10		83	77	75	77	13	8	10	20	8		81	79	78	91	09	8	10	100	7		86	79	76	72	12	8																																			
19	8	300	10		81	76	73	77	10	8	10	250	8		82	77	75	79	11	10	10	100	7		82	77	75	79	13	6																																			
22	2	UNL	10		80	76	74	82	10	9	6	UNL	7		81	77	75	82	12	11	5	UNL	7		81	77	75	82	12	6																																			
JUL 28th																						JUL 29th																						JUL 30th																					
01	2	UNL	9		80	77	75	85	13	7	2	UNL	8		80	76	74	82	11	6	5	UNL	10		80	76	74	82	09	10																																			
04	5	UNL	8		80	77	76	88	13	6	4	UNL	8		80	75	73	79	14	7	6	22	7		78	75	73	85	09	13																																			
07	7	300	7		81	78	76	85	14	7	8	UNL	8		81	77	75	82	10	8	8	250	10		79	76	74	85	13	9																																			
10	8	100	8		85	79	76	75	10	8	9	UNL	8		84	77	74	72	09	11	9	100	8		80	76	74	82	12	13																																			
13	10	100	8		86	78	75	70	12	10	8	300	10		87	79	75	68	11	11	9	250	10		83	77	75	77	12	9																																			
16	8	100	8		87	79	76	70	11	11	9	300	10		85	77	74	70	10	13	10	250	10		82	77	75	79	11	7																																			
19	10	UNL	8		83	77	75	77	13	8	9	300	10		82	76	73	74	09	11	9	250	10		82	77	75	79	13	8																																			
22	5	UNL	8		81	76	74	79	12	8	0	UNL	10		81	75	72	74	10	13	5	UNL	10		80	77	75	85	12	4																																			
JUL 31st																						JUL 31st																						JUL 31st																					
01	5	UNL	10		80	77	76	88	14	8	5	UNL	10		80	76	74	82	11	6	5	UNL	10		80	76	74	82	09	10																																			
04	8	18	10		80	77	75	85	18	5	6	22	7		78	75	73	79	14	7	6	22	7		78	75	73	85	09	13																																			
07	8	18	5		78	76	75	91	09	5	8	250	10		79	76	74	85	13	9	8	250	10		79	76	74	85	13	9																																			
10	7	UNL	10		83	78	76	80	14	8	9	100	8		80	76	74	82	12	13	9	100	8		80	76	74	82	12	13																																			
13	9	UNL	10		88	81	79	75	12	10	9	250	10		87	79	75	68	11	11	9	250	10		83	77	75	77	12	9																																			
16	9	300	8		86	79	76	72	13	12	10	250	10		85	77	74	70	10	13	10	250	10		82	77	75	79	11	7																																			
19	10	UNL	8		82	78	77	85	12	11	9	250	10		82	77	75	79	13	8	9	250	10		82	77	75	79	13	8																																			
22	3	UNL	8		91	78	76	85	12	8	5	UNL	10		80	77	75	85	12	4	5	UNL	10		80	77	75	85	12	4																																			

SUMMARY BY HOURS

HOUR U.S.T.	AVERAGES								RESULTANT WIND	
	SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	TEMPERATURE			REL HUMIDITY %	WIND SPEED (MPH)	DIRECTION	SPEED (MPH)	
			AIR TEMP OF	WET BULB OF	DEW POINT OF					
01	5	30.040	77	75	74	89	4.7	11	2.9	
04	5	30.020	76	74	74	93	3.5	12	2.7	
07	7	30.040	78	76	75	90	5.0	12	3.0	
10	8	30.065	83	77	75	75	8.9	12	7.1	
13	8	30.060	86	78	75	71	11.5	12	10.1	
16	8	30.030	84	78	75	75	10.7	12	9.4	
19	8	30.030	82	76	74	79	9.0	12	7.6	
22	6	30.060	79	75	73	84	5.6	12	4.6	

OBSERVATIONS AT 3-HOUR INTERVALS

AUG 1984 12844
WEST PALM BEACH, FLORIDA

OBSERVATIONS AT 5 HOUR INTERVALS														WEST PALM BEACH, FLORIDA													
HOUR	1	5	VISIBILITY			TEMPERATURE			WIND			HOUR	1	5	VISIBILITY			TEMPERATURE			WIND						
			CEILING IN HUNDREDS OF FEET	WHOLE MILES	TENTHS MILE	AIR OF	WET BULB OF	DEW POINT OF	DIRECTION	SPEED (KNOTS)	REL HUMIDITY %				CEILING IN HUNDREDS OF FEET	WHOLE MILES	TENTHS MILE	AIR OF	WET BULB OF	DEW POINT OF	DIRECTION	SPEED (KNOTS)	REL HUMIDITY %				
AUG 1st																											
01	9	300	8	81	78	77	88	13	8	9	300	10	81	77	75	82	15	8	3	UNL	8						
04	10	300	10	80	77	76	88	18	7	6	UNL	10	81	76	74	79	13	7	10	14	7						
07	8	300	8	81	78	77	88	17	7	7	UNL	10	81	76	74	79	11	11	9	90	10						
10	7	UNL	8	84	79	77	80	16	15	3	UNL	10	85	78	75	72	12	11	9	100	10						
13	10	300	10	83	77	75	77	15	10	2	UNL	9	87	79	75	68	11	13	10	100	10						
16	8	UNL	10	86	80	77	75	15	10	1	UNL	10	86	77	73	65	11	12	10	100	10						
19	8	UNL	10	82	78	76	82	15	9	9	UNL	10	83	77	74	74	07	10	9	100	10						
22	3	UNL	10	81	78	77	88	13	5	6	30	10	82	78	76	82	07	13	6	250	10						
AUG 2nd																											
01	9	300	10	81	77	75	82	15	8	3	UNL	8	81	76	74	79	13	7	10	14	7						
04	10	300	10	81	76	74	79	11	11	9	90	10	81	76	74	79	11	11	9	90	10						
07	8	300	10	85	78	75	72	12	11	9	100	10	85	78	75	72	12	11	9	100	10						
10	7	UNL	9	87	79	75	68	11	13	10	100	10	87	79	75	68	11	13	10	100	10						
13	10	300	10	86	77	73	65	11	12	10	100	10	86	77	73	65	11	12	10	100	10						
16	8	UNL	10	83	77	74	74	07	10	9	100	10	83	77	74	74	07	10	9	100	10						
19	8	UNL	10	82	78	76	82	07	13	6	250	10	82	78	76	82	07	13	6	250	10						
AUG 3rd																											
01	9	300	10	81	77	75	82	15	8	3	UNL	8	81	76	74	79	13	7	10	14	7						
04	10	300	10	81	76	74	79	13	7	10	14	7	81	76	74	79	13	7	10	14	7						
07	8	300	10	81	76	74	79	11	11	9	90	10	81	76	74	79	11	11	9	90	10						
10	7	UNL	8	84	79	77	80	16	15	3	UNL	10	85	78	75	72	12	11	9	100	10						
13	10	300	10	83	77	75	77	15	10	2	UNL	9	87	79	75	68	11	13	10	100	10						
16	8	UNL	10	86	80	77	75	15	10	1	UNL	10	86	77	73	65	11	12	10	100	10						
19	8	UNL	10	82	78	76	82	15	9	9	UNL	10	83	77	74	74	07	10	9	100	10						
22	3	UNL	10	81	78	77	88	13	5	6	30	10	82	78	76	82	07	13	6	250	10						
AUG 4th																											
01	3	UNL	9	79	76	74	85	13	6	3	UNL	8	77	76	75	94	00	0	0	UNL	10						
04	9	120	9	80	77	75	85	10	8	9	75	8	76	75	74	94	30	4	0	UNL	10						
07	9	100	7	81	77	75	82	10	11	5	UNL	10	77	76	76	97	00	0	2	UNL	10						
10	10	250	7	84	77	74	72	15	13	6	65	8	86	79	76	72	12	8	5	UNL	10						
13	9	30	10	85	77	73	67	17	10	9	28	8	81	77	75	62	33	10	7	300	10						
16	8	250	12	86	78	75	70	14	8	8	250	10	86	78	74	68	13	8	0	UNL	10						
19	4	UNL	12	82	77	75	79	14	8	4	UNL	10	83	77	75	77	14	8	2	UNL	10						
22	8	50	10	80	77	76	88	18	3	0	UNL	10	81	77	75	82	00	0	0	UNL	10						
AUG 5th																											
01	3	UNL	9	79	76	74	85	13	6	3	UNL	8	77	76	75	94	00	0	0	UNL	10						
04	9	120	9	80	77	75	85	10	8	9	75	8	76	75	74	94	30	4	0	UNL	10						
07	9	100	7	81	77	75	82	10	11	5	UNL	10	77	76	76	97	00	0	2	UNL	10						
10	10	250	7	84	77	74	72	15	13	6	65	8	86	79	76	72	12	8	5	UNL	10						
13	9	30	10	85	77	73	67	17	10	9	28	8	81	77	75	62	33	10	7	300	10						
16	8	250	12	86	78	75	70	14	8	8	250	10	86	78	74	68	13	8	0	UNL	10						
19	4	UNL	12	82	77	75	79	14	8	4	UNL	10	83	77	75	77	14	8	2	UNL	10						
22	8	50	10	80	77	76	88	18	3	0	UNL	10	81	77	75	82	00	0	0	UNL	10						
AUG 6th																											
01	3	UNL	9	79	76	74	85	13	6	3	UNL	8	77	76	75	94	00	0	0	UNL	10						
04	9	120	9	80	77	75	85	10	8	9	75	8	76	75	74	94	30	4	0	UNL	10						
07	9	100	7	81	77	75	82	10	11	5	UNL	10	77	76	76	97	00	0	2	UNL	10						
10	10	250	7	84	77	74	72	15	13	6	65	8	86	79	76	72	12	8	5	UNL	10						
13	9	30	10	85	77	73	67	17	10	9	28	8	81	77	75	62	33	10	7	300	10						
16	8	250	12	86	78	75	70	14	8	8	250	10	86	78	74	68	13	8	0	UNL	10						
19	4	UNL	12	82	77	75	79	14	8	4	UNL	10	83	77	75	77	14	8	2	UNL	10						
22	8	50	10	80	77	76	88	18	3	0	UNL	10	81	77	75	82	00	0	0	UNL	10						
AUG 7th																											
01	7	UNL	8	76	75	74	94	23	4	2	UNL	10	78	76	75	91	00	0	6	UNL	10						
04	2	UNL	8	75	74	74	97	00	0	2	UNL	10	74	73	73	97	00	0	6	UNL	10						
07	1	UNL	10	76	75	75	97	20	4	4	UNL	10	77	76	75	94	16	4	2	UNL	10						
10	2	UNL	10	86	79	76	72	25	7	1	UNL	10	87	79	75	68	20	5	2	UNL	10						
13	3	UNL	10	89	80	76	66	14	9	5	UNL	10	89	80	76	66	10	10	1	UNL	10						
16	4	UNL	10	85	75	70	61	14	10	1	UNL	10	87	77	73	63	12	10	2	UNL	10						
19	3	UNL	10	82	75	71	69	15	5	4	UNL	10	83	77	74	74	15	8	3	UNL	10						
22	0	UNL	10	79	75	73	82	18	4	6	300	10	81	77	75	82	19	3	6	UNL	10						
AUG 8th																											
01	7	UNL	8	76	75	74	94	23	4	2	UNL	10	78	76	75	91	00	0	6	UNL	10						
04	2	UNL	8	75	74	74	97	00	0	2	UNL	10	74	73	73	97	00	0	6	UNL	10						
07	1	UNL	10	76	75	75	97	20	4	4	UNL	10	77	76	75	94	16	4	2	UNL	10						
10	2	UNL	10	86	79	76	72	25	7	1	UNL	10	87	79	75	68	20	5	2	UNL	10						
13	3	UNL	10	89	80	76	66	14	9	5	UNL	10	89	80	76	66	10	10	1	UNL	10						
16	4	UNL	10	85	75	70	61	14	10	1	UNL	10	87	77	73	63	12	10	2	UNL	10						
19	3	UNL	10	82	75	71	69	15	5	4	UNL	10	83	77	74	74	15	8	3	UNL	10						
22	0	UNL	10	79	75	73	82	18	4	6	300	10	81	77	75	82	19	3	6	UNL	10						
AUG 9th																											
01	7	UNL	8	76	75	74	94	23	4	2	UNL	10	78	76	75	91	00	0	6	UNL	10						
04	2	UNL	8	75	74	74	97	00	0	2	UNL	10	74	73	73	97	00	0	6	UNL	10						
07	1	UNL	10	76	75	75	97	20	4	4	UNL	10	77	76	75	94	16	4	2	UNL	10						
10	2	UNL	10	86	79	76	72	25	7	1	UNL	10	87	79	75	68	20	5	2	UNL	10						
13	3	UNL	10	89	80	76	66	14	9	5	UNL	10	89	80	76	66	10	10	1	UNL	10						
16	4	UNL	10	85	75	70	61	14	10	1	UNL	10	87	77	73	63	12	10	2	UNL	10						
19	3	UNL	10	82	75	71	69	15	5	4	UNL	10	83	77	74	74	15	8	3	UNL	10						
22	0	UNL	10	79	75	73	82	18	4	6	300	10	81	77	75	82	19	3	6	UNL	10						
AUG 10th																											
01	3	UNL	10	78	76	75	91	21	3	2	UNL	10	77	74	73	88	00	0	9	100	10						
04	4	UNL	10	77	76	75	94	00	0	2	UNL	10	76	73	72	88	20	6	2	UNL	10						
07	0	UNL	10	78	76	75	91	19	3	0	UNL	7	76	75	74	94	22	4	4	UNL	10						
10	1	UNL	10	86	77	73	65	25	8	4	UNL	10	86	79	76	72	28	9	4	UNL	12						
13	3	UNL	10	90	80	76	64	13	8	5	UNL	10	92	80	75	58	25	10	7	300	12						
16	2	UNL	12																								

AUG 1984 12844
WEST PALM BEACH, FLORIDA

SUMMARY BY HOURS

HOUR	L.S.T	AVERAGES							RESULTANT WIND	
		SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	TEMPERATURE			REL HUMIDITY %	WIND SPEED (MPH)	DIRECTION	SPEED (MPH)
				AIR TEMP OF	WET BULB OF	DEW POINT OF				
01	3	30.025	78	74	73	86	4	11	1.2	
04	3	30.010	76	74	73	91	2.4	15	0.5	
07	5	30.030	76	74	74	92	3.6	14	1.2	
10	6	30.050	85	77	74	71	8.5	14	2.5	
13	6	30.040	86	78	74	67	10.6	11	6.3	
16	6	30.000	84	76	73	69	11.0	11	8.2	
19	7	30.005	82	76	73	76	8.2	11	5.0	
22	4	30.040	79	75	73	81	4.3	09	2.2	

SEP 1984 12844
WEST PALM BEACH, FLORIDA

WEATHER CODES

BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

SEP 1984 12844
WEST PALM BEACH, FLORIDA

SUMMARY BY HOURS

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OBSERVATIONS AT 3-HOUR INTERVALS

OCT 1984 12844
WEST PALM BEACH, FLORIDA

WEST PALM BEACH, FLORIDA																																																																	
HOUR U.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI- BILITY WHOLE MILES	VISI- BILITY TENTHS MILE	WEATHER	TEMPERATURE				WIND		SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISI- BILITY WHOLE MILES	VISI- BILITY TENTHS MILE	WEATHER	TEMPERATURE				WIND																																												
						AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)						AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %	DIRECTION	SPEED (KNOTS)																																											
OCT 1st																						OCT 2nd																						OCT 3rd																					
01	9	70	10			73	72	71	94	22	5	10	55	5		H	74	70	68	82	34	7	1	UNL	10			74	65	60	62	03	8																																
04	9	45	10			73	72	71	94	00	0	4	UNL	10			72	68	65	79	35	8	1	UNL	10			68	63	60	76	35	5																																
07	7	300	10			73	72	72	97	19	3	9	38	10			75	69	66	74	01	8	4	UNL	10			68	63	59	73	34	4																																
10	9	28	10			77	75	74	91	25	6	7	300	10			79	71	67	67	03	13	1	UNL	10			77	64	55	47	05	11																																
13	9	22	8			80	75	73	79	35	7	7	90	10			80	70	65	60	04	14	2	UNL	10			80	67	58	47	05	12																																
16	10	30	10			78	74	72	82	03	11	9	38	10			79	69	63	58	01	12	3	UNL	10			79	66	58	49	01	10																																
19	10	40	4		H	77	73	71	82	35	7	3	UNL	10			75	67	63	66	03	7	5	UNL	10			75	65	58	56	05	10																																
22	8	80	5		H	74	71	70	87	35	6	3	UNL	10			74	66	61	64	02	9	4	UNL	10			74	64	58	58	07	9																																
OCT 4th																						OCT 5th																						OCT 6th																					
01	6	50	10			74	64	58	58	09	8	0	UNL	10			76	68	64	67	08	12	3	UNL	10			76	68	63	64	09	9																																
04	7	45	10			75	66	60	60	07	11	3	UNL	10			76	66	60	58	10	10	4	UNL	10			75	66	60	60	09	10																																
07	9	50	10			74	64	58	58	09	13	5	UNL	10			76	67	61	60	08	10	6	35	10			77	67	60	56	07	13																																
10	6	50	15			81	69	62	53	08	10	4	UNL	12			82	70	63	53	09	9	3	UNL	12			82	69	61	49	08	13																																
13	5	UNL	15			83	68	59	44	06	13	7	300	12			82	69	61	49	05	13	4	UNL	12			84	71	64	51	07	14																																
16	5	UNL	12			80	68	61	52	07	11	4	UNL	12			82	69	61	49	08	12	2	UNL	12			82	70	64	55	10	12																																
19	4	UNL	10			77	68	63	62	06	12	7	UNL	12			78	69	63	60	07	11	3	UNL	12			78	69	64	62	08	11																																
22	4	UNL	10			76	68	64	67	08	13	4	UNL	10			78	69	64	62	08	10	6	45	10			78	71	67	69	07	17																																
OCT 7th																						OCT 8th																						OCT 9th																					
01	3	UNL	7			78	70	66	67	08	15	2	UNL	10			77	70	66	69	07	16	8	55	10			75	70	68	79	05	16																																
04	1	UNL	7			76	68	64	67	07	12	1	UNL	10			76	70	67	74	08	11	9	50	10			75	70	67	76	03	8																																
07	2	UNL	8			77	71	67	71	04	8	6	75	10			76	71	68	76	04	5	8	40	7			72	71	71	97	35	7																																
10	3	UNL	10			83	72	67	59	08	11	3	UNL	10			83	71	65	55	04	14	4	UNL	10			81	74	71	72	05	16																																
13	3	UNL	12			85	73	67	55	08	12	3	UNL	10			81	70	64	56	03	18	4	UNL	10			83	74	70	65	04	17																																
16	0	UNL	12			82	72	67	61	08	17	5	UNL	10			81	70	64	56	04	13	4	UNL	10			79	72	69	72	04	17																																
19	2	UNL	10			79	71	66	65	07	14	3	UNL	10			76	68	64	67	05	12	5	UNL	10			77	71	68	74	04	16																																
22	5	UNL	10			79	71	66	65	06	8	0	UNL	10			75	67	62	64	05	12	3	UNL	10			76	70	66	71	05	15																																
OCT 10th																						OCT 11th																						OCT 12th																					
01	2	UNL	10			76	70	66	71	05	13	6	30	10			72	70	69	90	30	7	0	UNL	10			72	71	70	94	33	5																																
04	4	UNL	10			75	69	66	74	03	11	6	40	7			70	69	69	97	32	5	9	3	7			70	70	70	100	33	6																																
07	1	UNL	10			67	65	64	90	31	5	8	41	7			70	69	69	97	34	9	8	55	7			71	71	71	100	31	5																																
10	2	UNL	10			81	72	68	65	01	10	7	23	10			79	74	71	77	01	11	9	55	7			77	74	73	88	01	5																																
13	3	UNL	10			83	71	64	53	03	13	4	UNL	12			83	72	66	57	02	10	4	UNL	10			83	74	70	65	02	11																																
16	4	UNL	10			81	72	68	65	03	15	1	UNL	12			82	72	66	59	03	10	5	UNL	10			79	73	70	74	05	12																																
19	4	UNL	10			78	71	68	72	02	9	1	UNL	10			75	72	70	85	34	6	2	UNL	10			76	73	72	88	36	7																																
22	2	UNL	10			76	70	66	71	02	9	2	UNL	10			74	72	71	90	32	6	1	UNL	10			73	72	71	94	34	5																																
OCT 13th																						OCT 14th																						OCT 15th																					
01	0	UNL	8			70	69	69	97	35	5	1	UNL	10			66	64	62	87	00	0	0	UNL	10			65	63	62	90	00	0																																
04	7	45	8			70	69	69	97	33	5	0	UNL	10			63	62	62	97	00	0	6	UNL	10			63	62	62	97	00	0																																
07	1	UNL	8			69	68	68	97	33	4	2	UNL	7			62	62	62	100	00	0	4	UNL	7			63	62	62	97	00	0																																
10	2	UNL	8			78	69	63	60	36	7	8	UNL	10			77	67	60	56	32	5	2	UNL	10			79	71	67	67	25	5																																
13	4	UNL	10			82	70	64	55	32	7	4	UNL	12			82	67	58	44	00	0	1	UNL	10			8																																					
16	3	UNL	10			81	71	65	58	08	8	1	UNL	12			80	67	59	49	09	7	0	UNL	10			82	70	64	55	11	7																																
19	1	UNL	10			73	67	63	71	36	5	0	UNL	12			73	66	62	69	14	3	0	UNL	10			75	67	63	66	14	3																																
22	1	UNL	10			68	65	63	84	00	0	0	UNL	10			68	64	62	81	00	0	0	UNL	10			70	67	65	84	15	3																																
OCT 16th																						OCT 17th																						OCT 18th																					
01	0	UNL	10			67	66	65	93	00	0	1	UNL	10			74	70	68	82	09	8	4	UNL	7			75	69	65	71	08	11																																
04	0	UNL	10			66	65	65	97	00	0	2	UNL	10			74	70	67	79	12	7	1	UNL	7			74	69	66	76	11	6																																
07	0	UNL	7			64	64	64	100	00	0	2	UNL	7			73	69	67	82	10	4	5	UNL	7			73	68	65	76	08	7																																
10	0	UNL	7			82	72	67	61	30	4	3	UNL	8			78	71	68	72	07	6	5	UNL	10			78	71	67	69	08	9																																
13	1	UNL	7			83	71	65	55	10	7	2	UNL	8			82	72	66	59	09	12	5	UNL	10			79	71	67	67	10	7																																
16	0	UNL	10			80	71	66	63	08	11	2	UNL	8			80	71	67	65	03	9	6	UNL	10			80	71	66	63	11	10																																
19	0	UNL	10			77	69	65	67	09	7	2	UNL	8			76	69	65	69	08	10	7	UNL	10			76	70	67	74	08	10																																
22	0	UNL	10			76	70	66	71	10	9	1	UNL	8			75	69	65	71	08	10	4	UNL	10			76	70	67	74	10	3																																

OBSERVATIONS AT 3-HOUR INTERVALS

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WEST PALM BEACH, FLORIDA

HOUR L.S.T.	OCT 19th												OCT 20th												OCT 21st												OCT 22nd												OCT 23rd												OCT 24th												OCT 25th												OCT 26th												OCT 27th												OCT 28th												OCT 29th												OCT 30th																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE			WIND	VISI- BILITY			WEATHER	TEMPERATURE		

OBSERVATIONS AT 3 HOUR INTERVALS

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WEST PALM BEACH, FLORIDA

NOV 1st										NOV 2nd										NOV 3rd									
TIME	CEILING	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	TIME	CEILING	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	TIME	CEILING	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
01	51	55	10	77	77	67	77	06	14	6	45	10	75	72	71	87	08	9	6	300	7	74	71	70	87	08	7	74	71
04	3	UNL	10	75	70	68	70	26	13	3	UNL	10	74	71	70	87	08	8	10	19	7	73	72	72	97	13	5	73	72
07	8	22	8	76	71	69	79	36	13	5	UNL	10	74	71	70	87	07	8	10	19	7	70	69	69	97	27	5	74	73
10	9	100	10	79	74	72	79	07	14	6	300	10	80	75	73	79	07	10	9	50	10	74	73	72	94	22	5	74	73
13	7	300	10	81	74	71	75	07	15	6	300	10	81	74	71	72	06	12	5	UNL	12	78	73	71	74	08	6	79	74
16	4	UNL	10	79	73	70	74	06	15	7	UNL	10	80	74	71	74	07	11	8	250	12	79	74	72	79	11	7	77	75
19	5	UNL	10	76	73	70	81	06	12	5	UNL	10	74	72	71	10	07	5	10	100	10	77	75	74	91	07	3	76	74
22	2	UNL	10	75	72	70	85	07	12	5	UNL	10	75	72	70	85	00	0	5	UNL	10	76	74	73	91	00	0	76	74
NOV 4th										NOV 5th										NOV 6th									
01	5	UNL	10	74	74	74	100	00	0	2	UNL	10	74	73	72	94	20	5	0	UNL	10	68	66	65	93	32	10	68	66
04	1	UNL	7	72	72	72	100	00	0	1	UNL	10	71	70	70	97	00	0	1	UNL	10	66	65	64	91	33	7	66	65
07	1	UNL	7	71	71	71	100	00	0	0	UNL	7	70	70	70	100	29	4	0	UNL	8	64	62	61	90	32	7	64	62
10	0	UNL	10	80	75	72	77	20	7	0	UNL	7	79	74	72	79	32	5	0	UNL	8	72	65	60	66	36	11	72	65
13	3	UNL	10	85	76	72	65	26	9	2	UNL	10	86	72	65	50	27	9	5	UNL	10	75	65	58	56	36	17	75	65
16	6	300	10	84	75	71	65	31	6	5	UNL	10	84	70	63	49	30	6	1	UNL	10	73	62	55	53	01	14	73	62
19	8	300	10	79	75	73	82	00	0	9	35	8	74	73	72	94	36	9	0	UNL	10	65	56	48	54	36	12	65	56
22	6	300	10	76	74	73	91	00	0	0	UNL	10	71	69	67	87	25	7	0	UNL	10	63	54	45	52	33	11	63	54
NOV 7th										NOV 8th										NOV 9th									
01	0	UNL	10	61	51	42	50	33	14	0	UNL	12	59	57	56	90	32	8	9	50	10	69	62	57	66	36	4	69	62
04	0	UNL	10	58	51	43	58	33	12	0	UNL	12	57	56	55	93	32	7	4	UNL	10	62	59	56	81	31	4	62	59
07	1	UNL	10	56	51	46	69	32	9	9	45	10	60	58	56	87	33	8	6	50	10	60	57	55	84	00	0	60	57
10	1	UNL	12	70	61	55	59	34	9	10	55	10	65	60	56	73	32	9	5	UNL	10	76	66	59	56	05	13	76	66
13	2	UNL	12	78	62	49	36	02	13	10	55	10	70	65	62	76	33	7	4	UNL	10	77	65	57	50	04	13	77	65
16	3	UNL	12	75	62	53	46	03	12	9	35	10	74	64	58	58	02	16	3	UNL	12	76	65	57	52	02	12	76	65
19	8	45	10	68	63	59	73	32	14	3	UNL	10	67	59	52	59	01	8	2	UNL	10	74	65	60	62	05	11	74	65
22	8	32	9	63	60	57	81	32	9	9	35	10	71	62	56	59	05	10	6	32	10	74	66	61	64	08	11	74	66
NOV 10th										NOV 11th										NOV 12th									
01	8	55	10	74	64	53	58	09	10	9	65	10	78	66	63	79	28	5	0	UNL	10	62	55	49	63	33	13	62	55
04	1	UNL	10	72	64	58	62	10	8	1	UNL	10	64	62	60	87	30	4	0	UNL	10	55	51	48	77	32	10	55	51
07	1	UNL	10	63	60	57	81	30	4	7	UNL	10	63	61	59	87	19	3	0	UNL	10	51	48	45	80	30	5	51	48
10	3	UNL	10	78	67	61	56	10	11	9	UNL	10	75	68	64	69	19	8	0	UNL	12	62	55	49	63	30	10	62	55
13	3	UNL	12	80	68	61	52	09	12	4	UNL	10	80	69	62	54	23	11	0	UNL	12	69	56	45	42	33	10	69	56
16	8	50	12	77	67	61	58	09	12	7	UNL	10	81	67	59	47	24	8	0	UNL	12	70	58	48	46	34	9	70	58
19	4	55	10	74	68	64	71	13	5	7	45	10	73	65	60	64	25	4	0	UNL	10	58	51	44	60	30	7	58	51
22	10	55	10	73	67	64	74	00	0	0	UNL	10	69	64	60	73	29	8	0	UNL	10	55	49	43	64	31	6	55	49
NOV 13th										NOV 14th										NOV 15th									
01	0	UNL	10	52	47	42	69	32	11	0	UNL	10	58	53	48	70	34	8	9	45	10	69	57	47	46	07	9	69	57
04	0	UNL	10	50	46	42	74	32	10	0	UNL	10	55	52	49	80	33	5	9	45	10	70	58	49	47	10	10	70	58
07	0	UNL	10	49	45	41	74	33	7	2	UNL	10	53	50	48	83	32	5	7	45	10	70	59	51	51	09	10	70	59
10	0	UNL	10	60	53	46	60	32	10	3	UNL	10	68	59	51	55	36	5	5	UNL	10	75	62	52	45	08	14	75	62
13	0	UNL	10	70	58	47	44	36	11	4	UNL	10	74	60	49	41	05	10	4	UNL	12	76	63	53	45	08	14	76	63
16	1	UNL	10	70	60	52	53	36	13	8	50	10	71	59	50	48	06	13	3	UNL	12	75	63	54	48	10	13	75	63
19	0	UNL	10	62	57	52	70	32	10	9	50	10	70	58	48	46	08	9	3	UNL	10	71	61	54	55	08	9	71	61
22	1	UNL	10	59	54	49	70	32	8	8	45	10	70	59	50	49	07	10	2	UNL	10	70	62	56	61	09	8	70	62
NOV 16th										NOV 17th										NOV 18th									
01	3	UNL	10	71	63	57	61	09	6	5	UNL	10	66	61	58	76	00	0	4	UNL	10	74	66	61	64	09	7	74	66
04	4	UNL	10	70	62	57	64	11	5	0	UNL	10	64	60	57	78	00	0	1	UNL	10	74	67	63	69	11	9	74	67
07	4	UNL	10	69	61	56	63	07	7	2	UNL	10	61	59	57	87	00	0	6	50	10	75	68	63	66	12	10	75	68
10	3	UNL	10	75	64	56	52	08	12	1	UNL	12	78	67	61	56	04	5	8	26	10	77	69	65	67	13	13	77	69
13	7	50	10	78	65	57	49	09	11	1	UNL	12	79	65	55	44	06	10	5	UNL	10	81	70	63	54	14	14	81	70
16	4	UNL	10	76	65	57	52	07	8	0	UNL	12	78	66	58	50	06	10	0	UNL	10	79	69	63	58	14	11	79	69
19	4	UNL	10	73	64	58	60	07	8	1	UNL	10	73	65	59	62	08	7	0	UNL	10	75	67	62	64	14	10	75	67
22	7	55	10	69	63	58	68	00	0	0	UNL	10	73	65	59	62	09	9	1	UNL	10	75	67	63	66	14	7	75	67

WEATHER CODES

* TORNAO	ZL FREEZING DRIZZLE	IPW ICE PELLET SHOWERS	BN BLOWING SAND
T THUNDERSTORM	S SNOW	A HAIL	BS BLOWING SNOW
Q SQUALL	SW SNOW SHOWERS	F FOG	BY BLOWING SPRAY
R RAIN	SG SNOW GRAINS	IF ICE FOG	K SMOKE
RW RAIN SHOWERS	SP SNOW PELLETS	GF GROUND FOG	H HAZE
ZR FREEZING RAIN	IC ICE CRYSTALS	BD BLOWING DUST	O DUST
L DRIZZLE	IP ICE PELLETS		

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SUMMARY BY HOURS

HOUR	L. S. I	AVERAGES							RESULTANT WIND	
		SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	TEMPERATURE			REL HUMIDITY %	WIND SPEED (MPH)	DIRECTION	SPEED (MPH)
				AIR TEMP OF	WET BULB OF	DEW POINT OF				
01	5	30	020	69	61	76	9	03	3.9	
04	4	30	000	67	61	80	7	03	3.9	
07	5	30	030	66	60	82	7	01	3.0	
10	6	30	060	73	62	70	11	05	3.8	
13	3	30	020	76	61	62	13	03	5.0	
16	6	30	000	76	61	63	12	04	7.3	
19	6	30	020	71	62	72	9	04	5.3	
22	5	30	050	70	61	74	8	04	3.7	

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WEST PALM BEACH, FLORIDA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
HOURS	SKY COVER	CEILING IN HUNDREDS OF FEET	VISIBILITY	WIND	TEMPERATURE					WIND	SKY COVER	CEILING IN HUNDREDS OF FEET	VISIBILITY	WIND	TEMPERATURE					WIND	SKY COVER	CEILING IN HUNDREDS OF FEET	VISIBILITY	WIND	TEMPERATURE					WIND	SKY COVER	CEILING IN HUNDREDS OF FEET	VISIBILITY	WIND																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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OBSERVATIONS AT 3-HOUR INTERVALS

DEC 1984 12344
WEST PALM BEACH, FLORIDA

WEST PALM BEACH, FLORIDA																														
HOUR L.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY	WEATHER	TEMPERATURE				WIND	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY	WEATHER	TEMPERATURE				WIND												
					AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %						AIR OF	WET BULB OF	DEW POINT OF	REL HUMIDITY %													
DEC 19th																														
01	3	UNL	10		72	65	60	66	11	8	1	UNL	10		62	60	58	87	00	0	4	UNL	10		70	65	61	73	09	5
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07	1	UNL	10		65	60	56	73	00	0	1	UNL	10		60	59	58	93	00	0	0	UNL	10		60	58	56	87	08	3
10	4	UNL	10		76	66	60	58	07	11	9	55	10		71	67	64	79	35	6	1	UNL	10		76	67	62	62	10	10
13	2	UNL	12		78	66	58	50	06	8	9	55	10		76	67	61	60	31	10	10	45	10		73	69	66	79	14	7
16	3	UNL	12		75	65	58	56	07	12	9	50	10		74	67	62	66	05	9	4	UNL	10		76	68	63	64	14	7
19	3	UNL	10		71	64	60	68	07	7	10	55	10		73	66	61	66	06	7	0	UNL	10		69	65	62	79	00	0
22	0	UNL	10		70	63	59	58	09	4	0	UNL	10		71	65	61	71	10	7	0	UNL	10		63	61	59	87	00	0
DEC 20th																														
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04	3	UNL	10		63	62	61	93	00	0	0	UNL	10		59	58	58	97	00	0	2	UNL	10		71	64	60	68	08	9
07	5	UNL	10		62	61	60	93	00	0	9	50	10		61	60	60	97	00	0	2	UNL	10		71	64	60	68	09	10
10	1	UNL	10		76	68	63	64	20	6	4	UNL	10		74	68	64	71	36	5	9	50	10		76	68	64	67	08	14
13	3	UNL	10		79	68	61	54	17	7	3	UNL	10		79	68	62	56	08	12	3	UNL	12		79	71	66	65	10	10
16	2	UNL	10		76	66	60	58	14	9	4	UNL	10		76	68	63	64	08	11	4	UNL	12		77	69	64	64	12	9
19	3	UNL	10		70	64	60	71	00	0	3	UNL	10		73	66	62	69	08	10	5	UNL	10		75	68	64	69	09	7
22	2	UNL	10		66	63	61	84	00	0	1	UNL	10		72	66	63	73	08	9	2	UNL	10		74	69	66	76	10	10
DEC 21st																														
01	3	UNL	10		61	59	58	90	00	0	0	UNL	10		62	61	60	93	00	0	2	UNL	10		72	65	61	69	08	11
04	3	UNL	10		63	62	61	93	00	0	0	UNL	10		59	58	58	97	00	0	2	UNL	10		71	64	60	68	08	9
07	5	UNL	10		62	61	60	93	00	0	9	50	10		61	60	60	97	00	0	2	UNL	10		71	64	60	68	09	10
10	1	UNL	10		76	68	63	64	20	6	4	UNL	10		74	68	64	71	36	5	9	50	10		76	68	64	67	08	14
13	3	UNL	10		79	68	61	54	17	7	3	UNL	10		79	68	62	56	08	12	3	UNL	12		79	71	66	65	10	10
16	2	UNL	10		76	66	60	58	14	9	4	UNL	10		76	68	63	64	08	11	4	UNL	12		77	69	64	64	12	9
19	3	UNL	10		70	64	60	71	00	0	3	UNL	10		73	66	62	69	08	10	5	UNL	10		75	68	64	69	09	7
22	2	UNL	10		66	63	61	84	00	0	1	UNL	10		72	66	63	73	08	9	2	UNL	10		74	69	66	76	10	10
DEC 22nd																														
01	3	UNL	10		61	59	58	90	00	0	0	UNL	10		62	61	60	93	00	0	2	UNL	10		72	65	61	69	08	11
04	3	UNL	10		63	62	61	93	00	0	0	UNL	10		59	58	58	97	00	0	2	UNL	10		71	64	60	68	08	9
07	5	UNL	10		62	61	60	93	00	0	9	50	10		61	60	60	97	00	0	2	UNL	10		71	64	60	68	09	10
10	1	UNL	10		76	68	63	64	20	6	4	UNL	10		74	68	64	71	36	5	9	50	10		76	68	64	67	08	14
13	3	UNL	10		79	68	61	54	17	7	3	UNL	10		79	68	62	56	08	12	3	UNL	12		79	71	66	65	10	10
16	2	UNL	10		76	66	60	58	14	9	4	UNL	10		76	68	63	64	08	11	4	UNL	12		77	69	64	64	12	9
19	3	UNL	10		70	64	60	71	00	0	3	UNL	10		73	66	62	69	08	10	5	UNL	10		75	68	64	69	09	7
22	2	UNL	10		66	63	61	84	00	0	1	UNL	10		72	66	63	73	08	9	2	UNL	10		74	69	66	76	10	10
DEC 23rd																														
01	3	UNL	10		61	59	58	90	00	0	0	UNL	10		62	61	60	93	00	0	2	UNL	10		72	65	61	69	08	11
04	3	UNL	10		63	62	61	93	00	0	0	UNL	10		59	58	58	97	00	0	2	UNL	10		71	64	60	68	08	9
07	5	UNL	10		62	61	60	93	00	0	9	50	10		61	60	60	97	00	0	2	UNL	10		71	64	60	68	09	10
10	1	UNL	10		76	68	63	64	20	6	4	UNL	10		74	68	64	71	36	5	9	50	10		76	68	64	67	08	14
13	3	UNL	10		79	68	61	54	17	7	3	UNL	10		79	68	62	56	08	12	3	UNL	12		79	71	66	65	10	10
16	2	UNL	10		76	66	60	58	14	9	4	UNL	10		76	68	63	64	08	11	4	UNL	12		77	69	64	64	12	9
19	3	UNL	10		70	64	60	71	00	0	3	UNL	10		73	66	62	69	08	10	5	UNL	10		75	68	64	69	09	7
22	2	UNL	10		66	63	61	84	00	0	1	UNL	10		72	66	63	73	08	9	2	UNL	10		74	69	66	76	10	10
DEC 24th																														
01	8	45	10		75	70	67	76	11	8	10	50	10		76	70	67	74	07	18	2	UNL	10		74	68	65	74	09	15
04	6	50	10		75	70	68	79	09	9	4	UNL	10		75	72	70	85	08	16	2	UNL	10		74	68	64	71	10	13
07	9	50	10		75	71	69	82	08	10	4	UNL	10		73	71	70	90	07	12	8	50	10		74	68	65	74	09	13
10	3	UNL	10		78	72	69	74	10	11	8	45	8		77	73	71	82	11	13	3	UNL	10		77	68	63	62	11	16
13	5	UNL	10		80	73	69	69	09	15	5	UNL	10		79	72	69	72	10	13	8	UNL	10		79	70	65	62	10	14
16	1	UNL	10		79	71	67	67	08	13	1	UNL	10		78	71	68	72	07	13	4	UNL	10		77	70	66	69	07	17
19	5	UNL	10		75	70	68	79	08	12	2	UNL	10		75	69	66	74	07	12	4	UNL	10		75	69	65	71	07	17
22	6	17	10		76	71	69	79	07	16	2	UNL	10		75	70	68	79	08	16	2	UNL	10		74	67	63	63	08	15
DEC 25th																														
01	4	UNL	10		74	67	62	66	10	15	4	UNL	10		74	68	65	74	09	13	5	UNL	10		74	69	66	76	10	10
04	5	UNL	10		73	66	62	69	08	14	4	UNL	10		74	69	66	76	09	13	5	UNL	10		73	69	66	79	12	5
07	1	UNL	10		73	66	62	69	09	14	5	UNL	10		74	69	66	76	09	13	7	22	10		73	68	65	76	09	8
10	1	UNL	10		78	69	63	60	10	17	6	45	10		78	70	66	67	10	14	2	UNL	10		78	70	65	64	08	11
13	2	UNL	12		80	70	64	58	09	13	6	50	10		79	69	64	60	10	12	3	UNL	10		80	70	65	60	09	13
16	3	UNL	12		79	68	62	56	10	15	2	UNL	10		79	69	63	58	12	10	3	UNL	10		78	69	63	60	09	11
19	2	UNL	10		75	67	62	64	10	11	0	UNL	10		74	68	64	71	11	6	7	45	10		75	68	63	68	08	11
22	2	UNL	10		75	69	65	71	10	11	1	UNL	10		73	68	65	76	11	7	7	45	10		75	69	66	74	10	12
DEC 26th																														
01	4	UNL	10		74	67	62	66	10	15	4	UNL	10		74	68	65	74	09	13	5	UNL	10		74	69	66	76	10	10
04	5	UNL	10		73	66	62	69	08	14	4	UNL	10		74	69	66	76	09	13	5									

JAN 1985 12844
WEST PALM BEACH, FLORIDA

WEATHER CODES

BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1.15).

JAN 1985 12844
WEST PALM BEACH, FLORIDA

SUMMARY BY HOURS

HOUR	L.S.T	AVERAGES							RESULTANT WIND	
		SKY COVER (TENTHS)	STATION PRESSURE (INCHES)	TEMPERATURE			REL HUMIDITY %	WIND SPEED (MPH)	DIRECTION	SPEED (MPH)
				AIR TEMP of	WET BULB of	DEW POINT of				
01	4	30	0.090	56	53	50	80	7.1	27	2.9
04	3	30	0.080	55	52	49	83	7.0	29	3.4
07	3	30	0.095	53	51	48	84	6.3	29	2.9
10	3	30	1.40	63	56	49	63	11.4	30	4.7
13	3	30	0.085	69	58	49	50	12.9	30	4.9
16	4	30	0.250	69	58	49	51	11.9	28	2.9
19	4	30	0.080	62	56	51	66	7.3	27	2.9
22	3	36	0.95	58	54	50	75	6.9	29	4.4

COOLING SYSTEM ALTERNATIVES

MEMORANDUM

September 19, 1985

TO: Steve Cowen

FROM: Glynn B. Stringer

SUBJECT: Project No. 85 443 000
Waste Management, Inc.
Broward County Resource Recovery Project
Cooling System and Water Study Final Report

RE: Memorandum "Preliminary Report" of September 6, 1985 from Glynn B. Stringer to Steve Cowen on same subject.

INTRODUCTION

As part of the overall cooling system optimization study, various cooling system designs were evaluated based strictly on water availability and environmental permitting requirements. The most feasible system was to pretreat Broward County wastewater treatment plant effluent and use as cooling tower makeup. The other alternates considered are also presented in the following discussion in order of declining feasibility. This report also summarizes a review of dewatering, potable water, fire water, service water and boiler makeup water in the following sections.

COOLING SYSTEMS

A sketch of each cooling system considered is presented in Appendix 1 and labeled corresponding to the lettering of this section. The systems are presented in order of declining feasibility based on water availability and environmental permitting requirements.

A. PRETREAT BROWARD COUNTY WASTEWATER TREATMENT PLANT EFFLUENT AND USE AS COOLING TOWER MAKEUP.

As illustrated in SKETCH A, secondary treated effluent would be obtained from the Broward County Wastewater Treatment Plant, treated to reduce phosphates, and then used as cooling tower makeup. By pretreating the makeup, the tower could be operated at 5 - 8 cycles of concentration. The Engineer's cost estimate for the pretreatment plant would be \$1.25-million based on a 1200 GPM design throughput and a chemical operating cost of \$15.00 per million gallons. Based on 5 - 8 cycles and a heat load of 385-million BTU's per hour the makeup rate to the tower would be 920-1000 GPM. WMI would be responsible for installing a pump and

line system to deliver the makeup from the Broward County plant to WMI's pretreatment plant. Blowdown from the makeup pretreatment plant would be dewatered and disposed of in the landfill.

The tower will require a 2400 lb/day capacity chlorinator system at an installed cost of \$175,000. Maximum annual chlorine costs will be \$10,000. Other chemical additives' (i.e., acrylate, azole, sulfuric acid and biocide) annual costs will be \$65,000 with an associated equipment installed cost of \$120,000 (this capital cost can be greatly reduced by allowing the water treatment chemical vendor to supply tankage, pumps, etc.).

The blowdown rate from the cooling tower will be 110 - 190 GPM and will be returned to the Broward County Municipal Wastewater Treatment Plant. Based on an averaged 150 GPM blowdown rate, treatment costs for the blowdown would be \$60,000 annually. WMI would be responsible for installing a line to get the blowdown over to the 36-inch sewer main located on Power Line Road. The sewer main's residual pressure at the point of Power Line Road and 48th Street is approximately 10 psig.

Neither State, District nor County regulatory agencies would require WMI to obtain permits for this type system since all liquid waste streams will be sent to the County Waste Treatment Plant and it will become the responsibility of the county to meet the ocean outfall permit discharge limitations.

B. BROWARD COUNTY WASTEWATER TREATMENT PLANT EFFLUENT USED DIRECTLY AS COOLING TOWER MAKEUP.

This concept is illustrated in SKETCH B. The County Treatment Plant's effluent would be used directly as makeup to a 2 -3 cycle cooling tower. The average makeup rate would be 1300 GPM with a blowdown rate of 500 GPM. This system would not require a pretreatment plant for the cooling water makeup. The reasons this system is not recommended are:

1. Only a few plants in the United States have successfully used secondary treated sewage as cooling tower makeup, thus very little experience in this area. Most of the successful applications have been in California.
2. The secondary treated effluent has a much greater tendency for promoting bacterial-slime growth in the tower.
3. To counter the greater bacterial-slime growth, chlorine and other chemical consumptions are increased, blowdown is increased and, thus chemical and blowdown treatment costs increase.

4. Broward County's wastewater treatment plant has virtually no additional capacity. The 500+ GPM blowdown rate could force Broward County to expand the plant and, in turn, WMI would be charged for the cost of expansion.

C. UTILIZE YORK LAKE IN A SPRAY POND ARRANGEMENT

York Lake is located directly across 48th Street from the proposed plant site. The lake could be converted to a spray pond arrangement providing 90°F or less cooling water year round by locating the water intake in the deepest area of the lake. The warm water returned to the lake would be sprayed up into the air above the lake and thereby achieve cooling by evaporation. The reasons this system is not recommended are:

1. York Lake is jointly owned by Olympia and York Florida Equity Corporation, Chase Development Corporation and Ronto, Inc., with Ronto, Inc., being the spokesman for the group. The owners are open to negotiations concerning the lake, based on the the following guidelines;
 - a. bid proposals must be submitted,
 - b. a presentation must be made to the owners explaining environmental impact on the lake and surroundings from the proposed use of the lake.
 - c. The owners' decision regarding lake usage would be subject to approval by the residents of Independence Bay.
 - d. The owners would then decide if future negotiations, bids, or presentations are needed.
2. A disadvantage of this system is that, in certain conditions, it creates fog. Since the spray is close to the ground, the dense fog may present problems to motorists in the area -- especially on Power Line Road.
3. The South Florida Water Management District would require filing an application for permit to use the lake water. At their discretion, they may require a groundwater hydrologic model developed to determine effects upon coastal saline water intrusion as groundwater seeps into York Lake replacing evaporative losses.

4. This cooling system cannot be recommended, at this time, because there is no guarantee or even positive indication that WMI would be able to purchase, lease, or otherwise gain use of, York Lake from the present owners.

D. UTILIZE YORK LAKE AS SOURCE OF COOLING WATER WITH PRECOOLING OF THE DISCHARGE BACK TO THE LAKE

This system was eliminated due to items 1, 3 and 4 in Section C and because stringent chemical discharge limitations would be imposed by the FDER on the return water to the lake. Treatment of the discharge would be required.

E. USE GROUNDWATER AS MAKEUP TO A COOLING TOWER

The South Florida Water Management District would not issue a permit to allow usage of groundwater for this purpose (based on 1,000 GPM requirements).

F. USE BROWARD COUNTY WASTEWATER TREATMENT PLANT EFFLUENT AS ONCE-THROUGH COOLING WATER

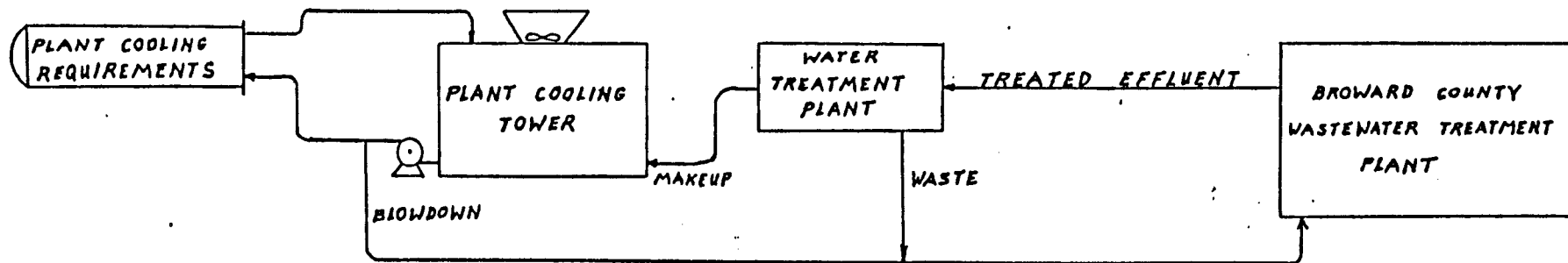
Insufficient quantity of effluent was consistently available to meet the cooling requirements of the plant (350-400 million Btu's per hour).

G. USE BROWARD COUNTY WASTEWATER TREATMENT PLANT EFFLUENT AS ONCE-THROUGH COOLING WATER WITH GROUNDWATER SUPPLEMENTATION

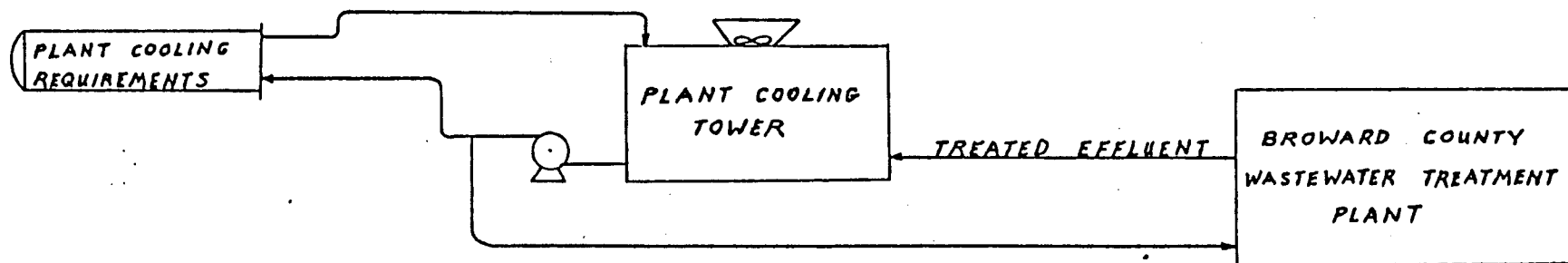
The South Florida Water Management District would not issue a permit to allow usage of groundwater for this purpose (based on 5,000 GPM daily average requirements).

H. USE YORK LAKE AS A COOLING POND

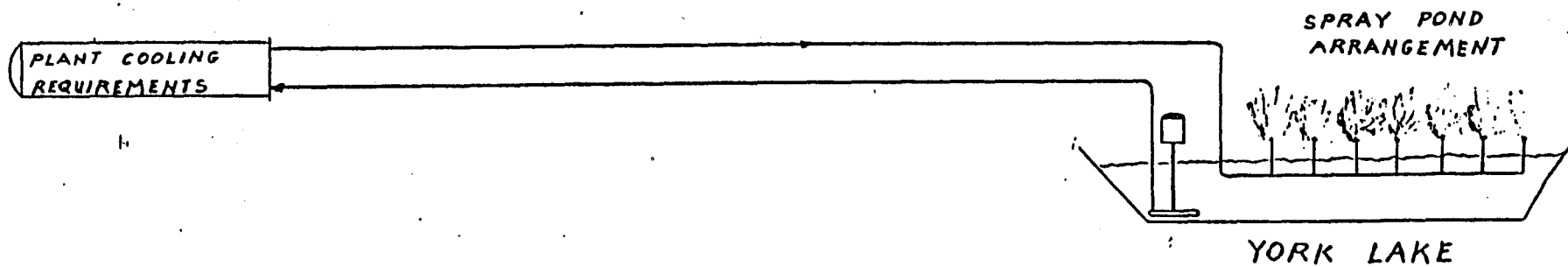
The lake cannot be used as a natural cooling pond because at a cooling water circulation rate of 38,500 GPM with a 20°F T, the lake waters would exceed the 92° F or 3°F above ambient waters mixing zone limitations of the FDER. Other alternatives, such as submerged hot water discharge and cooling by thermal dilution with cool water pumped from the lake, were impractical.



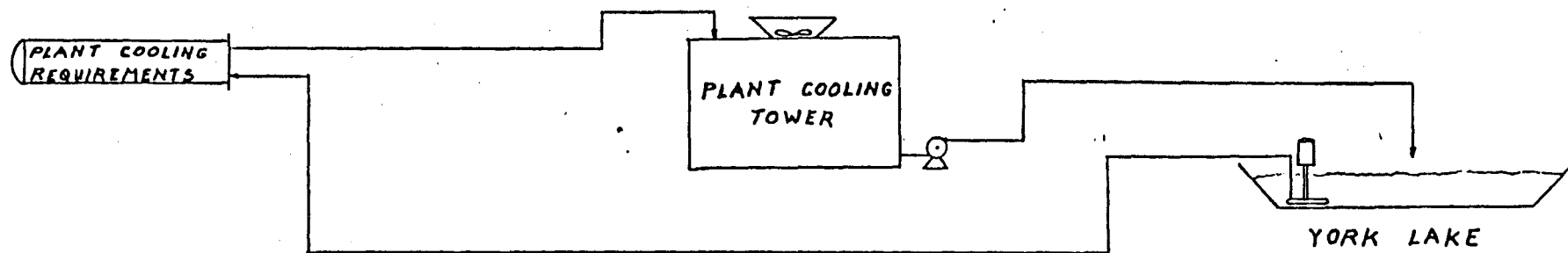
SKETCH - A



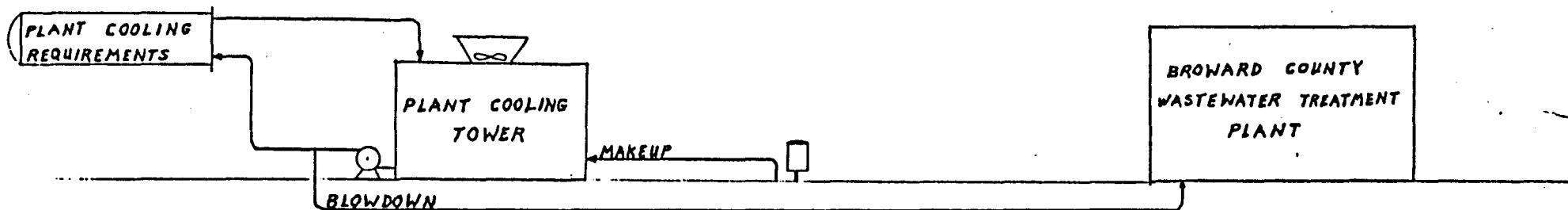
SKETCH - B



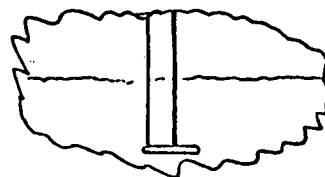
SKETCH - C



SKETCH - D

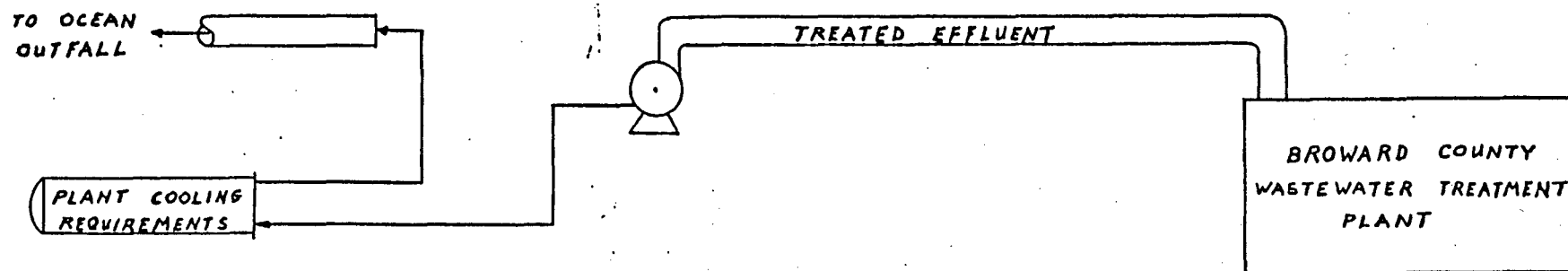


SKETCH - E



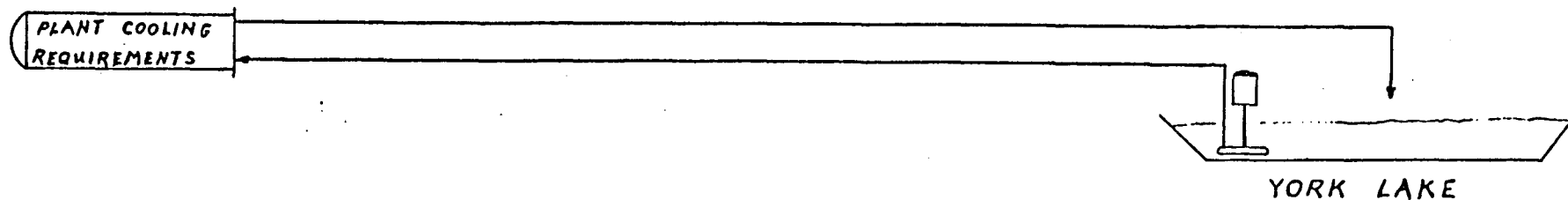
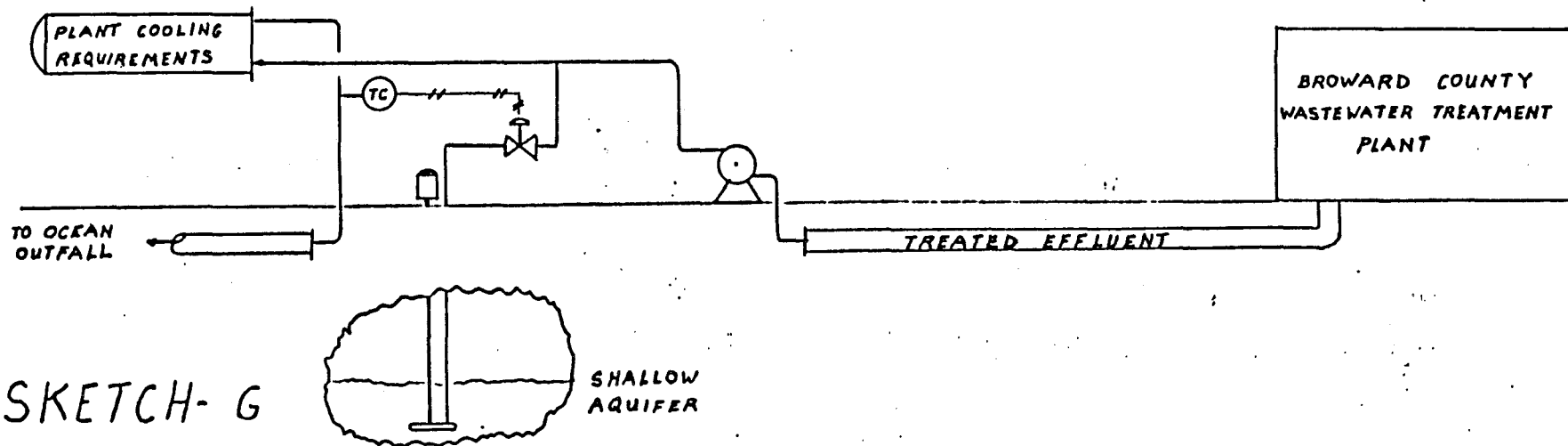
SHALLOW AQUIFER

MBL
08/27/85



SKETCH - F

MBL
08/27/85



ARCHAEOLOGICAL SITES

RM
Dennis → File

**MALCOLM
PIRNIE**

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

August 20, 1985

Division of Archives History
and Records Management
Florida Department of State
Tallahassee, Florida 32301

Attention: Mr. George W. Percy
Deputy State Historic Preservation Officer

Re: Cultural Resource Assessment Request

Gentlemen:

On June 28, 1985, CZR, Inc., acting on the behalf of the Broward County Office of Resource Recovery, requested that your office provide a cultural resource assessment in accordance with 36 C.F.R., Part 800 ("Procedures for the Protection of Historic and Cultural Properties") of two proposed resource recovery facility and attendant landfill sites in Broward County. At the time of that request, the County had not selected a full service vendor for either the Northern or Southern resource recovery facility. Subsequent to vendor selection on July 2, 1985, the County Commissioners approved the construction of the Northern facility at an alternate site.

Thus, we would appreciate your department's review of the proposed alternate site for any known historic and archeologic resources; we have enclosed an aerial photograph depicting the proposed site boundaries. We would also appreciate any data relative to the probability of resource occurrence and need to conduct an archeological survey of the site.

If you have any questions or require additional information on the site for your assessment, do not hesitate to call.

Very truly yours,

MALCOLM PIRNIE, INC.

David S. Cerrato
David S. Cerrato

Enclosure

cc: Thomas M. Henderson



FLORIDA DEPARTMENT OF STATE
George Firestone
Secretary of State
DIVISION OF ARCHIVES,
HISTORY AND RECORDS MANAGEMENT
The Capitol, Tallahassee, Florida 32301-8020
(904) 488-1480

AUG 23 1985

August 23, 1985

In Reply Refer to:

Mike Wisenbaker
Historic Sites Specialist
(904) 487-2333

Mr. David S. Cerrato
Malcolm Pirnie
Box 751
White Plains, N.Y. 10602

RE: Your Letter of August 20, 1985
Cultural Resource Assessment Request
Proposed Northern Resource Recovery
Facility, Broward County, Florida

Dear Mr. Cerrato:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Procedures for the Protection of Historic and Cultural Properties"), we have reviewed the above referenced project for possible impact to archaeological and historical sites and properties listed, or eligible for listing, in the National Register of Historic Places. The authorities for these procedures are the National Historic Preservation Act of 1966 (Public Law 89-665) as amended by P.L. 91-243, P.L. 93-54, P.L. 94-422, P.L. 94-458 and P.L. 96-515, and Presidential Executive Order 11593 ("Protection and Enhancement of the Cultural Environment").

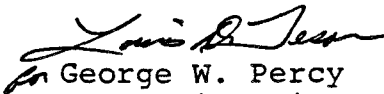
A review of the Florida Master Site File indicates that no archaeological or historical sites are recorded for the project area. Furthermore, because of the location of the project, it is considered highly unlikely that any significant, unrecorded sites exist in the vicinity. Therefore, it is the opinion of this office that the proposed project will have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state or local significance.

Mr. David S. Cerrato
August 23, 1985
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If you have any questions concerning our comments, please do not hesitate to contact us.

Your interest and cooperation in helping to protect Florida's archaeological and historical resources are appreciated.

Sincerely,


George W. Percy
State Historic
Preservation Officer

GWP/Wmr

POWER OF ATTORNEY

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, That

NORTH BROWARD COUNTY RESOURCE RECOVERY PROJECT, INC., a corporation organized and existing under the laws of Florida (hereinafter the "Corporation"), has irrevocably constituted and appointed, and by these presents does irrevocably constitute and appoint Thomas Henderson its true and lawful Attorney-in-Fact, with full power of substitution, with respect to all matters arising in connection with the development, acquisition, construction and operation of the proposed resource recovery facilities, financed by the issuance by Broward County, Florida of its Resource Recovery Revenue Bonds, Series 1984A, 1984B and 1984C. Without in any way limiting the generality of the foregoing, the power and authority of the said Attorney-in-Fact and of any substitute Attorney-in-Fact appointed hereunder, shall include the power and authority to make application for, execute and deliver on behalf of the Corporation any and all regulatory forms, permits and licenses as may be required by federal, state and local statutes, ordinances and/or administrative regulations, and any and all other agreements, contracts, consents and documents in connection with the Corporation's acting as aforesaid which the said Attorney-in-Fact or any such substitute Attorney-in-Fact may deem advisable. The Corporation hereby ratifies and confirms all that the said Attorney-in-Fact or any such substitute Attorney-in-Fact may do by virtue hereof.

IN WITNESS WHEREOF, the Corporation has caused these presents to be executed in its name a member of its Board of Directors this 18th day of March, 1985.

NORTH BROWARD COUNTY RESOURCE
RECOVERY PROJECT, INC.

By



James B. May

A member of the Board of Directors